

Recognise place value in numbers with up to seven digits

	3,000,000	4,044,044	
	sixty thousand	4,994,449	
	5,555,055	2,109,000 80,000	
	2019 Paper 2 Question 3 1,009,909 1,023,065 1,009,099 1,230,650 1st largest 2nd 3rd 4th smallest	B, D, E	
	2019 Paper 3 Question 2 7 4,000,000	3,350,000 3,449,999	
	5,500,000	3,000,000 80,000	

**2016 Paper 2 Question 16**

9,999,995

5,900,000

B



6,750,000

5,925,000



Solve problems involving addition and subtraction



6,642,000 7,042,000

7,999,000

7,990,000



	hockey	rounders	Total
boys	22	28	50
girls	27	26	53
Total	49	54	103

10



103

Solve problems involving multiplication or division

	2016 Paper 3 Question 21 This shows that $17 \times 326 = 5542$ so you can work out $326 \div 5542$ because $1 \times 326 = 326$ and if you add 1 times a number to 17 times a number, you get 18 times that number.	16																	
	19	16 46p																	
	2019 Paper 2 Question 16 4	7 8																	
	$10^2 \div (10 \div 10) \div (10 \div 10) = 100$	6.3																	
	7	29																	
	8																		
	7 4	<table border="1"> <thead> <tr> <th></th><th>Number who do wear glasses</th><th>Number who do not wear glasses</th><th>Total</th></tr> </thead> <tbody> <tr> <td>Number of boys</td><td>1</td><td>15</td><td>16</td></tr> <tr> <td>Number of girls</td><td>3</td><td>11</td><td>14</td></tr> <tr> <td>Total</td><td>4</td><td>26</td><td>30</td></tr> </tbody> </table>		Number who do wear glasses	Number who do not wear glasses	Total	Number of boys	1	15	16	Number of girls	3	11	14	Total	4	26	30	
	Number who do wear glasses	Number who do not wear glasses	Total																
Number of boys	1	15	16																
Number of girls	3	11	14																
Total	4	26	30																

	2019 Paper 3 Question 20 29	67	
	29,160		

Identify negative numbers on number lines

	2015 Paper 3 Question 2 -12, 2	-100, 150													
	-10, 45	X is 125 Y is -75													
	<table><tr><th>number</th><th>section</th></tr><tr><td>99</td><td>J</td></tr><tr><td>29</td><td>G</td></tr><tr><td>-83</td><td>A</td></tr><tr><td>-15</td><td>E</td></tr><tr><td>44</td><td>H</td></tr></table>	number	section	99	J	29	G	-83	A	-15	E	44	H	A is -80 B is 60	
number	section														
99	J														
29	G														
-83	A														
-15	E														
44	H														

Complete sequences involving negative numbers

 -75, -200	-60, -140	
 4, 9, 14	-35, -80	
 67	2, -1, 1	

Use knowledge of multiples to identify rules in sequences

 Mary is correct. The numbers in the sequence are always 1 more than a multiple of 3.	It will not be in the sequence. All numbers in the sequence are multiples of 40. 2140 is not in the 40 times table.	
 It will <u>not</u> be in the sequence. The numbers in this sequence are always 1 more than a multiple of 7. $777 \div 7 = 111$ so 777 is a multiple of 7	12	
	2051	

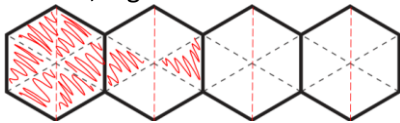
Find a fraction of a shape

$$\frac{4}{24} \text{ or } \frac{1}{6}$$

$$\frac{2}{6} \text{ or } \frac{1}{3}$$

$$\frac{1}{9}$$

if hexagons are split down the middle to make equal parts (triangles), 8 triangles should be shaded, e.g.



Complete fraction arithmetic problems

$\frac{2}{5}$ is larger because it is equivalent to $\frac{6}{15}$

$\frac{1}{3}$ is only equivalent to $\frac{5}{15}$

$\frac{4}{7}$ is larger because it is equivalent to $\frac{36}{63}$

$\frac{5}{9}$ is only equivalent to $\frac{35}{63}$

2018 Paper 2 Question 14

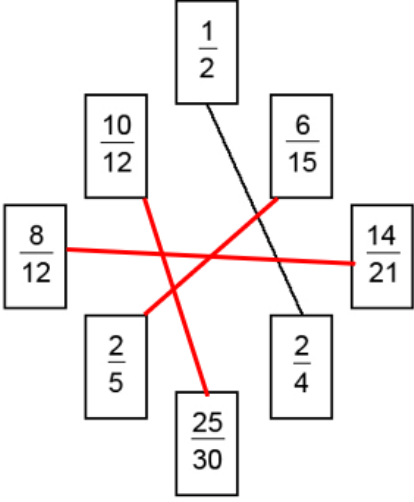
$\frac{3}{5}, \frac{3}{4}, \frac{6}{5}$

Yes

$\frac{1}{3}$ is only equivalent to $\frac{3}{9}$ so $\frac{4}{9}$ is larger

No

$\frac{4}{9}$ is equivalent to $\frac{8}{18}$ so they are the same size

▶ 8, 19, 30	▶ $\frac{1}{\boxed{10}} + \frac{\boxed{3}}{5} \frac{6}{10} = \frac{7}{10}$
▶ 3, 17	▶ and $\frac{1}{\boxed{2}} \frac{5}{10} + \frac{\boxed{1}}{5} \frac{2}{10} = \frac{7}{10}$ (any order)
▶ $\frac{11}{6}$	▶ $\frac{11}{5}$
▶ $\frac{25}{36}$	▶ 
▶ < > =	
▶ 12 40 5	▶ $\frac{3}{5}$ $\frac{1}{3}$
	▶ 3 $\frac{10}{13}$



$$1\frac{5}{6}$$



$$\frac{1}{3\frac{3}{8}}$$



$$\frac{3}{10}$$

$$\frac{9}{20}$$

Solve word problems involving fractions



$$\frac{12}{20} \text{ or } \frac{3}{5}$$



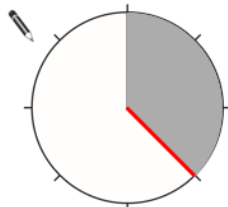
$$\frac{3}{10}$$



$$\frac{3}{8} \text{ shaded}$$

e.g.

