Level 1 / Level 2 GCSE (9 – 1)

MATHEMATICS

Paper 1 (Non- calculator)

Foundation Tier

Time : 1 hour 30 minutes   **Paper : 1 MA1 / 1F**

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Write $\frac{3}{8}$ as a percentage.

$\frac{3}{8} \times 100\% = 37.5\%$ (1)

.... %

(Total for Question 1 is 1 mark)

2. Work out $4 \div (8 - 12)$

$4 \div (-4) = -1$ (1)

....

(Total for Question 2 is 1 mark)

3. Write 150 minutes in hours.

$\frac{150}{60} = 2.5$ (1)

.... hours

(Total for Question 3 is 1 mark)

4. Find a number that is exactly halfway between 11 and 21

$\frac{11+21}{2} = 16$ (1)

....

(Total for Question 4 is 1 mark)

5. Here are the winning numbers in a lottery game.

2   9   27   29   38   49

a. Which number is a prime number?

either   2 or 29   (1)

....(1)

b. Which square number is a factor of 81?

Square numbers: $3^2 = 9, 7^2 = 49$

$\frac{81}{49} = 1.6531 ...$, so not a factor of 81

$\frac{81}{9} = 9$, so it is a factor of 81

9 (1)

....(1)

(Total for Question 5 is 2 marks)

6. A family of 2 adults and 3 children are going on holiday.

The adult price for the holiday is £640.

The company is offering a discount of 25% off adult prices, and a child cost $\frac{2}{5}$ of the

original adult prices.

Work out the total cost of the holiday.

New adult cost:

Either :

$\frac{1}{4} \times 640 = 160$

$640 - 160 = 480$ (1)   OR $\frac{3}{4} \times 640 = 480$ (1)

Child cost:

$\frac{2}{5} \times 640 = 256$ (1)

Total cost:

$2 \times 480 + 3 \times 256 = 1728$

(1)   (1)
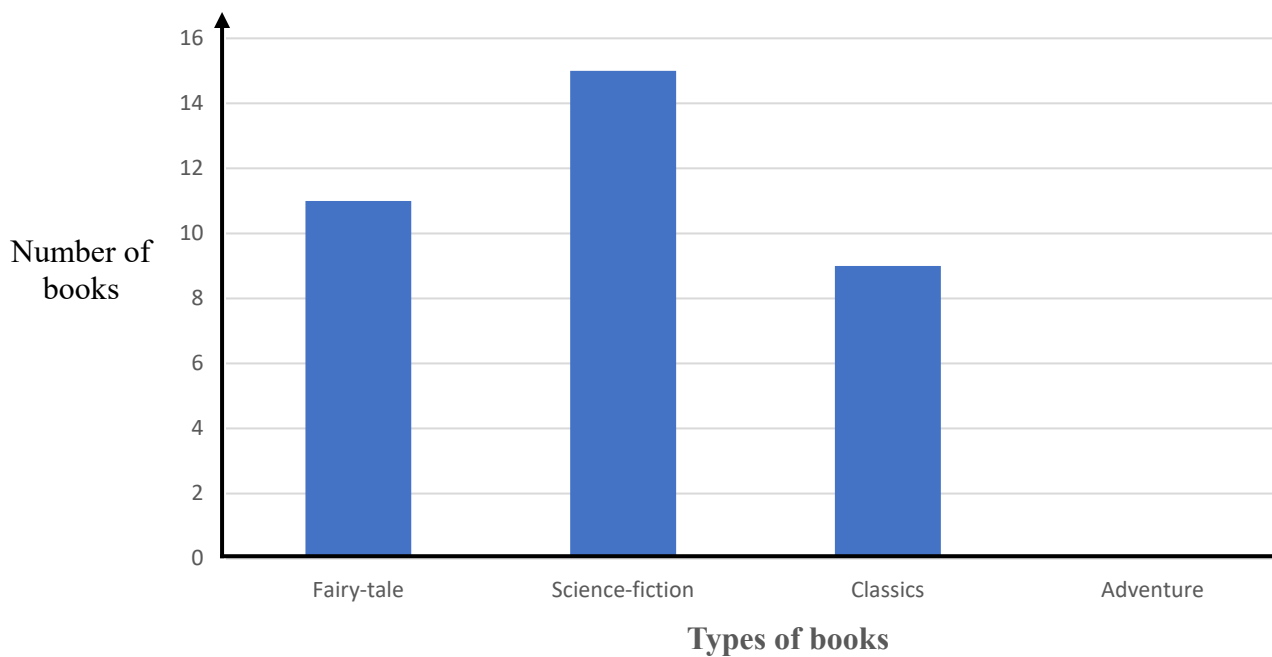
....

