

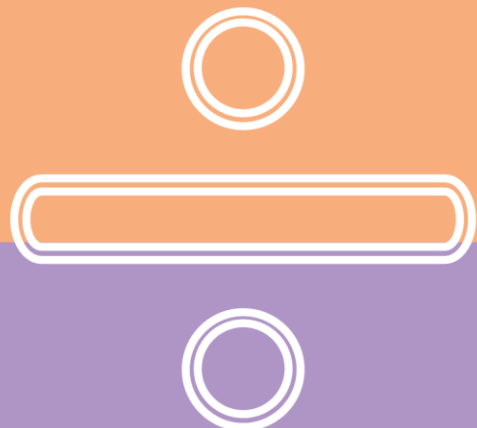
Name: .....

HOME

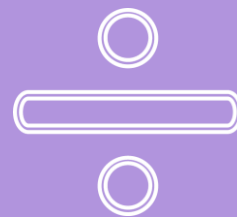
LEARNING

for year 6

Maths



# Contents



## Section 1 - pupil's section

### Number: number and place value

Resource 1 - read, write, order and compare numbers up to 10,000,000 .....	008
Resource 2 - use negative numbers in context .....	010
Resource 3 - solve number and practical problems .....	013

### Number: addition, subtraction, multiplication and division

Resource 1 - multiply multi-digit numbers up to 4 digits .....	016
Resource 2 - formal long division .....	019
Resource 3 - formal short division .....	024
Resource 4 - perform mental calculations .....	027
Resource 5 - identify common factors, multiples and prime numbers .....	029
Resource 6 - BODMAS .....	032
Resource 7 - addition and subtraction multi-step problems .....	034
Resource 8 - addition, subtraction, multiplication and division problems .....	036
Resource 9 - use estimation to check answers .....	039

### Number: fractions (including decimals and percentages)

Resource 1 - use common factors to simplify fractions .....	139
Resource 2 - add and subtract fractions .....	140
Resource 3 - multiply proper fractions .....	141
Resource 4 - divide fractions by whole numbers .....	143
Resource 5 - multiply numbers up to two decimal places .....	144
Resource 6 - written division methods up to two decimal places .....	146
Resource 7 - use equivalences between fractions, decimals and percentages ....	147

### Ratio and proportion

Resource 1 - relative sizes .....	148
Resource 2 - calculations of percentages .....	149
Resource 3 - scale factors .....	150
Resource 4 - unequal sharing.....	151

## Algebra

Resource 1 - use simple formulae .....	153
Resource 2 - generate and describe linear number sequences .....	153
Resource 3 - express missing number problems algebraically .....	154
Resource 4 - working with two variables .....	155

## Measurement

Resource 1 - solve problems involving units of measure .....	157
Resource 2 - convert between miles and kilometres .....	158
Resource 3 - area and perimeter .....	159
Resource 4 - use formula for area and volume of shapes .....	160
Resource 5 - calculate the area of parallelograms and triangles .....	160

## Geometry: properties of shape

Resource 1 - draw, compare and classify 2D shapes .....	162
Resource 2 - recognise, describe and build simple 3D shapes .....	163
Resource 3 - illustrate and name parts of the circle.....	164
Resource 4 - recognise angles .....	164

## Geometry: position and direction

Resource 1 - draw, translate and reflect shapes in all four quadrants.....	166
--	-----

## Statistics

Resource 1 - interpret and construct pie charts and line graphs .....	167
Resource 2 - using the mean .....	168

## Teacher's section and answers

Teaching notes and curriculum mapping .....	126
Teacher's tick list .....	127

### Number: number and place value

Resource 1 - read, write, order and compare numbers up to 10,000,000 .....	129
Resource 2 - use negative numbers in context .....	129
Resource 3 - solve number and practical problems .....	130

### Number: addition, subtraction, multiplication and division

Resource 1 - multiply multi-digit numbers up to 4 digits .....	131
Resource 2 - formal long division .....	132
Resource 3 - formal short division .....	134
Resource 4 - perform mental calculations .....	135
Resource 5 - identify common factors, multiples and prime numbers .....	135
Resource 6 - BODMAS .....	136
Resource 7 - addition and subtraction multi-step problems .....	137
Resource 8 - addition, subtraction, multiplication and division problems .....	137
Resource 9 - use estimation to check answers .....	138

### Number: fractions (including decimals and percentages)

Resource 1 - use common factors to simplify fractions .....	139
Resource 2 - add and subtract fractions .....	140
Resource 3 - multiply proper fractions .....	141
Resource 4 - divide fractions by whole numbers .....	143
Resource 5 - multiply numbers up to two decimal places .....	144
Resource 6 - written division methods up to two decimal places .....	146
Resource 7 - use equivalences between fractions, decimals and percentages ....	147

### Ratio and proportion

Resource 1 - relative sizes .....	148
Resource 2 - calculations of percentages .....	149
Resource 3 - scale factors .....	150
Resource 4 - unequal sharing.....	151

## Algebra

Resource 1 - use simple formulae .....	153
Resource 2 - generate and describe linear number sequences .....	153
Resource 3 - express missing number problems algebraically .....	154
Resource 4 - working with two variables .....	155

## Measurement

Resource 1 - solve problems involving units of measure .....	157
Resource 2 - convert between miles and kilometres .....	158
Resource 3 - area and perimeter .....	159
Resource 4 - use formula for area and volume of shapes .....	160
Resource 5 - calculate the area of parallelograms and triangles .....	160

## Geometry: properties of shape

Resource 1 - draw, compare and classify 2D shapes .....	162
Resource 2 - recognise, describe and build simple 3D shapes .....	163
Resource 3 - illustrate and name parts of the circle.....	164
Resource 4 - recognise angles .....	165

## Geometry: position and direction

Resource 1 - draw, translate and reflect shapes in all four quadrants.....	166
--	-----

## Statistics

Resource 1 - interpret and construct pie charts and line graphs .....	167
Resource 2 - using the mean .....	168

# Section 1:

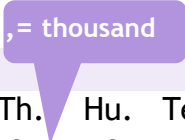
# Number

In this task, you will:

- read, write, order and compare numbers up to 10,000,000 and determine the value of each digit
- round any whole number to a required degree of accuracy.

Look at the examples and answer the questions. If you are anxious, try questions 1-12. If you're feeling confident, try questions 1-15. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>a. Write in words the number 40,078.</p> <p>b. Write down the new place value of the 7 when this number is multiplied by ten.</p>	<p>Round these numbers to the degree of accuracy given in the brackets:</p> <p>a. 6835 (nearest 1000)</p> <p>b. 4723 (nearest 100)</p> <p>c. 14,924 (nearest 10)</p>
<p><b>Answers</b></p> <p>a. Ten Th. Th. Hu. Tens Ones 4 0, 0 7 8</p> <p>b. 40,078 → forty thousand and seventy eight. 40,078 × 10 = 400,780. The 7 represents 7 hundred.</p>	<p><b>Answers</b></p> <p>a. 6835 → 7000</p> <p>b. 4723 → 4700</p> <p>c. 14,924 → 14,920</p>



Write in words:

- 1523 → .....
- 8071 → .....
- 17,080 → .....
- 8,230,050 → .....

Write in figures:

- Six thousand, seven hundred and two → .....
- Twelve thousand, five hundred and eighty → .....
- Half of a million → .....
- Ten million, fifty thousand and one hundred → .....

## Resource 1 – read, write, order and compare numbers up to 10,000,000

For each of the following numbers, write down the place value of 9:

9. 1943                       $\longrightarrow$  .....
10. 90,500                       $\longrightarrow$  .....
11. 9,154,000                       $\longrightarrow$  .....
12.  $94 \times 10$                        $\longrightarrow$  .....

Round the following numbers to the degree of accuracy indicated in the brackets:

Write your answers in the spaces below

- |     |         |                      |                      |
|-----|---------|----------------------|----------------------|
| 13. | 8473    | ..... (nearest 100)  | ..... (nearest 1000) |
| 14. | 19,637  | ..... (nearest 1000) | ..... (nearest 10)   |
| 15. | 203,848 | ..... (nearest 10)   | ..... (nearest 100)  |

### Challenge

Using the following digit cards write down:



- The largest five-digit number.
- A three-digit number which has a tens digit that is double the hundreds digit.
- A 5-digit number that rounds to sixty thousand.
- A 4-digit number that rounds to five thousand.
- A number that rounds to one hundred thousand.
- All the numbers round to ninety.
- The smallest 3-digit number where the hundreds digit is treble the units digit.

Answer



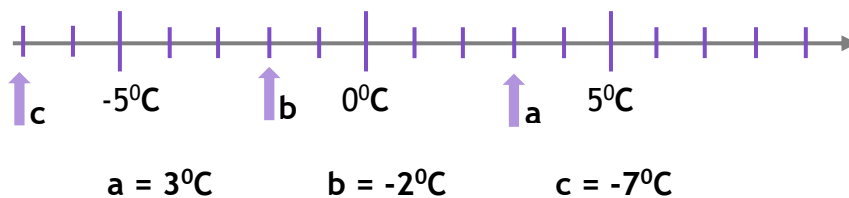
In this task, you will:

- use negative numbers in context, and calculate intervals across 0.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-9. If you're raring to go, try the challenge too!

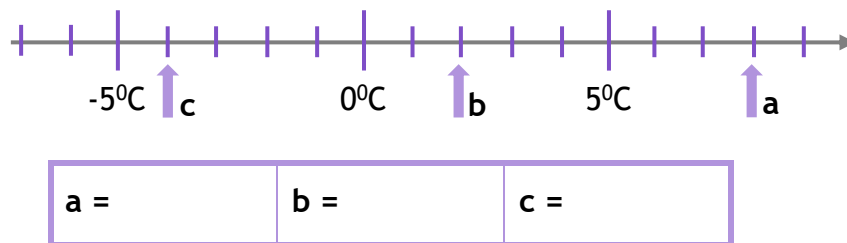
Examples

- a. Write down the temperature indicated by the arrows below.

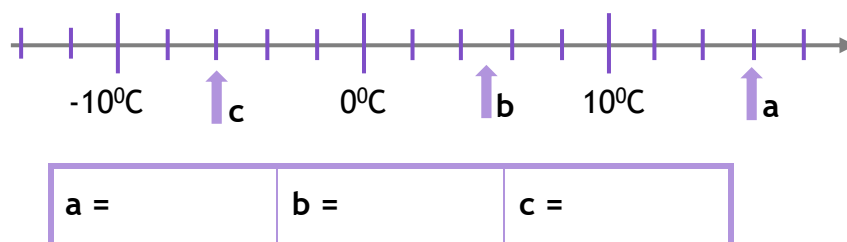


- b. What is the difference between the temperatures given by c and a above?  
 Counting up from -7 to 3 takes 10 steps so the difference is  $10^{\circ}\text{C}$ .

1. Write down the temperature indicated by the arrows below.

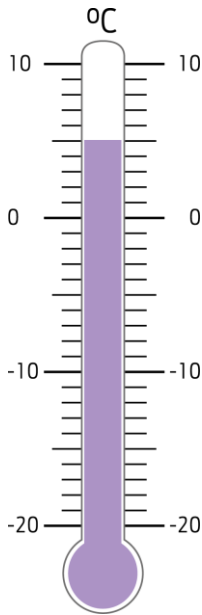


2. Write down the temperature indicated by the arrows below.

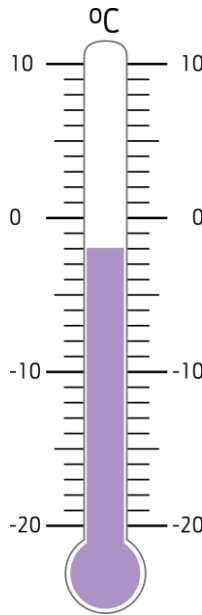


3. Write down the temperatures indicated on the thermometers below.

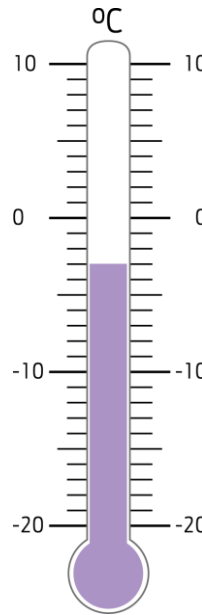
a. ....



b. ....



c. ....



4. The negative number for today is -3.

- a. 4 more → .....
- b. 2 less → .....
- c. 20 more → .....
- d. 20 less → .....

5. The temperature in Madrid overnight is  $-7^{\circ}\text{C}$ . During the morning it rose by  $15^{\circ}\text{C}$ . What is the new temperature?

$^{\circ}\text{C}$

6. What temperature is 15 degrees lower than  $8^{\circ}\text{C}$ ?

$^{\circ}\text{C}$

7. The temperature rises by 17 degrees from  $-9^{\circ}\text{C}$ . What is the new temperature?

$^{\circ}\text{C}$

8. The temperature in New York at 8am is  $-2^{\circ}\text{C}$ .

a. By 2pm the temperature has risen by  $14^{\circ}\text{C}$ . What is the temperature at 2pm?

$^{\circ}\text{C}$

b. Overnight the temperature drops to  $-6^{\circ}\text{C}$ . How many degrees did it fall by?

$^{\circ}\text{C}$

c. On another occasion, the lowest temperature was  $-8^{\circ}\text{C}$  and the highest was  $11^{\circ}\text{C}$ . What is the difference between these temperatures?

$^{\circ}\text{C}$

9. Complete the following sequences:

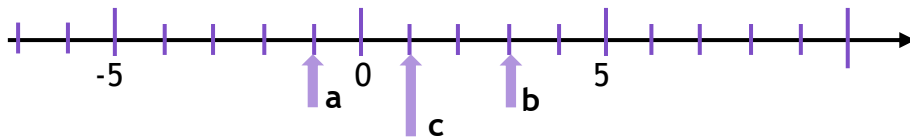
a.  1  7

b.   2 6 10

c.   2 8 14

### Challenge

On the diagram, we can see that **c** is *halfway* between points **a** and **b**. It is worth 1.



Find the number that is *halfway* between the following pairs of numbers:

- a. -2 and 6       $\longrightarrow$  .....
- b. -6 and 2       $\longrightarrow$  .....
- c. -3 and 9       $\longrightarrow$  .....
- d. -10 and -4       $\longrightarrow$  .....
- e. Find the number halfway between -24 and 36 and explain how you found it.



In this task, you will:

- solve number and practical problems that involve whole numbers, rounding and negative numbers.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>In the number 7.539:</p> <ol style="list-style-type: none"> <li>1. What does the digit 3 represent?</li> <li>2. Round this number to:                             <ol style="list-style-type: none"> <li>a. the nearest whole number</li> <li>b. 1 decimal place</li> </ol> </li> </ol> <p><b>Answers</b></p> <ol style="list-style-type: none"> <li>1. 3 represents <math>\frac{3}{100}</math> or three hundredths</li> <li>2. a. <math>7.539 \approx 8</math> b. <math>7.539 \approx 7.5</math></li> </ol>	<p>Circle two numbers which have a difference of 2</p> <p style="text-align: center;">-2   -1.5   0   0.5   1   1.5</p> <p><b>Two possible answers</b></p> <p>-2 and 0 -1.5 and 0.5</p>

1. Round the following to the nearest whole number.

- a.  $7.632 \approx$  .....
- b.  $17.3 \approx$  .....
- c.  $405.99 \approx$  .....

2. Using each of the digits 3, 6 and 9 only once in each number:

a. write down the largest even number and the smallest odd number.

**Largest even number:** .....

**Smallest odd number:** .....

b. make a 3-digit number that rounds to one thousand.

.....

3. Fill in the possible numbers:

Number	47	.....	961	.....	.....
Rounded to the nearest 10	.....	50	.....	90	200

4. Using each of the digits 3, 6, 4 and 9 only once in each number, write:



- a. the smallest odd number that can be made .....
- b. the largest 3-digit that can be made .....
- c. a 3-digit number that rounds to five hundred . .....
- d. the value of the ones digit in the largest 2-digit number that can be made  
.....
- e. the value of the hundreds digit in the answer when the largest 2-digit odd number is multiplied by 10 .....

5. The temperature in Leeds was  $-5^{\circ}\text{C}$  at midnight. By midday, the temperature had risen by  $12^{\circ}\text{C}$ .

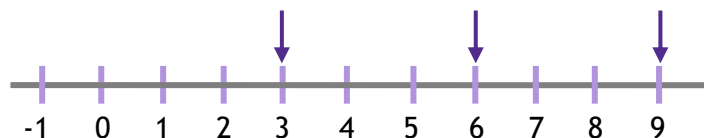
- a. What was the temperature at midday? .....
- By 10 o'clock that evening, the temperature had fallen to  $-1^{\circ}\text{C}$ .
- b. By how much did the temperature fall? .....

6. What number is five hundred less than one million? .....



7. The diagram below shows that 6 is **halfway** between the numbers three and nine.

What number is **halfway** between  $-1$  and  $5$ ? .....



8. Alice has £732 in her bank account. Jim has -£127 in his bank account.

a. Round the amount of money in Alice's account to the nearest £10.

b. Round the amount of money in Jim's account to the nearest £10.

c. How much more money does Alice have than Jim?

### Challenge

1. What number is halfway between:

a. -4 and 6?

b. -7 and 5?

2. The number **eight** is halfway between **two** and another. What is the other number?

3. Write down the 4-digit number that obeys the following instructions:

- It rounds to 3000.
- The thousands digit is half the units digit.
- The tens digit is the sum of the thousands and units digits.

In this task, you will:

- multiply multi-digit numbers up to 4 digits by a two-digit whole using the formal written method of long multiplication.

Look at the examples and answer the questions. If you are anxious, try questions 1-2. If you're feeling confident, try questions 1-4. If you're raring to go, try the challenge too!

Example 1

Find the product of  $1756 \times 49$ .

	1	7	5	6
×			4	9
1	5 <sub>6</sub>	8 <sub>5</sub>	0 <sub>5</sub>	4
7 <sub>3</sub>	0 <sub>2</sub>	2 <sub>2</sub>	4	0
8	6 <sub>1</sub>	0	4	4

$1756 \times 9 = 15,804$

$9 \times 6 = 54$ ; 4 down 5 to carry.

$9 \times 5 = 45$ ; add the 5 to give 50, so 0 down 5 to carry.

$9 \times 7 = 63$ ; add the 5 to give 68, so 8 down 6 to carry.

$9 \times 1 = 9$ ; add the 6 to give 15.

Similarly,  $1756 \times 40 = 70,240$

Finally, add  $15,804 + 70,240 = 86,044$

Example 2

Fill in the gaps to complete this long multiplication sum.

			2	7
×			4	
	1	1 <sub>2</sub>	4 <sub>6</sub>	3
	5 <sub>1</sub>	2	8	0
		2 <sub>1</sub>		3

$7 \times \text{what} = \dots 3$ ;  $7 \times 9 = 63$ ; 3 down 6 to carry.

$9 \times 2 = 18$ ; add the 6 gives 24, 4 down 2 to carry.

$9 \times 1 = 9$ ; add the 2 gives the final 11.

$127 \times 40 = 5080$

Finally adding  $1143 + 5080 = 6223$

**Answer  $127 \times 49 = 6223$**

1. Complete the following long multiplications:

a.			3	2
	×		2	3
				0

b.			1	4
	×		2	1
				0

c.			3	1
	×		2	4
				0

2. Complete the following long multiplications:

1.		1	3	2
	×		3	1
				0

2.		2	4	3
	×		2	1
				0

3.		5	2	3
	×		3	2
				0

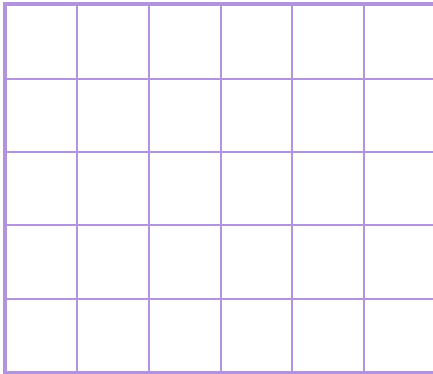
3. Find the products of the following multiplications:

a.  $483 \times 53$

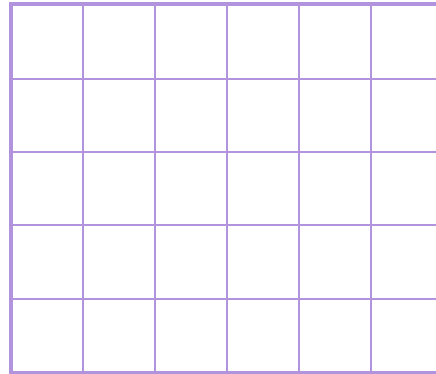

b.  $821 \times 37$




c.  $2461 \times 67$

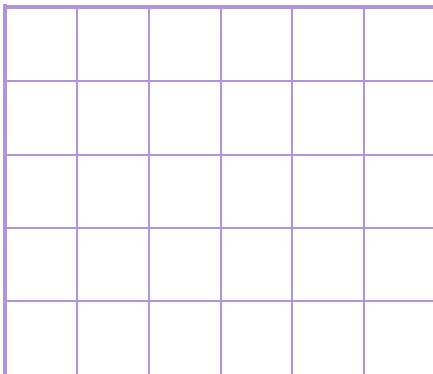


d.  $4118 \times 28$

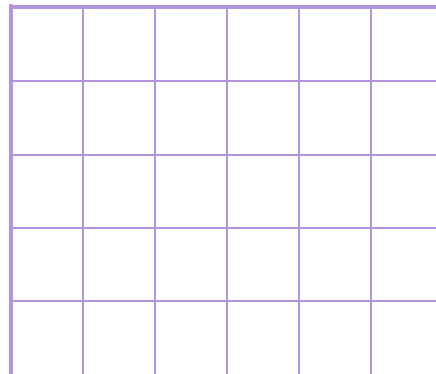


4. Find the following products:

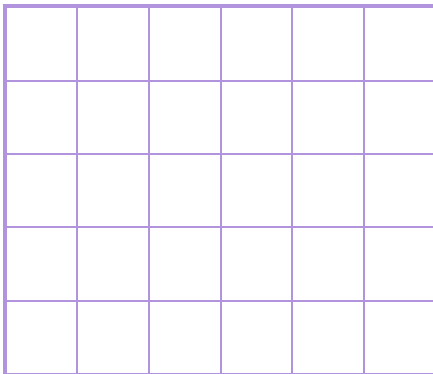
a.  $2743 \times 54$



b.  $4095 \times 63$



c.  $1986 \times 85$



## Challenge

Fill in the missing gaps in the following multiplications:

1.

			6	
	×		4	7
			3	4
	2	4		0
	2	9		4

2.

	3		7	4
×			2	
2		5	9	2
6	1	4		0
	6		7	2

3.

7		×		6	=	3	3	5	8
---	--	---	--	---	---	---	---	---	---

In this task, you will:

- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.

Look at the examples and answer the questions. If you are anxious, try questions 1-3. If you're feeling confident, try questions 1-5. If you're raring to go, try the challenge too!

Example 1

Complete the following division  $612 \div 17$ .

			3	6	
1	7	)	6	1	2
		-	5	1	0
			1	0	2
		-	1	0	2
					0

**Multiples of 17:**

17, 34, 51, 68, 85, 102, 119, 136, 153, 170  
 ( $17 \times 30 = 510$ )  
 ( $17 \times 6 = 102$ )

Example 2

A coach can fit 53 people in it. How many coaches are needed for a school trip for 400 people?

			7	r 29	
5	3	)	4	0	0
		-	3	7	1
			2	9	

**Multiples of 53:** 53, 106, 159, 212, 265, 318, 371, 424, 477, 530  
 ( $53 \times 7 = 371$ )

Since we can't leave out the remaining 29 people, we would need 8 coaches.



**Top tip:** usually when we need 'how many?' we round up; if it's 'how many can we get?' we round down.

1. Complete the following division sums:

a.  $704 \div 16 = \dots\dots\dots$  b.  $903 \div 43 = \dots\dots\dots$

1	6	)	7	0	4

4	3	)	9	0	3

2. Complete the following division sums:

a.  $3806 \div 22 = \dots\dots\dots$  b.  $5148 \div 36 = \dots\dots\dots$

2	2	)	3	8	0	6

3	6	)	5	1	4	8

3. Complete the following division sums and express the remainder as a whole number:

a.  $940 \div 29 = \dots\dots\dots$  b.  $4560 \div 32 = \dots\dots\dots$

2	9	)	9	4	0

3	2	)	4	5	6	0

4. Complete the following division sums and express the remainder as a whole number:

a.  $8924 \div 23 = \dots\dots\dots$  b.  $9558 \div 54 = \dots\dots\dots$

2	3	)	8	9	2	4

5	4	)	9	5	5	8

5. Complete the following division sums and express the remainder as a whole number:  
 a.  $1976 \div 83 = \dots\dots\dots$     b.  $2226 \div 47 = \dots\dots\dots$

8	3	)	1	9	7	6	

4	7	)	2	2	2	6	

**Challenge**

- Marker pens cost 69p each. Shola has £5 to spend on buying as many as she can.
  - How many can she buy? ..... pens
  - How much change does she receive? ..... pence
- One rack holds 28 CDs. Alisa has 183 CDs. How many racks does she need to hold all her CDs?  
 ..... racks

- Write down one digit from each list to complete the following divisions.
  - |   |   |   |   |   |   |   |   |   |   |   |   |               |
|---|---|---|---|---|---|---|---|---|---|---|---|---------------|
| 8 | 3 | □ | ÷ | 3 | □ | = | □ | 6 | 1 | 2 | 3 | Digit = ..... |
|---|---|---|---|---|---|---|---|---|---|---|---|---------------|
  - |   |   |   |   |   |   |   |   |   |   |   |   |   |               |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---------------|
| 2 | □ | 0 | 1 | ÷ | □ | 3 | = | 3 | □ | 5 | 6 | 7 | Digit = ..... |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---------------|

In this task, you will:

- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-9. If you're raring to go, try the challenge too!

Example 1

Judith cuts 5.1 metres of cotton into 24 equal lengths.

- How long is each length in cm?
- How much cotton is left over?

Answers

$5.1 \text{ m} \div 24$

Multiples of 24: 24, 48, 72, 96, 120 and so on.

			2	1	r6
2	4	)	5	1	30

- Each length is **21 cm** long.
- The remainder means **6 cm left over**.

Example 2

Work out  $\pounds 871 \div 37$  giving your answer to the nearest pence (2dp).

Answer

$871 \div 37$

			2	3	•	5	4	0
3	7	)	8	7	1	3	1	•
						20	0	
							15	0
								20

To find a decimal remainder, insert a decimal point and carry any remainder onto a zero (as shown above).

So  $\pounds 871 \div 37 = \pounds 23.54$

1. Complete these division sums:

- $621 \div 27 = \dots\dots\dots$
- $884 \div 34 = \dots\dots\dots$

2	7	)	6	2
			1	

3	4	)	8	8
			2	

- $1394 \div 41 = \dots\dots\dots$
- $1323 \div 63 = \dots\dots\dots$

4	1	)	1	3
			9	
				4

6	3	)	1	3
			2	
				3

2. Complete the following division sums and write a whole number remainder:

a.  $403 \div 24 = \dots\dots\dots$       b.  $1216 \div 52 = \dots\dots\dots$

2	4	)	4	0	3

5	2	)	1	2	1	6

3. Complete the division sums and express the remainder as a decimal remainder:

a.  $456 \div 32 = \dots\dots\dots$       b.  $804 \div 48 = \dots\dots\dots$

3	2	)	4	5	6		

4	8	)	8	0	4		

4. Margo stacks 420 bricks into piles containing 15 bricks each. How many piles does she make?

..... piles

5. Carlos buys 34 pairs of trainers for £986. How much did each pair cost?


..... per pair

6. A group of 58 people spent £1972 on tickets for a music festival. How much does one ticket cost?

..... per ticket



7. A courier delivers a class set of 29 books weighing 2407 kg to a local school. How much does each book weigh?

..... kg 

8. The organisers of a school fete sell 3888 cartons of drink on their stall. The drinks come in packs of 36. How many packs did they sell?


..... packs 

9. A charity raises £3852 from doing a sponsored run. Each runner paid £18 to enter. How many runners entered the race?

..... runners 

### Challenge

1. Birthday cards cost 79p each. Freddy has £5. He buys as many cards as he can. Work out the amount of change Freddy should get from £5. Give your answer in pence.

..... pence 

2. 600 pupils in a secondary school are travelling to their annual sports day. They take buses that carry 53 people when full.  
How many buses are needed?  
How many spare seats will there be?

..... buses  ..... seats 

In this task, you will:

- perform mental calculations, including with mixed operations and large numbers.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenge too!

Example 1	Example 2	Example 3
<p>Use <b>BODMAS</b> to calculate:</p> <p>a. <math>4 + 5 \times 3</math>                      b. <math>12 \div 3 + 2 \times 4</math>                      c. <math>(1 + 2 + 3)^2</math></p> <p><b>Answers:</b></p> <p>a. <math>4 + 5 \times 3 = 4 + 15 = 19</math>                      b. <math>12 \div 3 + 2 \times 4 = 4 + 8 = 12</math>                      c. <math>(1 + 2 + 3)^2 = (6)^2 = 36</math></p>	<p>If <math>43 \times 21 = 903</math>, find the values of:</p> <p>a. <math>43,000 \times 210</math>                      b. <math>903,000 \div 21</math></p> <p><b>Answers:</b></p> <p>a. <math>43,000 \times 210 = 9,030,000</math>                      b. <math>903,000 \div 21 = 43,000</math></p>	<p>What is the difference in the place values of the two 6s in the number 1,762,563?</p> <p><b>Answer:</b></p> <p style="text-align: center;"> <math>1,762,563</math>                        60,000      60                 </p> <p><b>Difference:</b></p> <p> <math>+40 \quad +900 \quad +59,000</math>  <math>60 \quad 100 \quad 1000 \quad 60,000 = 59,940</math> </p>

- Using **BODMAS**, find the answers to the following sums:
  - $10 - 4 \times 2 = \dots\dots\dots$
  - $10 - (4 + 2) = \dots\dots\dots$
  - $10 \div 5 + 4 \times 2 = \dots\dots\dots$
  - $(10 + 2) \div 6 = \dots\dots\dots$

2. Insert the following symbols, > (greater than), < (less than) or = (equals).

a.	$(8 - 2) - 2 \times 3$		$0 \times 1 \times 2 \times 3 \times 4 \times 5$
b.	$100 - 5 \times 10$		$2 \times 5 \times 5$
c.	$4 + 5 \times 6 + 7$		$6 \times 7$
d.	$(1 + 3)^2$		$1 + 2 + 3 + 4 + 5$

3. Find the answer to the following sums:

a.  $700,000 + 60,000 + 500 + 40 + 3 = \dots\dots\dots$

b.  $1,000,000 + 20,000 + 300 + 4 = \dots\dots\dots$

4. If  $78 \times 34 = 2652$ , find the answer to the following sums:


a.  $780 \times 3400 = \dots\dots\dots$       b.  $2,652,000 \div 780 = \dots\dots\dots$

5. How much bigger is 60,435 than 14,503?  $\dots\dots\dots$

6. At a rugby ground, the four weeks in February had these attendances:

Week 1	Week 2	Week 3	Week 4
40,346	15,496	30,946	37,083

What was the total attendance for the whole of February?

..... 

### Challenge

1. Using up to four 4s, make sums with the following answers. An example is done for you.

Question	Working	Answer
Example	$44 \div 4 - 4 = 11 - 4 = 7$	7
a.		5
b.		9
c.		20
d.		80

In this task, you will:

- identify common factors, common multiples and prime numbers.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2	Example 3
<p>Find all the factors of 30.</p> <p><b>Answer</b></p> <p>We need to find pairs of numbers that multiply to give 30, so</p> <p><math>1 \times 30</math></p> <p><math>2 \times 15</math></p> <p><math>3 \times 10</math></p> <p><math>5 \times 6</math></p> <p>Factors of 30 are <b>1, 2, 3, 5, 6, 10, 15</b> and <b>30</b>.</p>	<p>Write down two multiples of both 6 and 8.</p> <p><b>Answer</b></p> <p>6, 12, 18, <b>24</b>, 30, 36, 42, <b>48</b>, 54, 60, ...</p> <p>8, 16, <b>24</b>, 32, 40, <b>48</b>, 56, 64, 72, 80, ...</p> <p>Common multiples of 6 and 8 are <b>24</b> and <b>48</b>.</p>	<p>7 only has 2 factors as <math>1 \times 7 = 7</math>. It is a <b>prime number</b>.</p> <p>Which of these are prime?</p> <p>33 43 53 63 73</p> <p><b>Answer</b></p> <p><math>33 = 1 \times 33</math>; <math>3 \times 11</math></p> <p><math>43 = 1 \times 43</math>; <math>53 = 1 \times 53</math>;</p> <p><math>63 = 1 \times 63</math>; <math>3 \times 21</math>; <math>9 \times 7</math></p> <p><math>73 = 1 \times 73</math>.</p> <p>The prime numbers are <b>43, 53</b> and <b>73</b>.</p>

1. Write down all the factors of:

a. 10

.....

b. 18

.....

c. 36

.....



2. Write down the first four multiples of:

a. 8 .....

b. 9 .....

c. 12 .....

d. Write down any number that is a multiple of both 9 and 12. ....

**Resource 5** - identify common factors, common multiples and prime numbers

3. Here is a list of numbers

3    13    16    29    36    48

Choose any number from this list that is a:

- a. Prime number → .....
- b. Multiple of 9 → .....
- c. Factor of 52 → .....
- d. Common multiple of two other numbers in the list? → .....

4. Write one number in each section of the Carroll diagram.

	100 or less	More than 100
Multiple of 30		
Multiple of 20		

5. Write down two factors of 24 that are not factors of 12.

..... 

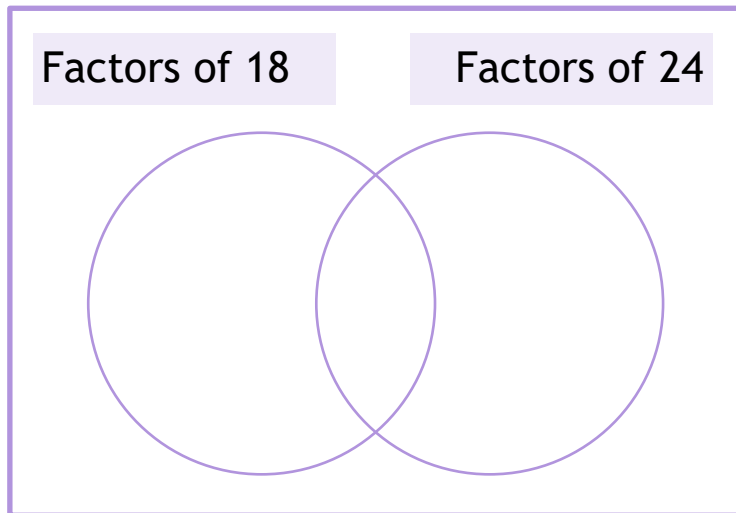
6. Write down all the common multiples of 6 and 9 that are between 50 and 100.

..... 

7. 376 is a multiple of 4 but not a multiple of 7.  
 406 is a multiple of 7 but not a multiple of 4.  
 Find a number that is **between** 376 and 402 that is a multiple of **both** 4 and 7.

..... 

8. Write these numbers in the correct spaces on the diagram: 6 7 8 9

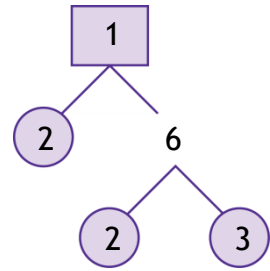


## Challenge

12 can be written in terms of factors as  $2 \times 6$ .

6 can be written in terms of factors as  $2 \times 3$ .

So  $12 = 2 \times 2 \times 3$ . These are called its **prime factors** as they are all prime numbers.



Find the **prime factors** of the following numbers.

a. 18

.....

b. 50

.....

c. 90

.....

d. 126

.....




## In this task, you will:

- use their knowledge of the order of operations to carry out calculations involving the four operations.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-12. If you're raring to go, try the challenge too!

When sums have got different operations in them, we have to solve them in the correct order. We use a method called B O D M A S.

B	=	Brackets	 <p>Do the sums in this order</p>
O	=	Orders	
D	=	Divide	
M	=	Multiply	
A	=	Add	
S	=	Subtract	

## Example 1

$$4 + 3 \times 2 \text{ (Multiply first)}$$

$$4 + 6 = 10$$

## Example 2

$$(7 - 3) \times 5 \text{ (Brackets first)}$$

$$4 \times 5 = 20$$

## Example 3

Using any of the numbers: 1, 4, 5 and 7, make a sum with the answer **34**.

a.  $5 \times 7 - 1 = 35 - 1 = 34$

b.  $4 \times 7 + 5 + 1 = 28 + 6 = 34$

c.  $4 + (7 - 1) \times 5 = 4 + 6 \times 5 = 4 + 30 = 34$

Find the answers to the following:

### Workings out and answer

1.  $7 - 5 + 4$

2.  $5 - 7 + 4$

3.  $7 \times 3 - 2$

4.  $2 \times 6 + 3$

5.  $8 \div 2 + 5$

6.  $12 \div 2 - 3$

7.  $7 + 3 \times 4$

8.  $9 - 3 \times 2$

9.  $18 - 5 \times 3$

10.  $7 + 15 \div 5$

11.  $(8 - 5) \times 4$

12.  $(2 + 7) \div 3$

### Challenge

1. Insert **brackets** to make the following sums correct.

Example:

$$7 \times 3 + 1 = 28 \text{ would become } 7 \times (3 + 1) = 7 \times 4 = 28$$

Show your workings and answers.

a.  $8 \times 4 - 2 = 16$

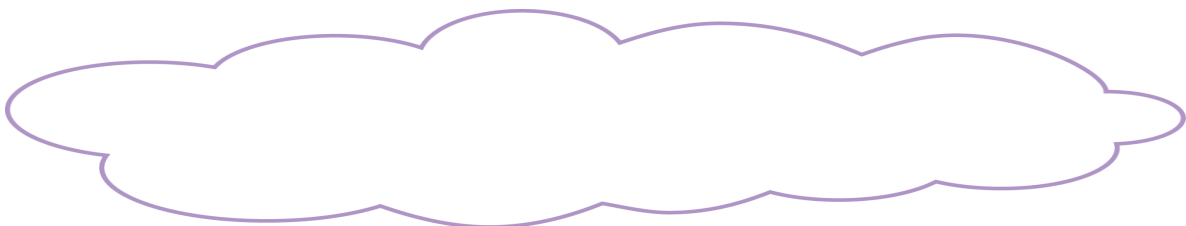
b.  $12 \div 1 + 5 = 2$

c.  $3 + 4 \times 5 = 35$

d.  $4 + 2 \times 5 - 3 = 12$

e.  $9 - 3 \times 2 \times 5 = 15$

2. Using any of the numbers: 2, 5, 6 and 8, find at least **three** ways to make a sum with the answer 30.






In this task, you will:

- solve addition and subtraction multi-step problems in contexts, deciding which methods to use and why.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>Joe is trying to complete a football sticker book. It needs 270 stickers overall. He has 143 in the book and a further 69 ready to stick in. How many more stickers will he need?</p> <p><b>Answer</b> So far, <math>143 + 69 = 212</math> How many more = <math>270 - 212 =</math> <b>58</b> needed</p>	<p>Place each of the numbers 1 to 5 in the V shape so that the two arms of the V have the <b>same total</b>.</p>  <p><b>Answer</b> The bottom number is used twice so remove this number and divide the remaining number sum by 2. <math>1 + 2 + 3 + 4 + 5 = 15</math>. <math>15 - 1 = 14</math>; <math>14 \div 2 = 7</math> Therefore, <math>4 + 3 + 1 = 1 + 2 + 5 (= 8)</math>; <math>4 + 2 + 3 = 3 + 1 + 5 (= 9)</math>; and <math>4 + 1 + 5 = 5 + 2 + 3 (= 10)</math>.</p>


1. A salesman has to travel 348 miles. In the first two hours he travelled 63 miles. In the next three hours he travelled a further 94 miles. How much further does he have to travel?

..... miles 

2. Use the operations + and - to make this calculation correct.

$$17 \square 9 \square 15 \square 8 = 19$$

3. A baker has 1043 loaves of bread at the start of the day. In the morning, 593 loaves are sold and a further 396 loaves are sold in the afternoon. How many loaves of bread are there left at the end of the day?

..... loaves 

## Resource 7 - addition and subtraction multi-step problems

4. In a garden centre, a rose plant costs £6.48, lily seeds cost £1.95 and daffodil bulbs cost 65p each. Mavis buys a rose plant and five daffodil bulbs. How much change does she get from a £10 note?

5. Circle the three numbers that total 100.

48      39      26      47      14      25

6. Write the missing digits to make this addition sum correct.

$$\begin{array}{r}
 \boxed{\phantom{0}} \boxed{\phantom{0}} \boxed{4} \boxed{5} \boxed{\phantom{0}} \\
 + \phantom{0} \boxed{\phantom{0}} \boxed{\phantom{0}} \phantom{0} \boxed{5} \\
 \hline
 4 \phantom{0} 0 \phantom{0} 5 \phantom{0} 2
 \end{array}$$



7. Keith bought a writing pad and a pen. He paid £1.40. Katy bought a writing pad and 2 pens. She paid £1.95. Calculate the cost of a writing pad.

8. Use all the digits to complete the following sums:

a. 9, 2, 6 and 4

$$\boxed{\phantom{0}} \boxed{\phantom{0}} - \boxed{\phantom{0}} \boxed{\phantom{0}} = 27$$

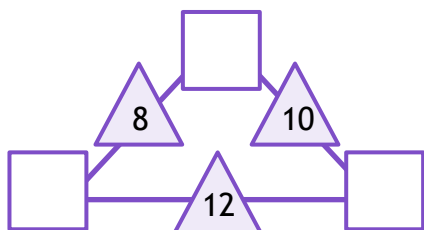
b. 3, 8, 5 and 4

$$\boxed{\phantom{0}} \boxed{\phantom{0}} - \boxed{\phantom{0}} \boxed{\phantom{0}} = 49$$

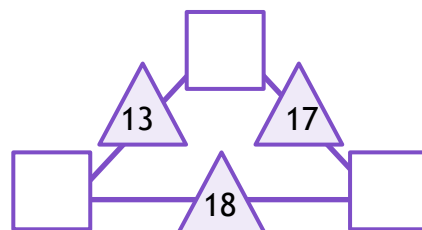
### Challenge

The number in each triangle is equal to the sum of the numbers in the squares on either side. Find the missing numbers.

a.



b.