Pupils in class 6K



Key:

- 11 year-old girls
- All other pupils in the class



$$\frac{3}{16}$$



2018 Paper 2 Question 23

1408 hours

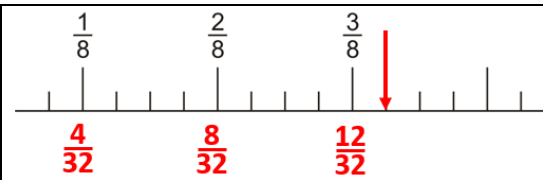


$$1.6 \text{ or } 1\frac{3}{5}$$

$$0.625 \text{ or } \frac{5}{8}$$



$$\frac{3}{8} \text{ m}$$



many possible answers

e.g. $\frac{7}{8}$ and $\frac{1}{8}$



220

$\frac{23}{35}$



117 cm²

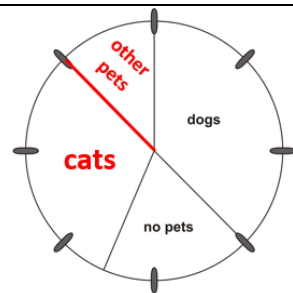
$\frac{4}{15}$



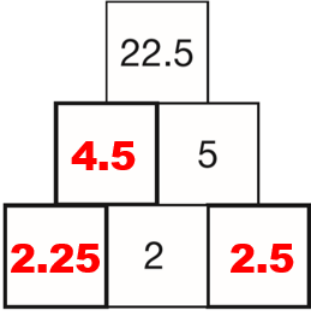
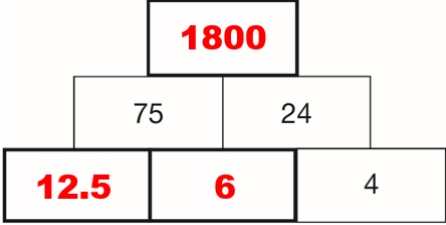
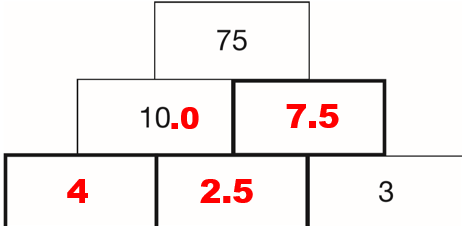
between £80 and £100

150 degrees

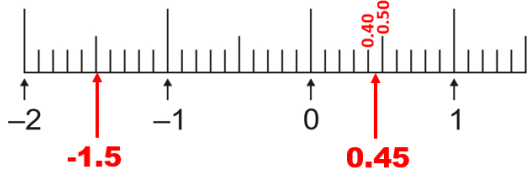
£50



Solve problems involving decimals

36 litres	$3.5 + 3.5 + 3.5$
2017 Paper 2 Question 20 many possible explanations e.g. 0.25 is twenty-five hundredths. Two fifths is equivalent to forty hundredths. or Two fifths is equivalent to four tenths, which is 0.4 0.25 is smaller than 0.4 because it has fewer tenths.	2.5, 4, 5.5 20 2016 Paper 2 Question 18 20
2015 Paper 3 Question 14 	
	0.75, 1.5, 96 20, 33.125 2015 Paper 2 Question 12 1.75

	4.9 -0.5	3.5 km	
		2018 Paper 2 Question 20 30 cm	
	2015 Paper 3 Question 9 29.25 g	Alfie is wrong. many possible explanations e.g. If one of the numbers is 1, the answer will be the same as (not greater than) the other number. e.g. $3 \times 1 = 3$ If one of the numbers is 0, the answer will always be 0 no matter how large the other number is. e.g. $5 \times 0 = 0$ If one of the numbers is less than 1, the answer will always be smaller than the other number. e.g. $\frac{1}{2} \times 4 = 2$ or $5 \times 0.1 = 0.5$	
	2018 Paper 3 Question 19 3363 336,300 35.4	16 800	
	2.5	0.5, 0.65	

 54.75	37.75	
 0.625		
 many possible answers e.g. $0.001 + 0.002 + 0.007$		
 many possible answers e.g. $\frac{701}{1000}$	2.25 and 2.75	

Complete sequences involving decimals

 15	2015 Paper 3 Question 16 96	
 2016 Paper 3 Question 13 15	7.5	

Solve problems involving percentages

2018 Paper 3 Question 8

£140

30

36%

46%

10% of 55 is 5.5

You can't have 5.5 people.

112,500

150 g

£1.25

Transport	Walk	Cycle	Bus	Car
Percentage of children	25%	10%	45%	20%
Angle on pie chart	90°	36°	162°	72°

Reasoning

Spelling

Arithmetic and Reading

Calculate a whole quantity given a percentage



Divide by 40 to get 1%, then multiply by 100 to get 100%
or
Divide by 4 to get 10%, then multiply by 10 to get 100%

18

200



160

400



32

160





60%

5%
95%



20

137.5 g



£22.50

£7.00



Solve problems involving money

	2 green bags, 3 red bags many possible explanations e.g. Nika might have bought 3 bags of green apples and Hassan might have bought 2 bags of red apples. 3 green bags is £2.25 for 18 apples (3 x 6) 2 red bags is £1.80 for 20 apples (2 x 10)	2016 Paper 3 Question 20 £11.40	
		£5.50 3	
		£1.50 250	
	£4.06 200 g	13	
		2015 Paper 2 Question 19 £16,470	
	£192	£3.50	
	25p		

Solve scaling problems

	75	2.4 g	
	9.6 cm	525 kg	

Solve scaling problems involving measurement

	50	50	
		2016 Paper 2 Question 11 30	
	2018 Paper 3 Question 13 40	2019 Paper 2 Question 19 3.75 l	
	2018 Paper 3 Question 9 108 cm	200 miles	
		2019 Paper 3 Question 15 400 km	
	16	3.6 m	