(Total for Question 6 is 4 marks)

7. In Mary's bookshelf, the books are only fairy-tale or science-fiction or classics or adventure.

The chart shows the number of fairy-tale books, the number of science-fiction books and the number of classics books.

Types of books

The total number of books is 48.

a. Work out the number of adventure books.

Total number of fairy-tale, science-fiction and classic books:

$11 + 15 + 9 = 35$

Number of adventure books:

$48 - 35 = 13$

(1)   (1)

………………………………………..**(2)**

b. Write down the mode.

The mode is the category that occurs the most

Science-fiction   (1)

……………………………………….

(1)

(Total for Question 7 is 3 marks)

8. Write in order of size, starting with the smallest.

$$\frac{3}{4}, \ 0.7, \ \frac{13}{20}, \ 78\%, \ \frac{7}{9}$$

Convert all of the numbers to decimals (or fractions):

0.75, 0.7, 0.65, 0.78, 0.77…

At least 3 conversions correct or 4 in the correct order **(1)**

Put in the correct order:

$0.65, 0.7, 0.75, 0.77, 0.78$

All in the correct order **(1)**

(Total for Question 8 is 2 marks)

9. On Saturday, Mike leaves home at 11.30 am and cycles 4 km to the sports centre.

It takes 20 minutes.

a. Work out the average speed in km per hour of his journey.

$$\text{speed(km/h)} = \frac{\text{distance (km)}}{\text{time (h)}}$$

$$12\text{km/h} = \frac{4\text{km}}{\frac{1}{3}\text{h}}$$

(1) **(1)**

…………………………….. km/h **(2)**

Mike spends 1h 10 min at the sports centre.

He starts to cycle home at a speed of 15 km/h on the same route.

b. At what time did Mike get home?

Mike gets to the sports centre at $11:30 + 20$ mins $= 11:50$am

Mike leaves the sports centre at $11:50 + 1\text{hr}10\text{mins} = 1:00$ pm

$$\text{time (h)} = \frac{\text{distance (km)}}{\text{speed (km/h)}}$$

$$\text{time (h)} = \frac{4}{15} = 16 \text{ min } \textbf{(1)}$$

Mike arrives home at $1:00$pm $+ 16$mins $= 1:16$ pm OR $13:16$ **(1)**

…………………………….

(2)

(Total for Question 9 is 4 marks)

10. a. Solve $y + y + y + y = 24$

$$4y = 24$$

$$y = 6 \ (1)$$

$y =$ ………………………………..

(1)

b. Solve $3x - 5 = 19$

$$3x = 19 + 5$$

$$3x = 24 \qquad (1)$$

$$x = 8 \qquad (1)$$

$x =$ ………………………………..

(2)

(Total for Question 10 is 3 marks)

11. Work out 69×25

×	60	9
20	1200	180
5	300	45

$$1200 + 180 + 300 + 45 = 1725$$

Correct addition and multiplication (2)

…………………………………

(Total for Question 11 is 2 marks)

12.
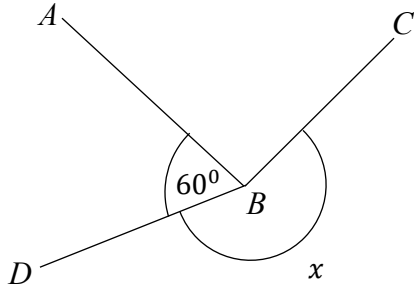
AB and *BC* are perpendicular lines.

a. i. Find the value of x

$$x + 60 + 90 = 360 \quad (1)$$

$$x = 210 \quad (1)$$

$x = $ ………………………………

(2)

ii. Give a reason for your answer.