In this task, you will:

- solve problems involving addition, subtraction, multiplication and division.


Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>A bag of 5 apples costs £1. A box of 4 melons costs £2.10. How much <b>more</b> does one melon cost than one apple?</p> <p><b>Answer</b> One apple costs <math>100p \div 5 = 20p</math> One melon costs <math>210p \div 4 = 55p</math> <math>55p - 20p = 35p</math> more.</p>	<p>Two families go to the cinema. The Reed family buy tickets for <b>one adult and four children</b> and pay <b>£19</b>. The Lowe family buy tickets for <b>two adults and two children</b> and pay <b>£17</b>. What is the cost of <b>one child's ticket</b>?</p> <p><b>Answer</b> Matching the adults first: Reed: 2 adults and 8 children = £38 Lowe: <u>2 adults and 2 children = £17</u> - 6 children = £21 So <math>£21 \div 6 = £3.50</math> for each child.</p>

1. A waiter and a waitress earned tips during a day while working in a restaurant. The waiter received £28 and the waitress received £37. They agree to share the tips. How much will they both get?


..... 

2. I bought 3 pears at 49p each and 2 drinks at £1.14 each. How much did I spend altogether? What change would I get by paying for the items with a £5 note?

..... 

## Resource 8 – addition, subtraction, multiplication and division problems

3. A farmer had 370 eggs. 18 smashed so he put the rest into boxes of 15. How many boxes did he use?

..... boxes 

4. Rose bushes cost £12.95 each. If you buy three rose bushes, you pay £30. How much money do you save through this offer?

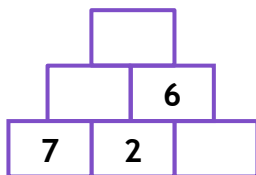
..... 

5. Jules has read 197 pages of a 648 page book. How many pages must he read until he reaches the middle of the book?

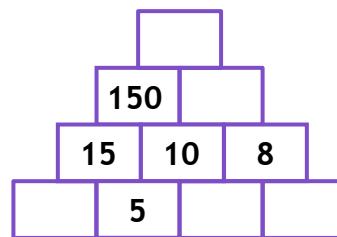
..... 

6. In the following grids, each number is the product of the two numbers which lie directly beneath it. Complete each grid.


a.



b.




7. At a primary school there are 238 pupils. One cold day in January, 17 pupils were absent and 13 pupils decided to go home for lunch. The remainder stayed for school lunch. Of these staying pupils, three times as many had a hot meal than had a packed lunch. How many pupils had a hot meal for lunch?

..... 

## Resource 8 – addition, subtraction, multiplication and division problems

8. Erica thinks of a number.  
She doubles this number and then adds thirteen.  
She divides this result by five and is left with the number seven.  
What number did Erica start with?

..... 

### Challenge

1. Michael has twice as much money as Trisha. When Michael spends £75 and Trisha has spent £20, they both have the same amount left. How much money did Michael have at first?

..... 

In this task, you will:

- use estimation to check answers to calculations and determine, in context of a problem, an appropriate degree of accuracy
- identify the value of each digit given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>A school wants to buy 23,486 pencils. They come in boxes of 64. Approximately how many boxes will they buy?</p> <p><b>Answer</b>  <math>24,486 \div 64 \approx 24,000 \div 60</math>  <math>\approx 2400 \div 6 = 400</math> boxes</p>	<p>Joe saves 30 pence every day for a year. He estimates that he will have approximately saved £110. Is he right?</p> <p><b>Answer</b>  <math>365 \times 30 \approx 400 \times 30</math>  <math>\approx 12,000 \text{ p} = \text{£}120</math>, so yes</p>

- 34 boxes contain 18 apples each.  
Circle the best estimate that shows the total number of apples.  
 a. 400      b. 500      c. 600      d. 800
- There are 342 children going to the theatre. The theatre can seat up to 22 children in each row. Circle the best estimate to show how many rows will be filled.  
 a. 10      b. 15      c. 20      d. 25
- Suzie buys 54 chews at 16 pence each. Roughly, how much does she spend?

.....

## Resource 9 – use estimation to check answers

4. Carol has 42 boxes of toys with a total weight of 197 kg. What is the approximate weight of each box?

..... 


5. Complete the following table. The first row has been done for you.


	Question	Rounding	Estimate	Actual
e.g.	$19 \times 241$	$20 \times 200$	4000	4579
a.	$15,463 + 8946$			
b.	$7631 - 2814$			
c.	$78 \times 437$			
d.	$5632 \div 32$			

6. Complete the following table:

$\times 1000$	$\times 100$	Number	$\div 10$	$\div 100$
	42			
	6.75			
2300				
			6	
				0.45

7. Every week, 2392 new patients are admitted to a hospital. Estimate how many patients visited the hospital during 2018.

..... 

8. Using any of the digits 3, 6, 7 and 8 once only in each number, write: 

a. the number that is closest to 500.

--	--	--

b. the value of the **hundreds** digit in the answer when the largest 3-digit **odd** number is multiplied by 10.

--	--	--

c. the value of digit 7 in the smallest 4-digit number when it is divided by 1000.

--	--	--	--

### Challenge

Two **whole** numbers are each **rounded** to the **nearest 10**.

The sum of the rounded numbers is 80.

Work out the **maximum** possible sum of the original two numbers.

$$\boxed{\phantom{00}} + \boxed{\phantom{00}} = \boxed{80}$$



In this task, you will:

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination
- compare and order fractions, including fractions > 1.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-7. If you're raring to go, try the challenge too!

Example:

Circle the fraction that is greater than  $\frac{1}{2}$  and less than  $\frac{3}{4}$ .

$\frac{2}{5}$        $\frac{7}{8}$        $\frac{1}{3}$        $\frac{5}{8}$        $\frac{3}{6}$

To work this out, we can create equivalent fractions by simply building up fraction tables using our times table knowledge:

$$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16} = \frac{15}{20}$$

or taking each fraction in turn:

$\frac{2}{5} = \frac{4}{10} = \text{so } < \frac{5}{10} \left(\frac{1}{2}\right)$ ;    **✗**     $\frac{7}{8} < \frac{6}{8} \left(\frac{3}{4}\right)$ ;    **✗**     $\frac{1}{3} \left(\frac{4}{12}\right) < \frac{1}{2} \left(\frac{6}{12}\right)$ ;    **✗**  
 $\frac{5}{8}$  is between  $\frac{4}{8}$  and  $\frac{6}{8}$ ;    **✓**     $\frac{3}{6} = \frac{1}{2}$     **✗**

1. Write **four** equivalent fractions to the given one below using fraction tables.

a.  $\frac{2}{5} = \frac{4}{\square} = \frac{\square}{15} = \frac{\square}{\square} = \frac{\square}{\square}$   
 c.  $\frac{5}{6} = \frac{\square}{\square} = \frac{\square}{18} = \frac{\square}{24} = \frac{\square}{\square}$

b.  $\frac{3}{8} = \frac{\square}{\square} = \frac{\square}{24} = \frac{\square}{\square} = \frac{\square}{40}$

2. Write **four** equivalent fractions to the given one below using fraction tables.

a.  $\frac{2}{5} = \frac{4}{\square}$   
 c.  $\frac{5}{6} = \frac{20}{\square}$

b.  $\frac{2}{3} = \frac{\square}{12}$   
 d.  $\frac{2}{7} = \frac{10}{\square}$

## Resource 1 – use common factors to simplify fractions

3. Circle the larger fraction.

a.  $\frac{2}{3}$  or  $\frac{3}{4}$

b.  $\frac{5}{6}$  or  $\frac{7}{9}$

4. Write these fractions in order of size starting with the smallest.

$\frac{7}{12}$        $\frac{3}{4}$        $\frac{5}{6}$        $\frac{1}{2}$        $\frac{2}{3}$

Smallest,    .....,    .....,    .....,    .....,    .....,    Largest

5. Write in the missing values.

a.  $\frac{2}{3} = \frac{\square}{18} = \frac{10}{\square}$

b.  $\frac{\square}{8} = \frac{9}{24} = \frac{6}{\square}$

6. Insert the following symbols: >, < or =.

a.	$\frac{7}{2}$		$3\frac{1}{2}$
b.	$\frac{9}{10}$		$\frac{4}{5}$
c.	$1\frac{1}{3}$		$1\frac{1}{6}$
d.	$\frac{5}{12}$		$\frac{3}{8}$

7. Choose from the following numbers to make each pair of fractions equivalent:

3      15      6      20      18      5

a.  $\frac{\square}{8} = \frac{\square}{40}$

b.  $\frac{\square}{8} = \frac{\square}{40}$

c.  $\frac{\square}{7} = \frac{\square}{21}$

### Challenge

Complete the following equivalent fraction equations:

1. a.  $\frac{\square}{12} = \frac{20}{48} = \frac{10}{\square}$

b.  $\frac{10}{\square} = \frac{\square}{24} = \frac{5}{4}$

In this task, you will:

- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-7. If you're raring to go, try the challenge too!

Example

Find equivalent fractions by setting up a number (counting) sequence for both the numerator and denominator.

$$\frac{3}{8} = \frac{6}{16} = \frac{9}{24} = \frac{12}{32} = \frac{15}{40}$$

The sequence shows the numerator ascending in 3s and the denominator ascending in 8s.

Find the common denominator:

$\frac{5}{8} + \frac{1}{6}$	$\frac{5}{8} = \frac{10}{16} = \frac{15}{24} = \frac{20}{32} = \frac{25}{40}$
$\frac{15}{24} + \frac{4}{24} = \frac{19}{24}$	$\frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{4}{24} = \frac{5}{30}$

1. Find the common denominator to solve these addition sums.

a.  $\frac{1}{4} + \frac{3}{8} = \dots\dots\dots$

b.  $\frac{1}{3} + \frac{4}{9} = \dots\dots\dots$

2. Find the common denominator to solve these subtraction sums.

a.  $\frac{5}{6} - \frac{1}{3} = \dots\dots\dots$

b.  $\frac{7}{12} - \frac{1}{4} = \dots\dots\dots$

3. Complete the following fraction sums.

a.  $\frac{3}{4} + \frac{1}{6} = \dots\dots\dots$

b.  $\frac{3}{8} + \frac{5}{12} = \dots\dots\dots$

c.  $\frac{4}{9} - \frac{1}{6} = \dots\dots\dots$

d.  $\frac{11}{12} - \frac{5}{8} = \dots\dots\dots$

4. Jack and Sarah share a pizza. Jack has  $\frac{5}{8}$  and Sarah has  $\frac{1}{8}$  of the pizza.  
How much of the pizza have they eaten altogether?

.....

What fraction is left over?

.....

5. Find the common denominator to solve these subtraction sums.

a.  $\frac{1}{8} + \frac{5}{12} =$  .....      b.  $\frac{5}{9} + \frac{1}{6} =$  .....

c.  $\frac{7}{9} - \frac{5}{12} =$  .....      d.  $\frac{11}{12} - \frac{7}{8} =$  .....

6. Paula, Freda and Judith share a large bar of chocolate.

Paula has  $\frac{5}{12}$  and Freda has  $\frac{1}{4}$ .

What fraction of the chocolate is left for Judith?

.....

7. Stevie swam  $\frac{7}{12}$  of a mile on a Tuesday and  $\frac{3}{8}$  of a mile on a Thursday.  
How much further did he swim on the Tuesday than on the Thursday?

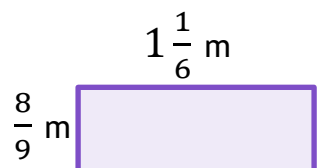
.....

### Challenge

1. Complete the following mixed number calculations.

a.  $3\frac{4}{9} + 2\frac{5}{12} =$  .....      b.  $7\frac{11}{12} - 3\frac{7}{8} =$  .....

2. Julie wants to wrap string around a large box.  
She has 5 metres of ribbon. How much string is left over?  
Give your answer as a fraction.



.....

In this task, you will:

- multiply simple pairs of proper fractions, writing the answer in its simplest form.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
Work out $\frac{3}{8} \times \frac{5}{6}$ .	Find $\frac{5}{6}$ of £27.
<p><b>Answer</b></p> <p>Multiply numerators and denominators <math>\frac{3 \times 5}{8 \times 6} = \frac{15}{48}</math></p> <p>Simplify fraction <math>\frac{15}{48} = \frac{\div 3}{\div 3} = \frac{5}{16}</math></p>	<p><b>Answer</b></p> <p>Remember 'of' means multiply.</p> <p>Create two fractions: <math>\frac{5}{6} \times \frac{27}{1} = \frac{5 \times 27}{6 \times 1} = \frac{135}{6}</math></p> <p>Simplify: <math>\frac{135}{6} = \frac{\div 3}{\div 3} = \frac{45}{2}</math></p> <p>Now the decimal division <math>45 \div 2 = \text{£}22.50</math></p>

1. Work out these multiplication sums.

a.  $\frac{3}{4} \times \frac{1}{2} = \dots\dots\dots$     b.  $\frac{5}{8} \times \frac{3}{4} = \dots\dots\dots$     c.  $\frac{1}{5} \times \frac{4}{5} = \dots\dots\dots$

2. Complete these multiplication sums simplifying your answers.

a.  $\frac{5}{8} \times \frac{2}{3} = \dots\dots\dots$     b.  $\frac{5}{6} \times \frac{3}{4} = \dots\dots\dots$     c.  $\frac{1}{4} \times \frac{8}{9} = \dots\dots\dots$

3. Calculate the following:

a.  $\frac{2}{3}$  of £18 =  $\dots\dots\dots$     b.  $\frac{3}{5}$  of £25 =  $\dots\dots\dots$     c.  $\frac{3}{8}$  of £48 =  $\dots\dots\dots$

4. Match up these calculations to their correct answer.

$\frac{11}{12} \times \frac{4}{5}$
$\frac{7}{8} \times \frac{2}{3}$
$\frac{3}{10} \times \frac{5}{6}$
$\frac{1}{2} \times \frac{3}{4}$

$\frac{1}{4}$
$\frac{11}{15}$
$\frac{7}{12}$
$\frac{3}{8}$

5. Complete these multiplication sums simplifying your answers.

a.  $\frac{5}{8} \times \frac{6}{7} = \dots\dots\dots$     b.  $\frac{5}{9} \times \frac{6}{7} = \dots\dots\dots$     c.  $\frac{5}{8} \times \frac{4}{15} = \dots\dots\dots$

6.  $\frac{2}{5}$  of my friends go to the cinema every weekend. Half of them are boys.  
What fraction of my friends are boys?

.....

7. There was  $\frac{7}{12}$  of a pie left in the fridge. Jade ate  $\frac{3}{4}$  of the leftover pie.  
How much of the pie did she eat?

.....

8. Complete these multiplication sums simplifying your answers.

a.  $\frac{5}{8}$  of £44 = .....    b.  $\frac{3}{4}$  of £54 = .....    c.  $\frac{7}{12}$  of £30 = .....

### Challenge

1. Complete these multiplication sums simplifying your answers.

a.  $\frac{5}{8} \times \frac{2}{3} \dots\dots\dots$     b.  $\frac{7}{9} \times \frac{3}{4} = \dots\dots\dots$     c.  $\frac{3}{4} \times \frac{11}{18} = \dots\dots\dots$

2. Complete the following mixed number calculations.

a.  $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \dots\dots\dots$     b.  $1\frac{1}{4} \times 1\frac{1}{5} = \dots\dots\dots$

(Tip: change to improper fractions first.)

In this task, you will:

- divide proper fractions by whole numbers
- associate a fraction with division and calculate decimal fraction equivalents for a simple fraction.

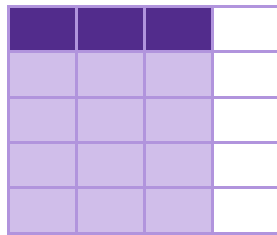
Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1

Work out  $\frac{3}{4} \div 5$ .

Answer

Draw a bar and divide it into 4 parts. Shade in three of these  $\left(\frac{3}{4}\right)$



Cut the bar into 5 equal horizontal bars.

Count those shaded in the first bar. This is the numerator (3). The denominator is all the sections together (20).

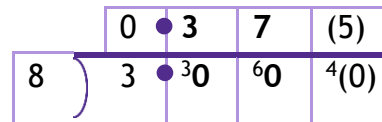
Answer  $\frac{3}{20}$  as  $\frac{3}{4} \div 5 = \frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$

Example 2

Which is larger  $\frac{3}{8}$  or 0.38?

Answer

Change the fraction to a decimal using short division ( $3 \div 8$ ).

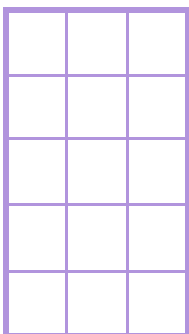


$\frac{3}{8} = 0.375$  for the complete division. This is less than 0.38!

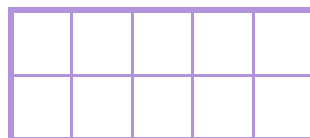
**0.38** is greater.

1. Work out the following divisions. You may use the grids to help you.

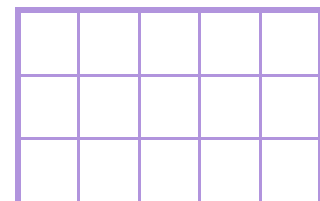
a.  $\frac{2}{3} \div 5 =$



b.  $\frac{3}{5} \div 2 =$



c.  $\frac{4}{5} \times 3 =$



## Resource 4 – divide fractions by whole numbers

2. Complete these divisions. You can draw grids to help you.

a.  $\frac{3}{4} \div 2 = \dots\dots\dots$     b.  $\frac{1}{2} \div 3 = \dots\dots\dots$     c.  $\frac{5}{6} \div 3 = \dots\dots\dots$

3. Change the following fractions to decimals.

a.  $\frac{3}{4} = \dots\dots\dots$     b.  $\frac{4}{5} = \dots\dots\dots$     c.  $\frac{5}{8} = \dots\dots\dots$

4. Match each fraction to its equivalent decimal number. One has been done for you.

$\frac{1}{4}$	\diagdown	0.5
$\frac{1}{2}$		0.25
$\frac{2}{5}$		0.3
$\frac{3}{10}$		0.4

5. Write these in order of size, starting with the smallest.

$\frac{2}{5}$       0.3       $\frac{1}{3}$       0.28       $\frac{3}{8}$

Smallest	\dots\dots\dots	\dots\dots\dots	\dots\dots\dots	\dots\dots\dots	\dots\dots\dots	Largest
----------	-----------------	-----------------	-----------------	-----------------	-----------------	---------

6. Complete these divisions. Write your answers as fractions in their simplest forms.

a.  $\frac{4}{5} \div 2 = \dots\dots\dots$     b.  $\frac{5}{6} \div 10 = \dots\dots\dots$     c.  $\frac{9}{10} \div 6 = \dots\dots\dots$

7. Write the following as decimals.

a.  $\frac{7}{8} = \dots\dots\dots$     b.  $\frac{1}{6} = \dots\dots\dots$     c.  $1\frac{1}{4} = \dots\dots\dots$

8. Kevin has £5 in his pocket and wants to share it equally between himself and five of his friends. He says that they will get 83 pence each as  $\text{£}5 \div 6 = \text{£}0.83$   
Using division, can you show that he is correct?

\dots\dots\dots



## Challenge

1. Josie has  $\frac{3}{4}$  of a metre of string. She wants to cut it into six equal lengths.  
How long will each length be? Write your answer in centimetres.

..... 

In this task, you will:

- multiply one-digit numbers with up to 2 decimal places by whole numbers.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1

Emma buys three music CDs. Each CD costs £13.49. She has saved up £40. Does she have enough money?

Answer

Calculation is  $£13.49 \times 3$

	1	3	.	4	9
×					3
£	4	0	.	4	7
		1		1	2

Since £40.47 is more than £40, Emma does not have enough money.

Example 2

Find the missing number.

$$\square \times 5 = 1.5$$

Answer

Ignoring the decimal point, we can say  $3 \times 5 = 15$  (or  $15 \div 5 = 3$ )

The answer must be ten times smaller as there is only **one decimal place** (one number after the decimal point). So the missing answer is **0.3**.

1. Complete the following multiplications. You can use the grids to help you.

a.  $26.4 \times 7$

		2	6	.	4
×					7
				.	

b.  $73.1 \times 4$

				.	
×					
				.	

a.  $7.86 \times 5$

		7	.	8	6
×					5
			.		

b.  $14.67 \times 6$

			.		
×					
			.		

## Resource 5 – multiply numbers up to 2 decimal places

2. Complete the following multiplications. You can use the grids to help you.

a.  $37.82 \times 8$

×						

b.  $184.5 \times 9$

×						

3. Answer the following questions.

a. Dane buys seven tickets costing £2.85 each. How much did he pay altogether?

.....

b. Paula travels 9.73 miles every day. How far does she travel over four days?

.....

4. A football shirt costs £32.69. If a five-a-side team need to buy some new shirts, how much will it cost them?

.....

5. Answer the following questions:

a. 

	×	4	=	1.2
--	---	---	---	-----

b. 

	×	9	=	10.8
--	---	---	---	------

6. Complete the following multiplications. You can use the grids to help you.

a.  $437.8 \times 8$

×						

b.  $384.75 \times 9$

×						

## Resource 5 – multiply numbers up to 2 decimal places

7. Stuart saves £283.57 every year. How much money does Stuart save over four years?

..... 
---

8. Karen bought seven cans of dog food for £1.99 each and four tins of cat food for £1.38 each. What was the total amount she spent?

..... 
---

### Challenge

1. Fill in the gaps:

a. 

0.08	×		=	0.48
------	---	--	---	------

b. 

	×	5	=	4.3
--	---	---	---	-----

In this task, you will:

- use written division methods in cases where the answer has up to two decimal places
- solve problems which require answers to be rounded to specified degrees of accuracy.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2																														
<p>Two shops A and B sell jars of jam.                      Shop A: 6 jars for £4.50                      Shop B: 8 jars for £5.92                      Which shop is better value?</p> <p><b>Answer:</b> completing the short division                      A: <math>£4.50 \div 6</math>      B: <math>£5.92 \div 8</math></p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;"> <table style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 0 5px;">A</td><td style="border: 1px solid black; padding: 2px;">0</td><td style="border: 1px solid black; padding: 2px;">7</td><td style="border: 1px solid black; padding: 2px;">5</td><td style="border: none; padding: 0 5px;"> </td><td style="border: 1px solid black; padding: 2px;">B</td><td style="border: 1px solid black; padding: 2px;">0</td><td style="border: 1px solid black; padding: 2px;">7</td><td style="border: 1px solid black; padding: 2px;">4</td></tr> <tr><td style="border: none;"></td><td style="border: 1px solid black; padding: 2px;">6</td><td style="border: 1px solid black; padding: 2px;">4</td><td style="border: 1px solid black; padding: 2px;">5</td><td style="border: none;"></td><td style="border: 1px solid black; padding: 2px;">8</td><td style="border: 1px solid black; padding: 2px;">5</td><td style="border: 1px solid black; padding: 2px;">9</td><td style="border: 1px solid black; padding: 2px;">2</td></tr> </table> </div> <div style="border: 1px solid black; padding: 2px;"> <table style="border-collapse: collapse; text-align: center;"> <tr><td style="border: none;"></td><td style="border: 1px solid black; padding: 2px;">0</td><td style="border: 1px solid black; padding: 2px;">3</td><td style="border: 1px solid black; padding: 2px;">8</td><td style="border: 1px solid black; padding: 2px;">8</td><td style="border: 1px solid black; padding: 2px;">8</td></tr> <tr><td style="border: none;"></td><td style="border: 1px solid black; padding: 2px;">9</td><td style="border: 1px solid black; padding: 2px;">3</td><td style="border: 1px solid black; padding: 2px;">5</td><td style="border: 1px solid black; padding: 2px;">8</td><td style="border: 1px solid black; padding: 2px;">0</td></tr> </table> </div> </div> <p>A cost 75p a jar.  <b>B cost 74p a jar</b>                      Shop B gives better value as it is a penny cheaper for a jar of jam.</p>	A	0	7	5		B	0	7	4		6	4	5		8	5	9	2		0	3	8	8	8		9	3	5	8	0	<p>Jimmy has nine weeks to save up £350 for his holiday.                      To the nearest penny, how much should he save each week?</p> <p><b>Answer:</b> <math>£350 \div 9</math></p> <p>For the nearest penny (2dp) look at the third decimal place.                      If the number is <b>five or more</b> then we round up, so the weekly savings are <b>£38.89</b>.</p>
A	0	7	5		B	0	7	4																							
	6	4	5		8	5	9	2																							
	0	3	8	8	8																										
	9	3	5	8	0																										

1. Calculate the following, giving answers up to 2 decimal places:

a.  $25 \div 4 =$

	4	2	5	0

b.  $51 \div 4 =$

	4	5	1	0

c.  $40 \div 3 =$

	3	4	0	0

2. Calculate the following, giving answers up to 2 decimal places:

a.  $43 \div 6 =$

	6	4	3	0	0

b.  $53 \div 8 =$

	8	5	3	0	0

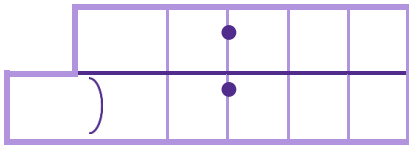
c.  $61 \div 7 =$

	7	6	1	0	0

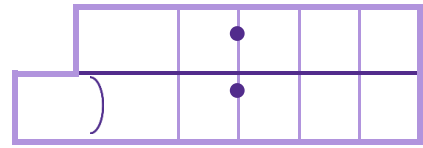
## Resource 6 – written division methods up to two decimal places

3. Calculate the following, giving answers up to 2 decimal places.

a.  $79 \div 5$



b.  $79 \div 8$



4. Julian is training for a race. He needs to reach 100 miles over 7 weeks.  
How much does he have to run each week to compete this?  
Write your answer to the nearest mile.

.....

5. Write in the missing numbers to complete the following sequences.

a.  $140 \div 8$

b.  $215 \div 9$

c.  $341 \div 7$

.....

.....

.....

6. Six friends go out to share a meal at a restaurant. The bill comes to £54.42. They share the cost equally. How much do they each pay?

.....

7. Erica wants to complete a 16-mile training run in three hours.

a. To the nearest mile, how far should she run each hour?

.....

b. Erica decides to round up. Explain why she did that.

.....

## Resource 6 – written division methods up to two decimal places

8. Three shops sell packets of balloons in different sizes as shown.

Billy's	Judy's	Smith's
3 packets for £4	7 packets for £9	9 packets for £11.75



Which shop give the best value?

..... 

### Challenge

1. A highland bike race consists of 6 laps. The total distance of the race is  $39\frac{1}{2}$  miles. How far is one lap (to the nearest hundredth of a mile)?

..... 

2. A Complete the following division sum in **two** different ways.

$$\boxed{\phantom{000}} \div \boxed{\phantom{00}} = \boxed{13.5}$$

$$\boxed{\phantom{000}} \div \boxed{\phantom{00}} = \boxed{13.5}$$



In this task, you will:

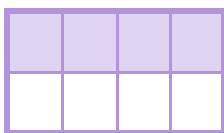
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenge too!

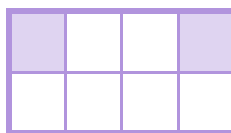
Example 1	Example 2
<p>Write the following amounts in ascending order starting with the smallest.</p> <p style="text-align: center;">0.5      <math>\frac{2}{5}</math>      42%      <math>\frac{11}{20}</math></p> <p><b>Answer</b> Change everything to either decimals or percentages.  <math>0.5 = 0.5 \times 100 = 50\%</math>;  <math>\frac{2}{5} = 2 \div 5 = 0.4 = 40\%</math>; <math>42\% = 42\%</math>;  <math>\frac{11}{20} = \frac{22}{40} = \frac{33}{60} = \frac{44}{80} = \frac{55}{100} = 55\%</math> ('<math>\times</math> by 5')  <b>Smallest: <math>\frac{2}{5}</math>, 42%, 0.5, <math>\frac{11}{20}</math> largest</b></p>	<p>Which is larger: <math>\frac{17}{25}</math> or 71%?</p> <p><b>Answer</b>  <math>\frac{17}{25} = \frac{34}{50} = \frac{51}{75} = \frac{51}{75} = \frac{68}{100} = 68\%</math></p> <p>This is less than 71%.  <b>71% is larger.</b></p>

1. Look at the diagrams below. Write down the percentage the shading represents in each diagram.

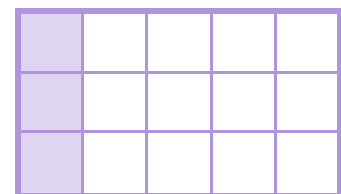
a. .... %



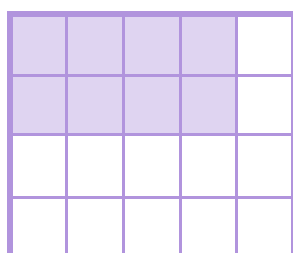
b. .... %



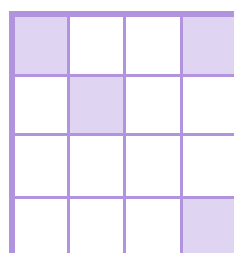
c. .... %



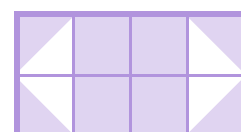
d. .... %



e. .... %



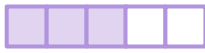
f. .... %





**Resource 7** – use equivalences between fractions, decimals and percentages

2. Complete the following table:

Diagram	Fraction	Decimal	Percentage
	$\frac{1}{4}$		
			
		0.3	
			45%

3. Arrange these quantities in order of size starting with the smallest.

0.21       $\frac{1}{4}$       30%       $\frac{1}{2}$        $\frac{2}{5}$

Smallest,	.....,	.....,	.....,	.....,	.....,	Largest
-----------	--------	--------	--------	--------	--------	---------


4. Circle the larger value.

a.  $\frac{3}{4}$  or 0.35

b. 0.25 or 7%

c.  $\frac{7}{8} =$  or 81%

5. Find the matching pairs. The first one is done for you.

50% of 8	30%
	0.7
$\frac{3}{10}$	$\frac{1}{4}$ of 16
$\frac{1}{5}$ of 15	$\frac{18}{25}$
72%	60%
$\frac{3}{5}$	0.5
$\frac{3}{5} + \frac{1}{10}$	3

(A purple arrow points from the first row of the left column to the second row of the right column.)

**Resource 7** – use equivalences between fractions, decimals and percentages

6. Write the following amounts in ascending order, starting with the smallest.

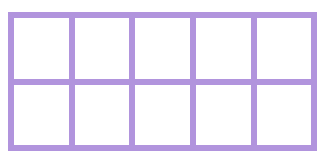
$\frac{1}{3}$       0.37      30%      0.073       $\frac{1}{4}$       29.5 %

Smallest	..... ,	..... ,	..... ,	..... ,	..... ,	..... ,	Largest
----------	---------	---------	---------	---------	---------	---------	---------

**Challenge**

1. Jean has 70 bottles of pop to sell one weekend. She wants to sell 60% of the bottles by Saturday night.

a. Shade in the grid to represent this sale of 60%.



b. Use the grid to help you find how many bottles she has left to sell on Sunday.

.....

---

## Section 2:

# Ratio and proportion

## In this task, you will:

- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

## Example

Orange paint is made by mixing red and yellow paint. For every 2 parts of red paint you would use 3 parts of yellow. This is a ratio of 2:3.

- a. MrAce wants to make 20 tins of orange paint. How much red and yellow paint will he need?
- b. Mrs Ure has 16 litres of red paint. How much yellow paint would she need to add to make orange paint?

- a. Build up the ratio table by counting up each table for red and yellow.

**Red : Yellow**

2 : 3

4 : 6

6 : 9

**8 : 12 this adds to 20!**

10 : 15

He needs **8 tins** of red paint and **12 tins** of yellow paint.

- b. Build up the ratio table by counting up each table for red and yellow.

**Red : Yellow**

2 : 3

4 : 6

6 : 9

**8 : 12 this adds to 20!**

10 : 15

He needs **8 tins** of red paint and **12 tins** of yellow paint.

1. Use ratio tables to share the following quantities into the given ratio.

a. £25 into 2:3

:

b. 30 into 1:4

:

c. 40 into 3:5

:

2. Use ratio tables to share the following quantities into the given ratio.

a. £56 into 2:5

:

b. £66 into 6:5

:

## Resource 1 – relative sizes

3. A box of chocolates contains 7 milk chocolates and 4 dark chocolates. Judy buys three boxes. How many milk chocolates will she have altogether?

..... milk chocolates

4. Builder Joe made up a cement mixture by mixing 3 bags of sand for every bag of cement. To build a wall, he needs 12 bags of sand. How many bags of cement will he need?

..... bags of cement

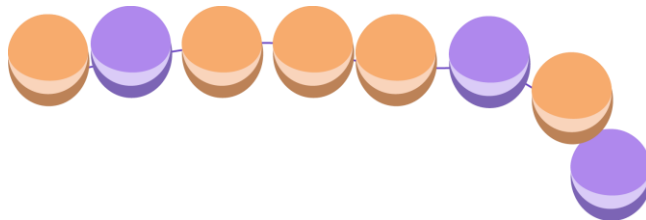
5. To make 5 scones it takes 2 cups of cheese for every 3 cups of butter.
- a. How many cups of butter will be needed for 35 scones?

..... cups of butter

- b. Ashton makes similar scones. He has 27 cups of butter available. How many cups of cheese will he need?

..... cups of cheese

6. A necklace is made by linking purple and orange beads. Suzanne makes a necklace like the one below.



- a. She decides to make 7 for her friends. How many purple beads will she need?

..... purple beads

- b. For Christmas, Suzanne buys 45 purple beads. How many orange beads will she need, and how many necklaces will she be able to make?

..... orange beads, ..... necklaces

7. Two small pizzas cost £11. Find the cost of 9 small pizzas.

£.....

8. Six tickets for a children’s play pool cost £27. Calculate the cost of four tickets.

£.....

**Challenge**

1. Every 100 g of ‘toasty’ white bread contains 4.5 grams of fibre. In a large loaf weighing 800 grams, there are 18 slices of bread. How much fibre is there in three slices of bread?

..... g of fibre

**In this task, you will:**

- solve problems involving the calculation of percentages and the use of percentages for comparison.

Look at the examples and answer the questions. If you are anxious, try questions 1-8. If you're feeling confident, try questions 1-11. If you're raring to go, try the challenge too!

Example 1	Example 2	Example 3
<p>A class contains 18 boys and 12 girls. What percentage of the class are boys?</p> <p><b>Answer</b>                      Total = 18 + 12 = 30                      Fraction boys = <math>\frac{18}{30}</math>                      We need to make this a fraction with a denominator of 100:  <math>\frac{18}{30} = \frac{3}{10} = \frac{30}{100} = 30\%</math></p>	<p>25% of the pears in a box are large. The rest are small. There are 13 large pears. How many small pears are there?</p> <p><b>Answer</b>                      We need to know what 100% is, so:.                      25% = 13                      50% = 26                      75% = 39                      100% = 52 [13 × 4]                      Small pears = 52 - 13 = 39                      (small = 75% = 13 × 3 = 39)</p>	<p>Find 35% of £8.</p> <p><b>Answer</b>                      We always find 10% first (÷10).                      10% of £8 = £8 ÷ 10 = £0.80                      5% of £8 = £0.80 ÷ 2 = £0.40                      So 35% = 10% + 10% + 10% + 5%                      = £0.80 + £0.80 + £0.80 + £0.40                      = £2.80                      (0.35 × £8 = £2.80)</p>

1. Write the following fractions as percentages:

- a.  $\frac{9}{20}$        b.  $\frac{9}{30}$        c.  $\frac{9}{60}$

2. There are 13 black and 7 white disks in a bag. What percentage are black disks?

..... %

3. Jamie had £40. He spent £12 on a DVD. What percentage of his money did he spend on the DVD?

..... %

4. Work out the following sums:

a. 20% of £30

£ .....

b. 15% of £8

£.....

c. 35% of £40

£.....

5. If 10% of a number is 7, what is the number?

.....

6. If 9 is 20% of a number, what is the number?

.....

7. A jacket costing £60 is reduced by 20% in a sale.

- a. How much was the jacket reduced in the sale?

£ .....

- b. How much was the final sale price?

£ .....

8. Orange squash is made with one part cordial and four parts water.

- a. What fraction of the squash is cordial?

.....



b. What percentage of the squash is water?

..... %

9. If 15% of a number is 30, what is 100%?

.....

10. Use ratio tables to share the following quantities into the given ratio.

- a. 60% of 24 = 20% of       b. 12% of 36 =  % of 6

11. Darren sees a crazy offer in an advert:  
Which offer should he go for?


**Offer A**

Eat 60% of 3 pizzas



**Offer B**

Eat 25% of 7 pizzas



Offer: .....

### Challenge

1. A golf club has 400 members. 65% of the members are male. 25% of the female members are children.

a. How many male members are in the golf club?

.....

b. How many female children are in the club?

.....

**In this task, you will:**

- solve problems involving similar shapes where the scale factor is known or can be found.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-10. If you're raring to go, try the challenge too!

**Example 1**

Two parcels weigh 360 grams. One parcel weighs twice as much as the other. What is the weight of the heavier parcel?

**Answer**

The heavier parcel =  $2 \times$  lighter parcel  
 So three lighter parcels weigh 360 g.  
 One weighs  $360 \text{ g} \div 3 = 120 \text{ g}$ .  
 So, the heavier parcel =  $2 \times 120 = 240 \text{ g}$ .

**Example 2**

Look at these similar shapes.

- Find the scale factor for the enlargement.
- Find the length of the side marked  $x$ .



**Answer**

- Scale factor =  $10 \div 5 = 2$
- $x = 3 \times 2 = 6 \text{ cm}$

1. A pen and a pencil cost 60 pence. If the pen cost twice as much as the pencil, find the cost of the pen.

..... pence

2. If 2 pens cost 80 pence, what do 3 pens cost?

£ .....

**Resource 3 – scale factors**

3. Larry made a scale drawing of a flat. The scale of the drawing is 1 cm : 2 m. The kitchen is 3 centimetres in the drawing. How long is the actual kitchen?

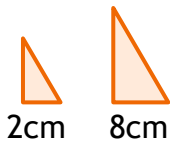
..... m

4. Lola makes a scale drawing of a bungalow. The side of the bungalow is 12 metres wide in real life and is 3 centimetres wide in the drawing. What is the scale of the drawing?

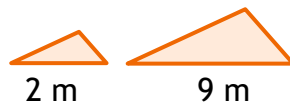
..... cm : ..... m

5. Complete the following multiplications. You can use the grids to help you.

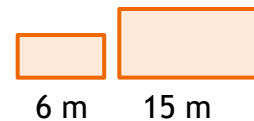
a. Scale factor .....



b. Scale factor .....



c. Scale factor .....

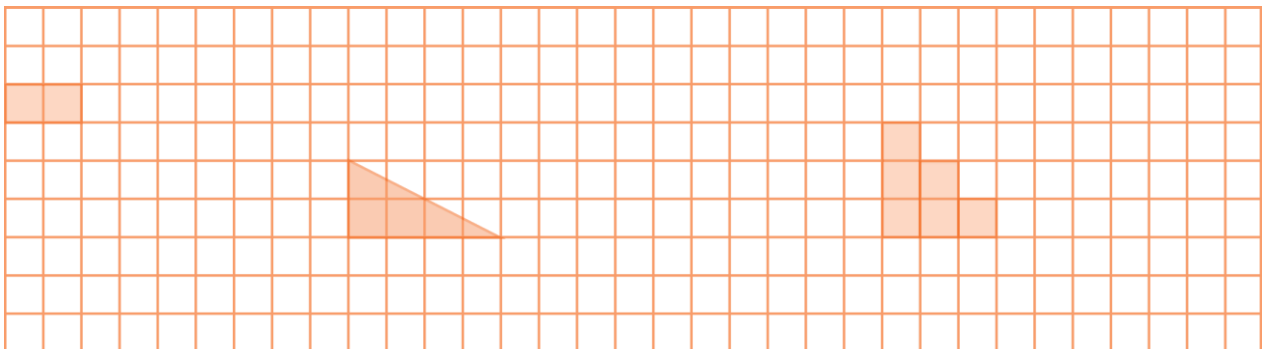


6. Complete these enlargements using the given scale factor.

a. Scale factor = 3

b. Scale factor = 2

c. Scale factor = 2



7. The distance from A to B is three times as far as from B to C. The distance from A to C is 80 kilometres. Calculate the distance from A to B.

A-B ..... km

**Resource 3 – scale factors**

8. An apple and blackberry pie requires three times as much apple than blackberry. The total weight of apples and blackberries in the pie is 220 grams. How much apple is there in the pie?

..... g

9. A scale drawing is made of a local park. 1 cm on the drawing represents 20 metres on the ground. One path is 7cm long on the drawing. What is the actual length?

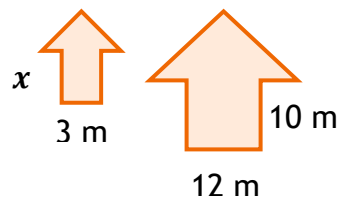
..... m

10. Find the lengths of the side marked  $x$  in these similar shapes.

a.  $x$  .....



b.  $x$  .....