Use the notation of ratio

2017 Paper 2 Question 22

1 : 4

1 : 3

39

75 grams of margarine, 50 grams of lard

48 and 75

Class	Number in class	Football	Netball	Hockey
6M	27	7	7	13
6P	33	16	9	8
6T	30	5	10	15

between 26% and 28%

between 46 and 50

	5 : 1 2006	33	
		184	

Solve money problems involving ratios with a decimal scaling factor

	£2.70 150 g	£2.63 300 g	
	£2.10		
	 250 g		

Solve measurement problems with a decimal scaling factor

	40 250 ml	75 g	
		750 ml 625 g	

	2015 Paper 3 Question 18 90 g	2017 Paper 2 Question 21 12.5 cm	
	375 g	39.6 km	

Use a formula

	2017 Paper 2 Question 11 140 minutes 2 kg	2015 Paper 2 Question 8 £2.55 25	
	2018 Paper 3 Question 15 £3.05 6		

Find numbers that meet conditions

	500 and 600 45 and 55	$m = 11$ and $n = 3$ $m = 19$ and $n = 3$	
	$p = 575$ $q = 425$	$k = 500$ $m = 750$ $n = 250$	
	94, 95 and 96	When j is 1 then k is 4 or 2 and 8, 3 and 12, 4 and 16, etc.	
	2017 Paper 3 Question 23 $10 \times a - 1$	$a = 16$ $b = 8$ $c = 6$	

Write rules using algebraic notation

	2019 Paper 3 Question 3 $10 - a$	$k - 2$ $2k + 3$ $\frac{1}{2}k + 6$	
--	--	---	---

$n + 3$ $2m - 5$	n plus 5 2 less than n n plus n n^2 $2 - n$ $n + 5$ $2n$ $n - 2$ $n + 2$
$a = 6c$	

Find values given rules expressed with algebraic notation

16	27
1 2 3 4 5 6 7 8 1 2 3 4 5 6 7 8	2019 Paper 3 Question 17 $x = 2$ and $y = 9$ or $x = 4$ and $y = 8$ or $x = 6$ and $y = 7$ or $x = 8$ and $y = 6$ 4 0
$m = 50$ $n = 5$	16, 17, 18, 19

	98 8	2016 Paper 2 Question 12 53 48	
		$y = 8$ $x = 9$	
	15, 16 or 17 6 or 7	302 49	
	2 and 4 3 and 2	-140 $\frac{1}{4}$ or 0.25	
		many possible answers e.g. 0.1 many possible answers e.g. 0.2	

Use an algebraic formula

$$s = 2n + 3$$

35

68

$$L = 2H - 4$$

120

$$3n + 75$$

43

14

$$S = 4N + 3$$

82

22



35

$$S = 2n + 1$$

121

$$q = 3n + 1$$



204

$$W = 2S + 4$$

Find missing values to calculate length



42 cm

2017 Paper 3 Question 22

7 cm





width is 22 cm
height is 17 cm

39 cm



20 cm

$x = 34$ cm
 $y = 82$ cm



Solve ratio problems involving length



14 cm

62 cm





2019 Paper 3 Question 22

10.5 cm

12 cm



Solve problems involving perimeter



18 cm

54 cm

5 metres



6.8

15 cm



Solve ratio problems involving perimeter



4 cm

4 cm



Calculate area and recognise that area can be divided



5

13.5 cm²



75 cm²

7500 cm²

1500 cm²



Calculate the area of a triangle

Note: Questions have been scaled down, so measurements given in cm are not to scale.



rectangle 14 cm^2

square 12 cm^2

7.5 cm^2



54 cm^2

20 cm^2



2016 Paper 3 Question 17

A

12 cm^2



80 cm^2

108 cm^2



Relate the area of triangles and rectangles

Note: Questions have been scaled down, so measurements given in cm are not to scale.

3

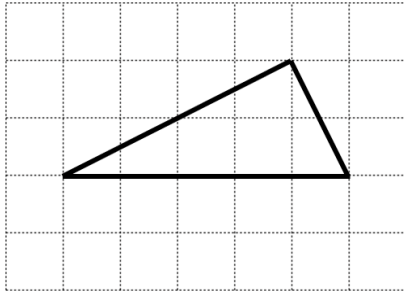
rectangle with sides of 2 cm and 4 cm
or 1 cm and 8 cm

Draw a triangle of a given area

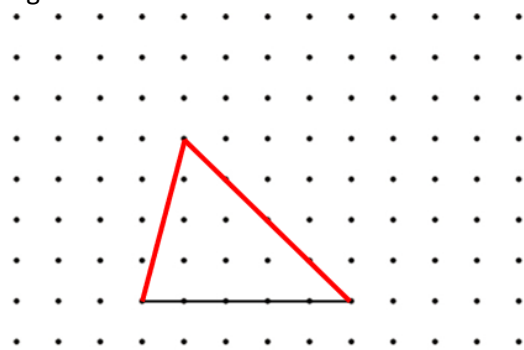
Note: Questions have been scaled down, so measurements given in cm are not to scale.

triangle with a base of 5 cm and height of 2 cm
or base of 2 cm and height of 5 cm

e.g.

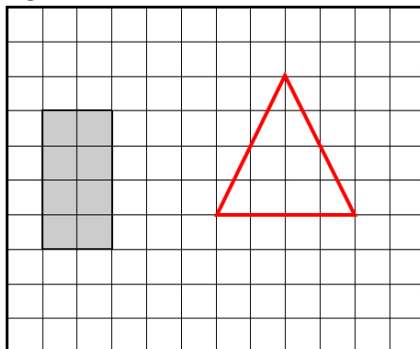


triangle with a height of 4 cm
e.g.

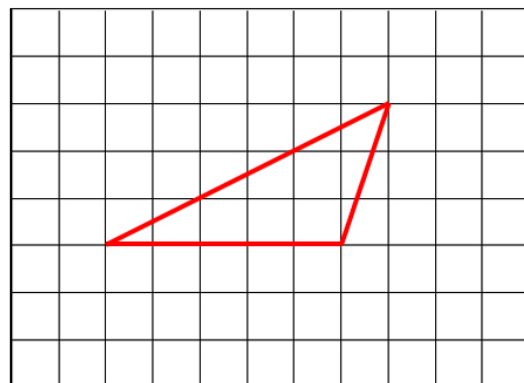


triangle with a base of 4 cm and height of 4 cm
or base of 8 cm and height of 2 cm
or base of 2 cm and height of 8 cm

e.g.

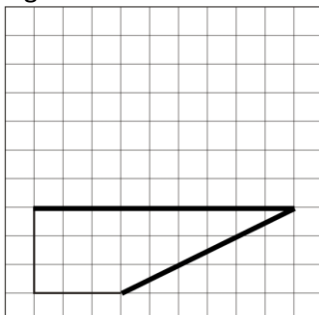


triangle must have an obtuse angle and a height of 3 cm
e.g.



many possible answers

e.g.