Angles at a point add up to 360° (1)

…………………………………………………………………………………………………

…………………………………………………………………………………………………

(1)

AB and *CD* are parallel lines.

EF and *GH* are straight lines.
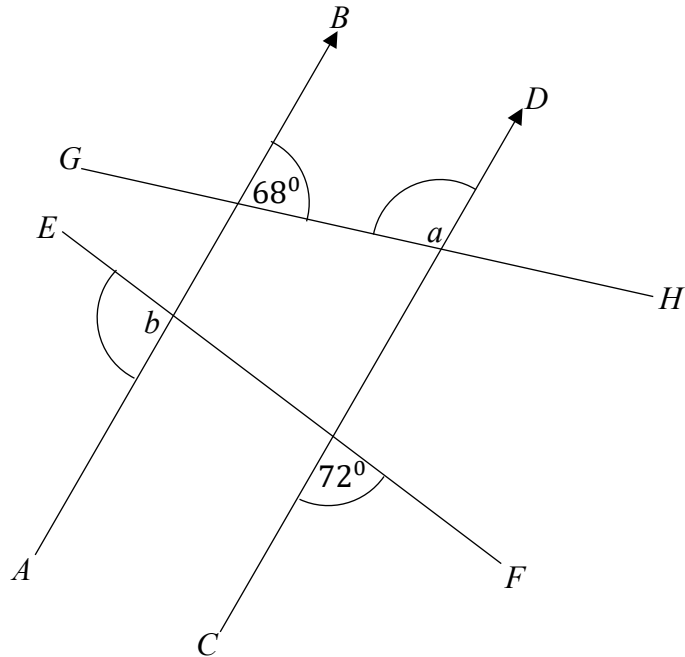
b. i. Jill says 'angle *a* is 72^0'

Is she right?

No, co-interior angles sum to 180°

$a + 68 = 180$

$a = 112$ (1)

……………………………………………………………………………………………

……………………………………………………………………………………………

(1)

ii. Work out the size of angle *b*.

Give a reason for your answer.

$b + 72 = 180$ (1)

Because alternate angles are equal and angles on a straight line sum to 180°   (1)

$b =$……………………………….

(2)

(Total for Question 12 is 6 marks)

13. The weight of an apple is *w* grams.

Write down an expression, in terms of *w*, for the weight of an apple in kilograms.

$$\frac{w}{1000} \qquad (1)$$

…………………………

(Total for Question 13 is 1 mark)

14. a. Work out 10% of 85.

$$\frac{10}{100} \times 85 = 8.5 \qquad (1)$$

…………………………

(1)

b. Milly has to work out the value of 25% of 260

She writes

10% of 260 = 26

10% of 260 = 26

5% of 260 = 18

So   25% of 260 is 70

Identify the mistake made by Milly and write down the correct answer.

5% of 260 is 13 $\qquad$ (1)

So 25% of 260 = 26 + 26 + 13

$$= 65 \qquad (1)$$

…………………………

(2)

(Total for Question 14 is 3 marks)

15. a. Work out the value of 11^2

$11 \times 11 = 121$ (1)

………………………..

(1)

b. Write down the value of $\sqrt[3]{216}$

$\sqrt[3]{216} = 6$ (1)

(It will be useful to be able to recall up to 10^3 for your exam)

………………………..

(1)

(Total for Question 15 is 2 marks)

16. a. Factorise $8 - 6a$

$2(4 - 3a)$ (1)

………………………….

(1)

b. Expand $4(3x - 5)$

$12x - 20$ (1)

………………………….

(1)

(Total for Question 16 is 2 marks)

17. Sam throws a biased dice 150 times and gets 24 sixes.

Kelly throws the same biased dice 480 times and gets 84 sixes.

a. Estimate the probabilities of getting sixes with this dice using the results of Sam's and

Kelly's throw.

$$Sam = \frac{24}{150} \qquad\qquad Kelly = \frac{84}{480}$$

(1)   (1)

…………………………….