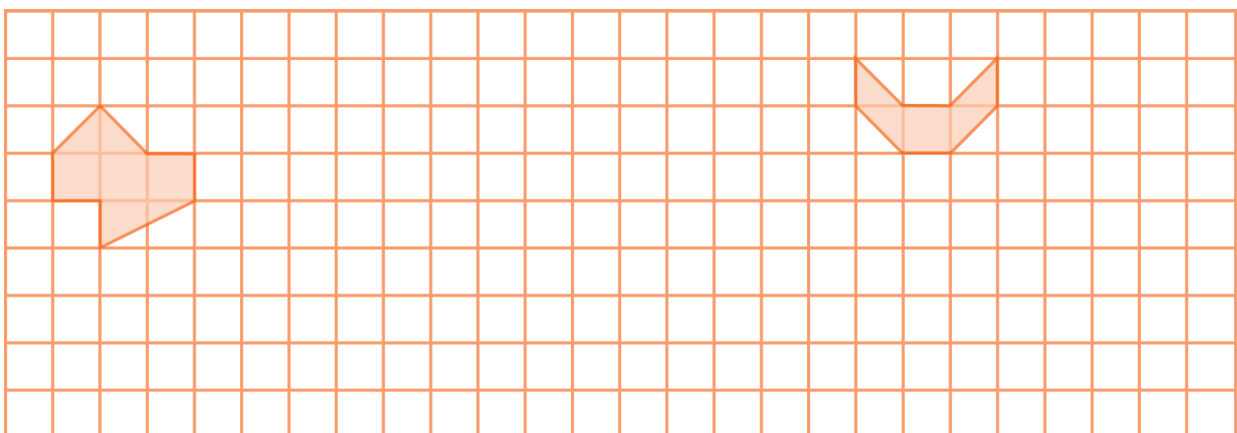


**Challenge**

1. Complete the following enlargements.

a. Scale factor = 2

b. Scale factor = 3



In this task, you will:

- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-9. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>Joe is 14 years older than Marie. Their combined age is 40 years old in total. How old is Joe?</p> <p><b>Answer</b>                      Take off Joe's extra 14 years, so <math>40 - 14 = 26</math>                      If Joe and Marie now add to 26, then <math>Marie = 26 \div 2 = 13</math>                      So Joe = <math>13 + 14 = 27</math> years old</p>	<p>Mr. Tobin spends <math>\frac{2}{5}</math> of her money shopping at a supermarket. She now has £24 left. How much did she have to start with?</p> <p><b>Answer</b>                      Is she spends <math>\frac{2}{5}</math>, then she has <math>1 - \frac{2}{5} = \frac{3}{5}</math> left.                      If <math>\frac{3}{5}</math>, or 3 parts = £24,                      Then <math>\frac{1}{5}</math>, or 1 part = <math>£24 \div 3 = £8</math>                      So <math>\frac{5}{5}</math>, or 5 parts (whole) = <math>5 \times £8 = £40</math></p>

1. Erica and Joseph have some marbles. Erica has 8 more marbles than Joseph. If they have 34 marbles together, how many marbles does Erica have?

..... marbles

2. A 16 metre length of string is cut into two pieces. One piece is 6 metres longer than the other, what is the length of the smaller piece of string?

The smaller length is .....

3. There are 33 oranges in a box. Beth and Clive share them out. For every two that Beth gets, Clive gets one. How many oranges do they each get?

Beth ..... , Clive .....

4. A bag contains red and blue balls. Three-quarters of the balls are blue and there are five red balls. How many balls are there altogether?

..... balls

5. Here is a recipe to make pancakes.  
 a. Julie has 60 grams of flour. How many pancakes can she make?

..... pancakes



- b. Ben has 100 ml of milk. How much flour will he need?

..... grams of flour

6. Alex and Keith are playing Top Trumps. There are 32 cards in a pack. At the end of a game, Alex wins with 6 more cards than Keith. How many cards did Alex end up with?

Alex had ..... cards

## Resource 4 – unequal sharing

7. Thomas has a bag of sweets. He gives 5 sweets to his friend and eats one third of the remainder himself. If he has 16 sweets left, how many sweets were there in the bag at the start?

..... sweets

8. A teaching assistant is checking the quality of coloured pencils. She finds that  $\frac{5}{8}$  of the pencils are good but throws away 42 pencils. How many pencils did she check?

..... pencils

9. Hens can lay eggs in three sizes: small, medium and large.  $\frac{2}{3}$  of the eggs laid are medium and the remaining eggs are equally small or large. If 8 of the eggs laid during one week are small, how many eggs were laid altogether?

..... eggs

### Challenge

1. A DIY shop stocks three popular colours of paint: blue, red and white. The owner likes to keep between 175 and 185 tins of paint.  $\frac{2}{9}$  of the paint is blue. For every two tins of blue there are three tins of red. How many tins of each colour will he have in stock?

blue ..... , red ..... , white .....

---

**Section 3:**

**Algebra**



## In this task, you will:

- use simple formulae.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>An electrician charges £25 per hour plus a call-out fee of £30.</p> <p>a. Using <math>T</math> for the total cost and <math>H</math> for the hours worked, write a formula for the cost of calling out the electrician.</p> <p>b. How much did he charge for 4 hours of work?</p> <p><b>Answer</b></p> <p>a. Total cost = £30 + 25 × number of hours Formula, <math>T = 30 + 25 \times H</math> <math>T = 30 + 25H</math></p> <p>b. Let <math>H = 4</math>; <math>T = 30 + 25 \times 4</math> <math>= 30 + 100 = £130</math></p>	<p>Alicia is <math>b</math> years of age. Bruce is five years older than Alicia.</p> <p>a. Write an expression for Bruce's age.</p> <p>b. Their total age comes to 37 years old. Write an equation in terms of <math>b</math> and find Bruce's age.</p> <p><b>Answer</b></p> <p>a. '5 more' means add 5. Bruce is '<math>b + 5</math>' years of age.</p> <p>b. Alicia + Bruce = 37 <math>b + b + 5 = 37</math> <math>2b + 5 = 37</math> ... '- 5' from both sides <math>2b = 32</math>... '÷ 2' <math>b = 16</math></p> <p>So, Bruce is <math>b + 5 = 16 + 5 = 21</math> years old.</p>

1. If  $p$  has the value of 7, find the value of the following expressions:

a.  $3p$

.....

b.  $11 - p$

.....

c.  $2p + 5$

.....

d.  $20 - 2p$

.....

2. The formula for working out the perimeter of a parallelogram is  $p = 2l + 2h$ . Work out the perimeter when:

a.  $l = 5$  and  $h = 4$

.....

b.  $l = 9$  and  $h = 3$


.....

c.  $l = 1.5$  and  $h = 2.5$

.....

3. The cost of producing a box of rulers is worked out as follows:

Cost = number of rulers  $\times$  11 pence + 15 pence for the box.

..... pence 

4. Crisps cost 25 pence a bag. Write down the formula for the total cost (C) of buying any number of bags. Use your formula to calculate the cost of six bags.

C = ..... , £ .....

5. A plumber charges £30 an hour plus a £40 fee for turning up.

- a. Write a formula for the total cost of calling a plumber out. Use T to stand for the total cost in pounds and H for each hour worked.

..... 

- b. Work out the charge for 4 hours' work.

£ .....

6. If  $a$  has the value of 3 and  $b$  has the value of 4, find the following:

- |              |              |              |         |
|--------------|--------------|--------------|---------|
| a. $3a + 2b$ | b. $3a - 2b$ | c. $5a - 3b$ | d. $ab$ |
| .....        | .....        | .....        | .....   |

7. The formula to work out the charges (in pence) a taxi driver makes  $T = 80 + 50 \times M$   
What would the taxi driver charge if a passenger travelled 7 miles?

£ .....

8. A chicken requires 45 minutes cooking time per kg, plus an extra 30 minutes.  
 a. Write a formula for the cooking time.

.....

- b. How long would a large 4 kg chicken take to cook? Give your answer in hours and minutes?

..... hours , ..... minutes

- c. A medium chicken took 2 hours (120 minutes) to cook. What was the weight of the chicken in kilograms?

..... kg

### Challenge

1. Two pizza shops advertise the following payments for deliveries.


**Peppa's**

£2 for each pizza delivered



**Salty's**

Charge =  $5 + 0.5 \times N$  (N is number of pizzas)



- a. Mrs Jacques wants to order three pizzas. Which shop should she choose?

.....

- b. Mr Jones paid £9 for the delivery of several pizzas for his son's party from Salty's shop. How much would it have cost if he had bought the same number of pizzas from Peppa's?

£.....

In this task, you will:

- generate and describe linear number sequences.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-7. If you're raring to go, try the challenge too!

Example 1

Find the missing number in each sequence and write down the rule.

- a. 8 16 ..... 32 ..... 48  
 b. 71 ..... 59 ..... 41

Answer

- a.  $16 - 8 = 8$ . So we 'add 8' each time.  
 8 16 24 32 40 48  
 b.  $71 - 59 = 12$  (for two jumps).  
 So for 1 jump,  $12 \div 2 = 6$ .  
 We 'subtract 6' each time.  
 71 65 59 53 47 41

Example 2

Complete the table for the matchstick sequence below.



Shape	1	2	3	4	10	20
Number	5	9				
Rule						

Answer

The pattern goes up in 4s (+4 each time). This means that the rule has 'x4' in it. For the first shape  $1 \times 4 = 4$ . To get '5' we need to add 1... rule is  $\dots \times 4 + 1$ .  
 $10^{\text{th}}$  shape =  $10 \times 4 + 1 = 40 + 1 = 41$   
 $20^{\text{th}}$  shape =  $20 \times 4 + 1 = 80 + 1 = 81$  (not 82)

1. Write in the missing numbers to complete the following sequences.

- a. 1, 4, ....., 10, ....., .....,      b. 4, 10, ....., ....., 28, ..... ,  
 c. 2, ....., 14, 20, ....., .....,      d. 30, ....., 22, ....., ....., .....

2. The rule for a sequence is given by:



If the first term is calculated by  $1 \times 4 - 3 = 4 - 3 = 1$ , complete the next four terms:

1, ....., ....., ....., .....

## Resource 2: generate and describe linear number sequences

3. Write in the missing numbers to complete the following sequences.

a.

In	Function	Out
2	$\times 5 - 2$	
5		
		18
		33

b.

In	Function	Out
4	$\div 2 + 3$	
8		
		8
		18

4. Write in the missing numbers to complete the following sequences.

Position of number	1	2	3	4	20
Rule	.....				
Number sequence	7	10	13	16	.....

5. Write in the missing numbers to complete the following sequences.

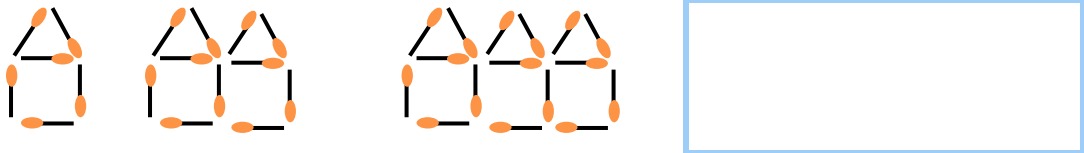
Rule	$\times 7 - 5$				
In	4	6	.....	9	.....
Out	.....	.....	9	.....	51

6. Write in the missing numbers to complete the following sequences.

- a. 7, ....., ....., 25                      b. 10, ....., ....., 46
- c. 3, ....., ....., ....., 27

7. Look at this matchstick sequence.

a. Draw a shape in the pattern (containing 4 'houses').



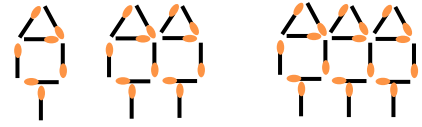
b. Complete the table:

Number of houses	1	2	3	4
Number of matchsticks	6	.....	.....	.....
Rule	.....			

### Challenge

1. Look at this matchstick sequence.

- a. Write down the rule for the sequence.  
Use M for matchsticks and N for the term number.



- b. Louise has 50 matchsticks. Will she be able to use all of these to make a pattern of complete houses in the above pattern or will she have any spare? Explain your reasoning.

.....

.....

.....

.....

.....

.....

In this task, you will:

- express missing number problems algebraically.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-11. If you're raring to go, try the challenge too!

Example 1	Example 2																					
<p>Fill in the missing numbers.                      a. <input type="text"/> + 7 = 12    b. <math>2 \times</math> <input type="text"/> - 9 = 7</p> <p><b>Answer</b>                      We can use inverse operations                      +/- and <math>\times/\div</math> act as opposites.                      a. <math>12 - 7 = 5</math>                      b. <math>7 + 9 = 16</math> ... so <math>2 \times</math> <input type="text"/> = 16 then                         <input type="text"/> = <math>16 \div 2 = 8</math></p> <hr style="border-top: 1px dashed #ADD8E6;"/> <p>Let <math>x</math> be the unknown.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>\rightarrow</math></td> <td style="border: 1px solid #ADD8E6; padding: 5px;"><math>\times 2</math></td> <td style="padding: 5px;"><math>\rightarrow</math></td> <td style="border: 1px solid #ADD8E6; padding: 5px;"><math>- 9</math></td> <td style="padding: 5px;"><math>\rightarrow</math></td> <td style="padding: 5px;">7</td> </tr> <tr> <td></td> <td style="padding: 5px;"><math>\leftarrow</math></td> <td style="border: 1px solid #ADD8E6; padding: 5px;"><math>\div 2</math></td> <td style="padding: 5px;"><math>\leftarrow</math></td> <td style="border: 1px solid #ADD8E6; padding: 5px;"><math>+ 9</math></td> <td style="padding: 5px;"><math>\leftarrow</math></td> <td style="padding: 5px;">7</td> </tr> <tr> <td style="padding: 5px;">8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="padding: 5px;">16</td> </tr> </table>	$x$	$\rightarrow$	$\times 2$	$\rightarrow$	$- 9$	$\rightarrow$	7		$\leftarrow$	$\div 2$	$\leftarrow$	$+ 9$	$\leftarrow$	7	8						16	<p>An online shop sells t-shirts for £9 and charges £4 for delivery. The shop calculates the total cost using the formula <math>C = 9n + 4</math>, where <math>n</math> is the number of t-shirts per order.</p> <p>a. Find the cost of buying eight t-shirts.                      b. Fiona paid £112 for some t-shirts. How many did she buy?</p> <p><b>Answer</b>                      a. For 8 t-shirts, <math>C = 9 \times 8 + 4 = 72 + 4 = \text{£}76</math>                      b. For £112 spent, <math>9n + 4 = 112</math> ... '-4' ...                         <math>9n = 108</math> ... '<math>\div 9</math>'                         <math>n = 12</math>                      Fiona paid £112 for 12 t-shirts</p>
$x$	$\rightarrow$	$\times 2$	$\rightarrow$	$- 9$	$\rightarrow$	7																
	$\leftarrow$	$\div 2$	$\leftarrow$	$+ 9$	$\leftarrow$	7																
8						16																

1. Find the missing numbers:

- a. .... - 11 = 23      b.  $25 -$  ..... = 13      c.  $3 \times$  ..... + 5 = 14

2. Find the value of the letters in the following equations:

- a.  $p + 17 = 30$                       b.  $5q - 7 = 13$                       c.  $2r + 3 = 35$
- $p =$  .....                       $q =$  .....                       $r =$  .....

3. A taxi driver charges a £3 pick-up fee and then £2 per mile. Circle the formula that he uses to calculate the cost of a journey.

- $3m + 2$ 
 $2m - 3$ 
 $3m - 2$ 
 $2m + 3$

### Resource 3: express missing number problems algebraically

4. The letter  $f$  is 7 less than the letter  $g$ .

Write two equations that show the relationship between  $f$  and  $g$ .

$$\dots\dots\dots = \dots\dots\dots$$

$$\dots\dots\dots = \dots\dots\dots$$

5. By solving this multiplication table, find the values of  $a$ ,  $b$ ,  $c$  and  $d$ .

$\times$	$a$	$b$
4	28	36
$c$	$d$	27

$$a = \dots\dots, b = \dots\dots, c = \dots\dots, d = \dots\dots$$

6. Robert thinks of a number. He multiplies it by 7 and subtracts 5. He ends up with 23. What number did he start with?

$$\dots\dots\dots$$

Number = ...

7. Five cauliflowers cost £2. If three cauliflowers and one broccoli cost £1.50, find the cost of two broccoli.

$$\dots\dots\dots$$

..... pence

8. a. If  $t = 15$ , find the value of  $3t - 20$ .

$$\dots\dots\dots$$

- b. Find the value of  $d$  when  $20 - 3d = 8$

$$\dots\dots\dots$$

9. Solve these equations by finding the value of  $x$ :

a.  $2x + 5 = 23$

$$x = \dots\dots\dots$$

b.  $7x - 12 = 30$

$$x = \dots\dots\dots$$



**Resource 3:** express missing number problems algebraically

10. Eric thinks of a number. He doubles it, adds 7 and multiplies that result by 5. He ends up with 75. What number did Eric first think of?

.....

11. Joe and Ted think of the same number. Joe adds 15 to the number. Ted multiplies the number by 4. They both get the same answer. What was the original number?

.....

**Challenge**

1. Here are two equations:

$$z = 3y + 5$$

$$x = 30 - z$$

If the value of  $y$  is 6, find the value of  $x$ .

$x =$  .....

## In this task, you will:

- find pairs of numbers that satisfy an equation with two unknowns
- enumerate possibilities of combinations of two variables.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2	Example 3
<p>Two numbers add up to 28. Both numbers are less than 20. What could they be?</p> <p><b>Answer</b>  <math>x + y = 28</math>            Start with <math>19 + 9 = 28</math>  <math>18 + 10 = 28</math>  <math>17 + 11 = 28</math>  <math>16 + 12 = 28</math>  <math>15 + 13 = 28</math>  <math>14 + 14 = 28 \dots</math>            then repeats ...</p>	<p>If <math>5m - 3n = 14</math>, find</p> <p>a. the value of <math>n</math> when <math>m = 4</math>            b. the value of <math>m</math> when <math>n = 7</math></p> <p><b>Answer</b>            a. <math>5 \times 4 - 3n = 14</math>  <math>20 - 3n = 14</math> (<math>20 - 14</math>)  <math>3n = 6</math> (<math>6 \div 3</math>)  <math>n = 2</math>            b. <math>5m - 3 \times 7 = 14</math>  <math>5m - 21 = 14</math> (<math>14 + 21</math>)  <math>5m = 35</math> (<math>35 \div 5</math>)  <math>m = 7</math></p>	<p>Find two solutions to <math>6c - 5d = 19</math></p> <p><b>Answer</b>            Build tables for <math>6c</math> and <math>5d</math>:  <math>6c</math>: 6, 12, 18, 24, 30, 36, 42, 48, ...  <math>5d</math>: 5, 10, 15, 20, 25, 30, 35, 40, ...            The first one is <math>24 - 5 = 19</math> where <math>c = 4</math>, <math>d = 1</math>.            The second one is <math>54 - 35 = 19</math> where <math>c = 9</math>, <math>d = 7</math>.</p>

1. Two numbers add to give 12. Write down all the possible numbers.

2. Find all the possible solutions to the following equations:

a.  $x + y = 10$

b.  $x - y = 5$  (both numbers positive and less than 10)

3. Fill in the gaps for each of these equations:

a.  $x + y = 12$

b.  $4x + y = 20$

i.  $x = 5, y = \dots\dots\dots$

i.  $x = 3, y = \dots\dots\dots$

ii.  $x = \dots\dots\dots, y = 9$

ii.  $x = \dots\dots\dots, y = 12$

4. In the equation,  $4p = q$ , both  $p$  and  $q$  are whole numbers less than 30. Write down all the possible solutions for the equation.

Build up the 4 times table:							
q	1	2					
p	4	8					

5. If  $3g - 2h = 7$ , find the value of:

a.  $g$  when  $h = 4$   $g = \dots\dots\dots$

b.  $h$  when  $g = 7$   $h = \dots\dots\dots$

6. Write down 2 possible solutions to the following:

a.  $4x + 3y = 30$

b.  $4x - 3y = 12$

.....  
.....

.....  
.....

7. Write down four possible pairs of numbers for the equation  $3s - 5 = t$ .

$s = \dots\dots\dots, t = \dots\dots\dots$	$s = \dots\dots\dots, t = \dots\dots\dots$
$s = \dots\dots\dots, t = \dots\dots\dots$	$s = \dots\dots\dots, t = \dots\dots\dots$

8. In the equation,  $3e - 2f = 4$ , both numbers  $e$  and  $f$  are less than 12. Find all the possible pairs of  $e$  and  $f$  that satisfy this equation:

### Challenge

1. Find one solution that is true for the pairs of equations.

a.  $r + s = 16, \quad r - s = 6$

b.  $v + w = 7, \quad 3v + 2w = 16$

$r = \dots\dots\dots \quad s = \dots\dots\dots$

$r = \dots\dots\dots \quad s = \dots\dots\dots$

---

**Section 4:**

**Measurement**

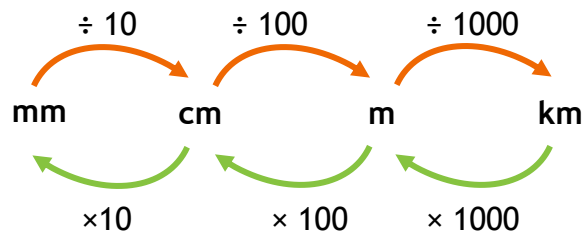
In this task, you will:

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit to a larger unit, and vice versa, using decimals up to three decimal places.

Look at the examples and answer the questions. If you are anxious, try questions 1-8. If you're feeling confident, try questions 1-11. If you're raring to go, try the challenge too!

Example

Remember the following:



One tin of baked beans weighs 425 g. Tins are sold in packs of 4. How much do 3 packs weigh? Give your answer in kg.

Answer

3 packs of 4 = 12 tins of beans. So 12 tins weigh  $12 \times 425$  g.

Now  $12 \times 425$  g = 5100 g.

Since 1 kg = 1000g, then  $5100$  g =  $5100 \div 1000$  kg = **5.1kg**

	4	2	5
×		1	2
	8	5 <sub>1</sub>	0
4	2	5	0
5 <sub>1</sub>	1 <sub>1</sub>	0	0

## Resource 1: solve problems involving units of measure

1. Convert the following metric units:

- |                  |   |       |                  |   |       |
|------------------|---|-------|------------------|---|-------|
| a. 4.5 km to m   | → | ..... | b. 3.6 m to cm   | → | ..... |
| c. 3.45 kg to g  | → | ..... | d. 0.85 cm to mm | → | ..... |
| e. 1.375 l to ml | → | ..... | f. 3250 g to kg  | → | ..... |
| g. 65 cm to m    | → | ..... | h. 875 m to km   | → | ..... |

2. Isa walks 273 m to school five days a week. She returns home the same way. How far does she walk altogether in one week of school? Give your answer in kilometres.

3. Julie fills cups with juice for a party. Each cup can hold 295 ml of juice. If she fills 20 cups, how much juice does she need in litres?

4. A small parcel weighs 145 grams. How much do nine parcels weigh in kilograms?

5. If I swim 200 metres each day. How many days will it take me to swim the equivalent of 3 kilometres?



## Resource 1: solve problems involving units of measure

6. How many weeks and days is 53 days equal to?

7. A film at the cinema lasts for 1 hour and 40 minutes. If the film starts at a quarter to two in the afternoon, at what time did it finish?

8. A pencil weighs 11 g .A box for 12 pencils weighs 15 g. Calculate the weight of 10 boxes of 12 pencils. Give your answer in kilograms.

9. Mandy has a 1 litre carton of orange juice. She fills five glasses with it. She puts 160ml of juice in each glass. How much juice does she have left?

10. Paula walks 4.62 km during a week, Kate walks  $4\frac{3}{4}$  km and Alex walks 4560 m.  
a. Who walks the furthest?

.....

- b. How far do they walk in total?

..... km



## Resource 1: solve problems involving units of measure

11. There are 24 screws in a small pack. Each screw weighs 7 g.

a. How much do 30 packs weigh in kilograms?

.....

b. How many packs would Tim need to buy if he wanted  $\frac{1}{2}$  kg of screws?

..... packs

### Challenge

1. A shop sells cartons of juice using the following offers:

**Offer A**  
One litre costs 79 pence

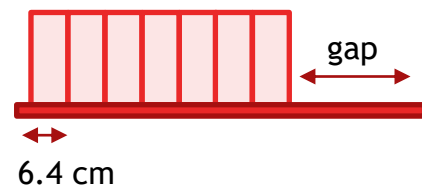
**Offer B**  
A pack of eight 300ml  
cartons for £2



Thelma wants to buy 9 litres of juice for a party. Which offer should she use to buy her juice?

Offer .....

2. Seven identical books are placed on a shelf which is half a metre long. If each book is 6.4 cm in width, what is the gap left on the end? Give your answer in millimetres.



..... millimetres

In this task, you will:

- convert between miles and kilometres.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-7. If you're raring to go, try the challenge too!

Example

5 miles = 8 kilometres

a. Convert 13 miles into kilometres.

b. Convert 100 km into miles.

Answers

- a. 5 miles = 8 km ( $\div 5$ )  
 1 mile = 1.6 km ( $\times 8$ )  
 13 miles = 12.8 km

		1	6	0
4	)	8	0	0

		1	6
$\times$			8
	1	2	8

- b. 8 km = 5 miles ( $\div 8$ )  
 1 km = 0.625 miles ( $\times 100$ )  
 100 km = 62.5 miles

		0	6	2	5
8	)	5	50	20	40

1. Convert the following distances into kilometres:

a. 10 miles

b. 25 miles

c. 3 miles

.....

.....

.....

2. Convert the following distances into miles:

a. 24 km

b. 56 km

c. 10 km

.....

.....

.....

3. Complete the following table:

Distance in miles	Distance in km
15 miles	
	32 km
	200 km
18 miles	
100 miles	
	3.6 km

4. Complete the following:

- a. 1 mile = ..... km      b. 9 miles = ..... km      c. 27 miles = ..... km  
 d. 8 km = ..... miles      e. 20 km = ..... miles      f. 52 km = ..... miles

5. In the UK, the maximum speed limit on motorways is 70 mph. In Spain, the maximum speed limit is 130 km/h. Which country has the higher speed limit?

.....

6. David ran 4.5 miles. Jenny ran 7 km. Who ran further and by how much?

..... km

## Resource 2: convert between miles and kilometers

7. Michael wants to complete 100 miles over three days. On day one, he cycles 50 km. On day two, he cycles 10 miles less than he did on day one. How far does he have to cycle on the third day?

.....

### Challenge

1. Two runners look at how fast they can run. Alisa can run at 7 miles per hour. Jasmine can run at 3 metres per second. Who runs faster?

You may need to know: **1 hour = 3600 seconds.**

.....

2. Mr Rushton wants to compare the hire costs of two cars in two different countries. He needs to travel **360 miles**. Which country represents the better value?

The table shows you the individual costs. You will need to know: **1 gallon = 4.5 litres**

England	Germany
40 miles to the gallon £1.20 per litre of petrol	16 kilometres to the litre £6 per gallon of petrol

.....



In this task, you will:

- recognise that shapes with the same areas can have different perimeters and vice versa.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenge too!

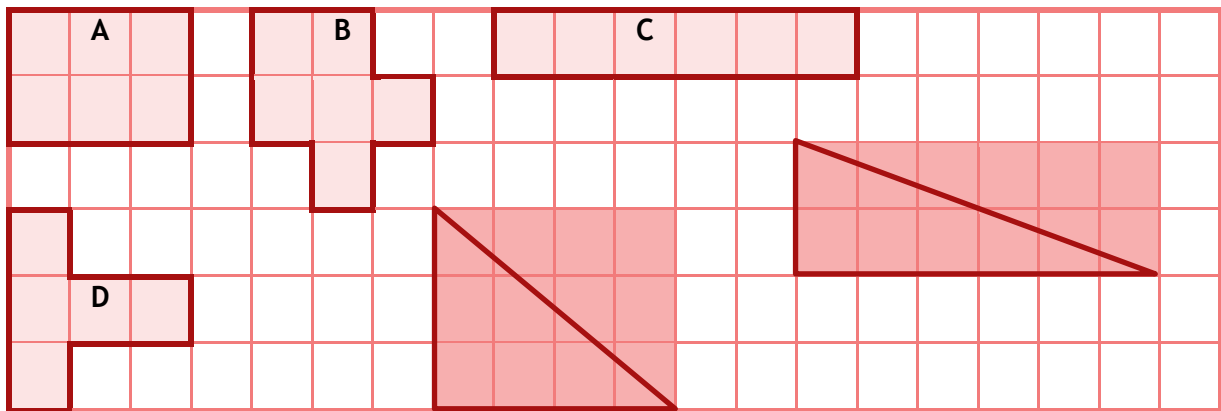
Example

Remember: Area = length x width or  $a = l \times w$



Perimeter = 2 x length and 2 x width or  $P = 2l + 2w$

The grid below contains four shapes.



- Which shapes have the same perimeter? .....
- Which shape has a different area to the others? .....
- Draw a triangle with the same area as rectangle C.

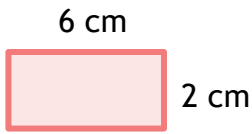
Answers

	A	B	C	D
Perimeter	10 cm	12 cm	14 cm	12 cm
Area	6 cm <sup>2</sup>	6 cm <sup>2</sup>	6 cm <sup>2</sup>	5 cm <sup>2</sup>

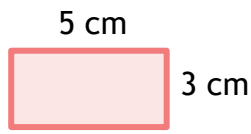
- Shapes B and D have the same perimeter of 12 cm. Shape D has a different area of 5 cm<sup>2</sup>.
- For a triangle with an area of 6 cm<sup>2</sup>, we have to think of cutting a rectangle with an area of 12 cm<sup>2</sup> in half. This could be: 12×1; or 6×2 and 4×3 as shown by the shaded diagrams above.

1. Write down the area and perimeter of the following rectangles.

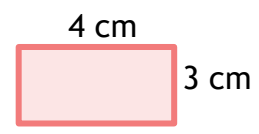
a.



b.

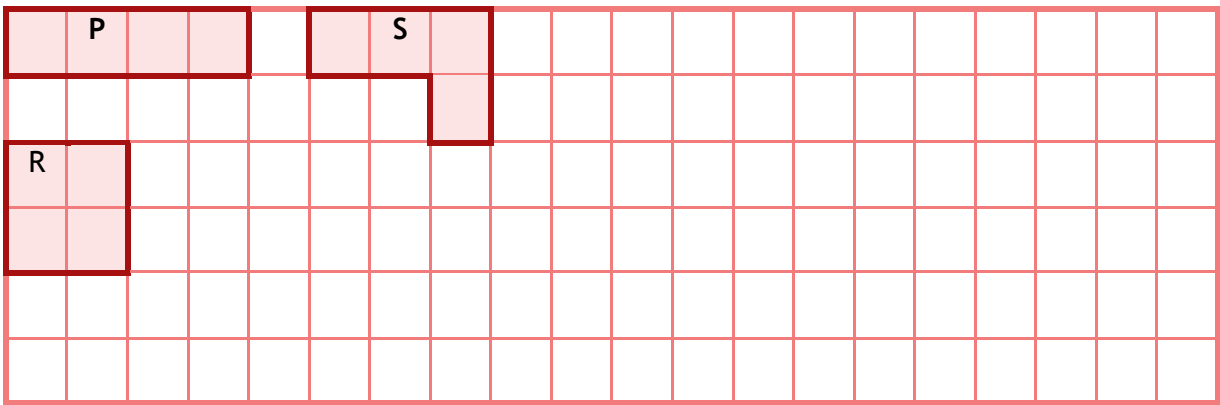


c.



.....	.....	.....
-------	-------	-------

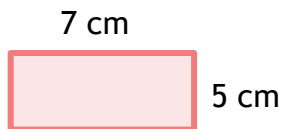
2. Look at the shapes in the grid below.



- a. Which two shapes have the same perimeter?.....
- b. Draw a shape with a perimeter of 6 cm, Find the area. . .....
- c. Draw a shape with an area of 6 cm<sup>2</sup>. Find the perimeter. ....

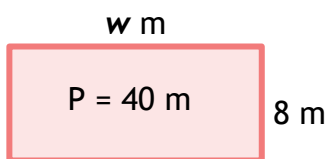
3. Use the formula to find:

a. The perimeter of the following rectangle:



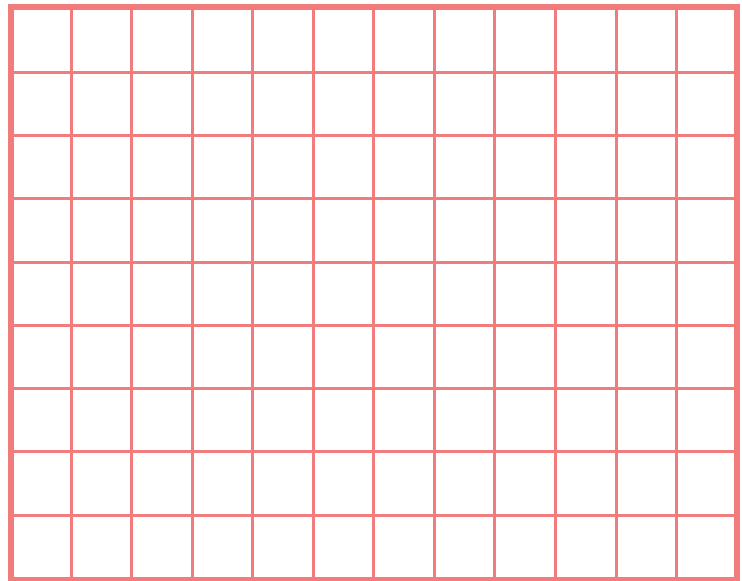
.....

b. Find the length if the perimeter = 40 m

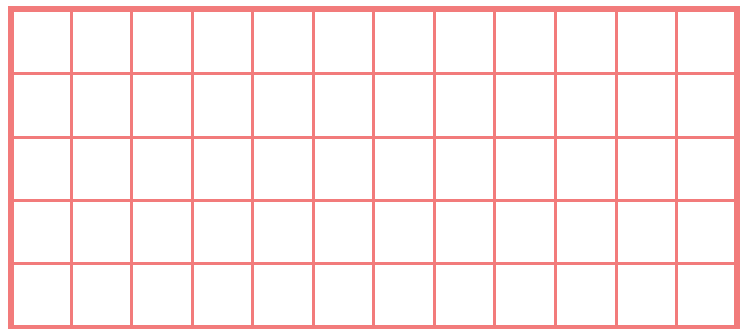


.....

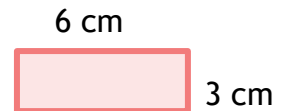
4. Use the grid opposite to draw:  
Two shapes with a perimeter of 10 cm, but with different areas.



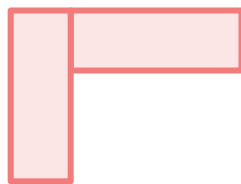
5. Use the grid opposite to draw:  
Two shapes where the perimeter is **twice** its area.



6. The following shapes are made by using rectangles measuring 6 cm by 3 cm.

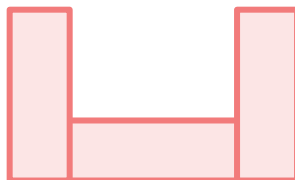


- a. Work out the perimeter of the following shape:



Perimeter:.....

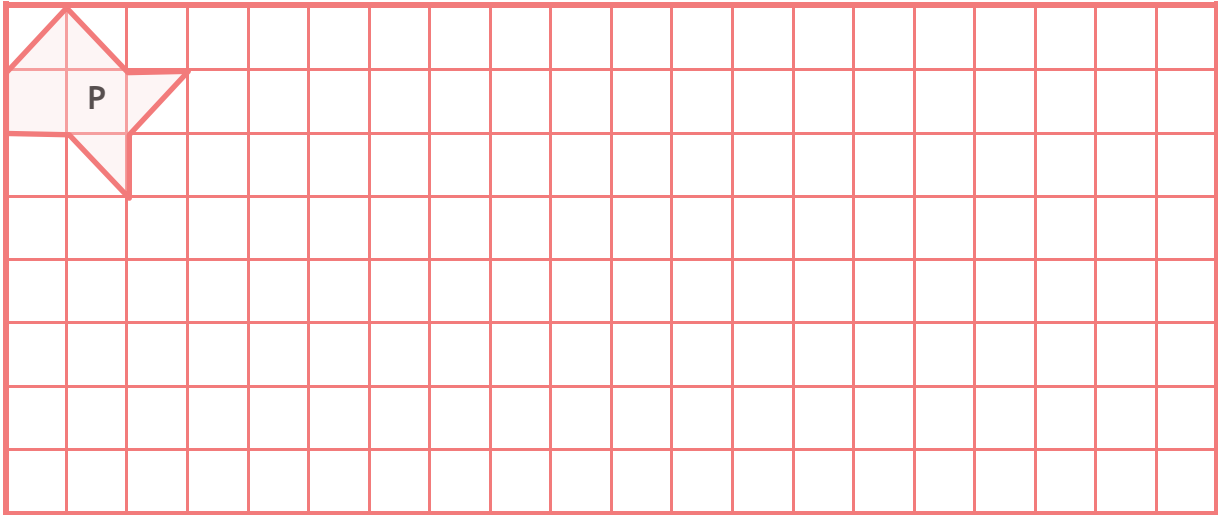
- b. Work out the perimeter of the following shape:



Perimeter:.....

## Challenge

1. Draw at least **three** shapes that have the same area and perimeter as shape P.
2. Draw **two** shapes which have a **smaller area** than P but have a **larger perimeter**.





In this task, you will:

- recognise when it is possible to use formulae for area and volume of shapes
- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>), and extending to other units.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenge too!

Example

Use the following formulae to find the volume and area of shapes

$$A = l \times w$$

$$P = l \times w \times h$$



A tank in the shape of a cuboid measures 30 cm by 30 cm by 9 cm. A leaky valve lets water out at a rate of 27 cm<sup>3</sup> every minute.

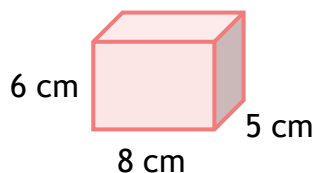
How long will it take to empty if the tank was half full?

Answer

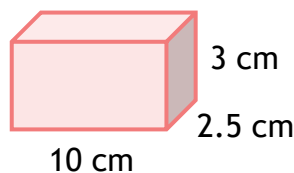
$$\begin{aligned} \text{Volume of water in tank} &= l \times w \times h \\ &= 30 \times 30 \times 9 \\ &= 8100 \text{ cm}^3 \\ \text{Time taken} &= 8100 \div 27 = 300 \text{ minutes} \\ &= 5 \text{ hours} \end{aligned}$$

1. Find the volume of the following cuboids:

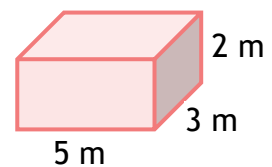
a.



b.



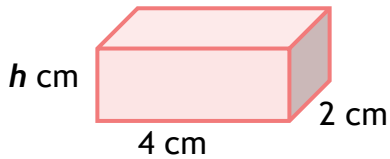
c.



.....	.....	.....
-------	-------	-------

**Resource 4:** use formula for area and volume of shapes

2. The volume of this cuboid is  $24 \text{ cm}^3$ . Calculate its height.

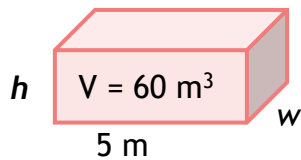


h = ..... cm

3. Find three different ways to make a cuboid with a volume of  $30 \text{ cm}^3$ .

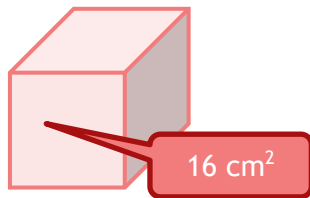
.....  
.....  
.....

4. A cuboid has a volume of  $60 \text{ m}^3$ .  
If the length of the cuboid is 5 metres, what could its width and height be?



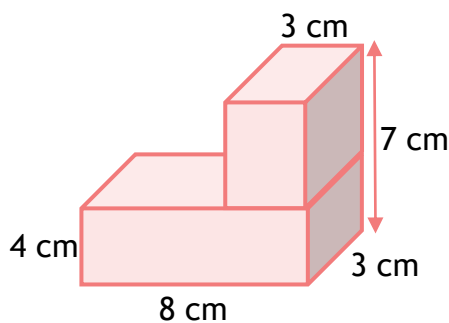
width = ..... m, height = .....m

5. One face of a cube has an area of  $16 \text{ cm}^2$ .  
What is the volume of the cube?



volume = .....  $\text{cm}^3$

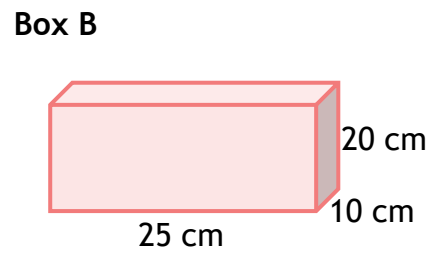
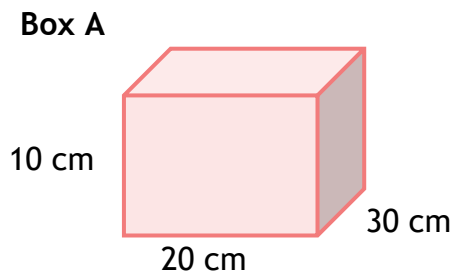
6. Find the volume of this shape. All dimensions are in centimetres.



volume = .....  $\text{cm}^3$

### Challenge

1. Calculate the volume of the following two boxes:



Box A volume.....

Box B volume .....

b. The two boxes are filled with water. Which box will hold the most water?

Box .....will collect most water.

**Resource 5:** calculate the area of parallelograms and triangles

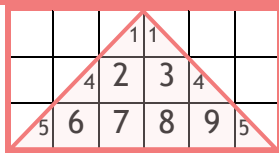
In this task, you will:

- calculate the area of parallelograms and triangles.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-9. If you're raring to go, try the challenge too!

**Example 1**

Look at this triangle.  
Work out its area by:



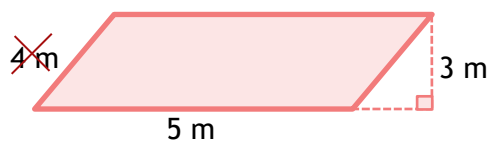
- Counting squares
- Using the formula.

**Answer**

- Numbering the squares including halves, the area is **9 square units**
- Area = base  $\times$  height  $\div$  2  
=  $6 \times 3 \div 2 = 18 \div 2 = 9 \text{ cm}^2$

**Example 2**

Calculate the area of this parallelogram.



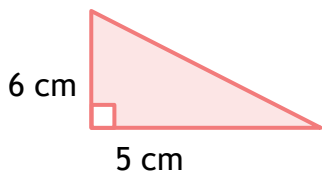
**Answer**

Remember **SNOTS** - *Say No To Slants*  
Area = base  $\times$  height =  $5 \times 3$   
=  **$15 \text{ m}^2$**

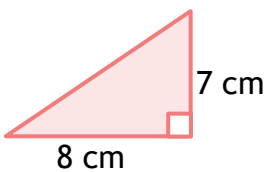
**SNOTS** works for all shapes with any sloping sides, remember to ignore them!

1. Find the areas of these triangles.

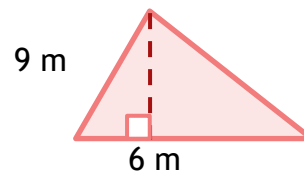
a.



b.

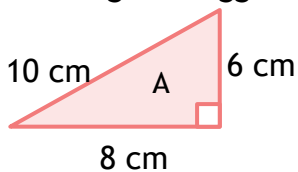


c.