Calculate the area of a parallelogram

Note: Questions have been scaled down, so measurements given in cm are not to scale.

12 cm²

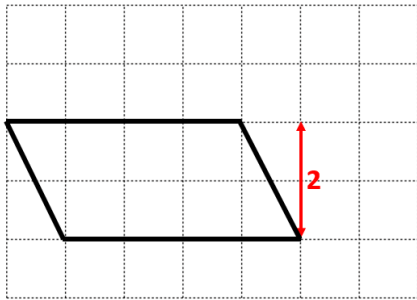
28 cm²

48 cm²

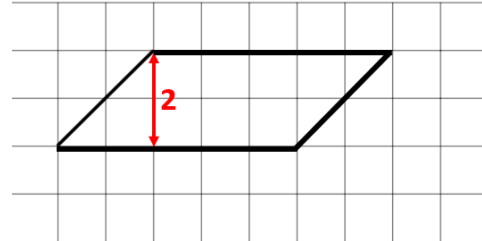
Draw a parallelogram of a given area

Note: Questions have been scaled down, so measurements given in cm are not to scale.

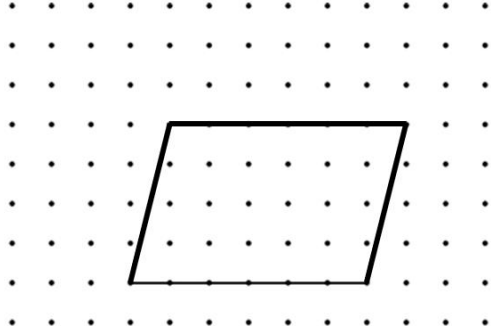
parallelogram with a base of 2 cm and height of 4 cm
or a base of 4 cm and height of 2 cm
e.g.



parallelogram must have a base of 5 cm
e.g.



parallelogram must have a height of 4 cm
e.g.



Solve problems involving area



289 cm²

205 cm²

1050 cm²



Apply knowledge of angles with isosceles triangles

35°

2015 Paper 2 Question 15

104°

Type of triangle	Angle 1	Angle 2	Angle 3
Isosceles	90°	45°	45°
Right-angled	80°	90°	10°
Isosceles	70°	70°	40°
Isosceles	70°	55°	55°

17°

140°

$r = 150^\circ$

$t = 110^\circ$

108°

Apply knowledge of angles and lengths in equilateral triangles

18°

$x = 155^\circ$

$y = 85^\circ$

64 cm

49 cm

Apply knowledge of angles in quadrilaterals (360) and pentagons (540)

132°

50°

20°

No, because regular shapes have angles of the same size, not just sides of the same length.

60°

Recognise vertically opposite angles and Z angles

	$a = 56^\circ$ $b = 34^\circ$	$x = 108^\circ$ $y = 54^\circ$	
	b and d	$x = 40^\circ$ $y = 25^\circ$	