(2)

b. Whose results will give the better estimate of getting six?
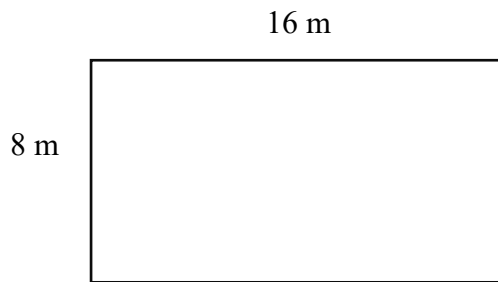
You must give a reason.

Kelly's , her experiment had more trials

(1)

……………………………

(1)

(Total for Question 17 is 3 marks)

18. The diagram shows the floor of a school hall.

16 m

8 m

Peter needs to polish the floor.

The polish normally costs £1.50 per square metre.

Peter has £190.

Has Peter got enough money to buy the polish for the floor?

You must show all your working.

Area of floor = 16 ×8 = 128   (1)

128 × £1.50 = £192   (1)

£192 > £190   He has not got enough money.   (1)

…………………………..

(Total for Question 18 is 3 marks)

19. a. Work out $\frac{4}{9} + \frac{7}{12}$

Lowest common denominator of 9 and 12 is 36, so we equate the denominators to this

$$\frac{16}{36} + \frac{21}{36} = \frac{37}{36} = 1\frac{1}{36}$$

Equating the denominators (1)

Final answer (1)

....

(2)

b. Work out $\frac{5}{6} \div \frac{2}{9}$

Give your answer as a mixed number in its simplest form.

$$\frac{5}{6} \times \frac{9}{2} = \frac{45}{12} = \frac{15}{4} = 3\frac{3}{4}$$

Method of multiplication (1)

Correct answer as a mixed number in its simplest form (1)

....

(2)

(Total for Question 19 is 4 marks)

20.

P

Q
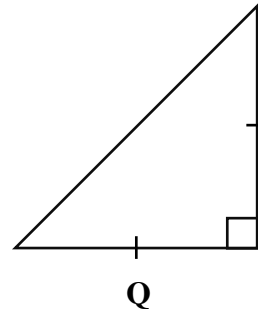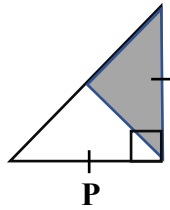
The length of the side of an isosceles triangle **Q** is 50% more than the length of the side of an isosceles triangle **P**.

Express the area of an isosceles triangle **Q** as a percentage of the area of the shaded region of an isosceles triangle **P**.

length of P = 1   length of Q = 1.5

Area of shaded region in P $= \dfrac{\frac{1\times1}{2}}{2}$ Area of Q $= \dfrac{1.5\times1.5}{2}$

$= \dfrac{1}{4} = 0.25$ (1) $= \dfrac{9}{8} = 1.125$ (1)

$\dfrac{1.125}{0.25} \times 100\% = 450\%$ (1)

....

(Total for Question 20 is 3 marks)

21. There are 600 students in a High School.

$\frac{3}{5}$ of the students are girls.

40% of the boys can play the piano.

The ratio of girls that cannot play the piano to boys that cannot play the piano is 4 : 3.

Complete the table.

	Can	Cannot	Total
Boys	96	144	240
Girls	168	192	360
Total	264	336	**600**

Total numbers of girls: $\frac{3}{5} \times 600 = 360$

Total number of boys: $600 - 360 = 240$ OR $\frac{2}{5} \times 600 = 240$ (1)

Number of boys who can play the piano: $240 \times \frac{40}{100} = 96$

Number of boys who cannot play the piano: $240 - 96 = 144$ OR $\frac{60}{100} \times 240 = 144$ (1)

Number of girls who cannot play the piano: $144 \times \frac{4}{3} = 192$ (1)

Number of girls who can play the piano: $360 - 192 = 168$ (1)

………………………………

(Total for Question 21 is 4 marks)

22. The diagram shows a 4-sided spinner that is biased.

The spinner is spun.