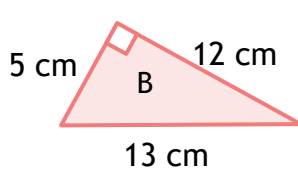


<p>.....</p> <p>.....</p> <p>..... cm<sup>3</sup></p>	<p>.....</p> <p>.....</p> <p>..... cm<sup>3</sup></p>	<p>.....</p> <p>.....</p> <p>..... cm<sup>3</sup></p>
---	---	---

2. Which triangle is bigger?



..... cm<sup>2</sup>



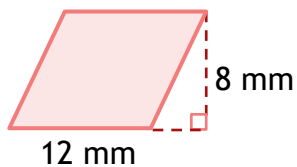
..... cm<sup>2</sup>

Triangle ..... is bigger.

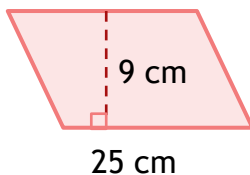
**Resource 5:** calculate the area of parallelograms and triangles

3. Find the areas of these triangles.

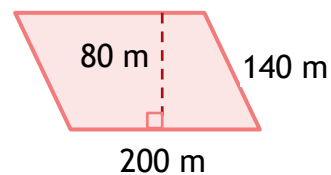
a.



b.

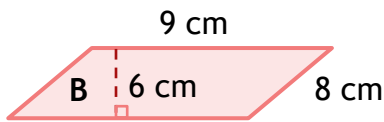
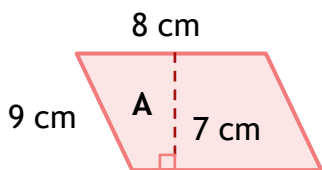


c.



.....	.....	.....
-------	-------	-------

4. Which parallelogram is the smaller?



..... cm<sup>2</sup>

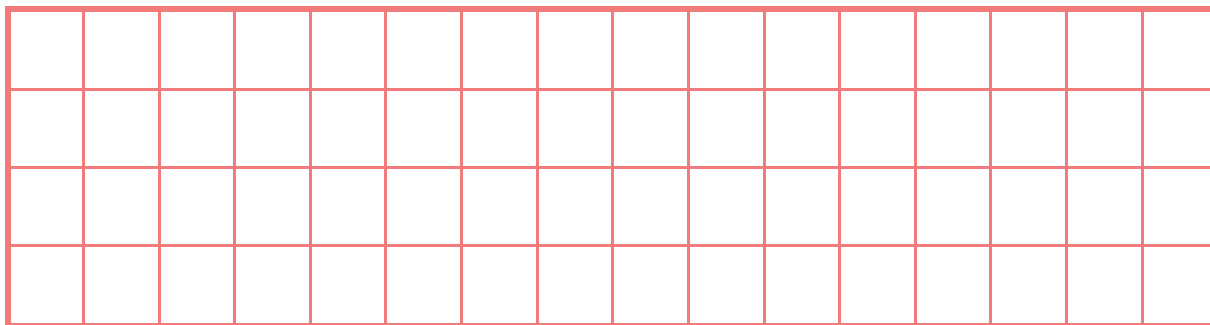
..... cm<sup>2</sup>

Parallelogram .... is smaller.

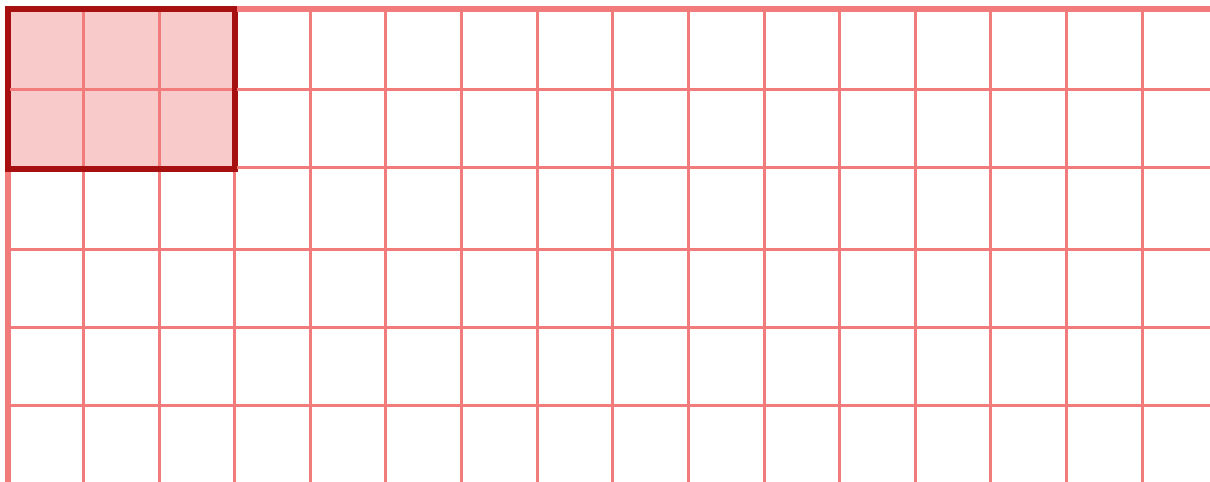
5. On the grid below draw the following shapes with an area of 4 square units:

a. Triangle

b. Parallelogram

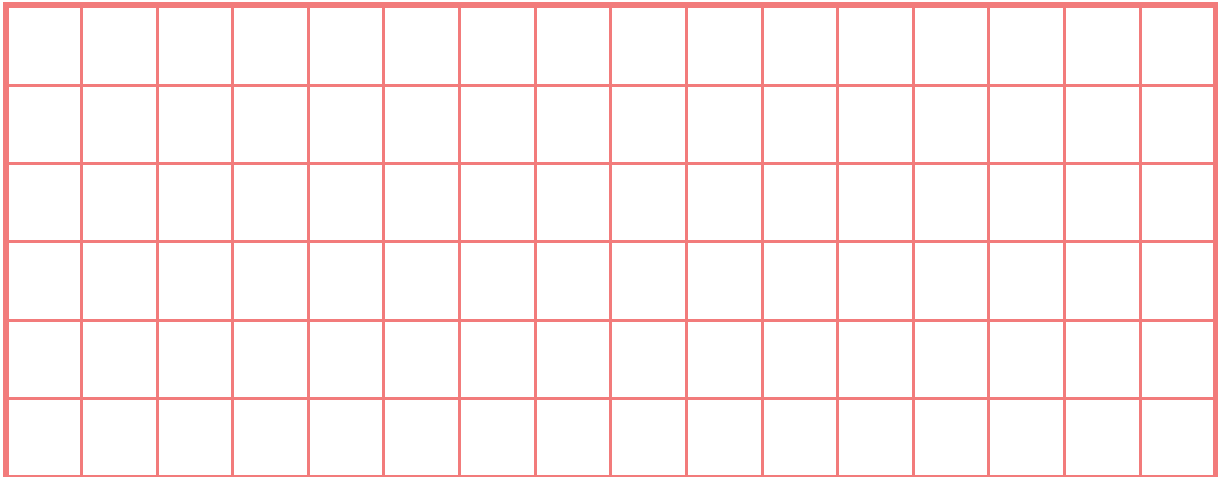


6. Draw two different triangles which have same area as the rectangle below:

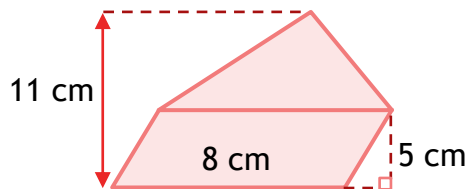


**Resource 5:** calculate the area of parallelograms and triangles

7. On the grid below, draw a parallelogram with an area of  $16 \text{ cm}^2$ .

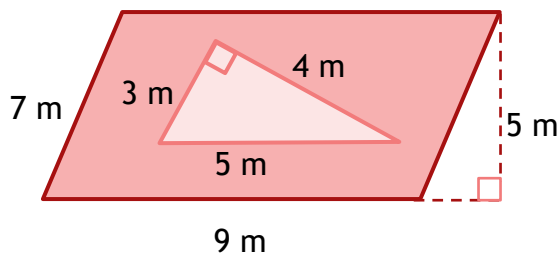


8. Find the area of the following shape.



.....

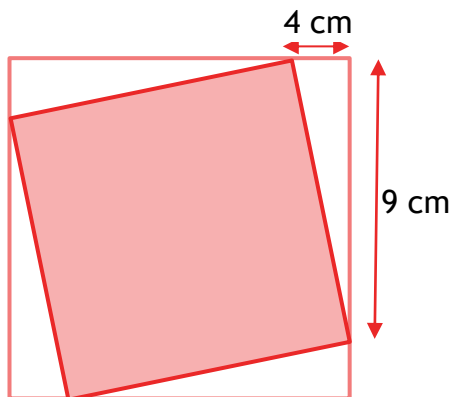
9. Work out the shaded area.



.....

**Challenge**

1. A larger square has a smaller (shaded) square drawn inside it, as in the diagram.  
 a. Calculate the area of the larger square.



Area .....

---


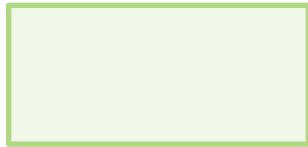
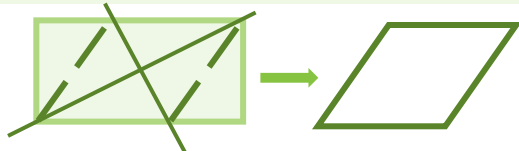
**Section 5:**

**Geometry**

In this task, you will:

- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit to a larger unit, and vice versa, using decimals up to three decimal places.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1	Example 2
<p>Find the size of the obtuse angle in a parallelogram if two opposite angles are <math>65^\circ</math>.</p> 	<p>Take this rectangle. Draw two straight lines to make a rhombus.</p> 
<p><b>Answer</b>                      Opposite angles are equal and all four angles add up to <math>360^\circ</math>.                      So far, <math>65^\circ + 65^\circ = 130^\circ</math>.  <math>360^\circ - 130^\circ = 230^\circ</math>                      Obtuse angle = <math>230^\circ \div 2 = 115^\circ</math></p>	<p><b>Answer</b></p>  <p>Remember all the sides are equal. The bold lines represent diagonals that cut at right angles.</p>

1. One angle in a parallelogram is  $72^\circ$ . Find the size of the other angle.

.....<sup>0</sup>

2. One angle in an isosceles triangle is  $50^\circ$ . Find the size of the other angles.

.....<sup>0</sup>, .....<sup>0</sup>



### Resource 1 – draw, compare and classify 2D shapes

3. Here are five triangles. Write down the letter of each triangle that has a right angle.

a.



b.



c.



d.

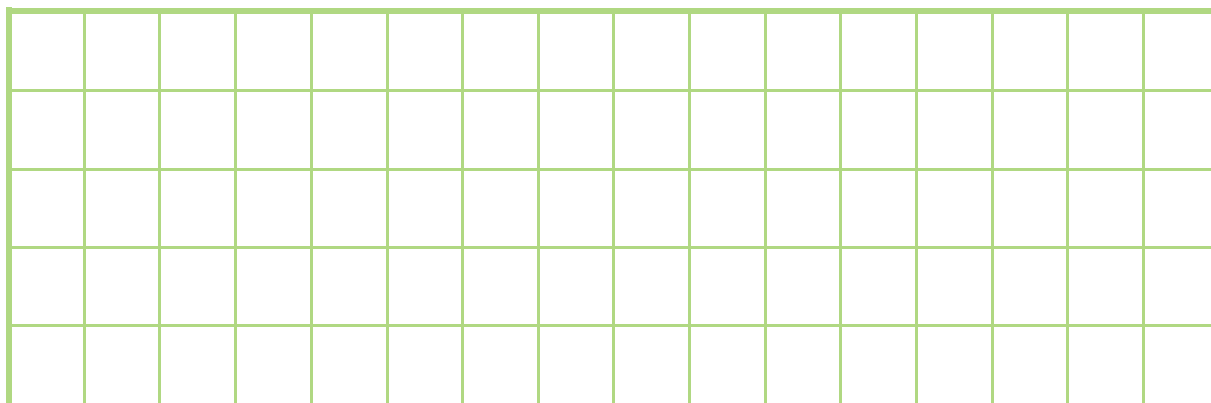


e.

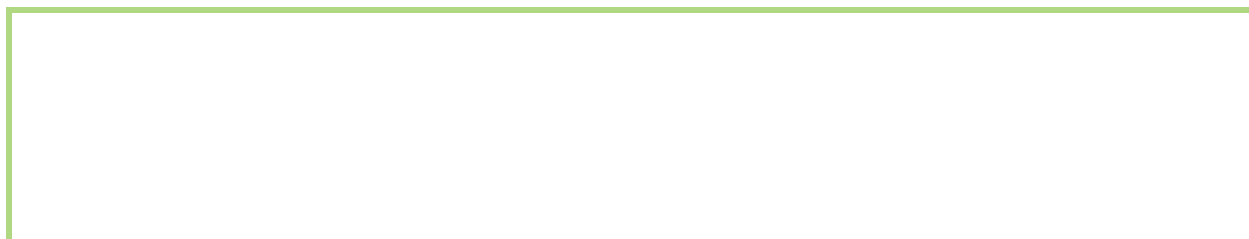


.....

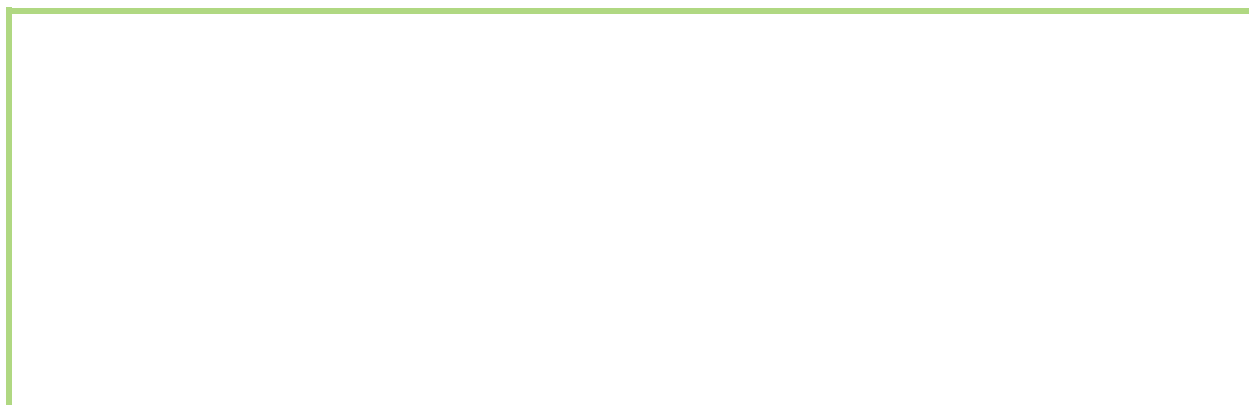
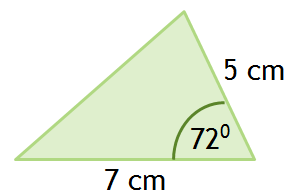
4. Draw three different hexagons that contain at least one right angle.



5. Using a ruler and a protractor or set square, draw a 8 cm x 3 cm rectangle.

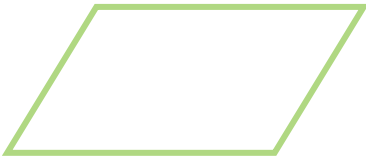


6. Here is a sketch of a triangle. It is not drawn to scale. Using a pencil, ruler and a protractor, draw an accurate drawing of the triangle below.

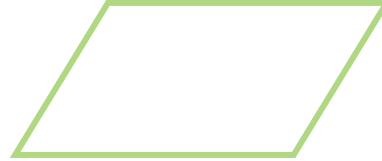


7. On each parallelogram draw **one** line to make a:

a. Rhombus

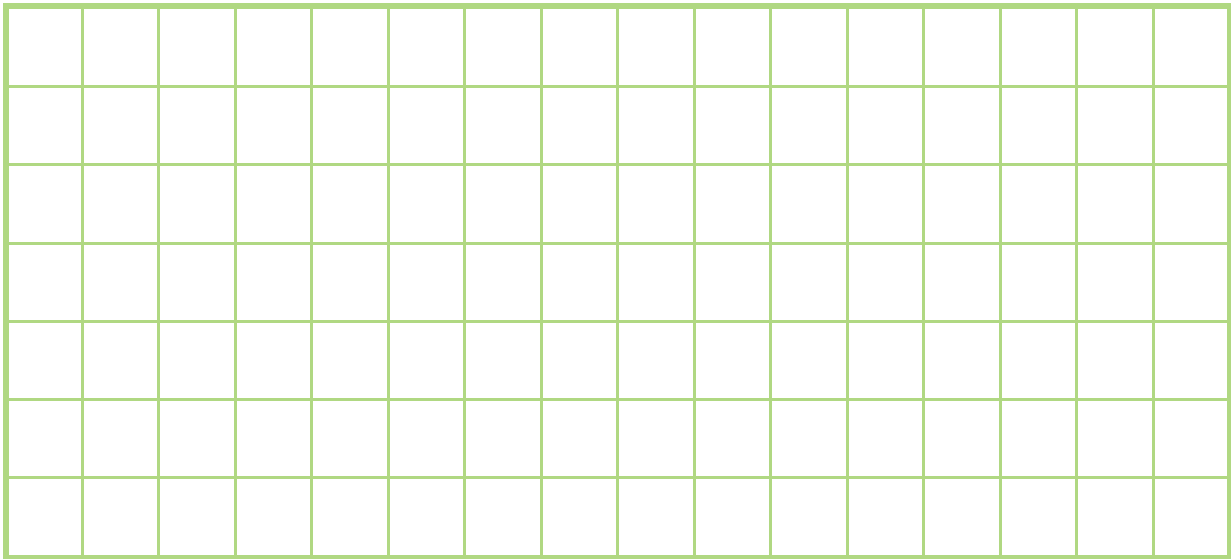


b. Trapezium



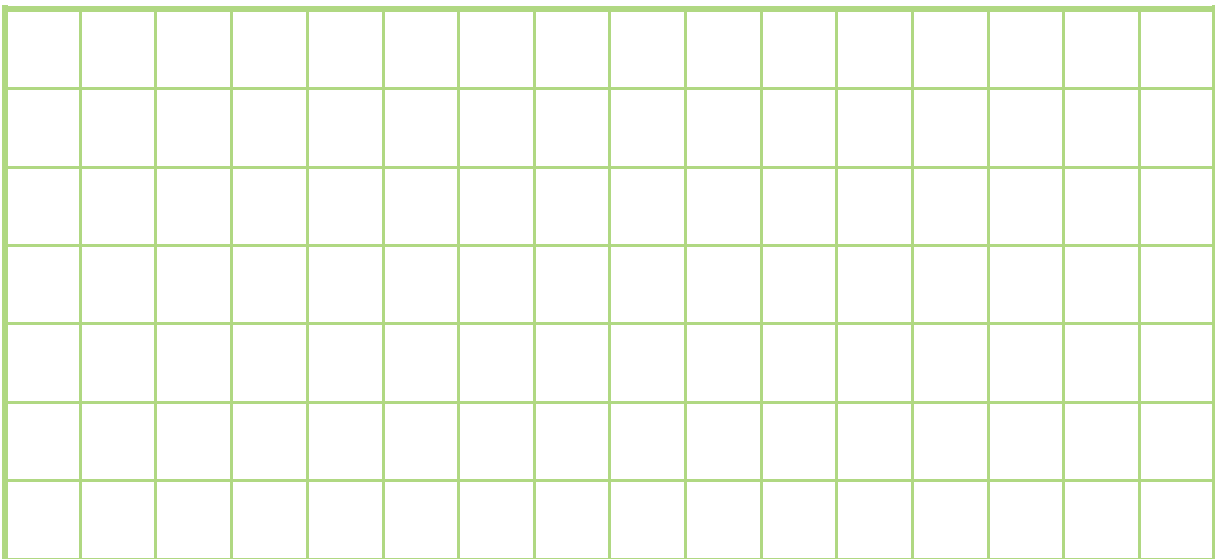
8. A kite has a perimeter of 20 cm. If one of the sides measures 4 cm, find the lengths of the other sides.

Draw an accurate diagram of your kite below.



### Challenge

1. Draw to the exact size a **rhombus** with side lengths of 6 cm and one of the angles equal to  $60^\circ$ . Use a pencil, ruler and protractor.



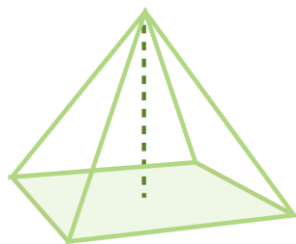
In this task, you will:

- recognise, describe and build 3D shapes, including making nets.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-7. If you're raring to go, try the challenge too!

Example 1

Look at this square-based pyramid. Complete the table.



Answer

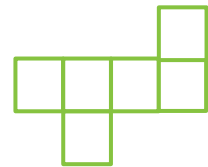
Vertices (vertex is single) are the corners.  
Edges are the drawn lines.  
Faces are the surfaces.

Faces	Edges	Vertices
5	8	5

Example 2

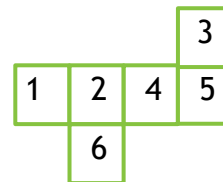
Fill in the spaces in the net of the cube below according to the following rules:

- 1 is opposite 4
- 2 is opposite 5
- 3 is opposite 6

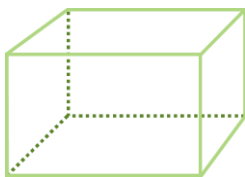


Answer

Opposite faces don't touch each other (on an edge).



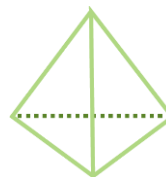
1. Link the shape to its correct name.



Sphere



Triangular prism



Cuboid



Tetrahedron

2. Name a shape with six faces. There may be more than one.

.....

## Resource 2 – recognise, describe and build simple 3D shapes

3. Write the names of these shapes in the correct places below.

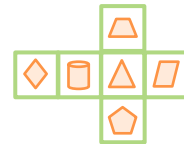
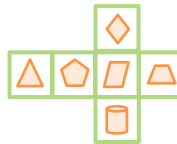
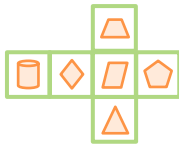
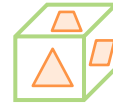
Cuboid  
Hexagonal prism  
Cube

Triangular prism  
Cone  
Square-based pyramid

Cylinder  
Sphere  
Tetrahedron

	At least one square face	No square faces
Curved face		
No curved face		

4. Draw a ring around the correct net of the cube shown.



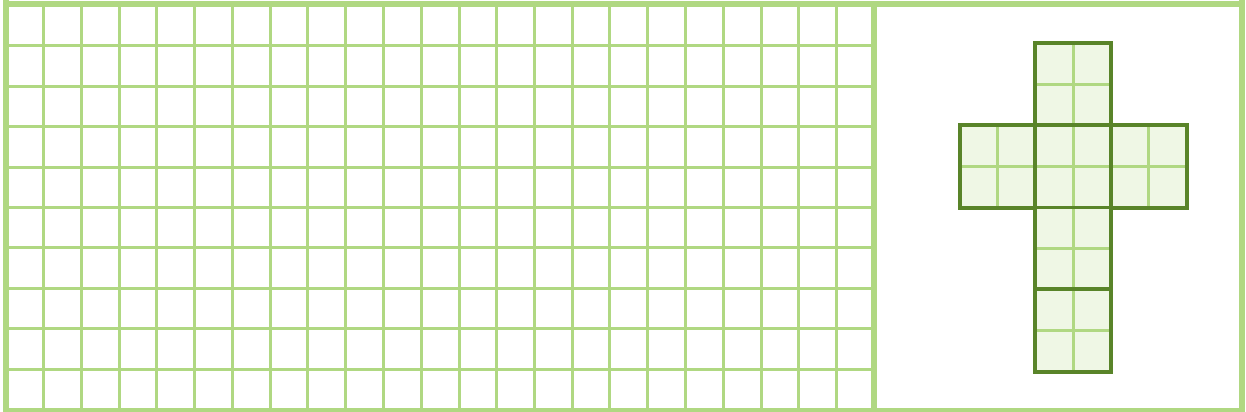
5. Complete the table below.

	Number of faces	Number of vertices	Number of edges
Cuboid			
Cylinder			
Tetrahedron			
Hexagonal prism			
Cube			

6. Name the shapes.

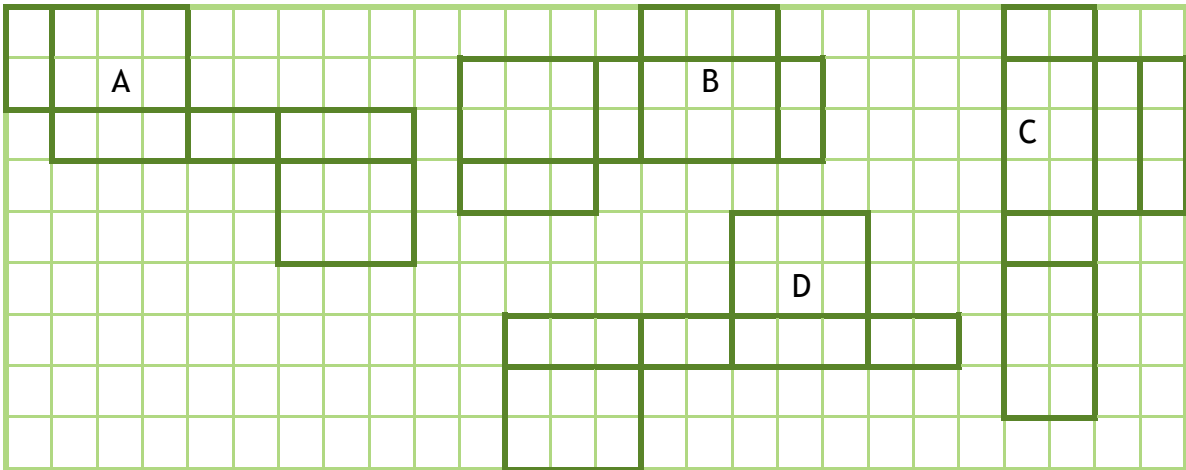
Shape properties	Name of shape
6 rectangular faces, 12 edges and 8 vertices	
1 curved face, 1 flat face, 1 vertex and 1 edge	
7 flat faces, 15 edges and 10 vertices	
1 curved face, no edges and no vertices	

7. On the grid below draw the shape the net below makes.



### Challenge

1. a. Circle the net which does not fold to make a cuboid.

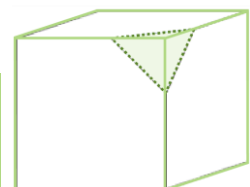


b. Draw at least two more nets to make a cuboid.



2. A **truncated cube** is made by cutting off each of the eight corners. The **first one** has been done for you. Visualise the shape and complete the table below.

Triangular faces	Octagonal faces	Edges	Vertices



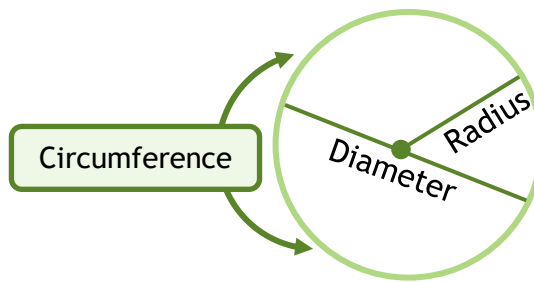
In this task, you will:

- recognise, describe and build 3D shapes, including making nets.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenge too!

Example

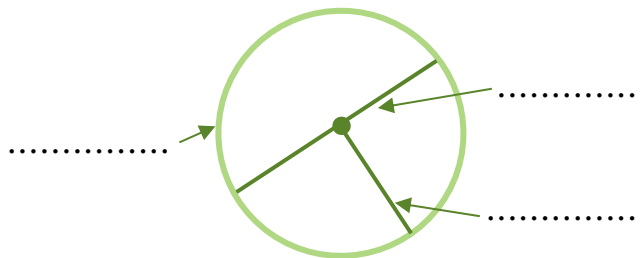
Here are the parts of circle.



1. The radius of a circle is 12 cm. What is its diameter?

2. The diameter of a circle is 7 m. What is its radius?

3. Label the parts of the circle.



4. Jenny measures the radius of her dinner plate as 9 cm.

- a. What is the diameter of her dinner plate?




- b. The diameter of her teacup is 10 cm. What is its radius?



### Resource 3: illustrate and name parts of a circle

- c. Jenny decorates some Easter eggs by tying ribbon around the circumference of each egg. She knows that the circumference of each egg is 36 cm. How much ribbon will she need to decorate five eggs?



.....

5. Dale measures the radius of a 10p coin as 12 millimetres. He lines up as many as he can until he reaches 1 metre.
- a. How many 10p coins will he have altogether?



.....

- b. What is the total value of this?

.....

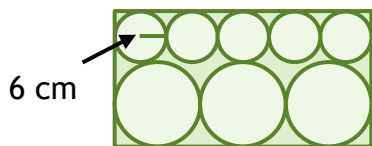
6. Danni stacks 2p coins to make a tower. She finds that a stack of 14 coins is the same height as that of a single two pence coin standing on its end. If the radius of the coin is 14 mm, what is the thickness of one 2p coin?



.....

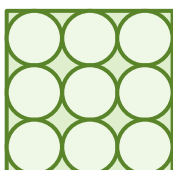
### Challenge

1. Three large circles and five small circles fit exactly inside this rectangle. The radius of the small circle is 6 centimetres. Find the diameter of the larger circle.



.....

2. Nine circles are enclosed in a square, as shown in the diagram below. If the radius of one of the circles is 2cm long, what is the area of the square?



.....

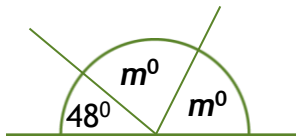
In this task, you will:

- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Look at the examples and answer the questions. If you are anxious, try questions 1-5. If you're feeling confident, try questions 1-8. If you're raring to go, try the challenge too!

Example 1

Find the size of angle  $m$ .



Answer

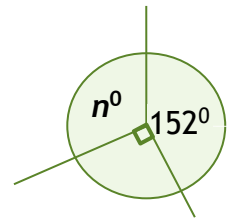
Angles on a straight line =  $180^\circ$ .  
So far,  $180^\circ - 48^\circ = 132^\circ$ .  
So,  $m^\circ = 132^\circ \div 2 = 66^\circ$

Example 2

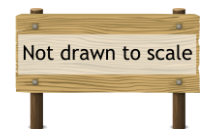
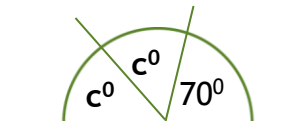
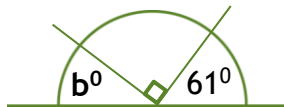
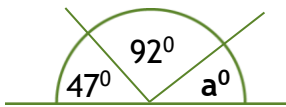
Find the size of angle  $n$ .

Answer

Angles in a circle (full turn) =  $360^\circ$   
So far  $90^\circ + 152^\circ = 242^\circ$   
 $n^\circ = 360^\circ - 242^\circ$   
 $n^\circ = 118^\circ$



1. Find the missing angle in each of the following diagrams.

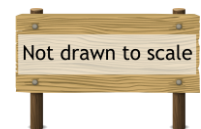
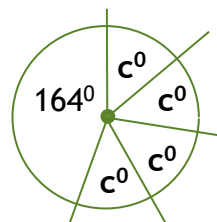
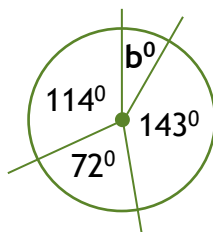
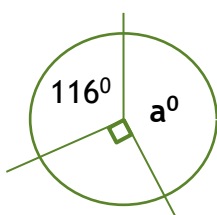


$a^\circ = \dots\dots\dots^\circ$     $b^\circ = \dots\dots\dots^\circ$     $c^\circ = \dots\dots\dots^\circ$

2. Meza says she can draw three angles together and make a perfect straight line. She uses the angles  $49^\circ$ ,  $74^\circ$  and  $67^\circ$ . Is she correct? Show your working out.

.....

3. Find the missing angle in the following diagrams:

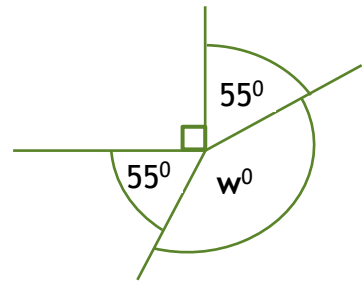


$a^\circ = \dots\dots\dots^\circ$     $b^\circ = \dots\dots\dots^\circ$     $c^\circ = \dots\dots\dots^\circ$



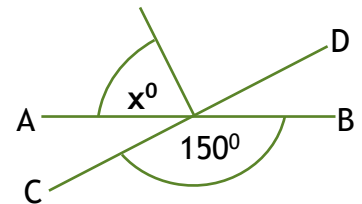
4. Calculate the size of angle w.

$w^\circ = \dots\dots\dots$



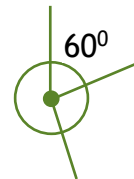
5. AB and CD are straight lines. Find the size of angle x.

$x^\circ = \dots\dots\dots$

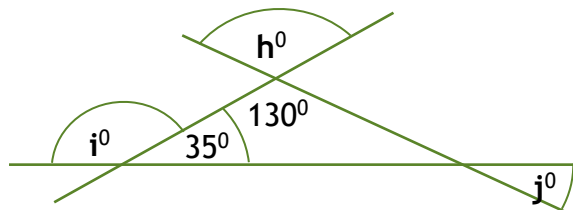


6. Three angles meet at a point. One angle is twice the size of the other and the third angle is  $60^\circ$ . Find the size of the two missing angles.

$\dots\dots\dots^\circ \quad \dots\dots\dots^\circ$



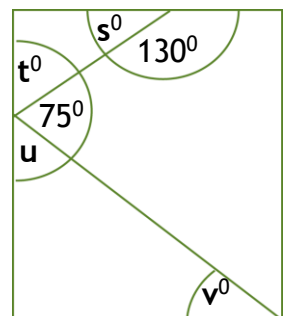
7. Find the size of the angles outside the triangle.



$h^\circ = \dots\dots\dots^\circ \quad i^\circ = \dots\dots\dots^\circ \quad j^\circ = \dots\dots\dots^\circ$

8. Find the size of the unknown angles inside this rectangle.

$s^\circ = \dots^\circ; t^\circ = \dots^\circ; u^\circ = \dots^\circ; v^\circ = \dots^\circ$

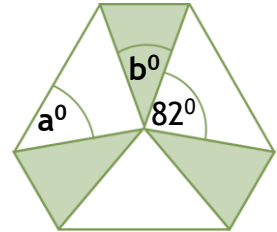


**Challenge**

1. The shape below has three identical white tiles and three identical grey tiles. The sides of each tile are all the same length. Opposite sides of each tile are parallel. One of the angles is  $82^\circ$ .

- a. Calculate the size of angle  $a^\circ$ .

$a^\circ = \dots\dots\dots$



- b. Calculate the size of angle  $b^\circ$ .

$b^\circ = \dots\dots\dots^\circ$

## Resource 1- draw, translate and reflect simple shapes in four quadrants

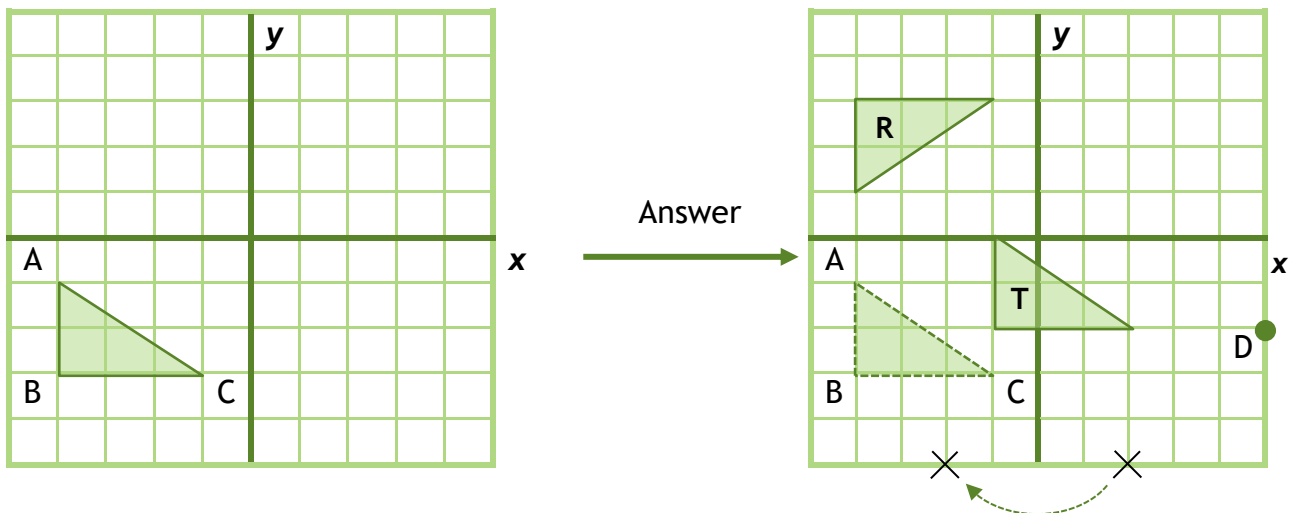
### In this task, you will:

- describe positions on the full coordinate grid (all four quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Look at the examples and answer the questions. If you are anxious, try questions 1. If you're feeling confident, try questions 1 and 2. If you're raring to go, try the challenge too!

### Example

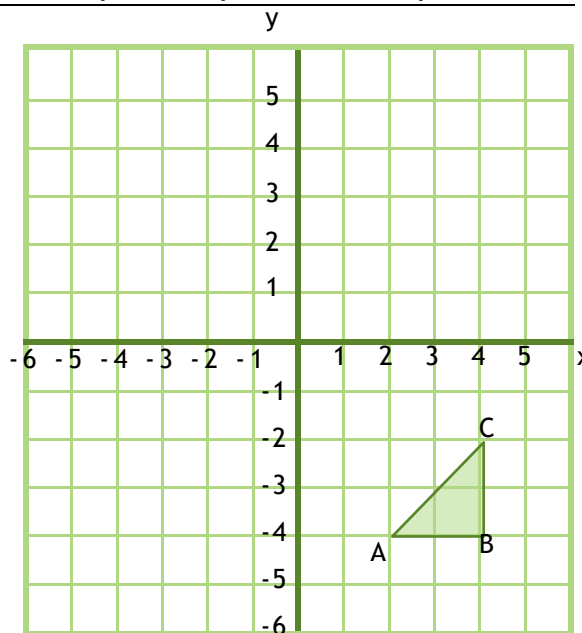
1. Write down the coordinates of point A. **Coordinates of A = (-4,-1).**
2. Draw the point D with coordinates (5,-2). **See diagram below.**
3. Translate the triangle ABC 3 to the right and 1 up. Label this T. **See diagram below.**
4. Reflect triangle ABC in the x-axis. Label this R. **See diagram below.**
5. What are the coordinates of the point that would reflect in the y-axis to give (2, -5)?  
**Coordinates = (-2, -5)**



## Resource 1- draw, translate and reflect simple shapes in four quadrants

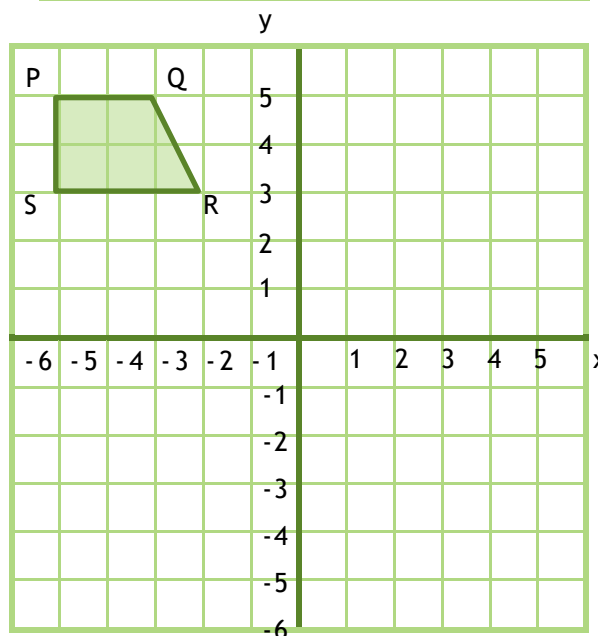
1. Use the grid opposite.

- Write down the coordinates of A.  
Answer:  $A = (\dots\dots, \dots\dots)$
- Plot the point D (-1, 5).
- Translate the triangle ABC 2 units to the left and 5 up. Label it T.
- Reflect triangle ABC in the y-axis. Label it.



2. Use the grid opposite.

- Write down the coordinates of P = ( ....., .....) )
- Plot the point V (0, -6).
- Translate the quadrilateral PQRS 5 units to the right. Label it A.
- Reflect PQRS in the x-axis. Label it B.

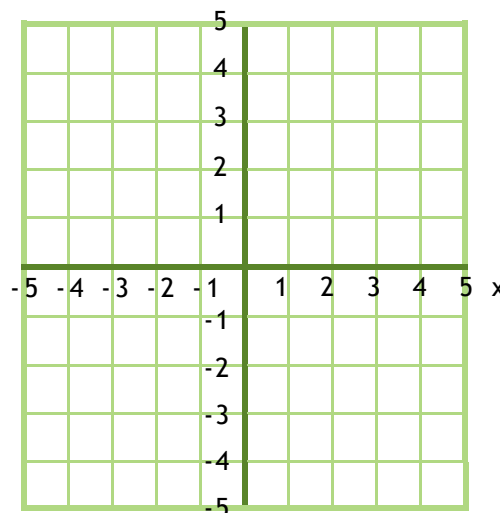


### Challenge

1. Use the grid opposite.

Write the new coordinates when:

- (2, 5) is translated 3 units to the left. (....., .....) )
- (0, -2) is translated 2 units up. (....., .....) )
- (-4, 1) reflected:
  - in the x-axis (....., .....) )
  - in the y-axis (....., .....) )



---

**Section 5:**

**Statistics**

In this task, you will:

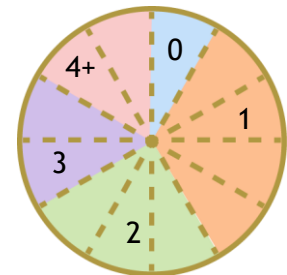
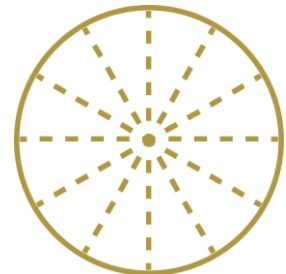
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Look at the examples and answer the questions. If you are anxious, try questions 1-4. If you're feeling confident, try questions 1-6. If you're raring to go, try the challenges too!