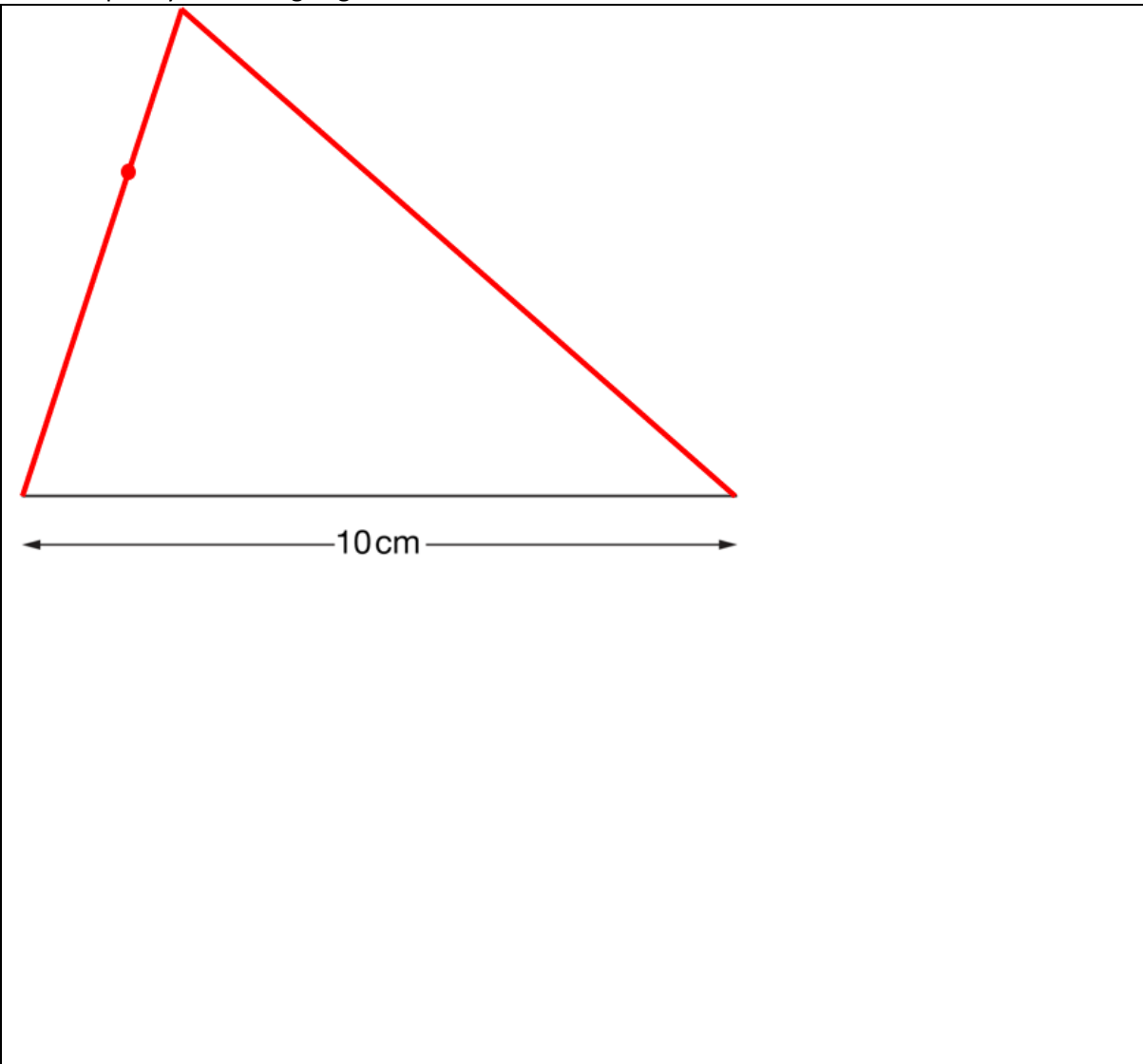
Solve problems involving angles

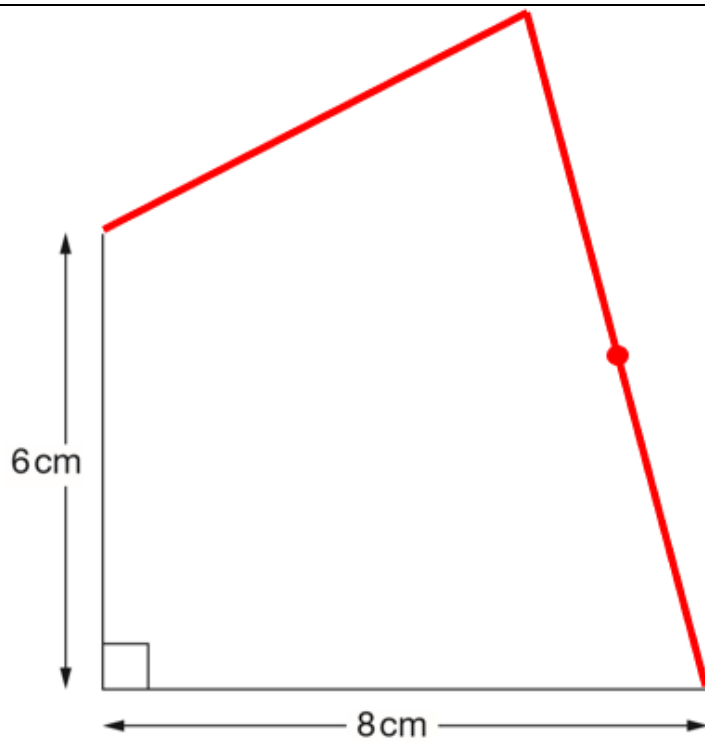
	2016 Paper 2 Question 17 $a = 160^\circ$ $b = 20^\circ$	$x = 55^\circ$ $y = 25^\circ$	
	$x = 55^\circ$ $y = 20^\circ$	$x = 125^\circ$ $y = 145^\circ$	

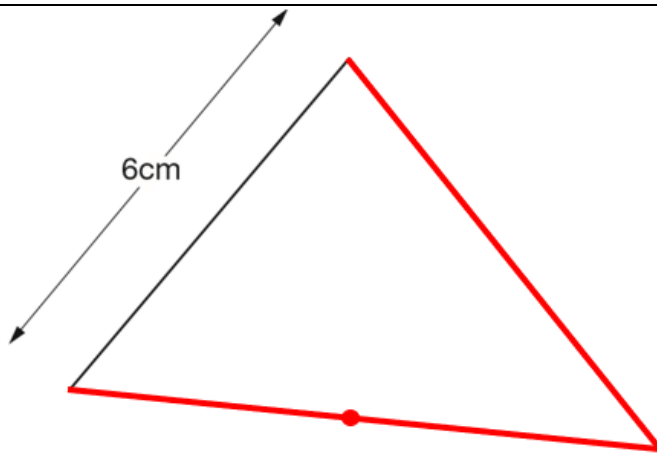


$a = 36^\circ$ $b = 72^\circ$ $c = 144^\circ$	
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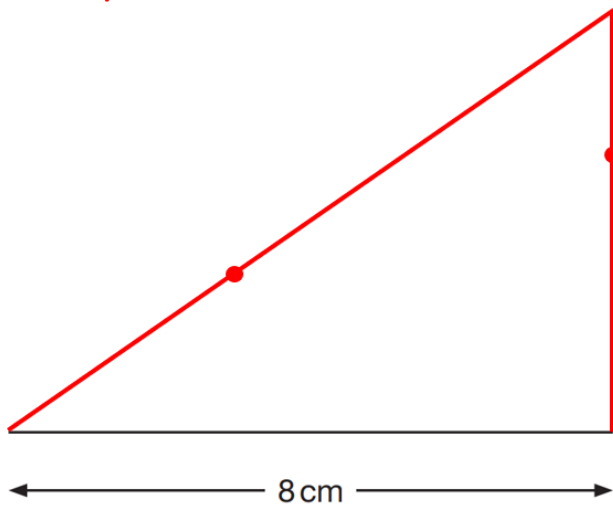
Draw shapes by measuring angles