The table below shows the probability that it will land on A, B or C.
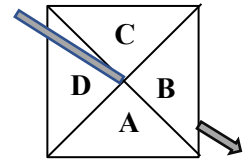
Letter	A	B	C	D
Probability	0.25	0.13	0.45	

a. Work out the probability that the spinner will land on D.

$0.25 + 0.13 + 0.45 = 0.83$

$1 - 0.83 = 0.17$

(1)   (1)

………………………………

(2)

The spinner is spun 200 times.

b. Work out an estimate for the number of times the spinner will land on C.

$200 \times 0.45 = 90$

(1)   (1)

………………………

(2)

(Total for Question 22 is 4 marks)

23. Isabel has the recipe for making 'cherry scones'. However, some figures cannot be read because someone spilled cherries on them.

> **MAKES 4 CHERRY SCONES**
>
> ⬤ grams flour
>
> ⬤ grams margarine
>
> 20 grams sugar
>
> 30 grams cherries
>
> 30 ml milk

Isabel wants to make 60 cherry scones.

From her past experience, she knows that she needs

> 50% more of margarine as sugar
>
> 5 times as much flour as sugar

a. Work out the amount of margarine she needs.

Amount of margarine for four scones: $20 \times \frac{150}{100} = 30$g **(1)**

$\frac{60}{4} = 15$ **(1)**

$15 \times 30g = 450\ g$ **(1)**

……………………………… g

(3)

Isabel buys 500 g of flour in bags.

b. Work out the number of bags of flour needed.

Amount of flour needed for four scones: $20 \times 5 = 100g$

$15 \times 100g = 1500\ g$ **(1)**

$\frac{1500}{500} = 3$ bags **(1)**

………………………………

(2)

(Total for Question 23 is 5 marks)