### Example 1

The table shows the number of goals scored by a hockey team over a series of 24 games. Draw a pie chart to show these results.

Goals scored	0	1	2	3	4 or more
Total	2	8	6	4	4

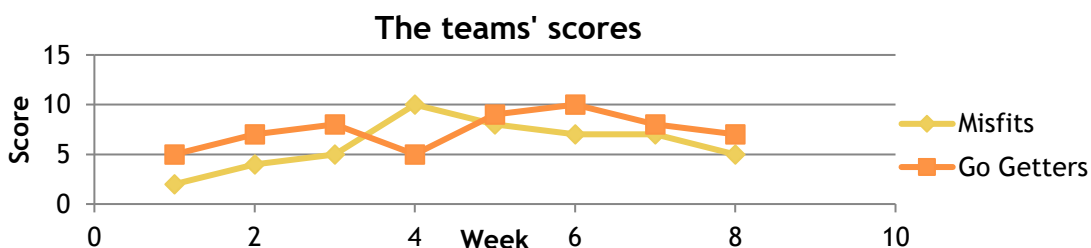


#### Answer

$2 + 8 + 6 + 4 + 4 = 24$  games  
 If 12 slices = 24 games  
 then 1 slice =  $24 \div 12$   
 = 2 games

### Example 2

The line graphs show the average scores two teams, the Misfits and the Go-Getters, scored each week for the last eight weeks.



- In which week did the two teams have the biggest difference in scores?
- In which weeks were their combined scores the largest?

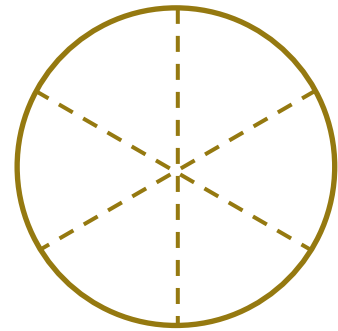
#### Answer

- Week 4 (difference =  $10 - 5 = 5$ ).
- Weeks 5 and 6 have the biggest total of 17 ( $9 + 8$  and  $10 + 7$ ).

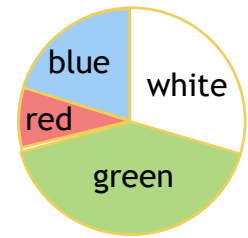
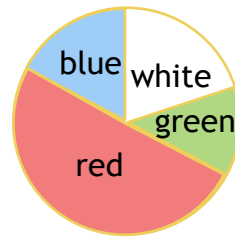
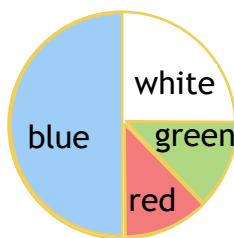
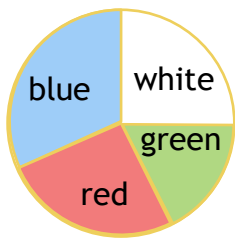
**Resource 1: interpret and construct pie charts and line graphs**

1. The table below shows the votes for three competitors in a competition. Complete the pie chart to illustrate the information.

A	B	C
3	9	6



2. The following pie charts show favourite colours. Match each statement to the correct pie chart.



If four people chose red then eight people chose blue.

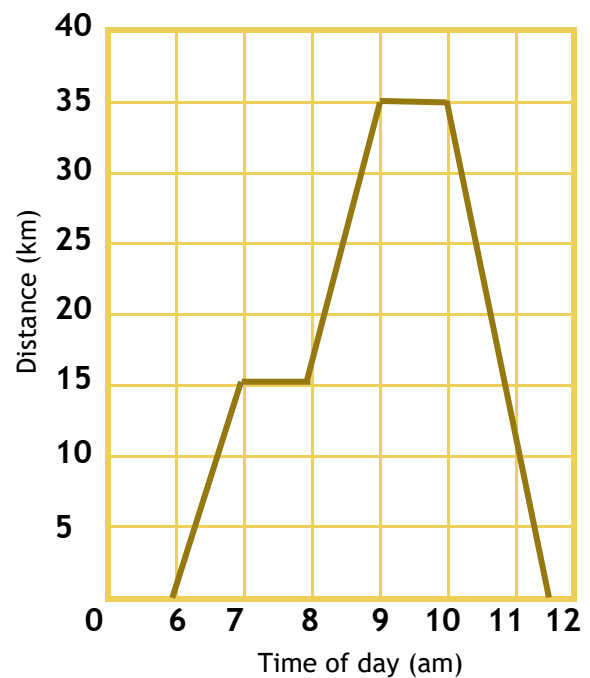
One quarter of the people chose red.

The same number of people chose red and green.

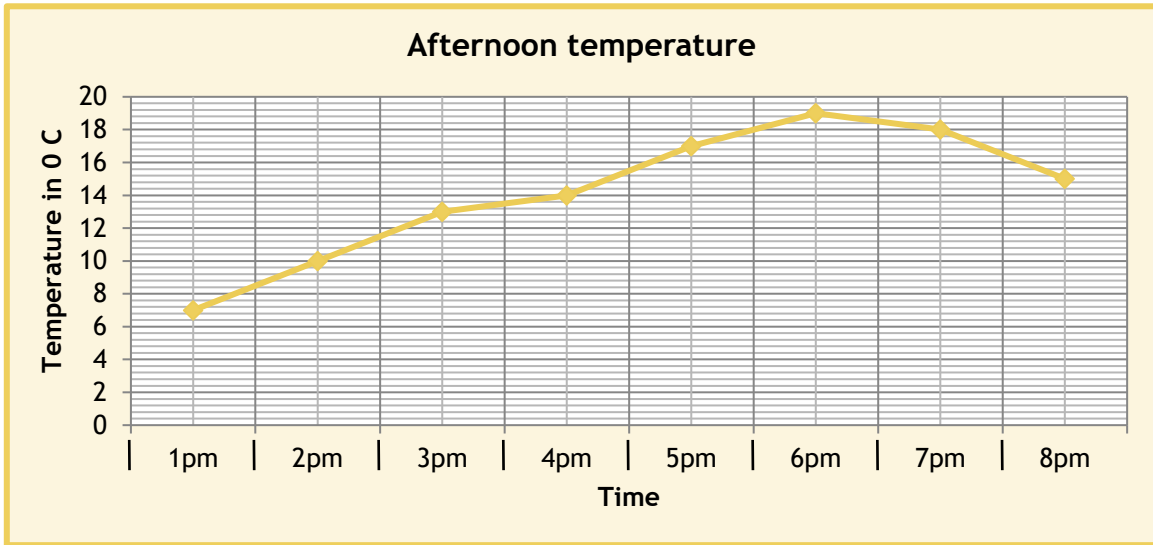
About 20% of the people chose white.

3. The graph shows an outing taken by Joe last Saturday. Read the graph carefully and fill in the blanks.

- Joe first stopped at ..... am.
- He travelled ..... kilometres in the first hour.
- By 9am, he had travelled .....kilometres.
- He shopped for..... hours.
- His journey home took ..... hours.
- His whole outing took ..... hours.

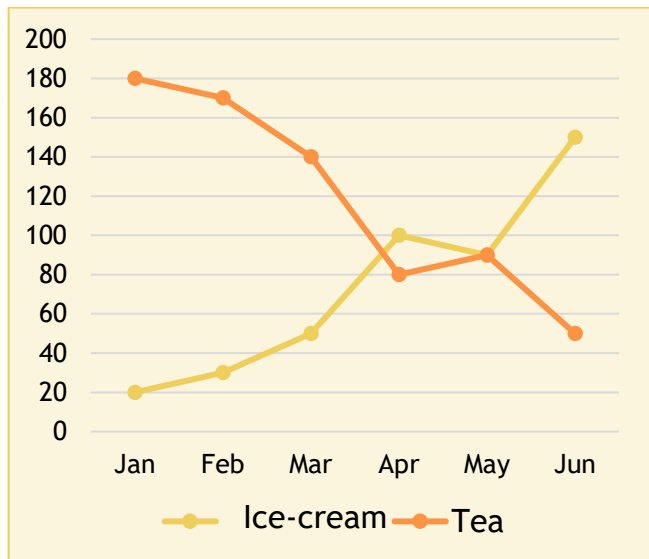


4. The graph shows the temperature recorded each hour during an afternoon.



- What was the highest temperature?..... °C
- How many hours had a temperature **below** 14°C?..... hours
- At what time was the temperature double that at 1pm? .....
- Between which two times did the temperature drop the fastest? .....

5. The line graph shows the sales of ice-creams and cups of tea at a small cafe.



- How many ice-creams were sold in March?  
.....
- How many more ice-creams than cups of tea were sold in June?  
.....
- How many cups of tea would you expect to sell in July?  
.....

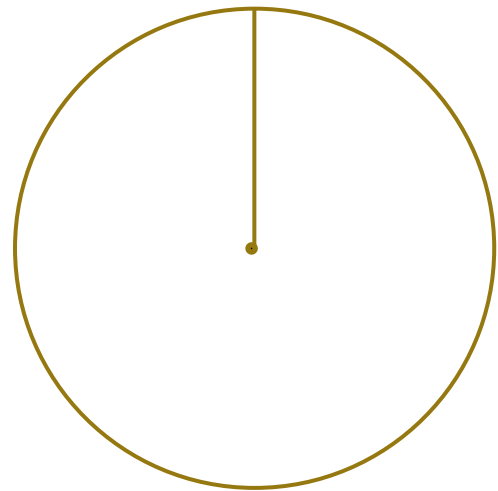




**Resource 1: interpret and construct pie charts and line graphs**

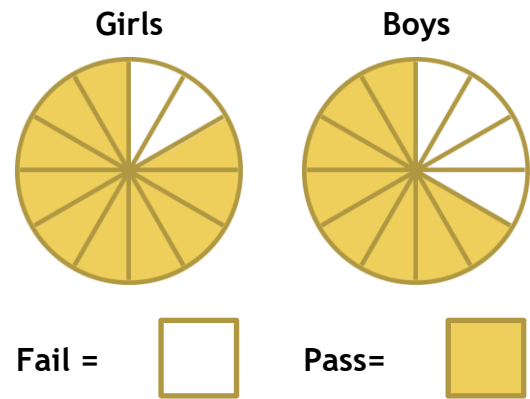
6. Complete the following pie chart.  
Forty pupils were asked what their favourite type of crisps were.  
Complete the pie chart to illustrate the information.

Flavour	Frequency	Angle
Beef	14	
Chicken	10	
Cheese and onion	5	
Plain	11	
<b>Total</b>	<b>40</b>	

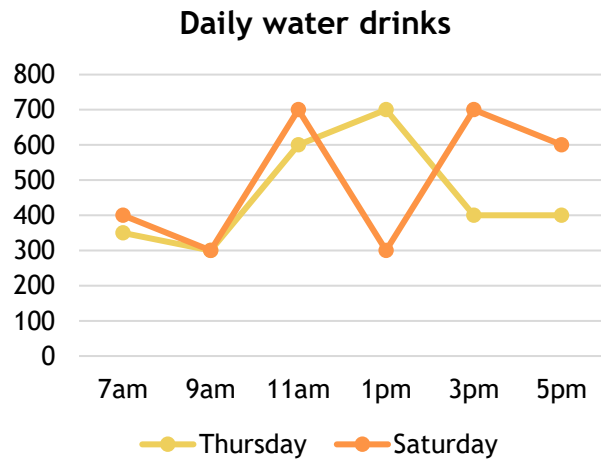


**Challenge**

1. The pie charts show the results of a reading test.
- a. Eight girls fail the test.  
How many girls pass the test?  
..... girls.
- b. The same number of boys took the test.  
How many boys failed the test?  
..... boys.



2. The graph shows how much water is drunk during two days.  
On which day was most water drunk?



Which day do you think was warmer and why?

.....

.....

In this task, you will:

- calculate and interpret the mean as an average.

Look at the examples and answer the questions. If you are anxious, try questions 1-6. If you're feeling confident, try questions 1-10. If you're raring to go, try the challenge too!

Example 1

The mean of three numbers is 4. If one of the numbers is 5, what could the other two numbers be?

Answer


The **total** of the three numbers =  $3 \times 4 = 12$   
 Now  $12 - 5 = 7$ . So the other two numbers must add up to 7.  
 These could be: **6 and 1, 5 and 2, 4 and 3.**

Example 2

A gymnast has averaged 5.3 in her first four events. What score does she need to achieve in her next event to increase her mean to 5.4?

Answer

**Total** of the first four scores =  $4 \times 5.3 = 21.2$   
 For a mean of 5.4, her total =  $5 \times 5.4 = 27.0$   
 Her fifth score must be:  $27.0 - 21.2 = 5.8$

- Find the mean of the following sets of numbers: 
  - 4, 6, 3, 7 .....
  - 3, 8, 8, 4, 7 .....
  - 1, 0, 9, 6, 4, 10.....
- The midday temperatures were recorded in the table for the last six months of 2018. Find the mean temperature.

July	August	September	October	November	December
18°C	20°C	17°C	15°C	14°C	12°C

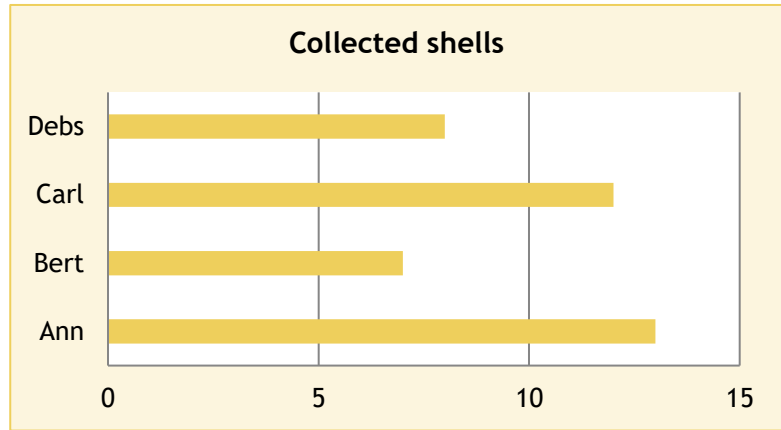
The mean is .....

- The mean of two numbers is 8. If one of the numbers is 5, what is the other number?  
 .....

4. The mean of two numbers is 3. What could the two numbers be?:  
Give three possible pairs of answers.

....., .....	....., .....	....., .....
--------------	--------------	--------------

5. Four friends are collecting shells on a beach. Find the mean number of shells collected.



.....

6. The mean of three numbers is 7. If two of the numbers are both 4, what is the third number?

.....

7. During a game of basketball, Mike scored 14, 9 and 11 points in the first three quarters. How many points does he need to score in the fourth quarter in order to score a mean of 12 points per quarter for the whole game?

.....

8. Find the missing number 4, ?, 7, 3, when the mean is 6.

.....

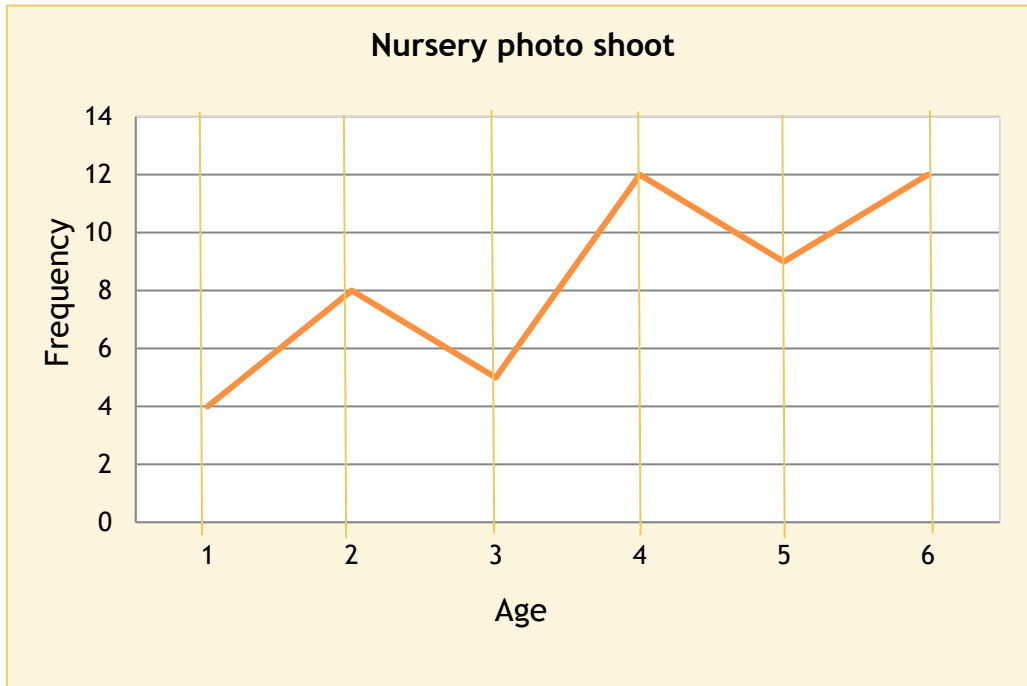
9. The mean of five numbers is 11. The mean of two of the numbers is 14. What is the mean of the three numbers?

.....

10. The mean of seven numbers is 3. The mean of another five numbers is 15. What is the mean of all twelve numbers put together?

### Challenge

1. The line graph shows the ages of toddlers who attended a photo shoot.



Calculate their mean age in years.

Mean .....

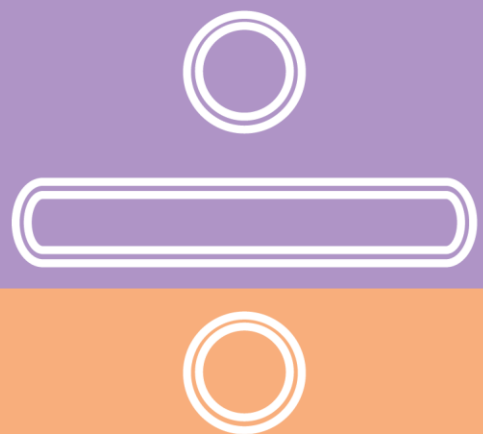
Teacher's section

HOME

LEARNING

for year 6

Maths



## Teaching notes and curriculum mapping

This resource aims to provide year 6 teachers with a photocopiable, independent home learning task for maths for every week of the school year.

The resource is divided into two sections - a teacher's section (including teaching notes, curriculum mapping, detailed answers and a tick list to enable teachers to track which tasks they have set and when) and a pupil's section which contains units for number, ratio and proportion, algebra, measurement, geometry and statistics.

Each unit comprises a set of photocopiable tasks. Each task is mapped to one or more of the requirements of the National Curriculum for maths year 6 and is intended to consolidate the learning that has been done in class.

Tasks are introduced through a comprehensive example and are differentiated. For each task, there is a suggestion for those who may find the topic difficult, a suggestion for those who are confident and a challenge for those who are raring to go!

We hope you enjoy using this resource. If you have any questions, please get in touch: email [support@teachitprimary.co.uk](mailto:support@teachitprimary.co.uk) or call us on 01225 788851. Alternatively, you might like to give some feedback for other Teachit Primary members - you can do this by adding a comment on the [Home learning for year 6 - Maths](#) page on Teachit Primary (please log in to access this!).

# Teacher's tick list

Keep track of what you have set and when.

<b>Number: number and place value</b>	<b>Date set</b>	
Resource 1 - read, write, order and compare numbers up to 10,000,000		
Resource 2 - use negative numbers in context		
Resource 3 - solve number and practical problems		
<b>Number: all four operations</b>	<b>Date set</b>	
Resource 1 - multiply multi-digit numbers up to 4 digits		
Resource 2 - formal long division		
Resource 3 - formal short division		
Resource 4 - perform mental calculations		
Resource 5 - identify common factors, multiples and prime numbers		
Resource 6 - BODMAS		
Resource 7 - addition and subtraction multi-step problems		
Resource 8 - addition, subtraction, multiplication and division problems		
Resource 9 - use estimation to check answers		
<b>Number: fractions (including decimals and percentages)</b>	<b>Date set</b>	
Resource 1 - use common factors to simplify fractions		
Resource 2 - add and subtract fractions		
Resource 3 - multiply proper fractions		
Resource 4 - divide fractions by whole numbers		
Resource 5 - multiply numbers up to two decimal places		
Resource 6 - written division methods up to two decimal places		
Resource 7 - use equivalences between fractions, decimals and percentages		
<b>Ratio and proportion</b>	<b>Date set</b>	
Resource 1 - relative sizes		
Resource 2 - calculations of percentages		
Resource 3 - scale factors		
Resource 4 - unequal sharing		

<b>Algebra</b>	<b>Date set</b>	
Resource 1 - use simple formulae		
Resource 2 - generate and describe linear number sequences		
Resource 3 - express missing number problems algebraically		
Resource 4 - working with two variables		
<b>Measurement</b>	<b>Date set</b>	
Resource 1 - solve problems involving units of measure		
Resource 2 - convert between miles and kilometres		
Resource 3 - area and perimeter		
Resource 4 - use formula for area and volume of shapes		
Resource 5 - calculate the area of parallelograms and triangles		
<b>Geometry: properties of shape</b>	<b>Date set</b>	
Resource 1 - draw, compare and classify 2D shapes		
Resource 2 - recognise, describe and build simple 3D shapes		
Resource 3 - illustrate and name parts of the circle		
Resource 4 - recognise angles		
<b>Geometry: position and direction</b>	<b>Date set</b>	
Resource 1 - draw, translate and reflect shapes in all four quadrants		
<b>Statistics</b>	<b>Date set</b>	
Resource 1 - interpret and construct pie charts and line graphs		
Resource 2 - using the mean		



Number: number and place value answers

Resource 1 - read, write, order and compare numbers up to 10,000,000

	Working out	Answer
1.	1523	One thousand five hundred and twenty-three
2.	8071	Eight thousand and seventy-one
3.	17,080	Seventeen thousand and eighty
4.	8,230,050	Eight million, two hundred and thirty thousand, and fifty
5.	Six thousand, seven hundred and two	6702
6.	Twelve thousand, five hundred and eighty	12,580
7.	Half of a million	500,000
8.	Ten million, fifty thousand and one hundred	10,050,100
9.	1943	Nine hundreds or 900
10.	90,500	Nine ten thousands or 90,000
11.	9,154,000	Nine millions or 9,000,000
12.	$94 \times 10 = 940$	Nine hundreds or 900
13.	8473      8500 (nearest 100)	8000 (nearest 1000)
14.	19,637      20,000 (nearest 1000)	19,640 (nearest 10)
15.	203,848      203,850 (nearest 10)	203,800 (nearest 100)

Challenge

Workings out and answers	
1.	98,653 (ninety-eight thousand, six hundred and fifty-three)
2.	365; 368; 369
3.	For example: 59,863, 58,693, 56,938
4.	5368; 5369; 5386; 5389; 5396; 5398
5.	Any five-digit number that starts with 96,000, 95,000 or 98,000.
6.	85, 86, 89 and 93
7.	953; 963; 983

Resource 2 - use negative numbers in context

Workings out and answers			
1.	a. $8^{\circ}\text{C}$	b. $2^{\circ}\text{C}$	c. $-4^{\circ}\text{C}$
2.	a. $16^{\circ}\text{C}$	b. $5^{\circ}\text{C}$	c. $-6^{\circ}\text{C}$
3.	a. $5^{\circ}\text{C}$	b. $-2^{\circ}\text{C}$	c. $-3^{\circ}\text{C}$
4.	a. $-3 + 4 = 1$	b. $-3 - 2 = -5$	c. $-3 + 20 = 17$ d. $-3 - 20 = -23$
5.	$-7 + 15 = 8$		$8^{\circ}\text{C}$
6.	$8 - 15 = -7$		$-7^{\circ}\text{C}$

7	$9 + 17 = 8$	$8^{\circ}\text{C}$
8	a. $-2 + 14 = 12^{\circ}\text{C}$	b. $12 - -6 = 12 + 6 = 18^{\circ}\text{C}$ c. $11 - -8 = 19^{\circ}\text{C}$
9	a. Sequence ascends in 3s. So, counting back in 3s $7 - 3 = 4...$ $1 - 3 = -2$	Sequence is: -2, 1, 4, 7, 10
	b. Sequence ascends in 4s. So, counting back in 4s $2 - 4 = -2...$ $-2 - 4 = -6$	Sequence is: -6, -2, 4, 6, 10
	c. Sequence ascends in 6s. So, counting back in 6s $2 - 6 = -4...$ $-4 - 6 = -10$	Sequence is: -10, -4, 2, 6, 14

Challenge

Children can count inwards until they meet in the middle of a number scale.

1.	a. $-2 + 6$ difference is 8; $8 \div 2 = 4$	2
	b. $-6 + 2$ difference is 8; $8 \div 2 = 4$	-2
	c. $-3 + 9$ difference is 12; $12 \div 2 = 6$	3
	d. $-10 + -4$ difference is 6; $6 \div 2 = 3$	-7
	e. $-24 + 36$ difference is 60; $60 \div 2 = 30$	6

Resource 3 - solve number and practical problems

Workings out and answers

1.	a. $7.632 \approx 8$	b. $17.3 \approx 17$	c. $405.99 \approx 406$
2.	a. Largest even = <b>936</b> ; smallest odd = <b>39</b>	<b>936 and 39</b>	
	b. <b>963</b> rounds to 1000	<b>963</b>	
3.	a. $47 \approx 50$	<b>50</b>	
	b. Any number between <b>45</b> and <b>54</b>	<b>45, 46, ...53, 54</b>	
	c. $961 \approx 960$	<b>960</b>	
	d. Any number between <b>85</b> and <b>94</b>	<b>85, 89, ... 90, ... 94</b>	
	e. Any number between <b>195</b> and <b>204</b>	<b>195, 196, ... 203, 204</b>	
4.	a. Smallest odd number = <b>43</b>	<b>43</b>	
	b. Largest 3-digit = <b>964</b>	<b>964</b>	
	c. <b>496</b> is closest to 500	<b>496</b>	
	d. Largest 2-digit = <b>96</b> ; <b>6</b> is the units value	<b>6</b>	
	e. $93 \times 10 = 930$ ; <b>9</b> is the hundreds value	<b>9</b>	
5.	a. $-5 + 12 = 7^{\circ}\text{C}$ is new temperature	<b><math>7^{\circ}\text{C}</math></b>	
	b. $7 - -1 = 7 + 1 = 8^{\circ}\text{C}$ drop in temperature	<b><math>8^{\circ}\text{C}</math></b>	
6.	$1,000,000 - 500 = 999,500$	<b>999,500</b>	
7.	$-1 + 5$ difference is 6; $6 \div 2 = 3$	<b>2</b>	
8.	a. <b>£730</b>	b. <b>£-130</b>	c. <b>£859</b>

Challenge

1.	a. $-4 + 6$ difference is 10; $10 \div 2 = 5$	<b>1</b>
	b. $-7 + 5$ difference is 12; $12 \div 2 = 6$	<b>-1</b>

2.	$8 - 2 = 6$ ; other number is $8 + 6 = 14$	14
3.	<ul style="list-style-type: none"> <li>It rounds to 3000 to the nearest hundred.</li> <li>The thousands digit is half the units digit.</li> <li>The tens digit is the sum of the thousands and units digits.</li> </ul> <p>Rounding to 3000 means any number between 2950 to 3049.                  If the thousands digit is 3, then units digit is 6.                  If the tens digit is 2, then units digit is 4.                  The tens is either <math>3 + 6 = 9</math> ✓ or <math>2 + 4 = 6</math> ✓.                  So, the 4-digit number is <b>2964</b> or <b>3096</b>.</p>	2964 or 3096

## Number: all four operations answers

### Resource 1 - multiply multi-digit numbers up to 4 digits

	Workings out	Answers																																																																																																														
1.	<p>a.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>3</td><td>2</td></tr> <tr><td>×</td><td></td><td>2</td><td>3</td></tr> <tr><td></td><td></td><td>9</td><td>6</td></tr> <tr><td></td><td>6</td><td>4</td><td>0</td></tr> <tr><td></td><td>7</td><td>3</td><td>6</td></tr> </table> <p>b.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>1</td><td>4</td></tr> <tr><td>×</td><td></td><td>2</td><td>1</td></tr> <tr><td></td><td></td><td>1</td><td>4</td></tr> <tr><td></td><td>2</td><td>8</td><td>0</td></tr> <tr><td></td><td>2</td><td>9</td><td>4</td></tr> </table> <p>c.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>3</td><td>1</td></tr> <tr><td>×</td><td></td><td>2</td><td>4</td></tr> <tr><td></td><td></td><td>1</td><td>2</td></tr> <tr><td></td><td>6</td><td>2</td><td>0</td></tr> <tr><td></td><td>7</td><td>4</td><td>4</td></tr> </table>			3	2	×		2	3			9	6		6	4	0		7	3	6			1	4	×		2	1			1	4		2	8	0		2	9	4			3	1	×		2	4			1	2		6	2	0		7	4	4	<p>a. 736 b. 294 c. 744</p>																																																		
		3	2																																																																																																													
×		2	3																																																																																																													
		9	6																																																																																																													
	6	4	0																																																																																																													
	7	3	6																																																																																																													
		1	4																																																																																																													
×		2	1																																																																																																													
		1	4																																																																																																													
	2	8	0																																																																																																													
	2	9	4																																																																																																													
		3	1																																																																																																													
×		2	4																																																																																																													
		1	2																																																																																																													
	6	2	0																																																																																																													
	7	4	4																																																																																																													
2.	<p>a.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>1</td><td>3</td><td>2</td></tr> <tr><td>×</td><td></td><td>3</td><td>1</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>3</td><td>2</td></tr> <tr><td></td><td>3</td><td>9</td><td>6</td><td>0</td></tr> <tr><td></td><td>4</td><td>0</td><td>9</td><td>2</td></tr> </table> <p>b.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>2</td><td>4</td><td>3</td></tr> <tr><td>×</td><td></td><td>2</td><td>1</td><td></td></tr> <tr><td></td><td></td><td>2</td><td>4</td><td>3</td></tr> <tr><td></td><td>4</td><td>8</td><td>6</td><td>0</td></tr> <tr><td></td><td>5</td><td>1</td><td>0</td><td>3</td></tr> </table> <p>c.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>5</td><td>2</td><td>3</td></tr> <tr><td>×</td><td></td><td>3</td><td>2</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>0</td><td>4</td></tr> <tr><td></td><td>1</td><td>5</td><td>5</td><td>9</td></tr> <tr><td></td><td>1</td><td>6</td><td>7</td><td>3</td></tr> </table>			1	3	2	×		3	1				1	3	2		3	9	6	0		4	0	9	2			2	4	3	×		2	1				2	4	3		4	8	6	0		5	1	0	3			5	2	3	×		3	2				1	0	4		1	5	5	9		1	6	7	3	<p>a. 4092 b. 5103 c. 16,736</p>																																			
		1	3	2																																																																																																												
×		3	1																																																																																																													
		1	3	2																																																																																																												
	3	9	6	0																																																																																																												
	4	0	9	2																																																																																																												
		2	4	3																																																																																																												
×		2	1																																																																																																													
		2	4	3																																																																																																												
	4	8	6	0																																																																																																												
	5	1	0	3																																																																																																												
		5	2	3																																																																																																												
×		3	2																																																																																																													
		1	0	4																																																																																																												
	1	5	5	9																																																																																																												
	1	6	7	3																																																																																																												
3.	<p>a.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>4</td><td>8</td><td>3</td></tr> <tr><td>×</td><td></td><td>5</td><td>3</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>4</td><td>4</td></tr> <tr><td></td><td>2</td><td>4</td><td>1</td><td>5</td></tr> <tr><td></td><td>2</td><td>5</td><td>5</td><td>9</td></tr> </table> <p>b.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>8</td><td>2</td><td>1</td></tr> <tr><td>×</td><td></td><td>3</td><td>7</td><td></td></tr> <tr><td></td><td></td><td>5</td><td>7</td><td>4</td></tr> <tr><td></td><td>2</td><td>4</td><td>6</td><td>3</td></tr> <tr><td></td><td>3</td><td>0</td><td>3</td><td>7</td></tr> </table> <p>c.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>2</td><td>4</td><td>6</td><td>1</td></tr> <tr><td>×</td><td></td><td></td><td>6</td><td>7</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>7</td><td>2</td><td>2</td></tr> <tr><td></td><td>1</td><td>4</td><td>7</td><td>6</td><td>6</td></tr> <tr><td></td><td>1</td><td>6</td><td>4</td><td>8</td><td>8</td></tr> </table> <p>d.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>4</td><td>1</td><td>1</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td>2</td><td>8</td><td></td></tr> <tr><td></td><td></td><td>3</td><td>2</td><td>9</td><td>4</td></tr> <tr><td></td><td>8</td><td>2</td><td>3</td><td>6</td><td>0</td></tr> <tr><td></td><td>1</td><td>1</td><td>5</td><td>3</td><td>0</td></tr> </table>			4	8	3	×		5	3				1	4	4		2	4	1	5		2	5	5	9			8	2	1	×		3	7				5	7	4		2	4	6	3		3	0	3	7			2	4	6	1	×			6	7				1	7	2	2		1	4	7	6	6		1	6	4	8	8			4	1	1	8	×			2	8				3	2	9	4		8	2	3	6	0		1	1	5	3	0	<p>a. 25,599 b. 30,377 c. 164,887 d. 115,304</p>
		4	8	3																																																																																																												
×		5	3																																																																																																													
		1	4	4																																																																																																												
	2	4	1	5																																																																																																												
	2	5	5	9																																																																																																												
		8	2	1																																																																																																												
×		3	7																																																																																																													
		5	7	4																																																																																																												
	2	4	6	3																																																																																																												
	3	0	3	7																																																																																																												
		2	4	6	1																																																																																																											
×			6	7																																																																																																												
		1	7	2	2																																																																																																											
	1	4	7	6	6																																																																																																											
	1	6	4	8	8																																																																																																											
		4	1	1	8																																																																																																											
×			2	8																																																																																																												
		3	2	9	4																																																																																																											
	8	2	3	6	0																																																																																																											
	1	1	5	3	0																																																																																																											
4.	<p>a.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>2</td><td>7</td><td>4</td><td>3</td></tr> <tr><td>×</td><td></td><td></td><td>5</td><td>4</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>0</td><td>9</td><td>7</td></tr> <tr><td></td><td>1</td><td>3</td><td>7</td><td>1</td><td>5</td></tr> <tr><td></td><td>1</td><td>4</td><td>8</td><td>1</td><td>2</td></tr> </table> <p>b.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>4</td><td>0</td><td>9</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td>6</td><td>3</td><td></td></tr> <tr><td></td><td></td><td>1</td><td>2</td><td>2</td><td>8</td></tr> <tr><td></td><td>2</td><td>4</td><td>5</td><td>7</td><td>0</td></tr> <tr><td></td><td>2</td><td>5</td><td>7</td><td>9</td><td>8</td></tr> </table> <p>c.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>1</td><td>9</td><td>8</td><td>6</td></tr> <tr><td>×</td><td></td><td></td><td>8</td><td>5</td><td></td></tr> <tr><td></td><td></td><td>9</td><td>9</td><td>3</td><td>0</td></tr> <tr><td></td><td>1</td><td>5</td><td>8</td><td>8</td><td>8</td></tr> <tr><td></td><td>1</td><td>6</td><td>8</td><td>8</td><td>1</td></tr> </table>			2	7	4	3	×			5	4				1	0	9	7		1	3	7	1	5		1	4	8	1	2			4	0	9	5	×			6	3				1	2	2	8		2	4	5	7	0		2	5	7	9	8			1	9	8	6	×			8	5				9	9	3	0		1	5	8	8	8		1	6	8	8	1	<p>a. 148,122 b. 257,985 c. 168,810</p>																				
		2	7	4	3																																																																																																											
×			5	4																																																																																																												
		1	0	9	7																																																																																																											
	1	3	7	1	5																																																																																																											
	1	4	8	1	2																																																																																																											
		4	0	9	5																																																																																																											
×			6	3																																																																																																												
		1	2	2	8																																																																																																											
	2	4	5	7	0																																																																																																											
	2	5	7	9	8																																																																																																											
		1	9	8	6																																																																																																											
×			8	5																																																																																																												
		9	9	3	0																																																																																																											
	1	5	8	8	8																																																																																																											
	1	6	8	8	1																																																																																																											

### Challenge

	Workings out	Answers	Workings out	Answers																																																			
1.	<p>a.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>6</td><td>2</td></tr> <tr><td>×</td><td></td><td>4</td><td>7</td></tr> <tr><td></td><td></td><td>4</td><td>3</td></tr> <tr><td></td><td>2</td><td>4</td><td>8</td></tr> <tr><td></td><td>2</td><td>9</td><td>1</td></tr> </table>			6	2	×		4	7			4	3		2	4	8		2	9	1	a. 2, 4 and 8	2.	<p>b.</p> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td></td><td></td><td>3</td><td>0</td><td>7</td><td>4</td></tr> <tr><td>×</td><td></td><td></td><td>2</td><td>8</td><td></td></tr> <tr><td></td><td></td><td>2</td><td>4</td><td>5</td><td>9</td></tr> <tr><td></td><td>6</td><td>1</td><td>4</td><td>8</td><td>0</td></tr> <tr><td></td><td>8</td><td>6</td><td>0</td><td>7</td><td>2</td></tr> </table>			3	0	7	4	×			2	8				2	4	5	9		6	1	4	8	0		8	6	0	7	2	b. 0, 8, 4 and 8
		6	2																																																				
×		4	7																																																				
		4	3																																																				
	2	4	8																																																				
	2	9	1																																																				
		3	0	7	4																																																		
×			2	8																																																			
		2	4	5	9																																																		
	6	1	4	8	0																																																		
	8	6	0	7	2																																																		

3.