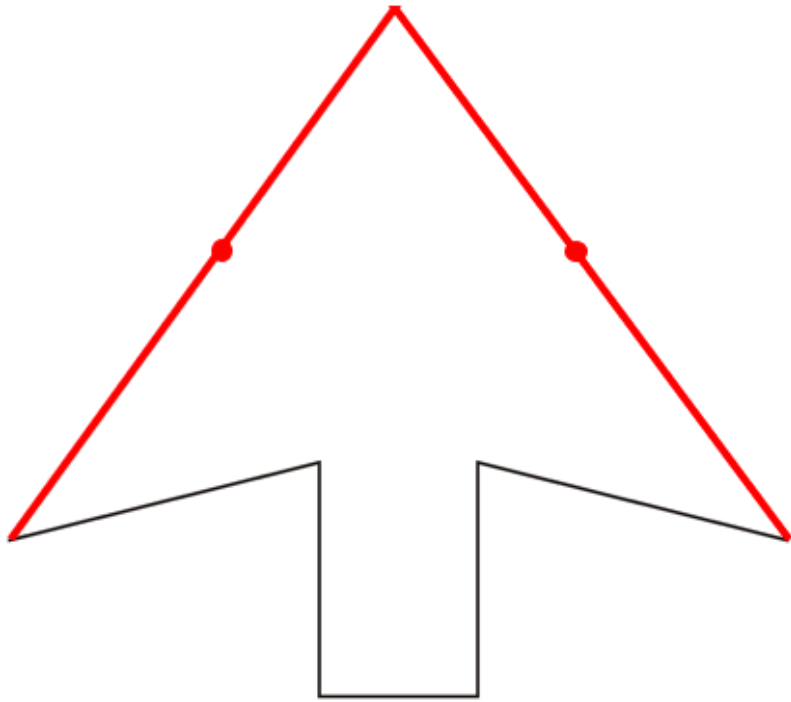


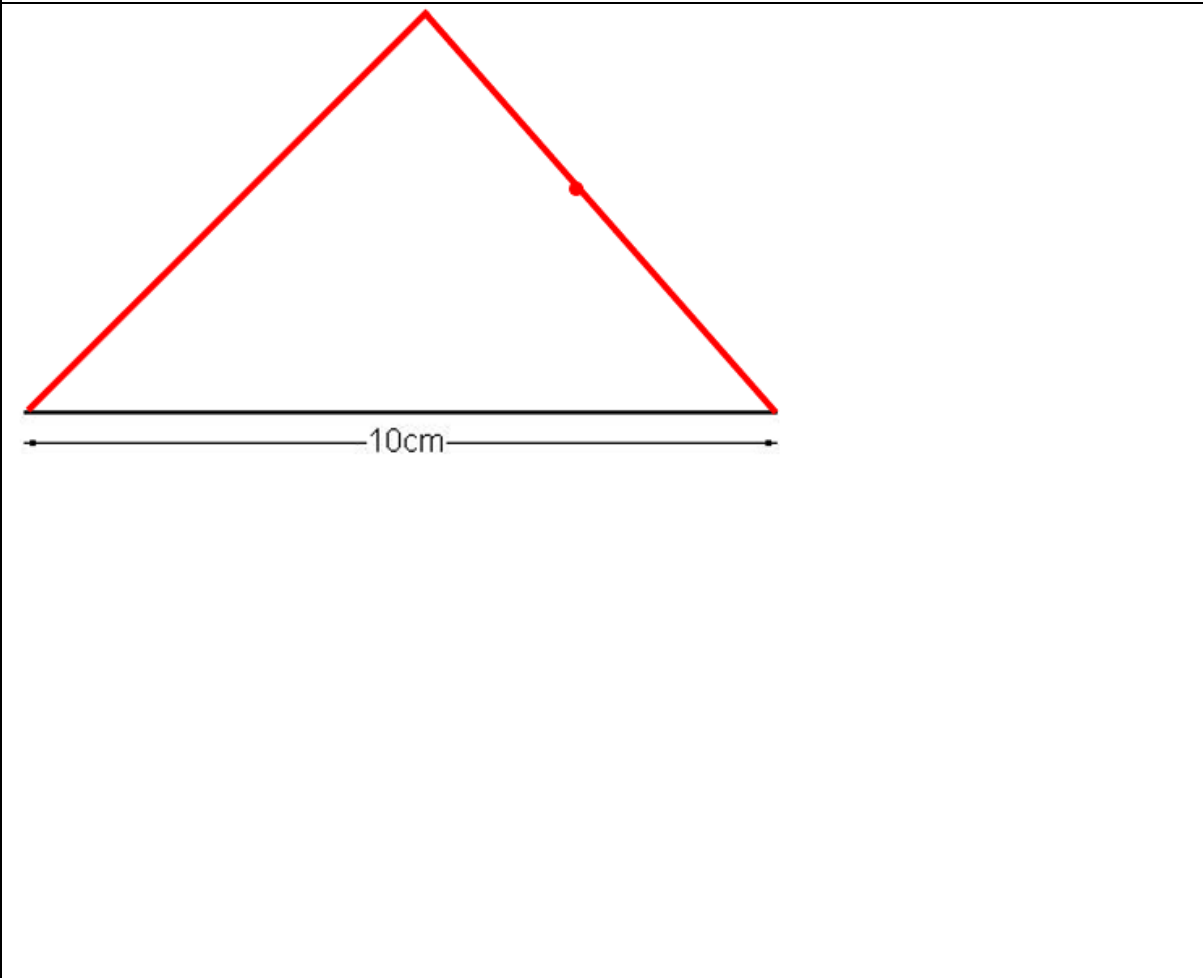
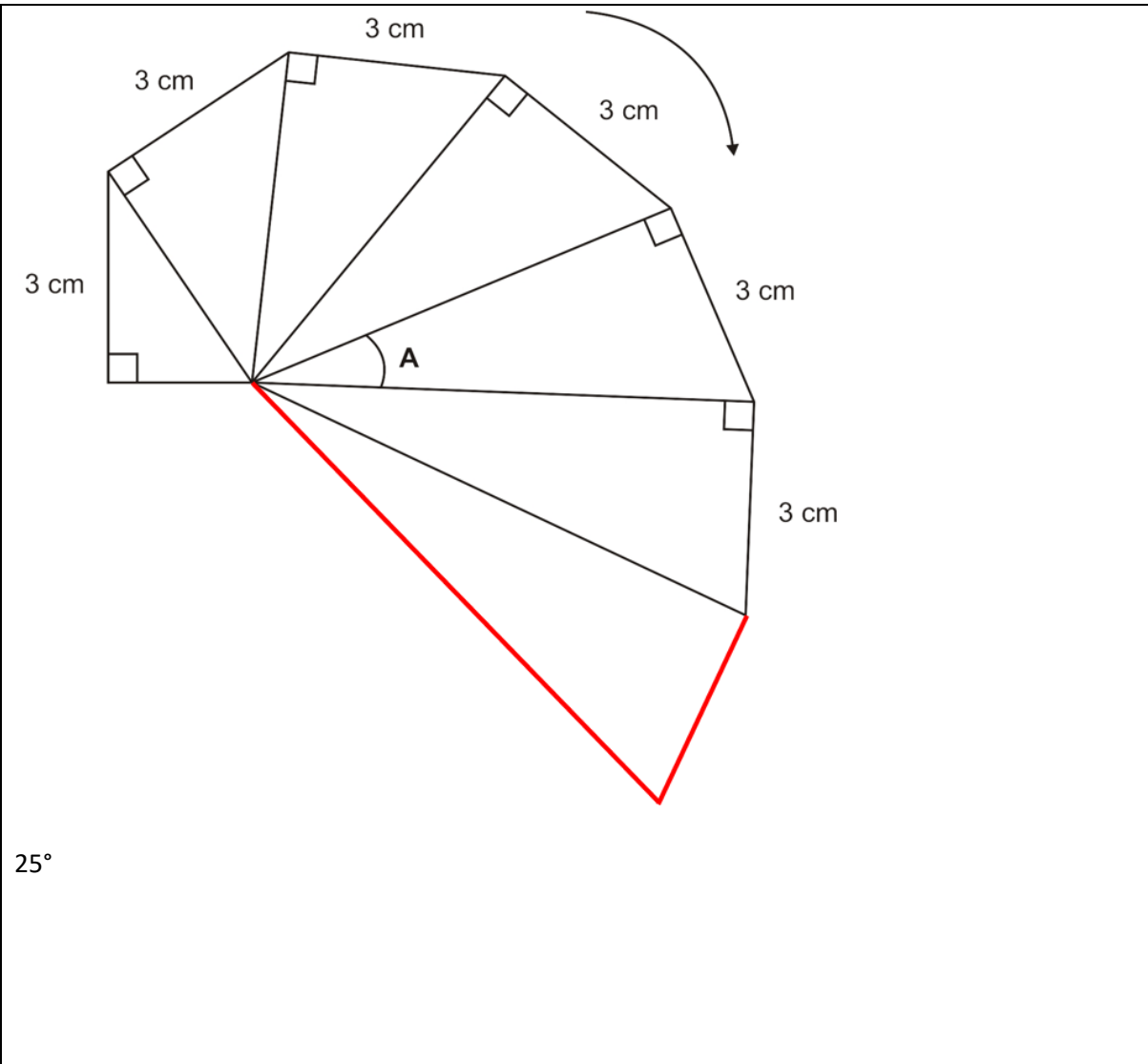