24. Work out the Lowest Common Multiple of 36 and 48
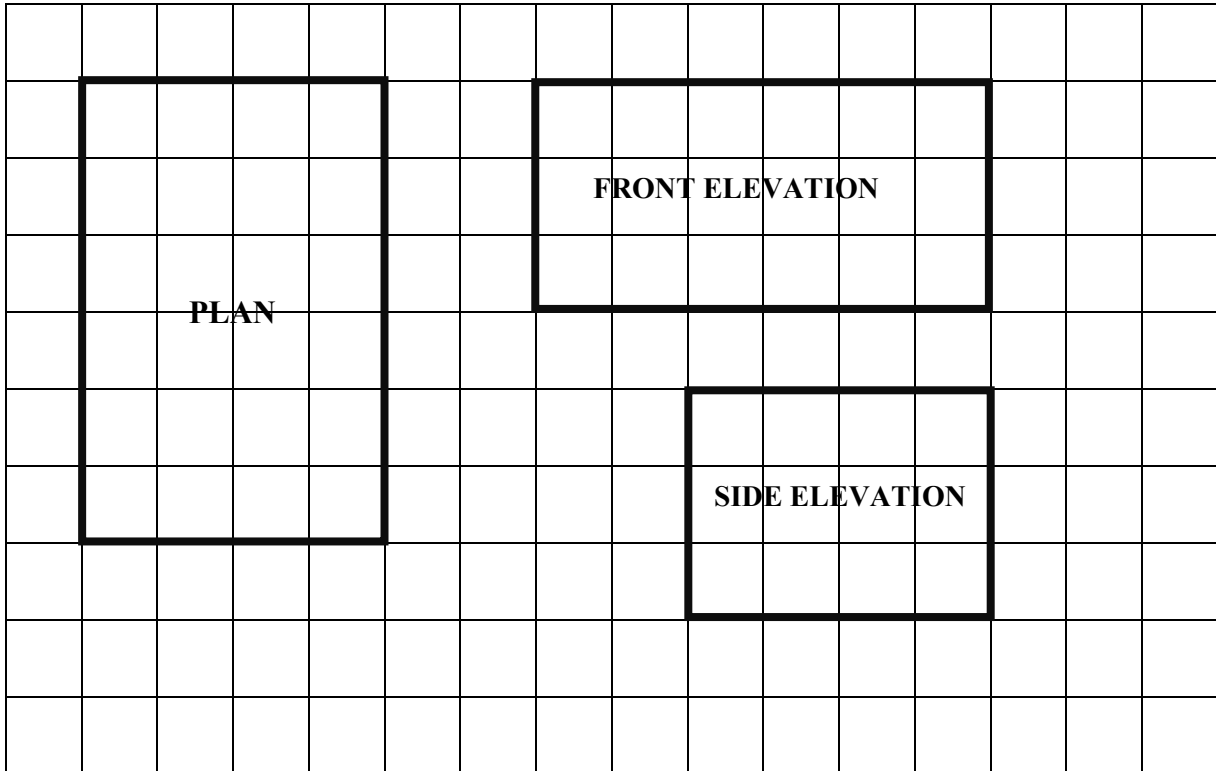
$$36 = 2^2 \times 3^2$$

$$48 = 2^4 \times 3$$

Listing the factors of 36 and 48 (1)   OR prime factors of 36 (1) OR prime factors of 48 (1)

$$LCM = 2^4 \times 3 = 144 \qquad \text{Final answer (1)}$$

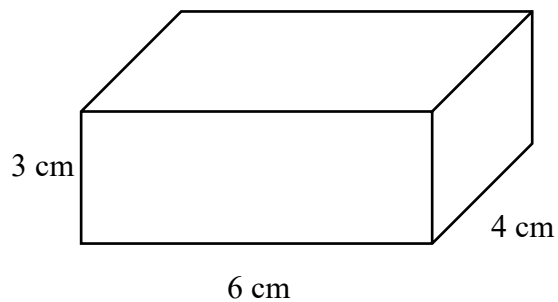…………………………………

(Total for Question 24 is 2 marks)

25. The diagram shows the plan, front elevation and side elevation of a solid shape, drawn on a centimetre grid.

FRONT ELEVATION

PLAN

SIDE ELEVATION

In the space below, draw a sketch of the solid shape.