		7	3	
×		4	6	
	4	3	8	
	2	9	2	0
	3	3	5	8

$73 \times 46 = 3358$

Resource 2 - formal long division

Workings out		Answers																																																																																																								
1.	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>a.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>4</td><td>4</td></tr> <tr><td>.</td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>1</td><td>6</td><td>)</td><td>7</td><td>0</td><td>4</td></tr> <tr><td></td><td></td><td></td><td>6</td><td>4</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>0</td><td>6</td><td>4</td></tr> <tr><td></td><td></td><td></td><td></td><td>6</td><td>4</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>4</td><td>4</td></tr> </table> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>b.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>2</td><td>1</td></tr> <tr><td>.</td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>4</td><td>3</td><td>)</td><td>9</td><td>0</td><td>3</td></tr> <tr><td></td><td></td><td></td><td>8</td><td>6</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>0</td><td>4</td><td>3</td></tr> <tr><td></td><td></td><td></td><td></td><td>4</td><td>3</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>2</td><td>1</td></tr> </table> </div> </div>			4	4	.				1	6	)	7	0	4				6	4	0				0	6	4					6	4					4	4			2	1	.				4	3	)	9	0	3				8	6	0				0	4	3					4	3					2	1	<p>a. <math>704 \div 16 = 44</math>                      b. <math>903 \div 43 = 21</math></p>																												
		4	4																																																																																																							
.																																																																																																										
1	6	)	7	0	4																																																																																																					
			6	4	0																																																																																																					
			0	6	4																																																																																																					
				6	4																																																																																																					
				4	4																																																																																																					
		2	1																																																																																																							
.																																																																																																										
4	3	)	9	0	3																																																																																																					
			8	6	0																																																																																																					
			0	4	3																																																																																																					
				4	3																																																																																																					
				2	1																																																																																																					
2.	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>a.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>1</td><td>7</td><td>3</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>2</td><td>2</td><td>)</td><td>3</td><td>8</td><td>0</td><td>6</td></tr> <tr><td></td><td></td><td></td><td>2</td><td>2</td><td>0</td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>6</td><td>0</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>5</td><td>4</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td></td><td>6</td><td>6</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>6</td><td>6</td></tr> </table> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>b.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>1</td><td>4</td><td>3</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>3</td><td>6</td><td>)</td><td>5</td><td>1</td><td>4</td><td>8</td></tr> <tr><td></td><td></td><td></td><td>3</td><td>6</td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>5</td><td>4</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>4</td><td>4</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td>8</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td>8</td></tr> </table> </div> </div>			1	7	3	.					2	2	)	3	8	0	6				2	2	0					1	6	0						1	5	4						6	6						6	6			1	4	3	.					3	6	)	5	1	4	8				3	6						1	5	4						1	4	4					1	0	8					1	0	8	<p>a. <math>3806 \div 22 = 173</math>                      b. <math>5148 \div 36 = 143</math></p>
		1	7	3																																																																																																						
.																																																																																																										
2	2	)	3	8	0	6																																																																																																				
			2	2	0																																																																																																					
			1	6	0																																																																																																					
				1	5	4																																																																																																				
					6	6																																																																																																				
					6	6																																																																																																				
		1	4	3																																																																																																						
.																																																																																																										
3	6	)	5	1	4	8																																																																																																				
			3	6																																																																																																						
			1	5	4																																																																																																					
				1	4	4																																																																																																				
				1	0	8																																																																																																				
				1	0	8																																																																																																				
3.	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>a.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>3</td><td>2</td><td>r12</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>2</td><td>9</td><td>)</td><td>9</td><td>4</td><td>0</td></tr> <tr><td></td><td></td><td></td><td>8</td><td>7</td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>7</td><td>0</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>5</td><td>8</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>1</td><td>2</td></tr> </table> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>b.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>1</td><td>4</td><td>2</td><td>r 16</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>3</td><td>2</td><td>)</td><td>4</td><td>5</td><td>6</td><td>0</td></tr> <tr><td></td><td></td><td></td><td>3</td><td>2</td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>3</td><td>6</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>2</td><td>8</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td></td><td>8</td><td>0</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td>6</td><td>4</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td></td><td>1</td><td>6</td></tr> </table> </div> </div>			3	2	r12	.					2	9	)	9	4	0				8	7					7	0						5	8					1	2			1	4	2	r 16	.						3	2	)	4	5	6	0				3	2						1	3	6						1	2	8						8	0						6	4						1	6	<p>a. <math>940 \div 29 = 32 \text{ r } 12</math>                      b. <math>4560 \div 32 = 142 \text{ r } 16</math></p>			
		3	2	r12																																																																																																						
.																																																																																																										
2	9	)	9	4	0																																																																																																					
			8	7																																																																																																						
			7	0																																																																																																						
				5	8																																																																																																					
				1	2																																																																																																					
		1	4	2	r 16																																																																																																					
.																																																																																																										
3	2	)	4	5	6	0																																																																																																				
			3	2																																																																																																						
			1	3	6																																																																																																					
				1	2	8																																																																																																				
					8	0																																																																																																				
					6	4																																																																																																				
					1	6																																																																																																				
4.	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>a.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>3</td><td>8</td><td>8</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>2</td><td>3</td><td>)</td><td>8</td><td>9</td><td>2</td><td>4</td></tr> <tr><td></td><td></td><td></td><td>6</td><td>9</td><td>0</td><td>6</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>2</td><td>0</td><td>2</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td><td>1</td><td>8</td><td>4</td><td>1</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>1</td><td>8</td><td></td><td></td></tr> </table> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p>b.</p> <table style="width: 100%; border-collapse: collapse;"> <tr><td></td><td></td><td>1</td><td>7</td><td>7</td></tr> <tr><td>.</td><td></td><td></td><td></td><td></td></tr> <tr style="border-top: 1px solid black;"><td>5</td><td>4</td><td>)</td><td>9</td><td>5</td><td>5</td><td>8</td></tr> <tr><td></td><td></td><td></td><td>5</td><td>4</td><td>0</td><td>5</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>4</td><td>1</td><td>8</td><td>4</td></tr> <tr><td></td><td></td><td></td><td></td><td>3</td><td>7</td><td>8</td><td>3</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td></td><td>4</td><td>0</td><td></td><td></td></tr> </table> </div> </div>			3	8	8	.					2	3	)	8	9	2	4				6	9	0	6				2	0	2	2					1	8	4	1					1	8					1	7	7	.					5	4	)	9	5	5	8				5	4	0	5				4	1	8	4					3	7	8	3					4	0			<p>a. <math>8924 \div 23 = 388</math>                      b. <math>9558 \div 54 = 177</math></p>										
		3	8	8																																																																																																						
.																																																																																																										
2	3	)	8	9	2	4																																																																																																				
			6	9	0	6																																																																																																				
			2	0	2	2																																																																																																				
				1	8	4	1																																																																																																			
				1	8																																																																																																					
		1	7	7																																																																																																						
.																																																																																																										
5	4	)	9	5	5	8																																																																																																				
			5	4	0	5																																																																																																				
			4	1	8	4																																																																																																				
				3	7	8	3																																																																																																			
				4	0																																																																																																					

5.	<p>a.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td>2</td><td>3</td><td>r 67</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">8</td><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td style="border-right: 1px solid black; padding-right: 5px;">1</td><td style="border-right: 1px solid black; padding-right: 5px;">9</td><td style="border-right: 1px solid black; padding-right: 5px;">7</td><td style="padding-right: 5px;">6</td></tr> <tr><td></td><td></td><td>1</td><td>6</td><td>6</td><td>↓</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td>3</td><td>1</td><td>6</td><td></td></tr> <tr><td></td><td></td><td>2</td><td>4</td><td>9</td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td>6</td><td>7</td><td></td><td></td></tr> </table>			2	3	r 67	8	3	1	9	7	6			1	6	6	↓			3	1	6				2	4	9				6	7			<p>b.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td>4</td><td>7</td><td>r 17</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">4</td><td style="border-right: 1px solid black; padding-right: 5px;">7</td><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="padding-right: 5px;">6</td></tr> <tr><td></td><td></td><td>1</td><td>8</td><td>8</td><td>↓</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td>3</td><td>4</td><td>6</td><td></td></tr> <tr><td></td><td></td><td>3</td><td>2</td><td>9</td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td>1</td><td>7</td><td></td><td></td></tr> </table>			4	7	r 17	4	7	2	2	2	6			1	8	8	↓			3	4	6				3	2	9				1	7			<p>a. <math>1976 \div 83 = 23 \text{ r } 67</math>          b. <math>2226 \div 47 = 47 \text{ r } 17</math></p>
		2	3	r 67																																																																					
8	3	1	9	7	6																																																																				
		1	6	6	↓																																																																				
		3	1	6																																																																					
		2	4	9																																																																					
		6	7																																																																						
		4	7	r 17																																																																					
4	7	2	2	2	6																																																																				
		1	8	8	↓																																																																				
		3	4	6																																																																					
		3	2	9																																																																					
		1	7																																																																						

Challenge

Workings out		Answers																																
<p>1. £5 ÷ 69p</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td></td><td>7</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">6</td><td style="border-right: 1px solid black; padding-right: 5px;">9</td><td style="border-right: 1px solid black; padding-right: 5px;">5</td><td style="border-right: 1px solid black; padding-right: 5px;">0</td><td style="padding-right: 5px;">0</td></tr> <tr><td></td><td></td><td>-</td><td>4</td><td>8</td><td>3</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>7</td><td></td></tr> </table>				7	6	9	5	0	0			-	4	8	3				1	7		<p>a. Shola can buy 7 marker pens                  b. Change is the remainder = 17 pence</p>	<p>a. 7 pens                  b. 17p change</p>											
			7																															
6	9	5	0	0																														
		-	4	8	3																													
			1	7																														
<p>2. <math>183 \div 28</math></p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td></td><td>6r15</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="border-right: 1px solid black; padding-right: 5px;">8</td><td style="border-right: 1px solid black; padding-right: 5px;">1</td><td style="border-right: 1px solid black; padding-right: 5px;">8</td><td style="padding-right: 5px;">3</td></tr> <tr><td></td><td></td><td>-</td><td>1</td><td>6</td><td>8</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>5</td><td></td></tr> </table>				6r15	2	8	1	8	3			-	1	6	8				1	5		<p><math>183 \div 28 = 6 \text{ r } 15</math>                  This means 15 spare CDs, so 7 racks are needed.</p>	<p>7 racks</p>											
			6r15																															
2	8	1	8	3																														
		-	1	6	8																													
			1	5																														
<p>3. a.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td></td><td>2</td><td>6</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="border-right: 1px solid black; padding-right: 5px;">8</td><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td style="padding-right: 5px;">2</td></tr> <tr><td></td><td></td><td>-</td><td>6</td><td>4</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>9</td><td>2</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>1</td><td>9</td><td>2</td></tr> </table>				2	6	3	2	8	3	2			-	6	4	0				1	9	2				1	9	2	<p><math>831 \div 31 = 26 \text{ r } 25</math>  <math>833 \div 33 = 25 \text{ r } 8</math>  <math>832 \div 32 = 26</math></p>	<p>Missing digit is 2</p>				
			2	6																														
3	2	8	3	2																														
		-	6	4	0																													
			1	9	2																													
			1	9	2																													
<p>b.</p> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td></td><td></td><td></td><td>3</td><td>7</td></tr> <tr style="border-top: 1px solid black;"><td style="border-right: 1px solid black; padding-right: 5px;">7</td><td style="border-right: 1px solid black; padding-right: 5px;">3</td><td style="border-right: 1px solid black; padding-right: 5px;">2</td><td style="border-right: 1px solid black; padding-right: 5px;">7</td><td style="padding-right: 5px;">0</td><td style="padding-right: 5px;">1</td></tr> <tr><td></td><td></td><td>-</td><td>2</td><td>1</td><td>9</td><td>0</td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>5</td><td>1</td><td>1</td><td></td></tr> <tr style="border-top: 1px solid black;"><td></td><td></td><td></td><td>5</td><td>1</td><td>1</td><td></td></tr> </table>				3	7	7	3	2	7	0	1			-	2	1	9	0				5	1	1					5	1	1		<p><math>2501 \div 53 = 47 \text{ r } 12</math>  <math>2601 \div 63 = 41 \text{ r } 20</math>  <math>2701 \div 73 = 37</math></p>	<p>Missing digit is 7</p>
			3	7																														
7	3	2	7	0	1																													
		-	2	1	9	0																												
			5	1	1																													
			5	1	1																													

Resource 3 - formal short division

Workings out and answers																																							
1. a.	b.																																						
<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>3</td></tr> <tr><td>2</td><td>7</td><td>)</td><td><del>6</del></td><td><del>67</del></td><td>81</td></tr> </table>				2	3	2	7	)	<del>6</del>	<del>67</del>	81	<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>6</td></tr> <tr><td>3</td><td>4</td><td>)</td><td><del>8</del></td><td><del>88</del></td><td>204</td></tr> </table>				2	6	3	4	)	<del>8</del>	<del>88</del>	204																
			2	3																																			
2	7	)	<del>6</del>	<del>67</del>	81																																		
			2	6																																			
3	4	)	<del>8</del>	<del>88</del>	204																																		
c.	d.																																						
<table border="1"> <tr><td></td><td></td><td></td><td></td><td>3</td><td>4</td></tr> <tr><td>4</td><td>1</td><td>)</td><td><del>1</del></td><td><del>13</del></td><td>139</td><td>164</td></tr> </table>					3	4	4	1	)	<del>1</del>	<del>13</del>	139	164	<table border="1"> <tr><td></td><td></td><td></td><td></td><td>2</td><td>1</td></tr> <tr><td>6</td><td>3</td><td>)</td><td><del>1</del></td><td><del>13</del></td><td>132</td><td>63</td></tr> </table>					2	1	6	3	)	<del>1</del>	<del>13</del>	132	63												
				3	4																																		
4	1	)	<del>1</del>	<del>13</del>	139	164																																	
				2	1																																		
6	3	)	<del>1</del>	<del>13</del>	132	63																																	
2. a.	b.																																						
<table border="1"> <tr><td></td><td></td><td></td><td>1</td><td>6</td><td>r19</td></tr> <tr><td>2</td><td>4</td><td>)</td><td><del>4</del></td><td><del>40</del></td><td>163</td></tr> </table>				1	6	r19	2	4	)	<del>4</del>	<del>40</del>	163	<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>3</td><td>r20</td></tr> <tr><td>5</td><td>2</td><td>)</td><td><del>1</del></td><td><del>12</del></td><td>121</td><td>176</td></tr> </table>				2	3	r20	5	2	)	<del>1</del>	<del>12</del>	121	176													
			1	6	r19																																		
2	4	)	<del>4</del>	<del>40</del>	163																																		
			2	3	r20																																		
5	2	)	<del>1</del>	<del>12</del>	121	176																																	
3. a.	b.																																						
<table border="1"> <tr><td></td><td></td><td></td><td>1</td><td>4</td><td>•</td><td>2</td><td>5</td><td></td></tr> <tr><td>3</td><td>2</td><td>)</td><td><del>4</del></td><td><del>45</del></td><td>136</td><td>•</td><td>80</td><td>160</td><td>0</td></tr> </table>				1	4	•	2	5		3	2	)	<del>4</del>	<del>45</del>	136	•	80	160	0	<table border="1"> <tr><td></td><td></td><td></td><td>1</td><td>6</td><td>•</td><td>7</td><td>5</td><td></td></tr> <tr><td>4</td><td>8</td><td>)</td><td><del>8</del></td><td><del>80</del></td><td>324</td><td>•</td><td>360</td><td>240</td><td>0</td></tr> </table>				1	6	•	7	5		4	8	)	<del>8</del>	<del>80</del>	324	•	360	240	0
			1	4	•	2	5																																
3	2	)	<del>4</del>	<del>45</del>	136	•	80	160	0																														
			1	6	•	7	5																																
4	8	)	<del>8</del>	<del>80</del>	324	•	360	240	0																														
4.	$420 \div 15 = 28$ piles																																						
<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>8</td></tr> <tr><td>1</td><td>5</td><td>)</td><td><del>4</del></td><td><del>47</del></td><td>120</td></tr> </table>				2	8	1	5	)	<del>4</del>	<del>47</del>	120																												
			2	8																																			
1	5	)	<del>4</del>	<del>47</del>	120																																		
5.	$\pounds 986 \div 34 = 29$ trainers																																						
<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>9</td></tr> <tr><td>3</td><td>4</td><td>)</td><td><del>9</del></td><td><del>98</del></td><td>306</td></tr> </table>				2	9	3	4	)	<del>9</del>	<del>98</del>	306																												
			2	9																																			
3	4	)	<del>9</del>	<del>98</del>	306																																		
6.	$\pounds 1972 \div 58$ Each ticket cost $\pounds 34$																																						
<table border="1"> <tr><td></td><td></td><td></td><td>3</td><td>4</td></tr> <tr><td>5</td><td>8</td><td>)</td><td><del>1</del></td><td><del>19</del></td><td>197</td><td>232</td></tr> </table>				3	4	5	8	)	<del>1</del>	<del>19</del>	197	232																											
			3	4																																			
5	8	)	<del>1</del>	<del>19</del>	197	232																																	
7.	$2407 \text{ kg} \div 29$ Each parcel weighs $83 \text{ kg}$																																						
<table border="1"> <tr><td></td><td></td><td></td><td>8</td><td>3</td></tr> <tr><td>2</td><td>9</td><td>)</td><td><del>2</del></td><td><del>24</del></td><td>240</td><td>87</td></tr> </table>				8	3	2	9	)	<del>2</del>	<del>24</del>	240	87																											
			8	3																																			
2	9	)	<del>2</del>	<del>24</del>	240	87																																	
8.	$3888 \div 36$ Altogether $108$ packs																																						
<table border="1"> <tr><td></td><td></td><td></td><td>1</td><td>0</td><td>8</td></tr> <tr><td>3</td><td>6</td><td>)</td><td><del>3</del></td><td><del>38</del></td><td>28</td><td>288</td></tr> </table>				1	0	8	3	6	)	<del>3</del>	<del>38</del>	28	288																										
			1	0	8																																		
3	6	)	<del>3</del>	<del>38</del>	28	288																																	
9.	$\pounds 3852 \div 18 = \pounds 214$																																						
<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>1</td><td>4</td></tr> <tr><td>1</td><td>8</td><td>)</td><td><del>3</del></td><td><del>38</del></td><td>25</td><td>72</td></tr> </table>				2	1	4	1	8	)	<del>3</del>	<del>38</del>	25	72																										
			2	1	4																																		
1	8	)	<del>3</del>	<del>38</del>	25	72																																	

Challenge

Workings out and answers													
1.	<table border="1"> <tr><td></td><td></td><td></td><td>6</td><td>r26</td></tr> <tr><td>7</td><td>9</td><td>)</td><td><del>5</del></td><td><del>50</del></td><td>500</td></tr> </table> <p>Freddy buys 6 cards with 26p change</p>				6	r26	7	9	)	<del>5</del>	<del>50</del>	500	
			6	r26									
7	9	)	<del>5</del>	<del>50</del>	500								
2.	<table border="1"> <tr><td></td><td></td><td></td><td>1</td><td>1</td><td>r12</td></tr> <tr><td>5</td><td>3</td><td>)</td><td><del>6</del></td><td><del>60</del></td><td>70</td></tr> </table> <p>12 buses are needed with 41 spare seats (<math>53 - 12 = 41</math>)</p>				1	1	r12	5	3	)	<del>6</del>	<del>60</del>	70
			1	1	r12								
5	3	)	<del>6</del>	<del>60</del>	70								



Resource 4 - perform mental calculations

		Workings out	Answers
1.	a.	$10 - (4 \times 2) = 10 - 8 = 2$	2
	b.	$10 - (4 + 2) = 10 - 6 = 4$	4
	c.	$10 \div 5 + (4 \times 2) = 2 + 8 = 10$	10
	d.	$(10 + 2) \div 6 = 12 \div 6 = 2$	2
2.	a.	$(8 - 2) - 2 \times 3 = 0 \times 1 \times 2 \times 3 \times 4 \times 5$	$0 = 0$
	b.	$100 - 5 \times 10 = 2 \times 5 \times 5$	$50 = 50$
	c.	$4 + 5 \times 6 + 7 < 6 \times 7$	$41 < 42$
	d.	$(1 + 3)^2 > 1 + 2 + 3 + 4 + 5$	$16 > 15$
3.	a.	$700,000 + 60,000 + 500 + 40 + 3 = 760,543$	760,543
	b.	$100,000 + 20,000 + 300 + 4 = 1,020,304$	1,020,304
4.	a.	$780 \times 3400 = 2,652,000$	2,652,000
	b.	$2,652,000 \div 780 = 3400$	3400
5.		$\begin{array}{r} \phantom{0}^5 6 \phantom{0}^9 0 \phantom{0}^{14} 3 \phantom{0}^5 \\ - \phantom{0}^1 4 \phantom{0}^5 0 \phantom{0}^3 \\ \hline \phantom{0}^4 5 \phantom{0}^9 3 \phantom{0}^2 \end{array}$	45,932
6.		Total = $40,346 + 15,496 + 30,946 + 37,083 = 123,871$	123,871


Challenge

1.	a.	$4 \div 4 + 4; (4 \times 4 + 4) \div 4$	5	c.	$4 \times 4 + 4; (4 \div 4 + 4) \times 4$	20
	b.	$4 \div 4 + 4 + 4;$	9	d.	$(4 \times 4 + 4) \times 4;$	80

Resource 5 - identify common factors, multiples and prime numbers

		Workings out	Answer
1.	a.	$10 = 1 \times 10; 2 \times 5$	1, 2, 5, 10
	b.	$18 = 1 \times 18; 2 \times 9; 3 \times 6$	1, 2, 3, 6, 9, 18
	c.	$30 = 1 \times 30; 2 \times 15; 3 \times 10; 5 \times 6$	1, 2, 3, 5, 6, 10, 15, 30
2.	a.	Multiples of 8: 8, 16, 24, 32, 40, ...	8, 16, 24, 32, 40
	b.	Multiples of 9: 9, 18, 27, 36, 45, ...	9, 18, 27, 36, 45
	c.	Multiples of 12: 12, 24, 36, 48, 60 ...	12, 24, 36, 48, 60
	d.	Common multiples of 9 and 12 are 36, 72, 108, and so on.	36, 72, 108, ...
3.	a.	Prime	3, 13 or 29
	b.	Multiple of 9	36
	c.	Factor of 52	13
	d.	$48 = 3 \times 16$	$48 = 3 \times 16$



4.		100 or less	More than 100
	Multiple of 30	30, 60 or 90	120, 150, ... 300, ...
	Multiple of 20	20, 40, 60, 80 or 100	120, 140, ... 200, ...
5.	Factors of 24 = $1 \times 24$ ; $2 \times 12$ ; $3 \times 8$ ; $4 \times 6$ . Factors of 12 = $1 \times 12$ ; $2 \times 6$ ; $3 \times 4$ .		8 and 24
6.	Multiples of 6: 6, 12, <b>18</b> , 24, 30, <b>36</b> , ... Multiples of 9: 9, <b>18</b> , 27, <b>36</b> , so we need Multiples of 18: 18, 36, <b>54</b> , <b>72</b> , <b>90</b> , 108, 126, ...		54, 72 and 90
7.	In between 376 and 406 Multiples of 4: <b>376</b> - 376, 380, 384, 388, <b>392</b> , 396, 400, 404, ... Multiples of 7: <b>406</b> - 399, <b>392</b> , 385, 378, 371, ... <b>392</b> is the joint multiple of 4 and 7.		392
8.	<div style="border: 1px solid black; padding: 5px; display: inline-block;">           Factors of 18        Factors of 24         </div>		

Challenge

a.	$18 = 2 \times 3 \times 3$	$2 \times 3 \times 3$
b.	$50 = 2 \times 5 \times 5$	$2 \times 5 \times 5$
c.	$90 = 2 \times 3 \times 3 \times 5$	$2 \times 3 \times 3 \times 5$
d.	$126 = 2 \times 3 \times 3 \times 7$	$2 \times 3 \times 3 \times 7$

Resource 6 - BODMAS

1.	$7 - 5 + 4 = 11 - 5 = 6$	2.	$5 - 7 + 4 = 9 - 7 = 2$
3.	$7 \times 3 - 2 = 21 - 2 = 19$	4.	$2 \times 6 + 3 = 12 + 3 = 15$
5.	$8 \div 2 + 5 = 4 + 5 = 9$	6.	$12 \div 2 - 3 = 6 - 3 = 3$
7.	$7 + 3 \times 4 = 7 + 12 = 19$	8.	$9 - 3 \times 2 = 9 - 6 = 3$
9.	$18 - 5 \times 3 = 18 - 15 = 3$	10.	$7 + 15 \div 5 = 7 + 3 = 10$
11.	$(8 - 5) \times 4 = 3 \times 4 = 12$	12.	$(2 + 7) \div 3 = 9 \div 3 = 3$

Challenge

1.	a.	$8 \times (4 - 2) = 16$	2.	Allow reversals of the order of the sums and possible variations.
	b.	$12 \div (1 + 5) = 2$	a.	$5 \times 6 = 30$
	c.	$(3 + 4) \times 5 = 35$	b.	$5 \times (8 - 2) = 5 \times 6 = 30$
	d.	$(4 + 2) \times (5 - 3) = 15$	c.	$8 \times (5 - 2) + 6 = 8 \times 3 + 6 = 24 + 6 = 30$
	e.	$(9 - 3 \times 2) \times 5 = 15$	d.	$(5 + 6) \times 2 + 8 = 11 \times 2 + 8 = 22 + 8 = 30$
			e.	$2^5 + 6 - 8 = 32 + 6 - 8 = 30$

Resource 7 - addition and subtraction multi-step problems

	Workings out	Answers																				
1.	So far $63 + 94 = 157$ miles Remainder = $348 - 157 = 191$ miles	191 miles																				
2.	$17 \boxed{+} 9 \boxed{-} 15 \boxed{+} 8 = 19$	+ . - . +																				
3.	So far $593 + 396 = 989$ loaves Remainder = $1043 - 989 = 54$ loaves	54 loaves																				
4.	Total cost = $£6.48 + (5 \times £0.65) = £9.73$ Change = $£10 - £9.73 = £0.27 = 27p$	27p																				
5.	48      39      26      47      14      25	$39 + 47 + 14 = 100$																				
6.	$7 + 5 = 12...$ '2 down 1 to carry' $5 + 9 + 1 = 15...$ '5 down 1 to carry' $4 + 5 + 1 = 10...$ '0 down 1 to carry' $3 + 0 + 1 = 4...$	<table border="1"> <tr><td></td><td>3</td><td>4</td><td>5</td><td>7</td></tr> <tr><td>+</td><td></td><td>5</td><td>9</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>4<sub>1</sub></td><td>0<sub>1</sub></td><td>5<sub>1</sub></td><td>2</td></tr> </table>		3	4	5	7	+		5	9	5							4 <sub>1</sub>	0 <sub>1</sub>	5 <sub>1</sub>	2
	3	4	5	7																		
+		5	9	5																		
	4 <sub>1</sub>	0 <sub>1</sub>	5 <sub>1</sub>	2																		
7.	$w + p = 140$ ; $w + 2p = 195$ , so extra pen costs 55p. One writing pad = $140 - 55 = 85p$	85p																				
8. a.	$\boxed{6} \boxed{9} - \boxed{4} \boxed{2} = 27$	$69 - 42 = 27$																				
b.	$\boxed{8} \boxed{4} - \boxed{3} \boxed{5} = 49$	$84 - 35 = 49$																				

Challenge

a.	Each corner number is added twice. $8 + 12 + 10 = 30$ . This means the corners must all add up to 15 ( $\frac{1}{2}$ of 30). To '8' we can use $1 + 7$ , $2 + 6$ or $3 + 5$ . By elimination, only the 3 and 5 completed the remaining answers. Note: $15 - 8 = 7$	
b.	$13 + 17 + 18 = 48$ . $\frac{1}{2}$ of 48 = 24. If the three numbers add to give 24 and the first 2 add up to say 13, then $24 - 13 = 11$ must be one of the numbers. $17 - 11 = 6$ , and, $13 - 6 = 7$	

Resource 8 - addition, subtraction, multiplication and division problems

1.	Collect in and share equally. $£28 + £37 = £65$ $£65 \div 2 = £32.50$ each	£32.50													
2.	$3 \times 49p = 147p = £1.47$ $2 \times £1.14 = £2.28 +$ <u>£3.75</u> ... Change = $£5 - £3.75 = £1.25$	£1.25 change													
3.	<table border="1"> <tr><td></td><td></td><td></td><td>2</td><td>3</td><td>r7</td></tr> <tr><td>1</td><td>5</td><td>)</td><td>3</td><td>35</td><td>52</td><td>7</td></tr> </table> $370 - 18 = 352$ left to share into boxes of 15. He needs 24 boxes				2	3	r7	1	5	)	3	35	52	7	24 boxes
			2	3	r7										
1	5	)	3	35	52	7									
4.	Buying separately costs $£12.95 \times 3 = £38.85$ Saving = $£38.85 - £30 = £8.85$ (or each would cost £10 deal, an individual saving of $£2.95, \times 3 = £8.85$ )	£8.85 saving													

5.	Halfway = $648 \div 2 = 324$ Remaining pages = $324 - 197 = 127$ pages	127 pages
6.		
7.	Pupils for dinner = $238 - 13 - 17 = 208$ . 3 times as many means $3 + 1 = 4$ groups. $208 \div 4 = 52$ So, 52 have a packed lunch and $3 \times 52 = 156$ have the hot meal.	156 pupils
8.	Work backwards and do the opposite. 	Starts with 11

**Challenge**

1.	Start at the end and work backwards. Michael: end + 75 = start (M) Trisha: end + 20 = start (T) But start (M) = $2 \times$ start (T) or start (T) = $\frac{1}{2}$ of start (M). So, the extra $(75 - 20) = 55$ must be what Trisha started with. So Michael started with $2 \times \text{£}55 = \text{£}110$ .	<b>£110</b> Letting E be end $E + 75 = 2(E + 20)$ $E + 75 = 2E + 40$ $35 = E$ $M = 35 + 75 = 110$
----	--	--

**Resource 9 - use estimation to check answers**

1.	$34 \times 18 \approx 30 \times 20 = 600$	<b>c. 600</b>																														
2.	$342 \div 22 \approx 300 \div 20 = 15$ rows	<b>b. 15</b>																														
3.	$54 \times 16 \approx 50 \times 20 = 1000$ pence = £10	<b>£10</b>																														
4.	$197 \div 42 \approx 200 \div 40 = 5$ kg	<b>5 kg</b>																														
5.	<table border="1"> <thead> <tr> <th></th> <th>Question</th> <th>Rounding</th> <th>Estimate</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>a.</td> <td><math>15,463 + 8946</math></td> <td><math>15,000 + 9000</math></td> <td>24,000</td> <td>24,409</td> </tr> <tr> <td>b.</td> <td><math>7631 - 2814</math></td> <td><math>8000 - 3000</math></td> <td>5000</td> <td>4817</td> </tr> <tr> <td>c.</td> <td><math>78 \times 437</math></td> <td><math>80 \times 400</math></td> <td>32,000</td> <td>34,086</td> </tr> <tr> <td>d.</td> <td><math>5632 \div 32</math></td> <td><math>6000 \div 30</math></td> <td>200</td> <td>176</td> </tr> </tbody> </table>		Question	Rounding	Estimate	Actual	a.	$15,463 + 8946$	$15,000 + 9000$	24,000	24,409	b.	$7631 - 2814$	$8000 - 3000$	5000	4817	c.	$78 \times 437$	$80 \times 400$	32,000	34,086	d.	$5632 \div 32$	$6000 \div 30$	200	176						
	Question	Rounding	Estimate	Actual																												
a.	$15,463 + 8946$	$15,000 + 9000$	24,000	24,409																												
b.	$7631 - 2814$	$8000 - 3000$	5000	4817																												
c.	$78 \times 437$	$80 \times 400$	32,000	34,086																												
d.	$5632 \div 32$	$6000 \div 30$	200	176																												
6.	<table border="1"> <thead> <tr> <th><math>\times 1000</math></th> <th><math>\times 100</math></th> <th>Number</th> <th><math>\div 10</math></th> <th><math>\div 100</math></th> </tr> </thead> <tbody> <tr> <td>42000</td> <td>4200</td> <td>42</td> <td>4.2</td> <td>0.42</td> </tr> <tr> <td>6750</td> <td>675</td> <td>6.75</td> <td>0.675</td> <td>0.0675</td> </tr> <tr> <td>23,000</td> <td>2300</td> <td>23</td> <td>2.3</td> <td>0.23</td> </tr> <tr> <td>60,000</td> <td>6000</td> <td>60</td> <td>6</td> <td>0.6</td> </tr> <tr> <td>45,000</td> <td>4500</td> <td>45</td> <td>4.5</td> <td>0.45</td> </tr> </tbody> </table>	$\times 1000$	$\times 100$	Number	$\div 10$	$\div 100$	42000	4200	42	4.2	0.42	6750	675	6.75	0.675	0.0675	23,000	2300	23	2.3	0.23	60,000	6000	60	6	0.6	45,000	4500	45	4.5	0.45	
$\times 1000$	$\times 100$	Number	$\div 10$	$\div 100$																												
42000	4200	42	4.2	0.42																												
6750	675	6.75	0.675	0.0675																												
23,000	2300	23	2.3	0.23																												
60,000	6000	60	6	0.6																												
45,000	4500	45	4.5	0.45																												

7.	$2392 \times 52 \approx 2000 \times 50 = 100,000$ patients in 2018	100,000
8. a.	387 is the closest to 500	387
b.	$873 \times 10 = 8730$ (7 hundred)	700
c.	$3678 \div 1000 = 3.678$ (7 tenths)	7 tenths

Challenge

1.	e.g. $50 + 30 = 80$ (rounded to nearest 10) 50 could be <b>45-54</b> ; 30 could be <b>25-34</b> . So maximum sum is <b>54 + 34</b> .	So maximum sum is <b>54 + 34</b> .
----	--	------------------------------------

Number: fractions (including decimals and percentages)

Resource 1 - use common factors to simplify fractions

Workings out and answers																			
1.	a. $\frac{2}{5} = \frac{4}{10} = \frac{6}{15} = \frac{8}{20} = \frac{10}{25}$	b. $\frac{3}{8} = \frac{6}{16} = \frac{9}{24} = \frac{12}{32} = \frac{15}{40}$	c. $\frac{5}{6} = \frac{10}{12} = \frac{15}{18} = \frac{20}{24} = \frac{25}{30}$																
2.	a. $\frac{3}{4} = \frac{9}{12}$	b. $\frac{2}{3} = \frac{8}{12}$	c. $\frac{5}{6} = \frac{20}{24}$																
	d. $\frac{2}{7} = \frac{10}{35}$																		
3.	a. $\frac{2}{3}$ or $\frac{3}{4}$ ,	b. $\frac{5}{6}$ or $\frac{7}{9}$	$\frac{3}{4}$ is bigger; $\frac{5}{6}$ is bigger.																
4.	Twelfths: $\frac{7}{12}; \frac{3}{4} = \frac{9}{12}; \frac{5}{6} = \frac{10}{12}; \frac{1}{2} = \frac{6}{12}; \frac{2}{3} = \frac{8}{12}$ Smallest: $\frac{1}{2}; \frac{7}{12}; \frac{2}{3}; \frac{3}{4}; \frac{5}{6}$																		
5.	a. $\frac{2}{3} = \frac{12}{18} = \frac{10}{15}$	b. $\frac{3}{8} = \frac{9}{24} = \frac{6}{16}$																	
6.	<table border="1" style="margin-left: 20px;"> <tr> <td>a.</td> <td><math>\frac{7}{2}</math></td> <td>=</td> <td><math>3\frac{1}{2}</math></td> </tr> <tr> <td>b.</td> <td><math>\frac{9}{10}</math></td> <td>&gt;</td> <td><math>\frac{4}{5}</math></td> </tr> <tr> <td>c.</td> <td><math>1\frac{1}{3}</math></td> <td>&gt;</td> <td><math>1\frac{1}{6}</math></td> </tr> <tr> <td>d.</td> <td><math>\frac{5}{12}</math></td> <td>&gt;</td> <td><math>\frac{3}{8}</math></td> </tr> </table>			a.	$\frac{7}{2}$	=	$3\frac{1}{2}$	b.	$\frac{9}{10}$	>	$\frac{4}{5}$	c.	$1\frac{1}{3}$	>	$1\frac{1}{6}$	d.	$\frac{5}{12}$	>	$\frac{3}{8}$
a.	$\frac{7}{2}$	=	$3\frac{1}{2}$																
b.	$\frac{9}{10}$	>	$\frac{4}{5}$																
c.	$1\frac{1}{3}$	>	$1\frac{1}{6}$																
d.	$\frac{5}{12}$	>	$\frac{3}{8}$																
7.	a. $\frac{3}{8} = \frac{15}{40}$	<b>3 and 15</b>	b. $\frac{5}{8} = \frac{20}{40}$																
	c. $\frac{6}{7} = \frac{18}{21}$	<b>6 and 18</b>	<b>5 and 20</b>																

Challenge

1.	a. $\frac{5}{12} = \frac{20}{48} = \frac{10}{24}$	b. $\frac{10}{8} = \frac{30}{24} = \frac{5}{4}$
----	---	---

Resource 2 - add and subtract fractions

	Workings out	Answers
1. a.	$\frac{1}{4} + \frac{3}{8}$ $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$	$\frac{5}{8}$
b.	$\frac{1}{3} + \frac{4}{9}$ $\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$	$\frac{7}{9}$
2. a.	$\frac{5}{6} - \frac{1}{3}$ $\frac{5}{6} - \frac{1}{6} = \frac{4}{6}$	$\frac{2}{3} = \frac{1}{2}$
b.	$\frac{7}{12} - \frac{1}{4}$ $\frac{7}{12} - \frac{3}{12} = \frac{4}{12}$	$\frac{1}{3} = \frac{1}{3}$
3. a	$\frac{3}{4} + \frac{1}{6}, \frac{9}{12} + \frac{2}{12} = \frac{11}{12}$	$\frac{11}{12}$
b	$\frac{3}{8} + \frac{5}{12}, \frac{9}{24} + \frac{10}{24} = \frac{19}{24}$	$\frac{19}{24}$
c	$\frac{4}{9} + \frac{1}{6}, \frac{8}{18} + \frac{3}{18} = \frac{11}{18}$	$\frac{11}{18}$
d	$\frac{11}{12} + \frac{5}{8}, \frac{22}{24} + \frac{15}{24} = \frac{37}{24}$	$\frac{37}{24}$
4.	$\frac{5}{8} + \frac{1}{8} = \frac{6}{8}$ eaten and $\frac{2}{8} = \frac{1}{4}$ left over.	$\frac{6}{8} = \frac{3}{4}, \frac{2}{8} = \frac{1}{4}$
5. a	$\frac{1}{8} + \frac{5}{12}, \frac{3}{24} + \frac{10}{24} = \frac{13}{24}$	$\frac{13}{24}$
b	$\frac{5}{9} + \frac{1}{6}, \frac{10}{18} + \frac{3}{18} = \frac{13}{18}$	$\frac{13}{18}$
c	$\frac{7}{9} - \frac{5}{12}, \frac{28}{36} - \frac{15}{36} = \frac{13}{36}$	$\frac{13}{36}$
d	$\frac{11}{12} - \frac{7}{8}, \frac{22}{24} - \frac{21}{24} = \frac{1}{24}$	$\frac{1}{24}$
6.	$\frac{5}{12} + \frac{1}{4} = \frac{5}{12} + \frac{3}{12} = \frac{8}{12}$	$\frac{4}{12} = \frac{1}{3}$
7.	$\frac{7}{12} + \frac{3}{8} = \frac{14}{24} + \frac{9}{24} = \frac{23}{24}$ of a mile further.	$\frac{23}{24}$

Challenge

<p>1. a. <math>3\frac{4}{9} + 2\frac{5}{12}</math></p> $= 5\frac{16}{36} + \frac{15}{36} = 5\frac{31}{36}$	<p>b. <math>7\frac{11}{12} - 3\frac{7}{8}</math></p> $= 4\frac{22}{24} - \frac{21}{24} = 4\frac{1}{24}$
<p>2. Perimeter = <math>1\frac{1}{6} + 1\frac{1}{6} + \frac{8}{9} + \frac{8}{9}</math></p> $= 2\frac{3}{18} + \frac{3}{18} + \frac{16}{18} + \frac{16}{18}$ $= 2\frac{38}{18}$ $= 2 + 2\frac{2}{18} = 4\frac{2}{18}$	
<p>Left over (spare) = <math>5 - 4\frac{2}{18} = \frac{16}{18} = \frac{8}{9}</math></p>	

Resource 3 - multiply proper fractions

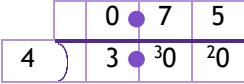
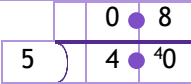
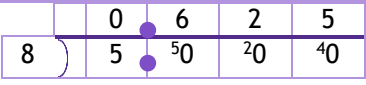
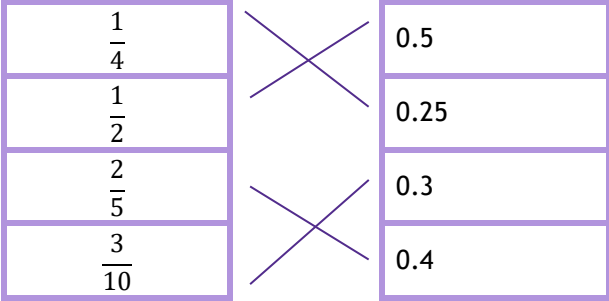
Workings out		Answers
1.	a. $\frac{3}{4} \times \frac{1}{2} = \frac{3 \times 1}{4 \times 2} = \frac{3}{8}$	$\frac{3}{8}$
	b. $\frac{5}{8} \times \frac{3}{4} = \frac{5 \times 3}{8 \times 4} = \frac{15}{32}$	$\frac{15}{32}$
	c. $\frac{1}{5} \times \frac{4}{5} = \frac{1 \times 4}{5 \times 5} = \frac{4}{25}$	$\frac{4}{25}$
2.	a. $\frac{5}{8} \times \frac{2}{3} = \frac{5 \times 2}{8 \times 3} = \frac{10}{24} = \frac{5}{12}$ ( $\div$ by 2)	$\frac{5}{12}$
	b. $\frac{5}{6} \times \frac{3}{4} = \frac{5 \times 3}{6 \times 4} = \frac{15}{24} = \frac{5}{8}$ ( $\div$ by 3)	$\frac{5}{8}$
	c. $\frac{1}{4} \times \frac{8}{9} = \frac{1 \times 8}{4 \times 9} = \frac{8}{36} = \frac{2}{9}$ ( $\div$ by 4)	$\frac{2}{9}$
3.	a. $\frac{2}{3}$ of £18 = $\frac{2}{3} \times \frac{18}{1} = \frac{2 \times 18}{3 \times 1} = \frac{36}{3} = \text{£}12$	<b>£12</b>
	b. $\frac{3}{5}$ of £25 = $\frac{3}{5} \times \frac{25}{1} = \frac{3 \times 25}{5 \times 1} = \frac{75}{5} = \text{£}15$	<b>£15</b>
	c. $\frac{3}{8}$ of £48 = $\frac{3}{8} \times \frac{48}{1} = \frac{3 \times 48}{8 \times 1} = \frac{144}{8} = \text{£}15$	<b>£15</b>

4.		
5. a.	$\frac{5}{8} \times \frac{6}{7} = \frac{5 \times 6}{8 \times 7} = \frac{30}{56} = \frac{15}{28}$ ( $\div$ by 2)	$\frac{15}{28}$
b.	$\frac{5}{9} \times \frac{6}{7} = \frac{5 \times 6}{9 \times 7} = \frac{30}{63} = \frac{10}{21}$ ( $\div$ by 3)	$\frac{10}{21}$
c.	$\frac{5}{8} \times \frac{4}{15} = \frac{5 \times 4}{8 \times 15} = \frac{20}{120} = \frac{1}{6}$ ( $\div$ by 20)	$\frac{1}{6}$
6.	$\frac{1}{2}$ of $\frac{2}{5} = \frac{1 \times 2}{2 \times 5} = \frac{2}{10} = \frac{1}{5}$	$\frac{1}{5}$
7.	$\frac{3}{4}$ of $\frac{7}{12} = \frac{3 \times 7}{4 \times 12} = \frac{21}{48} = \frac{7}{16}$	$\frac{7}{16}$
8. a.	$\frac{5}{8}$ of £44 = $\frac{5}{8} \times \frac{44}{1} = \frac{5 \times 44}{8 \times 1} = \frac{220}{8}$ $220 \div 8$ £27.50	<b>£27.50</b>
b.	$\frac{3}{4}$ of £54 = $\frac{3}{4} \times \frac{54}{1} = \frac{3 \times 54}{4 \times 1} = \frac{162}{4}$ $162 \div 4$ £40.50	<b>£40.50</b>
c.	$\frac{7}{12}$ of £30 = $\frac{7}{12} \times \frac{30}{1} = \frac{7 \times 30}{12 \times 1} = \frac{210}{12}$ $210 \div 12$ £17.50	<b>£17.50</b>

Challenge

1. a.	$\frac{5}{8} \times \frac{2}{3} = \frac{5 \times 2}{8 \times 3} = \frac{10}{24} = \frac{5}{12}$	b.	$\frac{7}{9} \times \frac{3}{4} = \frac{7 \times 3}{9 \times 4} = \frac{21}{36} = \frac{7}{12}$
c.	$\frac{3}{4} \times \frac{11}{18} = \frac{3 \times 11}{4 \times 18} = \frac{33}{72} = \frac{11}{24}$		
2. a.	$\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} = \frac{1 \times 2 \times 3 \times 4}{2 \times 3 \times 4 \times 5} = \frac{24}{120} = \frac{1}{5}$ ( $\div$ by 24)		
b.	$1\frac{1}{4} \times 1\frac{1}{5} = \frac{5}{4} \times \frac{6}{5} = \frac{30}{20} = \frac{3}{2} = 1\frac{1}{2}$		

Resource 4 - divide fractions by whole numbers

Workings out		Answers
1. a.	$\frac{2}{3} \div 5 = \frac{2}{3} \times \frac{1}{5} = \frac{2}{15}$	$\frac{2}{15}$
b.	$\frac{3}{5} \div 2 = \frac{3}{5} \times \frac{1}{2} = \frac{3}{10}$	$\frac{3}{10}$
c.	$\frac{4}{5} \div 3 = \frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$	$\frac{4}{15}$
2. a.	$\frac{3}{4} \div 2 = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$	$\frac{3}{8}$
b.	$\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$	$\frac{1}{6}$
c.	$\frac{5}{6} \div 3 = \frac{5}{6} \times \frac{1}{3} = \frac{5}{18}$	$\frac{5}{18}$
3. a.	$\frac{3}{4} = 3 \div 4 = 0.75$ 	0.75
b.	$\frac{4}{5} = 4 \div 5 = 0.8$ 	0.8
c.	$\frac{5}{8} = 5 \div 8 = 0.625$ 	0.625
4.		
5.	$\frac{2}{5} = 0.4$ ; $\frac{1}{3} = 0.333$ ; $\frac{3}{8} = 0.375... =$ <b>Smallest:</b> 0.28   0.3 $\frac{1}{3}$ $\frac{3}{8}$ $\frac{2}{5}$ <b>Largest</b>	
6. a.	$\frac{4}{5} \div 2 = \frac{4}{5} \times \frac{1}{2} = \frac{4}{10} = \frac{2}{5}$	$\frac{2}{5}$
b.	$\frac{5}{6} \div 10 = \frac{5}{6} \times \frac{1}{10} = \frac{5}{60} = \frac{1}{12}$	$\frac{1}{12}$
c.	$\frac{9}{10} \div 6 = \frac{9}{10} \times \frac{1}{6} = \frac{9}{60} = \frac{3}{20}$	$\frac{3}{20}$