2019 Paper 2 Question 13







Recognise parts of a circle

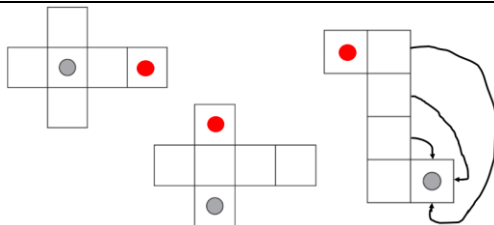
2017 Paper 3 Question 11
32 cm

11 cm

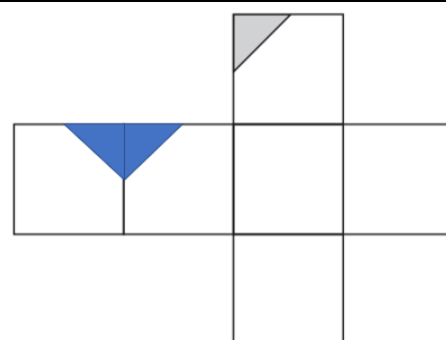
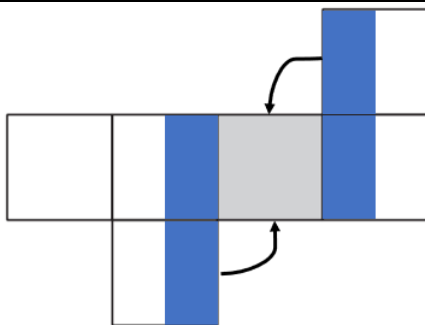
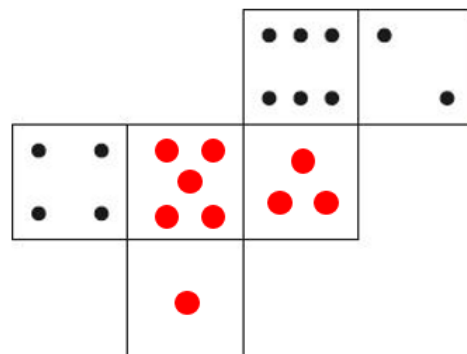
4
8
25

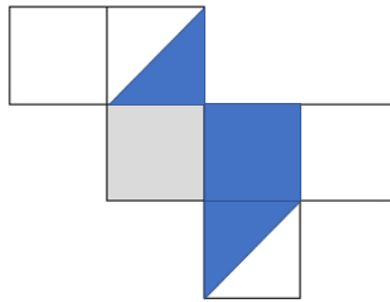
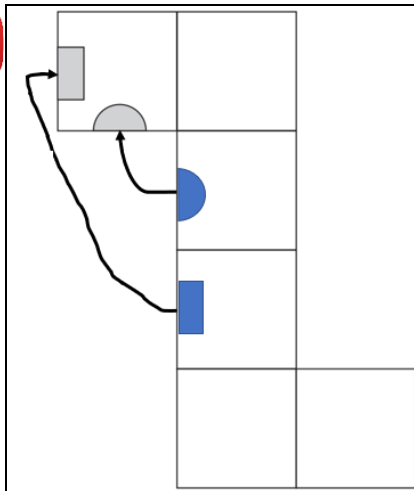
12.5 cm²

Solve problems involving nets of 3D shapes



2018 Paper 3 Question 17





Calculate volume



24 cm^3

600 cm^3



many possible answers
e.g. $10 \text{ cm} \times 10 \text{ cm} \times 3 \text{ cm}$
or $10 \text{ cm} \times 6 \text{ cm} \times 5 \text{ cm}$



7



18 cm^2

Write the possible dimensions of a cuboid given volume

4 cm, 3 cm and 2 cm
or 12 cm, 2 cm and 1 cm
or 24 cm, 1 cm and 1 cm
or 8 cm, 3 cm and 1 cm
or 6 cm, 4 cm and 1 cm

All the same
They all have a volume of 16 cubes.
Volume is how much space a 3D shape takes up.

4

30 cm, 1 cm and 1 cm
15 cm, 2 cm and 1 cm
5 cm, 3 cm and 2 cm
6 cm, 5 cm and 1 cm

	Dimensions		
Cuboid E	1	1	24
Cuboid F	1	2	12
Cuboid G	1	3	8
Cuboid H	1	4	6
Cuboid I	2	2	6
Cuboid J	2	3	4

(any order)

Calculate missing lengths given volume

2017 Paper 3 Question 24
9 cm

5 cm

5 cm

Calculate volume from nets



2018 Paper 2 Question 22

125cm³

The cuboids have the same volume.

$$4 \text{ cm} \times 3 \text{ cm} \times 1 \text{ cm} = 12\text{cm}^3$$

$$3 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm} = 12\text{cm}^3$$



Solve problems involving volume of cubes and cuboids



2019 Paper 2 Question 23

720

64



600cm³

many possible answers
e.g. 10 cm, 10 cm and 3 cm



300cm³

360cm³

12

Solve ratio problems involving co-ordinates on a simple co-ordinate grid

(2, 1)

The co-ordinates of point B are (12, 6).
x co-ordinates are increasing by 2 each time
from an even number and 11 is an odd number.
y co-ordinates are increasing by 1 each time
and point B is the 6th, not the 5th, point.