Give the dimensions of the solid on your sketch.
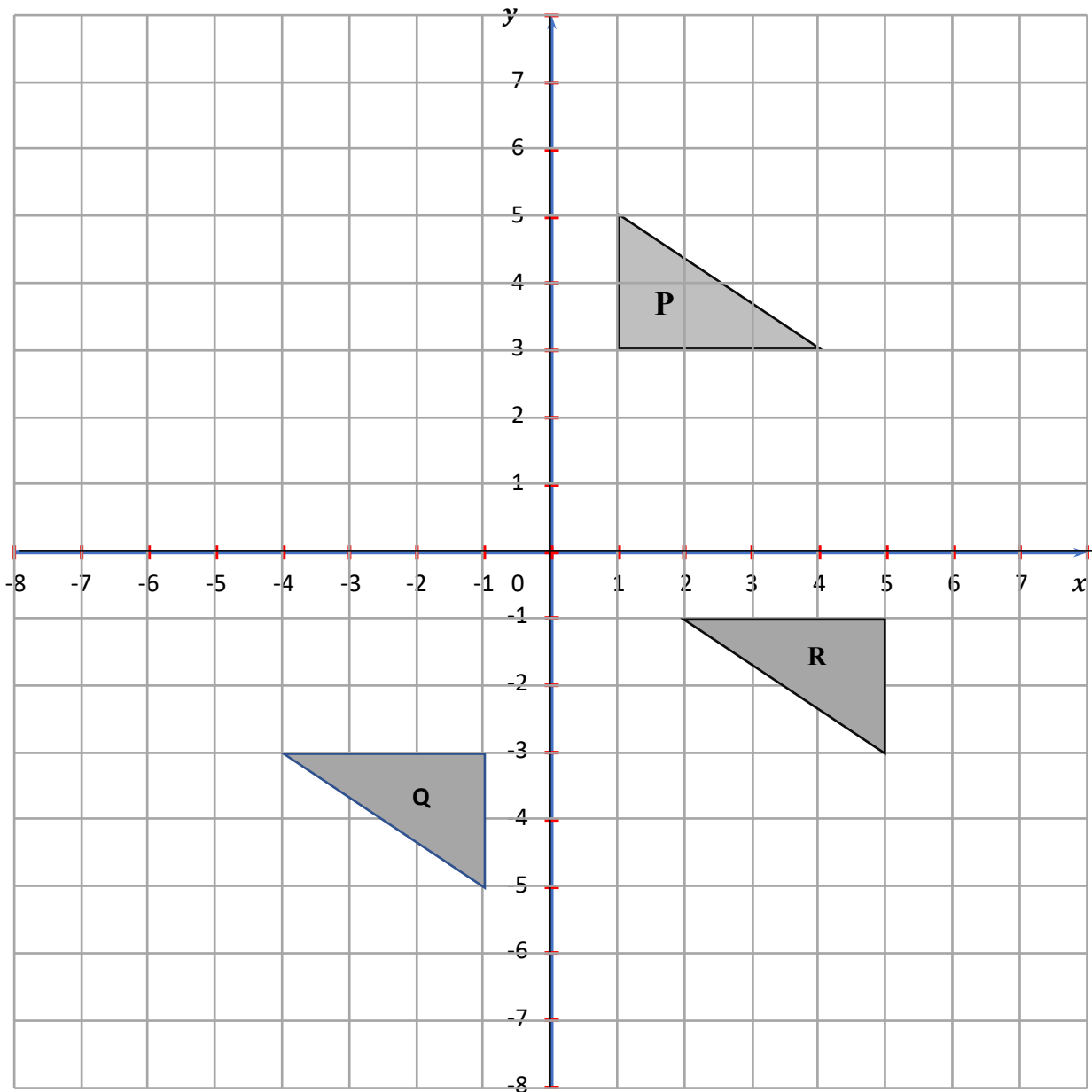
3 cm

4 cm

6 cm

Sketch of a cuboid   (1)

Dimensions shown correctly   (1)

(Total for Question 25 is 2 marks)

Shape **P** is rotated 180^0 about the origin to give shape **Q**.

Shape **Q** is translated by the vector $\begin{pmatrix} 6 \\ 2 \end{pmatrix}$ to give shape **R**.

Describe fully the single transformation that maps shape **P** to shape **R**.

Shape Q correctly placed   (1)   shape R correctly placed (1)

Rotation 180^0 about (3,1)

(1)   (1)

(Total for Question 26 is 4 marks)

27. The scale of a map is 1 : 5 000 000
On the map, the distance between two towns is 5.6 cm.

Work out the real distance between the towns.
Give your answer in kilometres.

$5.6 \times 5\,000\,000 = 28\,000\,000$ cm   (1)
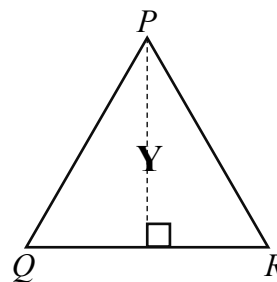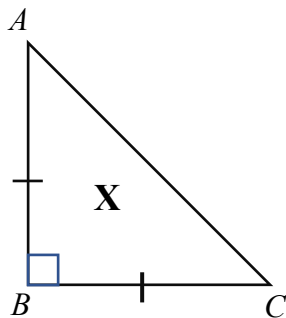
$= 280$ km   (1)

…………………………………… km

(Total for Question 27 is 2 marks)

28. Here are two triangles.

Triangle **X** is an isosceles right angled.

Triangle **Y** is equilateral.

$BC = QR$

The area of triangle **X** is 32 cm².

Find the perimeter of triangle Y.

$AB = BC$, we will call the length of these sides a.