7. a.	$\frac{7}{8} = 7 \div 8 = 0.875$	<table border="1"> <tr><td>0</td><td>8</td><td>7</td><td>5</td></tr> <tr><td>8</td><td>7</td><td>0</td><td>0</td></tr> </table>	0	8	7	5	8	7	0	0	0.875
0	8	7	5								
8	7	0	0								
b.	$\frac{1}{6} = 1 \div 6 = 0.166\dots$	<table border="1"> <tr><td>0</td><td>1</td><td>6</td><td>6</td></tr> <tr><td>6</td><td>1</td><td>0</td><td>0</td></tr> </table>	0	1	6	6	6	1	0	0	0.1666...
0	1	6	6								
6	1	0	0								
c.	$1\frac{1}{4} = 1 + 1 \div 4 = 1.25$	<table border="1"> <tr><td>0</td><td>2</td><td>5</td></tr> <tr><td>4</td><td>1</td><td>0</td></tr> </table>	0	2	5	4	1	0	1.25		
0	2	5									
4	1	0									
8.	$\frac{1}{6}$ of 5 = $\frac{5}{6} = 0.833\dots$	<table border="1"> <tr><td>0</td><td>8</td><td>3</td><td>3</td></tr> <tr><td>6</td><td>5</td><td>0</td><td>0</td></tr> </table>	0	8	3	3	6	5	0	0	0.833... rounds to 0.83 = 83p . Yes.
0	8	3	3								
6	5	0	0								

Challenge

$$\frac{3}{4} \div 6 = \frac{3}{4} \times \frac{1}{6} = \frac{3}{24} = \frac{1}{8} = 0.125; 0.125\text{m} = 0.125 \times 100 \text{ cm} = 12.5 \text{ cm}$$

Resource 5 - multiply numbers up to 2 decimal places

Workings out		Answers																																																				
1.	<p>a.</p> <table border="1"> <tr><td></td><td></td><td>2</td><td>6</td><td>.</td><td>4</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>7</td></tr> <tr><td></td><td>1</td><td>8</td><td>4</td><td>.</td><td>8</td></tr> <tr><td></td><td>4</td><td>8</td><td></td><td></td><td></td></tr> </table> <p>b.</p> <table border="1"> <tr><td></td><td></td><td>7</td><td>3</td><td>.</td><td>1</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td></td><td>2</td><td>9</td><td>2</td><td>.</td><td>4</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			2	6	.	4	×					7		1	8	4	.	8		4	8						7	3	.	1	×					4		2	9	2	.	4							<p>a. 184.8 b. 292.4 c. 39.30 d. 88.02</p>				
		2	6	.	4																																																	
×					7																																																	
	1	8	4	.	8																																																	
	4	8																																																				
		7	3	.	1																																																	
×					4																																																	
	2	9	2	.	4																																																	
	<p>c.</p> <table border="1"> <tr><td></td><td></td><td>7</td><td>.</td><td>8</td><td>6</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>5</td></tr> <tr><td></td><td>3</td><td>9</td><td>.</td><td>3</td><td>0</td></tr> <tr><td></td><td></td><td></td><td>4</td><td>3</td><td></td></tr> </table> <p>d.</p> <table border="1"> <tr><td></td><td>1</td><td>4</td><td>.</td><td>6</td><td>7</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>6</td></tr> <tr><td></td><td>8</td><td>8</td><td>.</td><td>0</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			7	.	8	6	×					5		3	9	.	3	0				4	3			1	4	.	6	7	×					6		8	8	.	0	2											
		7	.	8	6																																																	
×					5																																																	
	3	9	.	3	0																																																	
			4	3																																																		
	1	4	.	6	7																																																	
×					6																																																	
	8	8	.	0	2																																																	
2.	<p>a.</p> <table border="1"> <tr><td></td><td>3</td><td>7</td><td>.</td><td>8</td><td>2</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>8</td></tr> <tr><td></td><td>3</td><td>0</td><td>2</td><td>.</td><td>5</td><td>6</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table> <p>b.</p> <table border="1"> <tr><td></td><td>1</td><td>8</td><td>4</td><td>.</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>9</td></tr> <tr><td></td><td>1</td><td>6</td><td>6</td><td>0</td><td>.</td><td>5</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>		3	7	.	8	2	×					8		3	0	2	.	5	6									1	8	4	.	5	×					9		1	6	6	0	.	5								<p>a. 302.56 b. 1660.5</p>
	3	7	.	8	2																																																	
×					8																																																	
	3	0	2	.	5	6																																																
	1	8	4	.	5																																																	
×					9																																																	
	1	6	6	0	.	5																																																
3.	<p>a.</p> <table border="1"> <tr><td></td><td></td><td>2</td><td>.</td><td>8</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>7</td></tr> <tr><td></td><td>1</td><td>9</td><td>.</td><td>9</td><td>5</td></tr> <tr><td></td><td>5</td><td>3</td><td></td><td></td><td></td></tr> </table> <p>b.</p> <table border="1"> <tr><td></td><td></td><td>9</td><td>.</td><td>7</td><td>3</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td></td><td>3</td><td>8</td><td>.</td><td>9</td><td>2</td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>			2	.	8	5	×					7		1	9	.	9	5		5	3						9	.	7	3	×					4		3	8	.	9	2							<p>a. £19.95 b. 38.92 miles</p>				
		2	.	8	5																																																	
×					7																																																	
	1	9	.	9	5																																																	
	5	3																																																				
		9	.	7	3																																																	
×					4																																																	
	3	8	.	9	2																																																	

4.	<table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>3</td><td>2</td><td>.</td><td>6</td><td>9</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td></td><td>5</td></tr> <tr><td colspan="7"><hr/></td></tr> <tr><td></td><td>1</td><td>6</td><td>3</td><td>.</td><td>4</td><td>5</td></tr> <tr><td colspan="7"><hr/></td></tr> <tr><td></td><td>1</td><td>3</td><td>4</td><td></td><td></td><td></td></tr> </tbody> </table>			3	2	.	6	9	×						5	<hr/>								1	6	3	.	4	5	<hr/>								1	3	4				<b>£163.45</b>																																												
		3	2	.	6	9																																																																																		
×						5																																																																																		
<hr/>																																																																																								
	1	6	3	.	4	5																																																																																		
<hr/>																																																																																								
	1	3	4																																																																																					
5. a.	<p>Ignoring the decimal point, we can say <math>3 \times 4 = 12</math> The answer has only one decimal place. So, the missing answer is 0.3.</p>	<b>0.3</b>																																																																																						
	<p>b. Ignoring the decimal point, we can say <math>12 \times 9 = 108</math> The answer has only one decimal place. So, the missing answer is 1.2</p>	<b>1.2</b>																																																																																						
6.	<table style="width: 100%;"> <tbody> <tr> <td style="width: 50%; vertical-align: top;"> <p>a.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td>4</td><td>3</td><td>7</td><td>.</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>8</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>5</td><td>0</td><td>2</td><td>.</td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>6</td><td>6</td><td></td><td></td><td></td></tr> </tbody> </table> </td> <td style="width: 50%; vertical-align: top;"> <p>b.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>3</td><td>8</td><td>4</td><td>.</td><td>7</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td></td><td></td><td>9</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td>3</td><td>4</td><td>6</td><td>2</td><td>.</td><td>7</td><td>5</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table> </td> </tr> </tbody> </table>	<p>a.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td>4</td><td>3</td><td>7</td><td>.</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>8</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>5</td><td>0</td><td>2</td><td>.</td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>6</td><td>6</td><td></td><td></td><td></td></tr> </tbody> </table>		4	3	7	.	8	×					8	<hr/>						3	5	0	2	.	4	<hr/>						3	6	6				<p>b.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>3</td><td>8</td><td>4</td><td>.</td><td>7</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td></td><td></td><td>9</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td>3</td><td>4</td><td>6</td><td>2</td><td>.</td><td>7</td><td>5</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>			3	8	4	.	7	5	×							9	<hr/>									3	4	6	2	.	7	5	<hr/>																<p>a. <b>3502.4</b> b. <b>3462.75</b></p>
<p>a.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td>4</td><td>3</td><td>7</td><td>.</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>8</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>5</td><td>0</td><td>2</td><td>.</td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td>3</td><td>6</td><td>6</td><td></td><td></td><td></td></tr> </tbody> </table>		4	3	7	.	8	×					8	<hr/>						3	5	0	2	.	4	<hr/>						3	6	6				<p>b.</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>3</td><td>8</td><td>4</td><td>.</td><td>7</td><td>5</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td></td><td></td><td>9</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td>3</td><td>4</td><td>6</td><td>2</td><td>.</td><td>7</td><td>5</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>			3	8	4	.	7	5	×							9	<hr/>									3	4	6	2	.	7	5	<hr/>																		
	4	3	7	.	8																																																																																			
×					8																																																																																			
<hr/>																																																																																								
3	5	0	2	.	4																																																																																			
<hr/>																																																																																								
3	6	6																																																																																						
		3	8	4	.	7	5																																																																																	
×							9																																																																																	
<hr/>																																																																																								
	3	4	6	2	.	7	5																																																																																	
<hr/>																																																																																								
7.	<table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>2</td><td>8</td><td>3</td><td>.</td><td>5</td><td>7</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td>1</td><td>1</td><td>3</td><td>4</td><td>.</td><td>2</td><td>8</td></tr> <tr><td colspan="8"><hr/></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>			2	8	3	.	5	7	×							4	<hr/>									1	1	3	4	.	2	8	<hr/>																<b>£1134.28</b>																																						
		2	8	3	.	5	7																																																																																	
×							4																																																																																	
<hr/>																																																																																								
	1	1	3	4	.	2	8																																																																																	
<hr/>																																																																																								
8.	<table style="width: 100%;"> <tbody> <tr> <td style="width: 50%; vertical-align: top;"> <p>Dog food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>9</td><td>9</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>7</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>1</td><td>3</td><td>.</td><td>9</td><td>3</td></tr> </tbody> </table> </td> <td style="width: 50%; vertical-align: top;"> <p>Cat food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>3</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>5</td><td>.</td><td>5</td><td>2</td><td></td></tr> </tbody> </table> </td> </tr> </tbody> </table> <p>Total = <math>13.93 + 5.52 = £19.45</math></p>	<p>Dog food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>9</td><td>9</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>7</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>1</td><td>3</td><td>.</td><td>9</td><td>3</td></tr> </tbody> </table>			1	.	9	9	×					7	<hr/>							1	3	.	9	3	<p>Cat food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>3</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>5</td><td>.</td><td>5</td><td>2</td><td></td></tr> </tbody> </table>			1	.	3	8	×					4	<hr/>							5	.	5	2		<b>£19.45</b>																																				
<p>Dog food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>9</td><td>9</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>7</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>1</td><td>3</td><td>.</td><td>9</td><td>3</td></tr> </tbody> </table>			1	.	9	9	×					7	<hr/>							1	3	.	9	3	<p>Cat food tins</p> <table border="1" style="margin-left: 20px;"> <tbody> <tr><td></td><td></td><td>1</td><td>.</td><td>3</td><td>8</td></tr> <tr><td>×</td><td></td><td></td><td></td><td></td><td>4</td></tr> <tr><td colspan="6"><hr/></td></tr> <tr><td></td><td>5</td><td>.</td><td>5</td><td>2</td><td></td></tr> </tbody> </table>			1	.	3	8	×					4	<hr/>							5	.	5	2																																								
		1	.	9	9																																																																																			
×					7																																																																																			
<hr/>																																																																																								
	1	3	.	9	3																																																																																			
		1	.	3	8																																																																																			
×					4																																																																																			
<hr/>																																																																																								
	5	.	5	2																																																																																				

**Challenge**





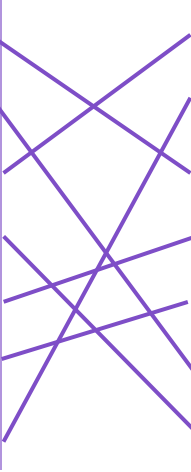

1. a.	<p><math>8 \times 6 = 48</math>. The answer has 2 decimal places and the missing number is 6 [<math>0.08 \times 6 = 0.48</math>].</p>	<b>Missing number is 6</b>
b.	<p>Think of 4.3 as 4.30. So, the missing number has to have 2 decimal places. Note <math>4.3 \div 5 = 0.86</math>. Missing number is 0.86</p>	<b>Missing number is 0.86</b>






Resource 7 - use equivalences between fractions, decimals and percentages

Workings out and answers

1.	a.	$\frac{4}{8} = 50\%$	b.	$\frac{2}{8} = 25\%$	c.	$\frac{3}{15} = \frac{1}{5} = 20\%$
	d.	$\frac{8}{20} = \frac{2}{5} = 40\%$	e.	$\frac{4}{16} = \frac{1}{4} = 25\%$	f.	$\frac{6}{8} = \frac{3}{4} = 75\%$
2.	Diagram	Fraction	Decimal	Percentage		
		$\frac{1}{4}$	0.25	25%		
		$\frac{3}{5}$	0.6	60%		
		$\frac{3}{10}$	0.3	30%		
		$\frac{45}{100} = \frac{90}{200}$	0.45	45%		
3.	$0.21 = 21\%$ ; $\frac{1}{4} = 0.25 = 25\%$ ; 30%; $0.5 = 50\%$ ; $\frac{2}{5} = 40\%$					
	<b>Smallest:</b>	0.21	$\frac{1}{4}$	30%	$\frac{2}{5}$	$\frac{1}{2}$ <b>Largest</b>
4.	a.	$\frac{2}{5} = 0.75$ which is larger than 0.35 ... larger = $\frac{3}{4}$				$\frac{3}{4}$
	b.	$0.25 = 25\%$				25%
	c.	$\frac{7}{8} = 0.875$ which is larger than 81%				$\frac{7}{8}$
5	50% of 8		30%			
			0.7			
	$\frac{3}{10}$		$\frac{1}{4}$ of 16			
	$\frac{1}{5}$ of 15		$\frac{18}{25}$			
	72%		60%			
	$\frac{3}{5}$		0.5			
	$\frac{3}{5} + \frac{1}{10}$		3			
6.	$\frac{1}{3} = 0.333 = 33.3\%$ ; $0.37 = 37\%$ ; 30%; $\frac{1}{4} = 25\%$ ; 29.5%					
	<b>Smallest:</b>	0.073	$\frac{1}{4}$	30%	$\frac{1}{3}$	29.5% 0.37 <b>Largest</b>

Challenge

1.	a.	60%	
	b.	10 squares = 70, so one square = $70 \div 10 = 7$ bottles.	
		60% = $6 \times 7 = 42$ bottles. $70 - 42 = 28$ bottles left for Sunday (40% left = $4 \times 7 = 28$ ).	

Ratio and proportion answers

Resource 1 - relative sizes answers

	Workings out			Answers			
1.	a. £25 into	2 : 3 4 : 6 6 : 9 8 : 12 <b>10 : 15</b> 15 : 25	b. £30 into	1 : 4 2 : 8 3 : 12 4 : 16 5 : 20 <b>6 : 24</b>	c. £40 into	3 : 5 6 : 10 9 : 15 12 : 20 15 : 25	a. <b>£10 : £15</b> b. <b>£6 : £24</b> c. <b>£15 : 25</b>
2.	a. £56 into	2 : 5 4 : 10 6 : 15 8 : 20 10 : 25 12 : 30 14 : 35 <b>16 : 40</b>	b. £66 into	6 : 5 12 : 10 18 : 15 24 : 20 30 : 25 <b>36 : 30</b>			a. <b>£16 : £40</b> b. <b>£36 : £30</b>
3.	Milk to dark 7 : 4 14 : 8 <b>21 : 12</b>	In three boxes she will get <b>21 milk chocolates.</b>					<b>21</b>
4.	Sand to cement 3 : 1 12 : 4	He needs <b>4 bags of cement.</b>					<b>4 bags</b>
5. a.	Cheese to butter 2 : 3 4 : 6 8 : 12 10 : 15 12 : 18 <b>14 : 21</b>	For 35 scones we need <b>21 cups</b> of butter.					<b>21 cups</b>
b.	<b>Continue count-up</b> 14 : 21 16 : 24 <b>18 : 27</b>	So 18 cups of cheese. ( $27 \div 3 = 9$ ; $9 \times 2 = 18$ )					<b>18 cups</b>
6. a.	<b>Purple to orange</b> 3 : 5 (use 7 times table to give $3 \times 7 = 21$ purple beads)						<b>21 purple beads</b>
b.	3 : 5 6 : 10 <u>9</u> : <u>15</u> (continue to build or multiply by 5) 45 : 75, so 45 purple beads will need <b>75 orange beads</b>						<b>75 beads and 15 necklaces</b>
7.	If 2 cost £11, then 1 cost $\pounds 11 \div 2 = \pounds 5.50$ .  So, 9 cost $\pounds 5.50 \times 9 = \pounds 49.50$						<b>£49.50</b>
8.	If 6 cost £2, then 1 cost $\pounds 2 \div 6 = \pounds 0.33$ . So, 4 cost $\pounds 0.33 \times 4 = \pounds 1.33$						<b>£18</b>

## Challenge

1.	<p>If 100 g has 4.5 grams of fibre, then 800 g has <math>4.5 \times 8 = 36</math> grams of fibre (equivalent to 18 slices).                  So, 1 slice contains <math>36 \text{ g} \div 18 = 2</math> grams fibre. Therefore 3 slices = <math>3 \times 2 = 6</math> g fibre</p>	<b>6 g fibre</b>
----	---	------------------

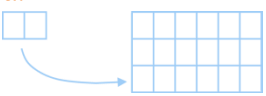
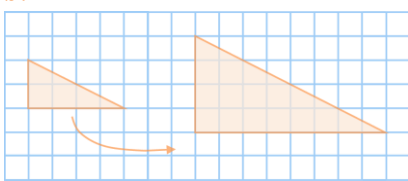
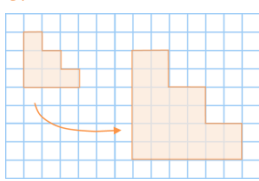
## Resource 2 - calculations of percentages answers

	Workings out	Answers			
1.	<p>a. <math>\frac{9}{20} = \frac{18}{40} = \frac{27}{60} = \frac{36}{80} = \frac{45}{100} = 45\%</math> (<math>\times 5</math>)</p> <p>b. <math>\frac{9}{30} = \frac{3}{10} = \frac{30}{100} = 30\%</math> (<math>\div 3, \times 10</math>)</p> <p>c. <math>\frac{9}{60} = \frac{3}{20} = \frac{15}{100} = 15\%</math> (<math>\div 3, \times 5</math>)</p>	<p><b>45%</b></p> <p><b>30%</b></p> <p><b>15%</b></p>			
2.	<p>Total = <math>13 + 7 = 20</math>                  Fraction black = <math>\frac{13}{20} = \frac{65}{100} = 65\%</math> (<math>\times 5</math>)</p>	<b>65%</b>			
3	Fraction spent = $\frac{12}{40} = \frac{3}{10} = 30\%$ ( $\div 3, \times 10$ )	<b>30%</b>			
4	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center;">a. 20% of £30 10% = £3 20% = £3 + £3 = <b>£6</b></td> <td style="width: 33%; text-align: center;">b. 15% of £8 10% = £0.80 5% = £0.40 15% = £0.80 + £0.40 = <b>£1.20</b></td> <td style="width: 33%; text-align: center;">c. 35% of £40 10% = £4 5% = £2 35% = £4 + £4 + £4 + £2 = = <b>£14</b></td> </tr> </table>	a. 20% of £30 10% = £3 20% = £3 + £3 = <b>£6</b>	b. 15% of £8 10% = £0.80 5% = £0.40 15% = £0.80 + £0.40 = <b>£1.20</b>	c. 35% of £40 10% = £4 5% = £2 35% = £4 + £4 + £4 + £2 = = <b>£14</b>	<p>a. <b>£6</b></p> <p>b. <b>£1.20</b></p> <p>c. <b>£14</b></p>
a. 20% of £30 10% = £3 20% = £3 + £3 = <b>£6</b>	b. 15% of £8 10% = £0.80 5% = £0.40 15% = £0.80 + £0.40 = <b>£1.20</b>	c. 35% of £40 10% = £4 5% = £2 35% = £4 + £4 + £4 + £2 = = <b>£14</b>			
5	<p>10% = or <math>10 \times 10\% = 100\%</math>  <math>20\% = 14</math> <math>10 \times 7 = 70</math>                  100% = <b>70</b></p>	<b>70</b>			
6	20% = 9, multiplying by 5 gives 100% = <b>45</b>	<b>45</b>			
7	<p>a. 10% of £60 = £6                  20% of £60 = £12. Jacket is reduced by <b>£12</b></p> <p>b. Sale price = £60 - £12 = <b>£48</b></p>	<p><b>£12</b></p> <p><b>£48</b></p>			
8	<p>a. 1 + 4 = 5 in total. Fraction cordial = <math>\frac{1}{5}</math></p> <p>b. Either: fraction water = <math>\frac{4}{5}</math> or fraction cordial <math>\frac{1}{5} = 20\%</math>  <math>\frac{4}{5} = \frac{8}{10} = \frac{80}{100} = 80\%</math> or % water = <math>100\% - 20\% = 80\%</math></p>	<p><math>\frac{1}{5}</math></p> <p><b>80%</b></p>			
9	<p>15% = 30                  30% = 60                  10% = 20, <math>\times 10 = 100\% = 200</math></p>	<b>200</b>			
10	<p>a. 60% of 24 = 20% of <b>72</b>, <math>60\% = 3 \times 20\%</math>, so <math>3 \times 24 = 72</math></p> <p>b. 12% of 36 = <b>72%</b> of 6, <math>36 = 6 \times 6</math>, so <math>12 \times 6 = 72\%</math></p>	<p><b>72</b></p> <p><b>72%</b></p>			
11	<p>A. 10% of £3 = 0.3                  60% of 3 = <math>0.3 \times 6 = 1.8</math></p> <p>B. <math>25\% = \frac{1}{4}</math> of 7  <math>= 7 \div 4 = 1.75</math></p>	<b>A is bigger</b>			

## Challenge

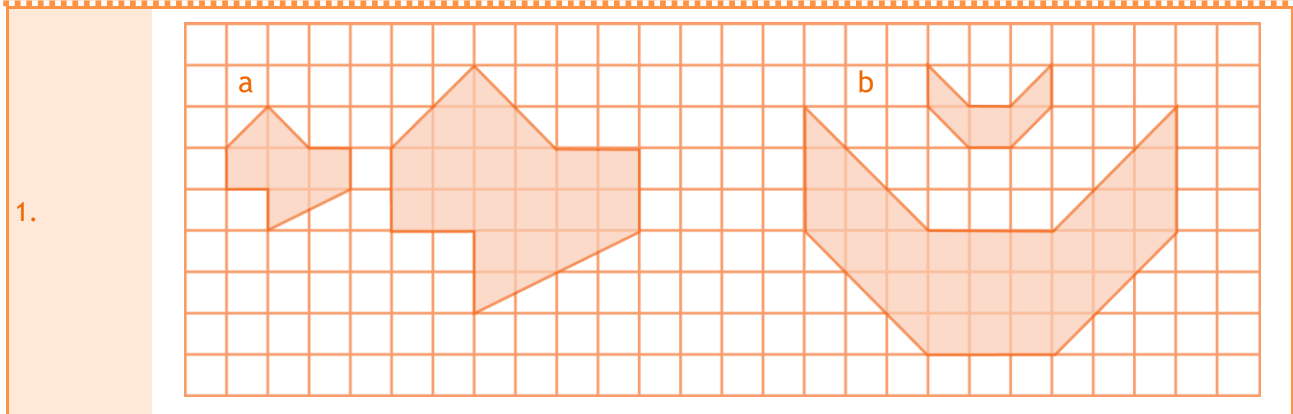
1. a	65% of 400 10% of 400 = 40 $\frac{5}{100} \text{ of } 400 = 20$ $65\% = 40 \times 6 + 20 = 260$ male members	260 male members
b	$400 - 260 = 140$ female members $25\% \text{ of } 140 = \frac{1}{4} \text{ of } 140 = 140 \div 4 = 35$ female children members	35 female children

## Resource 3 - scale factors

	Workings out	Answers
1.	1 pen = 2 pencils. As 1 pen + 1 pencil = 60p Then 3 pencils = 60p, so 1 pencil = $60p \div 3 = 20p$ So, 1 pen costs $2 \times 20p = 40$ pence	40 pence
2.	If 2 pens cost 80p then 1 pen costs $80p \div 2 = 40p$ , So, 3 pens = $3 \times 40p = 120p = \text{£}1.20$	3 pens = £1.20
3.	If 1 cm = 2 m Then 3 cm = $3 \times 2 \text{ m} = 6$ metres	6 m
4.	If 3 cm = 12 m Then 1 cm = $12 \text{ m} \div 3 = 4 \text{ m}$ . Scale is 1 cm : 4 m	1 cm : 4 m
5. a.	Scale factor = $8 \div 2 = 4$	SF = 4
b.	Scale factor = $9 \div 2 = 4.5$	SF = 4.5
c.	Scale factor = $15 \div 6 = 2.5$	SF = 2.5
6.	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">                     a.   </div> <div style="text-align: center;">                     b.   </div> <div style="text-align: center;">                     c.   </div> </div>	
7.	As $AB = 3 \times BC$ and $AB + BC = 80$ then $4 \times BC = 80 \text{ km}$ . So, $1 \times BC = 80 \text{ km} \div 4 = 20 \text{ km}$ . Then $AB = 3 \times 20 \text{ km} = 60 \text{ km}$ .	AB = 60 km
8.	As 1 apple = $3 \times$ blackberry and 1 apple + 1 blackberry = 220, then 4 blackberry = 220 g. So, 1 blackberry = $220 \text{ g} \div 4 = 55 \text{ g}$ . Then 1 apple = $3 \times 55 \text{ g} = 165 \text{ g}$ .	Apple = 165 g
9.	If 1 cm = 20 m Then $7 \times 20 = 140$ metres	140 m
10. a.	Scale factor = $8 \div 2 = 4$ $X = 4 \times 5 \text{ m} = 20 \text{ m}$	20 m
b.	Scale factor = $12 \div 3 = 4$ $X = 10 \div 4 = 2.5 \text{ m}$	2.5 m



Challenge



Resource 4 - unequal sharing

	Workings out	Answers
1.	$34 - 8 = 26$ marbles left. Joseph has $26 \div 2 = 13$ marbles. Erica has $13 + 8 = 21$	Erica has <b>21 marbles</b>
2.	$16 - 6 = 10$ m left. Smaller piece is $10 \text{ m} \div 2 = 5$ metres (longer = 11 m).	<b>5 metres</b>
3.	As Beth = $2 \times$ Clive and Beth + Clive = 33, then $3 \times$ Clive = 33 So, $1 \times$ Clive = $33 \div 3 = 11$ . So, Beth = $2 \times 11 = 22$ oranges.	Clive <b>11</b> ; Beth <b>22</b>
4.	Fraction red = $1 - \frac{3}{4} = \frac{1}{4}$ which equals 5 red balls. Total = $4 \times 5 = 20$ altogether.	<b>20 altogether</b>
5. a.	60 is half of 120. So, Julie can make $10 \div 2 = 5$ pancakes.	<b>5 pancakes</b>
b.	150 ml milk : 120 g flour ... dividing by 3 50 ml milk : 40 g flour ... multiplying by 2 100 ml milk : <b>80 g flour</b>	<b>80 g flour</b>
6.	Take off Alex's extra 6 cards to leave $32 - 6 = 26$ . $26 \div 2 = 13$ . So, Alex has $13 + 6 = 19$ cards.	Alex has <b>19 cards</b>
7.	Leave out the '5' until the end. If he eats $\frac{1}{3}$ then $\frac{2}{3}$ must be left over = 16. If $\frac{2}{3}$ (2 parts) = 16, then $\frac{1}{3}$ (1 part) = $16 \div 2 = 8$ . So, all (3 parts) = $8 \times 3 = 24$ , plus the '5' = <b>29 sweets</b> .	<b>29 sweets</b>
8.	$1 - \frac{5}{8} = \frac{3}{8}$ are poor. As $\frac{3}{8}$ (3 parts) = 42, then $\frac{1}{8}$ (1 part) = $42 \div 3 = 14$ . So, all (8 parts) = $8 \times 14 = 112$ pencils.	<b>112 pencils</b>
9.	If $\frac{2}{3}$ are medium, then $1 - \frac{2}{3} = \frac{1}{3}$ are either small or large. Since they are the same number 8, then $\frac{1}{3} = 8 + 8 = 16$ . So, the total eggs laid = $3 \times 16 = 48$ eggs altogether.	<b>48 eggs</b>

### Challenge

1.	<p>If <math>\frac{2}{9}</math> are blue, then <math>\frac{7}{9}</math> are either red or white. Ratio = blue : red or white is 2 : 7.</p> <p>Since the ratio of blue to red is 2 : 3 then the portion of white is <math>9 - 2 - 3 = 5</math>.</p> <p>So complete ratio is B : R : W 2 : 3 : 4</p> <p>We need a multiple of 9 between 175 and 185 = 180.</p> <p>Now <math>180 \div 9 = 20</math></p> <p>So blue = <math>2 \times 20 = 40</math>; red = <math>3 \times 20 = 60</math>; white = <math>4 \times 20 = 80</math></p>	<p>So blue = <math>2 \times 20 = 40</math>; red = <math>3 \times 20 = 60</math>; white = <math>4 \times 20 = 80</math></p>
----	--	--

## Algebra

## Resource 1 - use simple formulae

		Workings out	Answers
1.	a.	$3p = 3 \times 7 = 21$	21
	b.	$11 - p = 11 - 7 = 4$	4
	c.	$2p + 5 = 2 \times 7 + 5 = 14 + 5 = 19$	19
	d.	$20 - 2p = 20 - 2 \times 7 = 20 - 14 = 6$	6
2.	a.	$p = 2l + 2h = 2 \times 5 + 2 \times 4 = 10 + 8 = 18$	18
	b.	$p = 2l + 2h = 2 \times 9 + 2 \times 3 = 18 + 6 = 24$	24
	c.	$p = 2l + 2h = 2 \times 1.5 + 2 \times 2.5 = 3 + 5 = 8$	8
3.		Cost = $8 \times 11 + 15 = 88 + 15 = 103$ pence	103p
4.		Let C be cost and b for bags. $C = 25 \times b$ (25b) For 6 bags, cost = $25 \times 6 = 150$ pence = £1.50	$C = 25 \times b = 25b$ $= 1.50$
5.	a.	$T = 30 \times H + 40$ or $T = 40 + 30 \times H$	$T = 30 \times H + 40$
	b.	For 4 hours, $T = 30 \times 4 + 40 = 120 + 40 = £160$	£160
6.	a.	$3a + 2b = 3 \times 3 + 2 \times 4 = 9 + 8 = 17$	17
	b.	$3a - 2b = 3 \times 3 - 2 \times 4 = 9 - 8 = 1$	1
	c.	$5a - 3b = 5 \times 3 - 3 \times 4 = 15 - 12 = 3$	3
	d.	$ab = 3 \times 4 = 12$	12
7.		$T = 80 + 50 \times 7 = 80 + 350 = 430$ p = £4.30	£4.30
8.	a.	Let T be cooking time and k for kg. $T = 45 \times k + 30$	$T = 45k + 30$
	b.	For 4 kg, $T = 45 \times 4 + 30 = 180 + 30 = 210$ minutes	3 hours and 30 minutes
	c.	$45 \times k + 30 = 120$ (-30) $45 \times k = 90$ ( $\div 45$ ) $k = 2$	2 kg chicken

## Challenge

1. a.	Peppa's cost $3 \times £2 = £6$ ; Salty's cost = $5 + 0.5 \times 3 = 5 + 1.5 = £6.50$ . Peppa's is cheaper (by 50p).	Peppa's is cheaper (by 50p)
b.	$5 + 0.5 \times N = 9$ First subtract 5 from both sides. $0.5 \times N = 4$ Next divide by 0.5. $N = 8$ pizzas. So, Peppa's cost $8 \times £2 = £16$ .	Peppa's cost $8 \times £2 = £16$

## Resource 2 - generate and describe linear number sequences

		Workings out	Answers
1.	a.	1,4,7,10,13,16 (+ 3)	7, 13, 16
	b.	4,10,16,22,28,34 (+ 6)	16, 22, 34

c.	2,8,14,20,26,32 (+6)	8, 26, 32																								
d.	30,26,22,18,14,10	26, 18, 14																								
2.	$2 \times 4 - 3 = 8 - 3 = 5$ ; $3 \times 4 - 3 = 12 - 3 = 9$ ; ...	5, 9, 13, 17																								
3.	<table border="1" style="display: inline-table; margin-right: 20px;"> <thead> <tr> <th>In</th> <th>Function</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>2</td> <td rowspan="4" style="text-align: center;"><math>\times 5 - 2</math></td> <td>8</td> </tr> <tr> <td>5</td> <td>23</td> </tr> <tr> <td>4</td> <td>18</td> </tr> <tr> <td>7</td> <td>33</td> </tr> </tbody> </table> <table border="1" style="display: inline-table;"> <thead> <tr> <th>In</th> <th>Function</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>4</td> <td rowspan="4" style="text-align: center;"><math>\div 2 + 3</math></td> <td>5</td> </tr> <tr> <td>8</td> <td>7</td> </tr> <tr> <td>10</td> <td>8</td> </tr> <tr> <td>30</td> <td>18</td> </tr> </tbody> </table>	In	Function	Out	2	$\times 5 - 2$	8	5	23	4	18	7	33	In	Function	Out	4	$\div 2 + 3$	5	8	7	10	8	30	18	a. 8, 23; 4, 7 b. 5, 7; 10, 30
In	Function	Out																								
2	$\times 5 - 2$	8																								
5		23																								
4		18																								
7		33																								
In	Function	Out																								
4	$\div 2 + 3$	5																								
8		7																								
10		8																								
30		18																								
4.	7,10,13,16 (+3) This means that the rule has ' $\times 3$ ' in it. For the first shape $1 \times 3 = 3$ . To get '7' we need to add 4, so rule is $\times 3 + 4$ . $20^{\text{th}}$ term = $20 \times 3 + 4 = 60 + 4 = 64$	Rule is $\times 3 + 4$ . 64																								
5.	<table border="1" style="width: 100%;"> <thead> <tr> <th>Rule</th> <th colspan="5"><math>\times 7 - 5</math></th> </tr> </thead> <tbody> <tr> <td>In</td> <td>4</td> <td>6</td> <td>2</td> <td>9</td> <td>8</td> </tr> <tr> <td>Out</td> <td>23</td> <td>37</td> <td>9</td> <td>58</td> <td>51</td> </tr> </tbody> </table>	Rule	$\times 7 - 5$					In	4	6	2	9	8	Out	23	37	9	58	51	2, 8; 23, 37, 58						
Rule	$\times 7 - 5$																									
In	4	6	2	9	8																					
Out	23	37	9	58	51																					
6. a.	7,13,19,25; $25 - 7 = 18 \div 3 = 6$ ('+6')	13, 19																								
b.	10,22,34,46; $46 - 10 = 36 \div 3 = 12$ ('+12')	22, 34																								
c.	3,9,15,21,27; $27 - 3 = 24 \div 4 = 6$ ('+6')	9, 15, 21																								
7. a.																										
b.	<table border="1" style="width: 100%;"> <tbody> <tr> <td>Number of houses</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Number of matchsticks</td> <td>6</td> <td>11</td> <td>16</td> <td>21</td> </tr> <tr> <td>Rule</td> <td colspan="4" style="text-align: center;"><math>\times 5 + 1</math> (<math>5n + 1</math>)</td> </tr> </tbody> </table>	Number of houses	1	2	3	4	Number of matchsticks	6	11	16	21	Rule	$\times 5 + 1$ ( $5n + 1$ )				$\times 5 + 1$ ( $5n + 1$ )									
Number of houses	1	2	3	4																						
Number of matchsticks	6	11	16	21																						
Rule	$\times 5 + 1$ ( $5n + 1$ )																									

Challenge

1. a.	Sequence is 7, 13,19,25 (the rule is $M = 6N + 1$ ).	Sequence is 7, 13,19,25 (the rule is $M = 6N + 1$ )
b.	$6N + 1 = 50$ (-1) $6N = 49$ ( $\div 6$ ) $N = 49 \div 6 = 8 \text{ r } 1$ , so eight complete shapes with one spare matchstick.	One spare matchstick.