(50, 15)

B is (5, 4)

D is (10, 0)

(75, 36)



M is (15, 40)

C is (20, 0)

(13, 15)

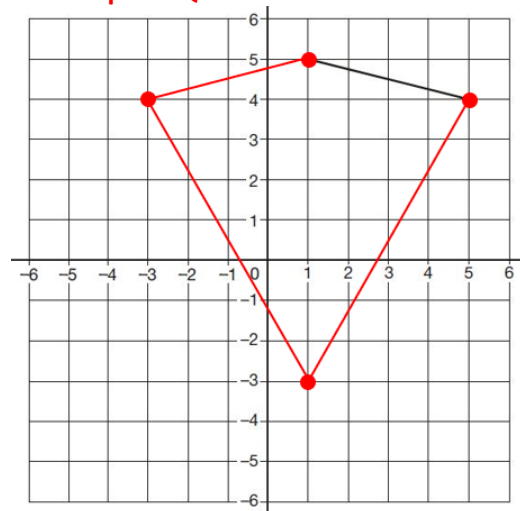


Identify and plot points on a full co-ordinate grid



Cross
Tick
Tick
Cross

2017 Paper 2 Question 17





D is $(-10, -4)$

E is $(0, 8)$

2018 Paper 3 Question 10

$(-3, 1)$



$(-3, -12)$

P is $(-12, -30)$

Q is $(38, -30)$



A is $(19, 25)$

B is $(-6, 19)$

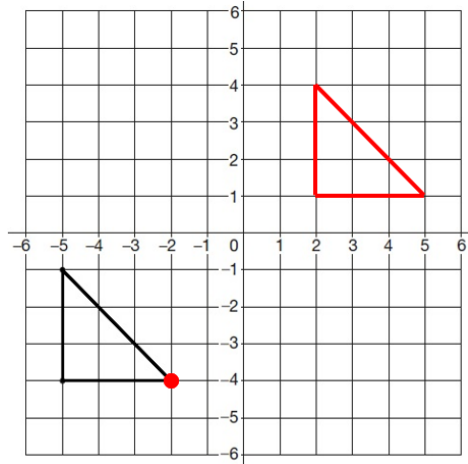
M is $(-10, 0)$

L is $(30, -20)$

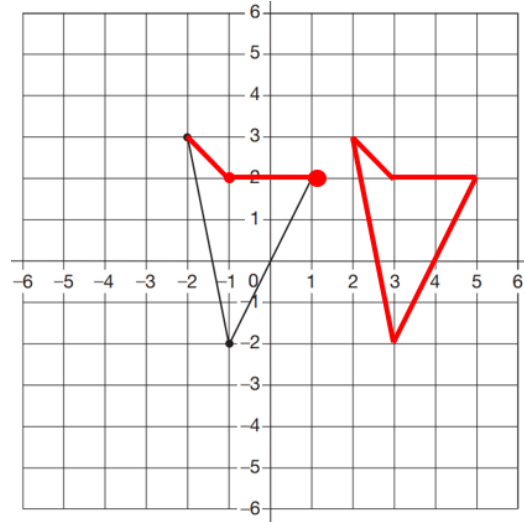


Translate a shape on a full co-ordinate grid

2017 Paper 3 Question 7



2019 Paper 3 Question 10



2015 Paper 3 Question 20

A is $(12, 0)$

B is $(9, -8)$

Reflect a shape on a full co-ordinate grid



A is (11, 9)

B is (15, 3)

2016 Paper 2 Question 20

(-10, -40)



Identify co-ordinates from equations on a line graph



A is (4, 9)
B is (-8, -3)

(-5, 0)

No. y is always 3 more than x.
-103 is 3 less than -100

$$y = x + 3$$
$$\text{or } x = y - 3$$



(1, -6)
or (2, -5)
or (3, -4)
or (4, -3)
or (5, -2)
or (6, -1)

Estimate values on a line graph to use in calculations

40

12 km or 13 km

It shows 22 km travelled in the first 60 minutes.
This means that $40 - 22 = 18$ km was travelled
in the second hour.
22 km is further than 18 km.

16 km

between 180 and 190

25,000

1997

1964

18 minutes or 19 minutes

between 6 minutes and 7.5 minutes



3:15pm

13 degrees or 14 degrees

10 years old

3 cm



between 140 and 160 metres

27 seconds

It reaches 200 m at 3 seconds and falls below
200 m at 26 seconds
 $26 - 3 = 23$

6 seconds

17.5 metres





between 255 seconds and 265 seconds

470 seconds

£550

15 seconds



between 12:40pm and 12:50pm

Estimate decimals or negative numbers on a line graph to use in calculations



between 8.6 kg and 8.8 kg

between 3.2 kg and 3.4 kg

between 22.2°C and 22.8°C

between 2:48pm and 2:52pm

5 degrees



between 7.3 cm and 7.7 cm

3 hours 45 minutes

8:45pm

3 degrees





2017 Paper 3 Question 4

7 degrees

-2 degrees

9

8th March

39.1 degrees



Solve problems involving information presented in line graphs



700 and 1000

Elementary

1 minute = 30 words

so 10 minutes = 300 words

Lines drawn vertically on 10 minutes and horizontally on 300 words cross in Elementary.

the delivery cost is the same (£5) whatever the cost of the toy





it's a straight line

08:10

Calculate the mean

2015 Paper 2 Question 17

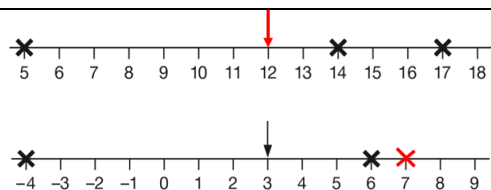
145 cm

2018 Paper 2 Question 18

£5.40

3

160 g



$14 + 23 + 13 + 13 = 63$
 $63 \div 4 = \text{more than } 15 \text{ (15.75)}$

22 km

2019 Paper 2 Question 22

$\frac{2}{5}$

10.7 °C

2.8 cm

52