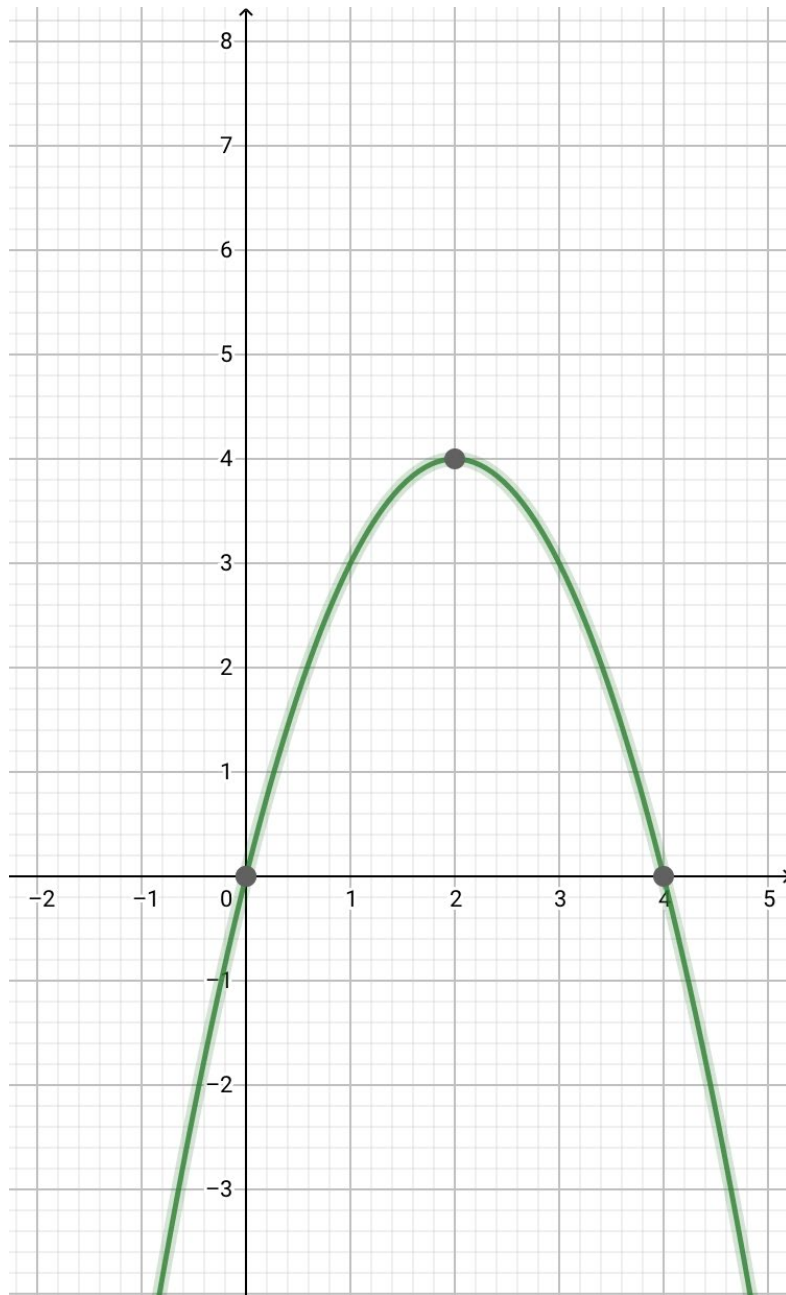Area of **X** $= \frac{a \times a}{2} = 32$ (1)

$a^2 = 64$
$a = 8$ (1)

Perimeter of **Y** $= 8 \times 3 = 24$ (1)

(Total for Question 28 is 3 marks)

29. Here is the graph of $y = -x^2 + 4x$

a. Write down the coordinates of the turning point on the graph of $y = -x^2 + 4x$

(2,4)   (1)

………………………………..

(1)

b. Use the graph to find the roots of the equation $-x^2 + 4x = 0$

$x = 0$ or $x = 4$

Either one of the roots is correct   (1)

Both values are correct   (1)

……………………………….

(2)

(Total for Question 29 is 3 marks)