Resource 3 - express missing numbers algebraically

		Workings out	Answers
1.	a.	$23 + 11 = 34$	34
	b.	$25 - 13 = 12$	12
	c.	$14 - 5 = 9$ ; $9 \div 3 = 3$	3
2.	a.	$p + 17 = 30$ (-17) $p = 13$	$p = 13$
	b.	$5q - 7 = 13$ (+7) $5q = 20$ ( $\div 5$ ) $q = 4$	$q = 4$
	c.	$2r + 3 = 35$ (-3) $2r = 32$ ( $\div 2$ ) $r = 16$	$r = 16$
3.			$2m + 3$
4.		$f = g - 7$ $f + 7 = g$ or $g - f = 7$	7

5.	$a = 28 \div 4 = 7$ ; $b = 36 \div 4 = 9$ ; $c = 27 \div b = 27 \div 9 = 3$ ; $d = a \times c = 7 \times 3 = 21$	$a = 7$ ; $b = 9$ ; $c = 3$ ; $d = 21$
6.	Robert: $7x - 5 = 23$ (+5) $7x = 28$ ( $\div 7$ ) $x = 4$	Number = 4
7.	$5c = 200p$ ( $\div 5$ ) $c = 40$ pence each Now $3c + b = 150p$ $3 \times 40 + b = 150$ $120 + b = 150$ , $b = 150 - 120 = 30$ pence each So 2 broccoli = $2 \times 30p = 60$ pence	60 pence
8. a.	$3t - 20$ $3 \times 15 - 20 = 45 - 20 = 25$	25
b.	$20 - d = 8$ , $20 - 8 = 12$ ... So, $3d = 12$ ( $\div 3$ ) $d = 4$	$d = 4$
9. a.	$2x + 5 = 23$ (-5) $2x = 18$ ( $\div 2$ ) $x = 9$	$x = 9$
b.	$7x - 12 = 30$ (+12) $7x = 42$ ( $\div 7$ ) $x = 6$	$x = 6$
10.	Let $x$ be the unknown. $X \rightarrow \times 2 \rightarrow + 7 \rightarrow \times 5 = 75$ $75 \rightarrow \div 5 \rightarrow - 7 \rightarrow \div 2 = X = 4$	$x = 4$
11.	Let $x$ be the number Joe: $x + 15$ ; Ted: $4 \times x$ ... so ... $4x = x + 15$ ... '-x' ... So ... $3x = 15$ ... ' $\div 3$ ' ... $x = 5$	Number is 5

Challenge

1.	$z = 3y + 5$ $x = 30 - z$ ... as $y = 6$ ... then $z = 3 \times 6 + 5 = 18 + 5 = 23$ .	Now $x = 30 - 23 = 7$
----	---	-----------------------

Resource 4 - working with two variables

	Workings out	Answers
1.	$1 + 11 = 12$ ; $2 + 10 = 12$ ; $3 + 9 = 12$ ; $4 + 8 = 12$ ; $5 + 7 = 12$ ; $6 + 6 = 12$ ... then repeats	
2. a.	$x + y = 10$ ... $1 + 9 = 10$ ; $2 + 8 = 10$ ; $3 + 7 = 10$ ; $4 + 6 = 10$ ; $5 + 5 = 10$ .	
b.	$x - y = 5$ ... $9 - 4 = 5$ ; $8 - 3 = 5$ ; $7 - 2 = 5$ ; $6 - 1 = 5$ ; $5 - 0 = 5$	
3. a.	$x + y = 12$ ...	
i.	when $x = 5$ , $y = 12 - 5 = 7$	i. $y = 7$
ii.	when $y = 9$ , $x = 12 - 9 = 3$	ii. $x = 3$
b.	$4x + y = 20$ ...	
i.	when $x = 3$ , $4x = 12$ , $y = 20 - 12 = 8$	i. $y = 8$
ii.	when $y = 12$ , $4x = 20 - 12 = 8$ , $x = 8 \div 4$ . $x = 2$	ii. $x = 2$

4.	Build up the 4 times table:								
	q	1	2	3	4	5	6	7	
	p	4	8	12	16	20	24	28	
5.	$3g - 2h = 7$								
a.	When $h = 4$ , $2h = 8$ , $3g = 7 + 8 = 15$						a. $g = 5$		
	$g = 15 \div 3 = 5$								
b.	When $g = 7$ , $3g = 21$ , $2h = 21 - 7 = 14$						b. $h = 7$		
	$h = 14 \div 2 = 7$								
6.	a.	$4x + 3y = 30$ ... trying $x = 1, 2, 3$ ... When $x = 3$ , $4x = 12$ , $3y = 30 - 12 = 18$ ; $y = 18 \div 3 = 6$ When $x = 6$ , $4x = 24$ , $3y = 30 - 24 = 6$ ; $y = 6 \div 3 = 2$						$x = 3, y = 6$ $x = 6, y = 2$	
	b.	$4x - 3y = 12$ ... trying $x = 1, 2, 3$ ... When $x = 6$ , $4x = 24$ , $3y = 24 - 12 = 12$ ; $y = 12 \div 3 = 4$ When $x = 9$ , $4x = 36$ , $3y = 36 - 24 = 12$ ; $y = 12 \div 3 = 8$						$x = 6, y = 4$ $x = 9, y = 8$ ...	
7.	$3s - 5 = t$ ... starting with $s = 2, 3, 4, \dots$ When $s = 2$ , $t = 3 \times 2 - 5 = 6 - 5 = 1$ ... (2, 1) When $s = 3$ , $t = 3 \times 3 - 5 = 9 - 5 = 4$ ... (3, 4) When $s = 4$ , $t = 3 \times 4 - 5 = 12 - 5 = 7$ ... (4, 7) When $s = 5$ , $t = 3 \times 5 - 5 = 15 - 5 = 10$ ... (5, 10)						$s = 2, t = 1$ $s = 3, t = 4$ $s = 4, t = 7$ $s = 5, t = 10$ ... (6, 13); (7, 16); (8, 19); (9, 22)...		
8.	$3e - 2f = 4$ ... starting with $e = 2, 3, 4, \dots$ When $e = 2$ , $3e = 6$ , $2f = 6 - 4 = 2$ ; $f = 1$ ... (2, 1) When $e = 4$ , $3e = 12$ , $2f = 12 - 4 = 8$ ; $f = 4$ ... (4, 4) When $e = 6$ , $3e = 18$ , $2f = 18 - 4 = 14$ ; $f = 7$ ... (6, 7) When $e = 8$ , $3e = 24$ , $2f = 24 - 4 = 20$ ; $f = 10$ ... (8, 10) When $e = 10$ , $3e = 30$ , $2f = 30 - 4 = 26$ ; $f = 13$ ... too big						$e = 2, f = 1$ $e = 4, f = 4$ $e = 6, f = 7$ $e = 8, f = 10$		

Challenge

1. a.	$r + s = 16$ ... pairs are (1, 15); (2, 14); (3, 13); (4, 12); (5, 11); (6, 10); (7, 9), (8, 8) and vice versa ... (9, 7); (10, 6); (11, 5) $r - s = 6$ ... pairs are (7, 1); (8, 2); (9, 3); (10, 4); (11, 5); (12, 6); ... $r = 11$ and $s = 5$	$r = 11$ and $s = 5$
b.	$v + w = 7$ ... pairs are (1, 6); (2, 5); (3, 4); (4, 3); (5, 2); (6, 1); ... $3v + 2w = 16$ ... letting $v$ have even numbers: 2, 4, 6, ... When $v = 2$ , $3v = 6$ , $2w = 16 - 6 = 10$ ; $w = 5$ ... (2, 5) When $v = 4$ , $3v = 12$ , $2w = 16 - 12 = 4$ ; $w = 2$ ... (4, 2) $v = 2$ and $w = 5$	$v = 2$ and $w = 5$

## Measurement

### Resource 1 - solve problems involving units of measure

	Workings out	Answers
1.	a. $4.5 \text{ km} = 4.5 \times 1000 \text{ m} = 4500 \text{ m}$	4500 m
	b. $3.6 \text{ cl} = 3.6 \times 10 \text{ ml} = 36 \text{ ml}$	36 ml
	c. $3.45 \text{ kg} = 3.45 \times 1000 \text{ g} = 3450 \text{ g}$	3450 g
	d. $0.85 \text{ cm} = 0.85 \times 10 \text{ mm} = 8.5 \text{ mm}$	8.5 mm
	e. $1.375 \text{ l} = 1.375 \times 1000 \text{ ml} = 1375 \text{ ml}$	1375 ml
	f. $3250 \text{ g} = 3250 \div 1000 \text{ kg} = 3.25 \text{ kg}$	3.25 kg
	g. $65\text{cm} = 65 \div 100 \text{ m} = 0.65 \text{ m}$	0.65 m
	h. $875\text{m} = 875 \div 1000 \text{ km} = 0.875 \text{ km}$	0.875 km
2.	Return journey each day for 5 days means $10 \times 273 \text{ m} = 2730 \text{ m}$ $2730 \text{ m} = 2730 \div 1000 = 2.73 \text{ km}$	2.73 km
3.	$20 \times 295 \text{ ml} = 5900 \text{ ml}$ $5900 \text{ ml} = 5900 \div 1000 \text{ l} = 5.9 \text{ litres}$	5.9 litres
4.	$145 \times 9 = 1305 \text{ g}$ $1305 \text{ g} = 1305 \div 1000 \text{ kg} = 1.305 \text{ kg}$	1.305 kg
5.	$3 \text{ km} = 3 \times 1000 \text{ m} = 3000 \text{ m}$ $3000 \text{ m} \div 200 \text{ m} = 15 \dots$ so 15 days	15 days
6.	$53 \div 7 = 7 \text{ r } 4$ , so 7 weeks 4 days	7 weeks 4 days
7.	Children can count on using a number line.	3.25pm
8.	10 boxes of 12 = $10 \times 12 \text{ pencils} = 120 \text{ pencils}$ Weight = $120 \times 11 \text{ g} = 1320 \text{ g} \dots$ + 10 boxes each 15 g = $10 \times 15 \text{ g} = 150 \text{ g}$ Total = $1320 \text{ g} + 150 \text{ g} = 1470 \text{ g} = 1470 \div 1000 \text{ kg} = 1.47 \text{ kg}$	1.47 kg
9.	5 glasses = $5 \times 160 \text{ ml} = 800 \text{ ml} \dots$ 1 litre = 1000 ml $1000 \text{ ml} - 800 \text{ ml} = 200 \text{ ml left over}$	200 ml
10.	a. Paula: 4.62 km; Kate: 4.75 km; Alex: $4560 \div 1000 = 4.56 \text{ km}$	Kate
	b. $4.62 \text{ km} + 4.75 \text{ km} + 4.56 \text{ km} = 13.93 \text{ km}$	13.93 km
11.	a. $24 \times 7 \text{ g} = 168 \text{ g}$ . So, 30 packs = $168 \text{ g} \times 30 = 5040 \text{ g}$ $5040 \text{ g} \div 1000 \text{ kg} = 5.04 \text{ kg}$	5.04 kg
	b. $\frac{1}{2} \text{ kg} = \frac{1}{2} \times 1000 \text{ g} = 500 \text{ g}$ . How many 168 g (packs) make 500 g Build up table: 168 336 504 (672) ... He needs 3 packs	3 packs

Challenge

1.	Offer A: $9 \times 79p = 711p$ Offer B: $9 \text{ l} = 9000 \text{ ml}$ . Number of bottles = $9000 \div 300 = 30$ bottles. Either buy 4 packs (32 bottles) costing $4 \times \text{£}2 = \text{£}8$ or 3 packs @ $3 \times \text{£}2 + 6$ bottles ( $6 \times 300 \text{ ml} = 1800 \text{ ml}$ ) [ $2 \times 1$ litre bottles] $\text{£}6 + 2 \times 79p = \text{£}7.58$ . Offer A is the better option	Offer A is the better option
2.	$\frac{1}{2}m = 50 \text{ cm}$ . Now 7 books = $7 \times 6.4 \text{ cm} = 44.8 \text{ cm}$ So, gap = $50 \text{ cm} - 44.8 \text{ cm} = 5.2 \text{ cm}$	Gap = $50 \text{ cm} - 44.8 = 5.2 \text{ cm}$ 52 millimetres

Resource 2 - convert between miles and kilometres


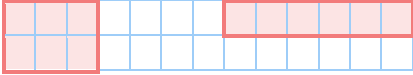
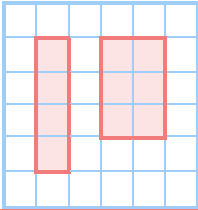
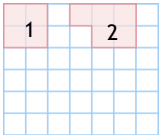
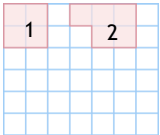
		Workings out	Answers														
1.	a.	$10 \text{ miles} = 10 \div 5 \times 8 \text{ km} = 2 \times 8 = 16 \text{ km}$	16 km														
	b.	$25 \text{ miles} = 25 \div 5 \times 8 \text{ km} = 5 \times 8 = 40 \text{ km}$	40 km														
	c.	$3 \text{ miles} = 3 \div 5 \times 8 \text{ km} = 0.6 \times 8 = 4.8 \text{ km}$	4.8 km														
2.	a.	$24 \text{ km} = 24 \text{ km} \div 8 \times 5 \text{ miles} = 3 \times 5 = 15 \text{ miles}$	15 miles														
	b.	$56 \text{ km} = 56 \text{ km} \div 8 \times 5 \text{ miles} = 7 \times 5 = 35 \text{ miles}$	35 miles														
	c.	$10 \text{ km} = 10 \text{ km} \div 8 \times 5 \text{ miles} = 1.25 \times 5 = 6.25 \text{ miles}$	6.25 miles														
3.		<table border="1"> <thead> <tr> <th>Distance in miles</th> <th>Distance in km</th> </tr> </thead> <tbody> <tr> <td>15 miles</td> <td>24 km</td> </tr> <tr> <td>20 miles</td> <td>32 km</td> </tr> <tr> <td>125 miles</td> <td>200 km</td> </tr> <tr> <td>18 miles</td> <td>28.8 km</td> </tr> <tr> <td>100 miles</td> <td>160 km</td> </tr> <tr> <td>2.25 miles</td> <td>3.6 km</td> </tr> </tbody> </table>	Distance in miles	Distance in km	15 miles	24 km	20 miles	32 km	125 miles	200 km	18 miles	28.8 km	100 miles	160 km	2.25 miles	3.6 km	
Distance in miles	Distance in km																
15 miles	24 km																
20 miles	32 km																
125 miles	200 km																
18 miles	28.8 km																
100 miles	160 km																
2.25 miles	3.6 km																
4.	a.	1 mile = 1.6 km	b. 9 miles = 14.4 km														
	c.	27 miles = 43.2 km	d. 8 km = 5 miles														
	e.	20 km = 12.5 miles	f. 52 km = 32.5 miles														
5.		$70 \text{ mph} = 70 \div 5 \times 8 = 112 \text{ km/h} < 130 \text{ km/h}$ [ $130 \text{ km/h} \div 8 \times 5 = 81.25 \text{ mph}$ ]	130 km/h is faster, so Spain														
6.		$4.5 \text{ miles} = 4.5 \div 5 \times 8 \text{ km} = 7.2 \text{ km} > 7 \text{ km}$ [ $7 \text{ km} = 7 \div 8 \times 5 \text{ miles} = 4.375 \text{ miles} < 4.5 \text{ miles}$ ]	David ran further														
7.		Day 1: $50 \text{ km} = 50 \div 8 \times 5 \text{ miles} = 31.25 \text{ miles}$ Day 2: $31.25 - 10 = 21.25 \text{ miles}$ Day 3: $100 - (31.25 + 21.25) = 100 - 52.5 = 47.5 \text{ miles}$	Day 3: 47.5 miles														

Challenge

1.	In 1 second, Jasmine can run 3 metres. In 1 hour, Jasmine can run $3 \times 3600$ metres = 10,800 m $10,800 \text{ m} = 10,800 \div 1000 \text{ km} = 10.8 \text{ km}$ per hour $10.8 \text{ kmph} = 10.8 \div 8 \times 5 \text{ mph} = 1.35 \times 5 = 6.75 \text{ mph} < 7 \text{ mph}$ ... So, 7 mph is faster	<table border="1"> <tr> <td></td> <td></td> <td>1</td> <td>•3</td> <td>5</td> <td></td> </tr> <tr> <td>8</td> <td>)</td> <td>10</td> <td>•28</td> <td>40</td> <td>0</td> </tr> </table>			1	•3	5		8	)	10	•28	40	0	7 mph is faster
		1	•3	5											
8	)	10	•28	40	0										
2.	<table border="1"> <thead> <tr> <th>England</th> <th>Germany</th> </tr> </thead> <tbody> <tr> <td>If 1 litre cost <math>\text{£}1.20</math> then 1 gallon cost <math>\text{£}1.20 \times 4.5 = \text{£}5.40</math> per gallon 360 miles = <math>360 \div 40 = 9</math> gallons. Total cost = <math>\text{£}5.40 \times 9 = \text{£}48.60</math></td> <td><math>16 \text{ km} = 16 \div 8 \times 5 \text{ miles} = 2 \times 5 = 10 \text{ miles}</math> If 1 litre of petrol gives 10 miles, then 1 gallon gives <math>10 \times 4.5 = 45 \text{ miles}</math> 360 miles = <math>360 \div 45 = 8</math> gallons. Total cost = <math>\text{£}6 \times 8 = \text{£}48</math>.</td> </tr> </tbody> </table>	England	Germany	If 1 litre cost $\text{£}1.20$ then 1 gallon cost $\text{£}1.20 \times 4.5 = \text{£}5.40$ per gallon 360 miles = $360 \div 40 = 9$ gallons. Total cost = $\text{£}5.40 \times 9 = \text{£}48.60$	$16 \text{ km} = 16 \div 8 \times 5 \text{ miles} = 2 \times 5 = 10 \text{ miles}$ If 1 litre of petrol gives 10 miles, then 1 gallon gives $10 \times 4.5 = 45 \text{ miles}$ 360 miles = $360 \div 45 = 8$ gallons. Total cost = $\text{£}6 \times 8 = \text{£}48$ .		Germany is cheaper								
England	Germany														
If 1 litre cost $\text{£}1.20$ then 1 gallon cost $\text{£}1.20 \times 4.5 = \text{£}5.40$ per gallon 360 miles = $360 \div 40 = 9$ gallons. Total cost = $\text{£}5.40 \times 9 = \text{£}48.60$	$16 \text{ km} = 16 \div 8 \times 5 \text{ miles} = 2 \times 5 = 10 \text{ miles}$ If 1 litre of petrol gives 10 miles, then 1 gallon gives $10 \times 4.5 = 45 \text{ miles}$ 360 miles = $360 \div 45 = 8$ gallons. Total cost = $\text{£}6 \times 8 = \text{£}48$ .														

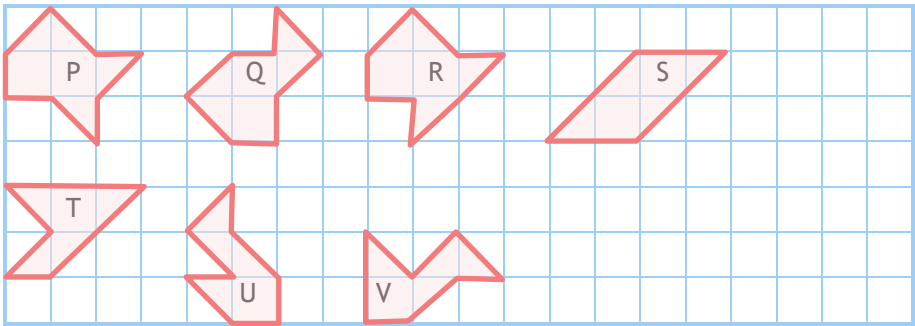


Resource 3 - area and perimeter answers

		Workings out	Answers
1.	a.	$A = 6 \times 2 = 12 \text{ cm}^2$	$A = 4 \times 3 = 12 \text{ cm}^2$
		$P = 6 + 2 + 6 + 2 = 16 \text{ cm}$	$P = 4 + 3 + 4 + 3 = 14 \text{ cm}$
2.	a.	Perimeter of P and Q are the same (10 cm).	
	b.	Perimeter = 6cm; area = 2cm <sup>2</sup> 	2 cm <sup>2</sup>
	c.	Perimeter = 3 + 2 + 3 + 2 = 10 cm Perimeter = 6 + 1 + 6 + 1 = 14 cm	
3.	a.	$P = 2l + 2w$ $P = 14 \text{ cm} + 10 \text{ cm}$ $P = 24 \text{ cm}$	$P = 2l + 2w$ $40 \text{ m} = 16 \text{ m} + 2w$ $40 \text{ m} - 16 \text{ m} = 24 \text{ m}$ $24 \text{ m} \div 2 = 12 \text{ m}$
			
4.	Possible answers:		
5.	Shape 1: Area = 4; Perimeter = 8 Shape 2: Area = 5; Perimeter = 10 There are others.		
6.	a.	Perimeter = 3 + 6 + 3 + 6 + (3) + 3 + 6 = 30 cm	30 cm
	b.	Perimeter = 3 + (3) + 6 + (3) + 3 + 6 + 3 + 6 + 3 + 6 = 42 cm	42 cm

Challenge

1. Q, R, S same area and perimeter as P.  
T, U and V have a smaller area.



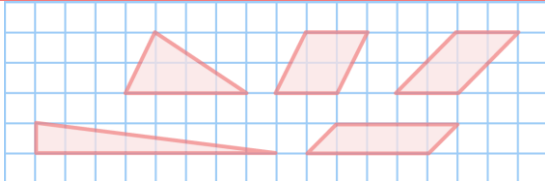
Resource 4 - use formula for area and volume of shapes answers

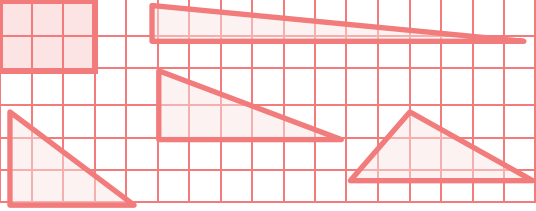
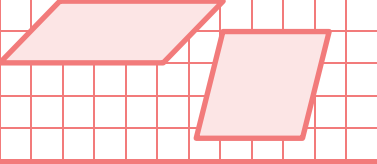
		Workings out	Answers
1.	a.	Volume = $8 \times 5 \times 6 = 240 \text{ cm}^3$	$240 \text{ cm}^3$
	b.	Volume = $10 \times 2.5 \times 3 = 75 \text{ cm}^3$	$75 \text{ cm}^3$
	c.	Volume = $5 \times 3 \times 2 = 30 \text{ m}^3$	$30 \text{ m}^3$
2.		Volume = $4 \times 2 \times h = 24 \text{ cm}^3$ $8h = 24 \text{ } (\div 8)$ $h = 3$	Height = 3 cm
3.		$30 \times 1 \times 1 = 30 \text{ cm}^3$ ; $15 \times 2 \times 1 = 30 \text{ cm}^3$ ; $10 \times 3 \times 1 = 30 \text{ cm}^3$ ; $6 \times 5 \times 1 = 30 \text{ cm}^3$ ; $5 \times 3 \times 2 = 30 \text{ cm}^3$ and many rotations of these... $3 \times 2 \times 5 = 30 \text{ cm}^3$ etc.	
4.		$60 \div 5 = 12$ , so 12 times multiplication facts: $1 \times 12$ , $2 \times 6$ , $3 \times 4$ in either order.	$1 \times 12$ $2 \times 6$ $3 \times 4$
5.		Area of face = $l \times w = 16 \dots$ but $4 \times 4 = 16 \text{ cm}^2$ Volume = $l \times l \times l = 4 \times 4 \times 4 = 64 \text{ cm}^3$	$64 \text{ cm}^3$
6.		Dimensions of top cuboid: length = 3 cm; width = 3 cm; height = $7 - 4 = 3 \text{ cm}$ $3 \times 3 \times 3 = 27 \text{ cm}^3$ Volume of bottom cuboid = $8 \times 3 \times 4 = 96 \text{ cm}^3$ Total volume = $27 + 96 = 123 \text{ cm}^3$	$123 \text{ cm}^3$

Challenge

Box A volume = $20 \text{ cm} \times 30 \text{ cm} \times 10 \text{ cm} = 6000 \text{ cm}^3$ Box B volume = $20 \text{ cm} \times 10 \text{ cm} \times 25 \text{ cm} = 5000 \text{ cm}^3$	Box A is the largest and will collect most water.
--	---

Resource 5 - calculate the area of parallelograms and triangles answers

		Workings out	Answers
1.	a.	Area = $6 \times 5 \div 2 = 15 \text{ cm}^2$	$15 \text{ cm}^2$
	b.	Area = $8 \times 7 \div 2 = 28 \text{ cm}^2$	$28 \text{ cm}^2$
	c.	Area = $9 \times 6 \div 2 = 27 \text{ m}^2$	$27 \text{ cm}^2$
2.		Triangle A: $8 \times 6 \div 2 = 24 \text{ cm}^2$ ; Triangle B: $12 \times 5 \div 2 = 30 \text{ cm}^2$ ; Triangle B is larger.	B is bigger
3.	a.	Area = $12 \times 8 = 96 \text{ mm}^2$	$96 \text{ mm}^2$
	b.	Area = $25 \times 9 = 225 \text{ cm}^2$	$225 \text{ cm}^2$
	c.	Area = $200 \times 80 = 16,000 \text{ m}^2$	$16,000 \text{ m}^2$
4.		Parallelogram A: $8 \times 7 = 56 \text{ cm}^2$ ; Parallelogram B: $9 \times 6 = 54 \text{ cm}^2$ ; Parallelogram B is smaller.	B is smaller
5.			Triangles are 4 by 2 or 8 by 1 or reversed. Parallelogram 2 by 2 or 4 by 1 or 1 by 4.

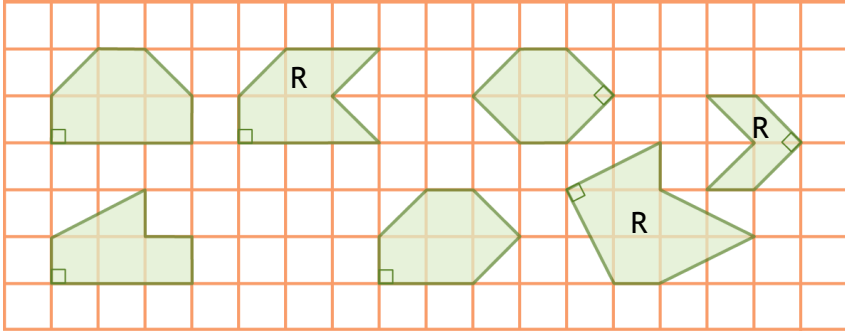

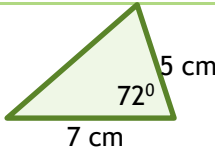


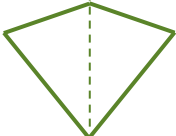
6.	Area of rectangle = $6 \text{ cm}^2$		
7.	Side length of square = $16 \div 4 = 4 \text{ cm}$ , Area = $4 \times 4 = 16 \text{ cm}^2$		Parallelogram dimensions could be: 16 by 1; 8 by 2; 4 by 4 or rotations of.
8.	Height of triangle = $11 - 5 = 6 \text{ cm}$ . Area of Triangle = $8 \times 6 \div 2 = 24 \text{ cm}^2$ ; Area of parallelogram = $8 \times 5 = 40 \text{ cm}^2$ . Total area = $24 + 40 = 64 \text{ cm}^2$		$64 \text{ cm}^2$
9.	Area of triangle = $4 \times 3 \div 2 = 6 \text{ cm}^2$ ; Area of parallelogram = $9 \times 5 = 45 \text{ cm}^2$ . Shaded area = $45 - 6 = 39 \text{ cm}^2$		$39 \text{ cm}^2$

Challenge

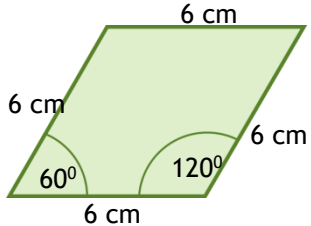
	Larger Square:	Smaller Square:	Shaded area of smaller square:	
	Length = $9 + 4 = 13 \text{ cm}$ . Area = $13 \times 13 = 169 \text{ cm}^2$ .	Area of one triangle = $9 \times 4 \div 2 = 18 \text{ cm}^2$ . Area of 4 triangles = $4 \times 18 = 72 \text{ cm}^2$	$= 169 - 72 = 97 \text{ cm}^2$	$169 \text{ cm}^2$

# Geometry

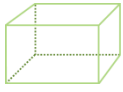



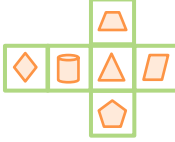
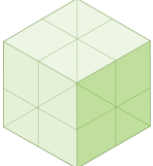
## Resource 1 - draw, compare and classify 2D shapes

	Workings out	Answers
1.	So far, $72^\circ + 72^\circ = 144^\circ$ . $360^\circ - 144^\circ = 216^\circ$ Other angle = $216^\circ \div 2 = 108^\circ$	108°
2.	<b>Option 1</b>	<b>Option 2</b>
	$50^\circ + 50^\circ = 100^\circ$	$180^\circ - 50^\circ = 130^\circ$
	$180^\circ - 100^\circ = 80^\circ$	$130^\circ \div 2 = 65^\circ$
	Angles: $50^\circ, 50^\circ, 80^\circ$	Angles: $50^\circ, 65^\circ, 65^\circ$
3.	A, C and E all have a right angle.	A, C and E
4.	<p>There are many of these, including reflex ones (R) and reflections or rotations of given ones, but here are a few.</p> 	
5.	 3 cm 8 cm Check measurements for accuracy.	6. 
7. a.	The faint orange lines represent the diagonals that should bisect each other at right angles. All four sides should measure the same length.	
b.	There are many different trapeziums that can be made, and they don't need to be isosceles, so long as there is one pair of parallel lines.	
8.	Opposite (adjacent) sides are equal. $4\text{ cm} + 4\text{ cm} = 8\text{ cm}$ . $20\text{ cm} - 8\text{ cm} = 12\text{ cm}$ , $12\text{ cm} \div 2 = 6\text{ cm}$ , so sides are: <b>4 cm, 4 cm, 6 cm, 6 cm</b> . Best drawn using the line of symmetry to help.	

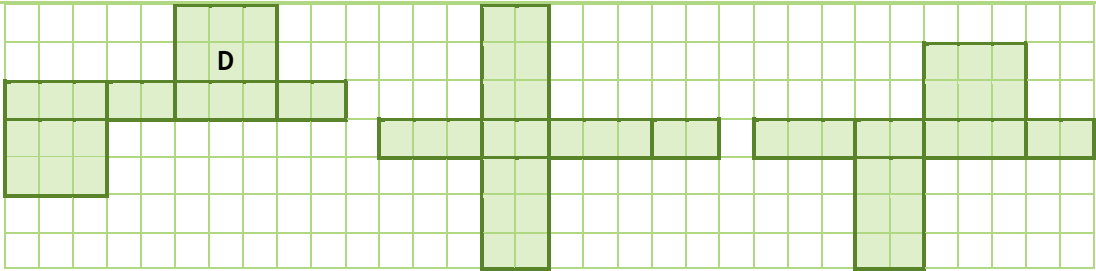
### Challenge

1.	$60^\circ + 60^\circ = 120^\circ$ $360^\circ - 120^\circ = 240^\circ$ $240^\circ \div 2 = 120^\circ$		
----	--	--	--

Resource 2 - recognise, describe and build simple 3D shapes answers

Workings out				
1.				
	Cuboid	Triangular prism	Triangle-based pyramid	Sphere
2.	Cube	Cuboid	Pentagonal pyramid	
3.		At least one square face	No square faces	
	Curved face		Sphere Cone Cylinder	
	No curved faces	Cuboid Square-based pyramid Cube	Tetrahedron Triangular prism Hexagonal prism	
4.				
5.		Number of faces	Number of Vertices	Number of edges
	Cuboid	6	8	12
	Cylinder	3	0	2
	Tetrahedron	4	4	6
	Hexagonal prism	8	12	18
	Cube	6	8	12
6.	Shape Properties		Name of shape	
	6 rectangular faces, 12 edges and 8 vertices		Cuboid	
	1 curved face, 1 flat face, 1 vertex and 1 edge		Cone	
	7 flat faces, 15 edges and 10 vertices		Pentagonal prism	
	1 curved face, no edges and no vertices		Sphere	
7.				2x2x2 cube

Challenge

1.	Net C does not make the (3 by 2 by 1) rectangle. There are many variations of the one rectangle either side of the 'four in a row' sequence. So the following three nets work; the first is the original net D.
	
	Check that the child's net has three sets of matching paired rectangles, e.g. 2 lots of 3 by 1, 2 lots of 3 by 2 and 2 lots of 2 by 1. Here are two others:

2.		Triangular faces	Octagonal faces	Edges
		8	6	36
				Vertices
				24

Resource 3 - illustrate and name parts of the circle answers

	Workings out	Answers
1.	Diameter = $2 \times \text{radius} = 2 \times 12 = 24 \text{ cm}$	D = 24 cm
2.	Radius = Diameter $\div 2 = 7 \div 2 = 3.5 \text{ m}$	R = 3.5 m
3.		
4. a.	Diameter = $2 \times \text{radius} = 2 \times 9 = 18 \text{ cm}$	D = 18 cm
b.	Diameter = $2 \times \text{radius}$ , so $10 \text{ cm} \div 2 = 5 \text{ cm}$	R = 5 cm
c.	For 5 eggs she needs $36 \text{ cm} \times 5 = 180 \text{ cm}$	180 cm
5.	Diameter = $2 \times \text{radius} = 2 \times 12 = 24 \text{ mm}$ . 1 metre = 1000 mm. We need to find how many groups of 24 are in 1000. $1000 \div 24 = 41 \text{ r } 16$ . Dale can line up 41 coins. 10p coins = $41 \times 10\text{p} = 410\text{p} = \text{£}4.10$	a. 41 10p coins b. £4.10
6.	Diameter = $2 \times \text{radius} = 2 \times 14 = 28 \text{ mm} = \text{height of pile}$ Thickness of one coin = $28 \div 14 = 2 \text{ mm}$	Thickness = 2 mm

Challenge

1.	Smaller circle: diameter = $2 \times \text{radius} = 2 \times 6 = 12 \text{ cm}$ Total length = $5 \times 12 \text{ cm} = 60 \text{ cm}$ Larger circle: diameter = $60 \text{ cm} \div 3 = 20 \text{ cm}$	Diameter = 20 cm
2.	We need the length of the square. Diameter = $2 \times \text{radius} = 2 \times 2 = 4 \text{ cm}$ . Length = $3 \times 4 = 12 \text{ cm}$ Area of square = $12 \times 12 = 144 \text{ cm}^2$	144 cm <sup>2</sup>

Resource 4 - recognise angles answers

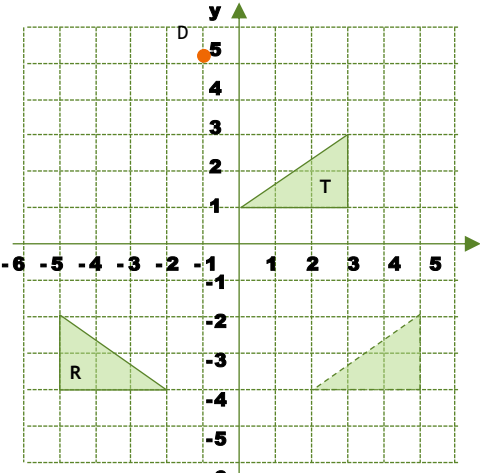
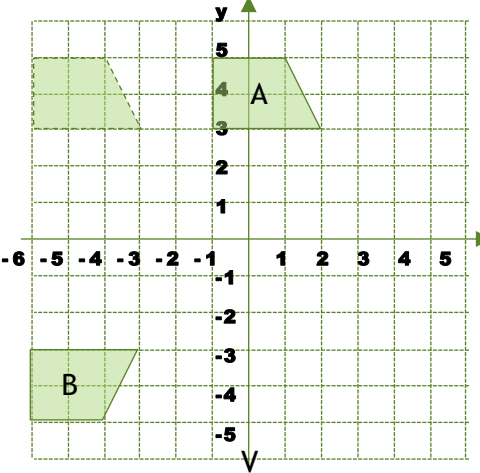
	Workings out	Answers
1. a.	Straight line = $180^\circ$ So far $47^\circ + 92^\circ = 139^\circ$ $a^\circ = 180^\circ - 139^\circ$ $a^\circ = 41^\circ$	a = 41°

b.	So far $90^{\circ} + 61^{\circ} = 151^{\circ}$ $b^{\circ} = 180^{\circ} - 151^{\circ}$ $b^{\circ} = 29^{\circ}$	$b = 29^{\circ}$
c.	So far $180^{\circ} - 70^{\circ} = 110^{\circ}$ $c^{\circ} = 110^{\circ} \div 2$ [both angles equal] $c^{\circ} = 55^{\circ}$	$c = 55^{\circ}$
2.	We have $49^{\circ} + 74^{\circ} + 67^{\circ} = 190^{\circ}$ not $180^{\circ}$	No
3. a.	Full turn = $360^{\circ}$ So far $90^{\circ} + 116^{\circ} = 206^{\circ}$ $d^{\circ} = 360^{\circ} - 206^{\circ}$ $d^{\circ} = 154^{\circ}$	$d = 154^{\circ}$
b.	Full turn = $360^{\circ}$ So far $114^{\circ} + 143^{\circ} + 72^{\circ} = 329^{\circ}$ $e^{\circ} = 360^{\circ} - 329^{\circ}$ $e^{\circ} = 31^{\circ}$	$e = 31^{\circ}$
c.	So far $360^{\circ} - 164^{\circ} = 196^{\circ}$ $f^{\circ} = 196^{\circ} \div 4$ [four equal angles, $f^{\circ}$ ] $f^{\circ} = 49^{\circ}$	$f = 49^{\circ}$
4.	So far $90^{\circ} + 55^{\circ} + 55^{\circ} = 200^{\circ}$ $w^{\circ} = 360^{\circ} - 200^{\circ} = 160^{\circ}$	$w = 160^{\circ}$
5.	The two unknown (equal) angles are: $180^{\circ} - 150^{\circ} = 30^{\circ}$ . So far, $90^{\circ} + 30^{\circ} + 30^{\circ} + 150^{\circ} = 300^{\circ}$ So, $x^{\circ} = 360^{\circ} - 300^{\circ}$ $= 60^{\circ}$ [or $90^{\circ} - 30^{\circ} = 60^{\circ}$ ]	$x = 60^{\circ}$
6.	If the smaller angle is $x^{\circ}$ , then the larger angle is $2x^{\circ}$ . Angles around a point add up to $360^{\circ}$ . So, $x^{\circ} + 2x^{\circ} + 60^{\circ} = 360^{\circ}$ $3x^{\circ} + 60^{\circ} = 360^{\circ}$ ... '-60°' $3x^{\circ} = 300^{\circ}$ ... '÷3' $x^{\circ} = 100^{\circ}$ ; larger = $2 \times 100^{\circ} = 200^{\circ}$	$100^{\circ}$ ; $200^{\circ}$
7.	$h = 130^{\circ}$ (vertically opposite) $i = 180^{\circ} - 35^{\circ}$ $= 145^{\circ}$ Third angle in triangle is $180^{\circ} - (35^{\circ} + 130^{\circ})$ $= 180^{\circ} - 165^{\circ}$ $= 15^{\circ}$ . $j^{\circ} = 15^{\circ}$ (vertically opposite)	$h = 130^{\circ}$ $i = 145^{\circ}$ $j = 15^{\circ}$
8.	$s^{\circ} = 180^{\circ} - 130^{\circ} = 50^{\circ}$ $t^{\circ} = 180^{\circ} - (90^{\circ} + 50^{\circ}) = 40^{\circ}$ $u^{\circ} = 180^{\circ} - (40^{\circ} + 75^{\circ}) = 65^{\circ}$ $v^{\circ} = 180^{\circ} - (90^{\circ} + 65^{\circ}) = 25^{\circ}$	$s = 50^{\circ}$ $t = 40^{\circ}$ $u = 65^{\circ}$ $v = 25^{\circ}$

Challenge

1.	Isosceles triangle with the two base angles, $a^{\circ}$ equal. So, $180^{\circ} - 82^{\circ} = 98^{\circ}$ $a^{\circ} = 98^{\circ} \div 2$ (equal angles) $a^{\circ} = 49^{\circ}$	$a^{\circ} = 49^{\circ}$
	Three angles of $82^{\circ}$ and three angles of $b^{\circ}$ around a point. $82^{\circ} + 82^{\circ} + 82^{\circ} = 246^{\circ}$ $360^{\circ} - 246^{\circ} = 114^{\circ}$ $b^{\circ} = 114^{\circ} \div 3$ $b^{\circ} = 38^{\circ}$	$b^{\circ} = 38^{\circ}$

Resource 1 - draw, translate and reflect shapes in all four quadrants answers:

Workings out	Answers
<p>1.</p> 	<p><math>A = (2, -4)</math></p>
<p>2.</p> 	<p><math>P = (-6, 5)</math></p>

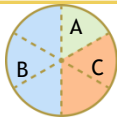
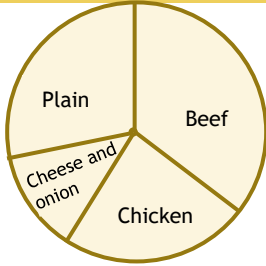
Challenge

1.	a.	(2, 5) translates 3 units to the left to give (-1, 5).
	b.	(0, -2) translates 2 up to give (0, 0).
	c.	(-4, 1) reflects in the (..... a) x-axis to give (-4-1).
	i.	x-axis to give (-4-1).
	ii.	y-axis to give (4, 1).



Statistics

Resource 1 - interpret and construct pie charts and line graphs

		Workings out	Answers															
1.		<table border="1"> <tr> <td>A</td> <td>B</td> <td>C</td> </tr> <tr> <td>3</td> <td>9</td> <td>6</td> </tr> </table>	A	B	C	3	9	6										
A	B	C																
3	9	6																
2.		Pie chart 1 = statement 2, pie chart 2 = statement 3, pie chart 3 = statement 4, pie chart 4 = statement 1																
3.	a.	a. Joe first stopped at <b>7am</b> .	<b>7am</b>															
	b.	He travelled <b>15</b> kilometres in the first hour.	<b>15</b>															
	c.	By 9 am, he had travelled <b>35</b> kilometres.	<b>35</b>															
	d.	He shopped for <b>1</b> hour.	<b>1 hour</b>															
	e.	He returned home taking <b>1½</b> hours.	<b>1½ hours</b>															
	f.	His whole outing took <b>5½</b> hours.	<b>5½</b>															
4.	a.	Highest temperature = <b>19°C</b>	<b>19°C</b>															
	b.	Below 14°C for <b>3 hours</b> (between 1pm and 4pm)	<b>3 hours</b>															
	c.	$2 \times 7^\circ\text{C} = 14^\circ\text{C}$ , so <b>4pm</b>	<b>4pm</b>															
	d.	<b>7pm - 8pm</b> ( $18 - 15 = 3^\circ\text{C}$ )	<b>7pm - 8pm</b>															
5.	a.	<b>50 ice-creams</b> sold in March	<b>50 ice-creams</b>															
	b.	$150 - 50 = 100$ more ice-creams	<b>100 more ice-creams</b>															
	c.	Anything less than <b>50</b> to follow the trend.	<b>50</b>															
6.		<table border="1"> <thead> <tr> <th>Flavour</th> <th>Frequency</th> <th>Angle</th> </tr> </thead> <tbody> <tr> <td>Beef</td> <td><math>14 \times 9</math></td> <td><math>126^\circ</math></td> </tr> <tr> <td>Chicken</td> <td><math>10 \times 9</math></td> <td><math>90^\circ</math></td> </tr> <tr> <td>Cheese and Onion</td> <td><math>5 \times 9</math></td> <td><math>45^\circ</math></td> </tr> <tr> <td>Plain</td> <td><math>11 \times 9</math></td> <td><math>99^\circ</math></td> </tr> </tbody> </table> <p style="text-align: center;"><math>MA = 360^\circ \div 40 = 9^\circ</math></p>	Flavour	Frequency	Angle	Beef	$14 \times 9$	$126^\circ$	Chicken	$10 \times 9$	$90^\circ$	Cheese and Onion	$5 \times 9$	$45^\circ$	Plain	$11 \times 9$	$99^\circ$	
Flavour	Frequency	Angle																
Beef	$14 \times 9$	$126^\circ$																
Chicken	$10 \times 9$	$90^\circ$																
Cheese and Onion	$5 \times 9$	$45^\circ$																
Plain	$11 \times 9$	$99^\circ$																

Challenge

1.	a.	2 out of 12 fail = $\frac{1}{6} = 8$ . So altogether = $6 \times 8 = 48$ girls	<b>40 girls passed</b>					
		10 out of 12 pass = $\frac{5}{6}$ ... $\frac{5}{6}$ of 48 = $48 \div 6 \times 5 = 8 \times 5 = 40$ passed						
	b.	5 out of 12 boys fail = $\frac{5}{12}$ of 48 = $48 \div 12 \times 5 = 20$ boys failed	<b>20 boys failed</b>					
2.		Adding up the total for day:						
		7am	9am	11am	1pm	3pm	5pm	Total
	Thursday	350	300	600	700	400	400	<b>2750</b>
	Saturday	400	300	700	300	700	600	<b>3000</b>
		Saturday was warmer as more water was drunk during that day.						

Resource 2 - using the mean answers

		Workings out	Answers
1.	a.	Mean = $(4 + 6 + 3 + 7) \div 4 = 20 \div 4 = 5$	5
	b.	Mean = $(3 + 8 + 8 + 4 + 7) \div 5 = 30 \div 5 = 6$	6
	c.	Mean = $(1 + 0 + 9 + 6 + 4 + 10) \div 6 = 30 \div 6 = 5$	5
2.		Mean = $(18 + 20 + 17 + 15 + 14 + 12) \div 6 = 96 \div 6 = 16$	16°C
3.		Total = $2 \times 8 = 16$ Other number = $16 - 5 = 11$	11
4.		Total = $2 \times 3 = 6$ . So, both numbers have to add up to 6. 1 and 5; 2 and 4; 3 and 3; 0 and 6	1 and 5; 2 and 4; 3 and 3; 0 and 6
5.		Mean = $(8 + 12 + 7 + 13) \div 4 = 40 \div 4 = 10$	10
6.		Total = $3 \times 7 = 21$ . So far $4 + 4 = 8$ . Third number = $21 - 8 = 13$	13
7.		Total = $4 \times 12 = 48$ . So far, we have $14 + 9 + 11 = 34$ . Mike needs to score $48 - 34 = 14$ points in the fourth quarter.	14 points
8.		Total = $4 \times 6 = 24$ . So far, we have $4 + 7 + 3 = 14$ . Missing number is $24 - 14 = 10$	10
9.		Total = $5 \times 11 = 55$ . So far, we have $2 \times 14 = 28$ . Remaining 3 numbers add up to $55 - 28 = 27$ . Mean = $27 \div 3 = 9$	9
10.		Total of seven numbers = $7 \times 3 = 21$ Total of five numbers = $5 \times 15 = 75$ Total of all twelve numbers = $21 + 75 = 96$ Mean of all twelve numbers = $96 \div 12 = 8$	8

Challenge

1.	Putting the results into a table.			Mean = $200 \div 50 = 4$
	Age in years	No. of children	Total	
	1	4	$1 \times 4 = 4$	
	2	8	$2 \times 8 = 16$	
	3	5	$3 \times 5 = 15$	
	4	12	$4 \times 12 = 48$	
	5	9	$5 \times 9 = 45$	
	6	12	$6 \times 12 = 72$	
		50	200	