



Oxford Cambridge and RSA

# F

## GCSE (9–1) Mathematics

J560/02 Paper 2 (Foundation Tier)

**Thursday 7 June 2018 – Morning**

**Time allowed: 1 hour 30 minutes**



**You may use:**

- geometrical instruments
- tracing paper

**Do not use:**

- a calculator



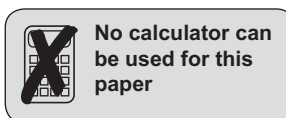
First name											
Last name											
Centre number						Candidate number					

**INSTRUCTIONS**

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the barcodes.

**INFORMATION**

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [ ].
- This document consists of **20** pages.



Answer **all** the questions.

- 1 (a) Write down a multiple of 6 between 10 and 20.

$2 \times 6 = 12$  or  $3 \times 6 = 18$

(a) ..... <sup>12</sup> ..... [1]

- (b) Write down two factors of 30 that are prime numbers.

30: 1, 2, 3, 5, 6, 10, 15, 30

Prime: a number with factors of 1 and itself only.

(b) ..... <sup>2</sup> ..... and ..... <sup>3</sup> ..... [2]

- 2 (a) Write these fractions as decimals.

(i)  $\frac{9}{10} = \frac{90}{100}$

(a)(i) ..... <sup>0.9</sup> ..... [1]

(ii)  $\frac{3}{4} = \frac{75}{100}$

(ii) ..... <sup>0.75</sup> ..... [1]

- (b) A plank of wood 2.4 m long is cut into 6 pieces of equal length.

How long is each piece?

$$\begin{array}{r} 0.4 \text{ m} \\ 6 \overline{) 2.24} \end{array}$$

(b) ..... <sup>0.4</sup> ..... m [2]

3 (a) Work out.

$$\begin{aligned} \text{(i)} \quad 10^3 &= 10 \times 10 \times 10 \\ &= 100 \times 10 \\ &= 1000 \end{aligned}$$

(a)(i) .....1000..... [2]

$$\begin{aligned} \text{(ii)} \quad 9(8 - 3 \times 2) &= 9(8 - 6) \text{ BIDMAS} \\ &= 9(2) \\ &= 18 \end{aligned}$$

(ii) .....18..... [2]

(b) Put brackets into this sum so that the answer is correct.

$$1 + 2 \times 3 + 5 = 17$$

[1]

$$\begin{aligned} 1 + 2 \times (3 + 5) &= 1 + 2 \times (8) \\ &= 1 + 16 \\ &= 17 \end{aligned}$$

$$1 + 2 \times (3 + 5) = 17$$

4 (a) Simplify.

(i)  $5x - 6y - x + 3y$   
 $= 5x - x - 6y + 3y$   
 $= 4x - 3y$

(a)(i) .....  $4x - 3y$  ..... [2]

(ii)  $w^8 \div w^2 = w^{8-2}$   
 $= w^6$

(ii) .....  $w^6$  ..... [1]

(iii)  $5c^2d \times 3c$   
 $= 5 \times c^2 \times d \times 3 \times c$   
 $= 5 \times 3 \times c^2 \times c \times d$   
 $= 15 \times c^{2+1} \times d$   
 $= 15 \times c^3 \times d$   
 $= 15c^3d$

(iii) .....  $15c^3d$  ..... [1]

(b) Work out the value of

(i)  $4x - 7$  when  $x = 5$ ,  
 $4(5) - 7 = 20 - 7$   
 $= 13$

(b)(i) .....  $13$  ..... [1]

(ii)  $\frac{p+7}{3}$  when  $p = 2$ .

$= \frac{2+7}{3}$

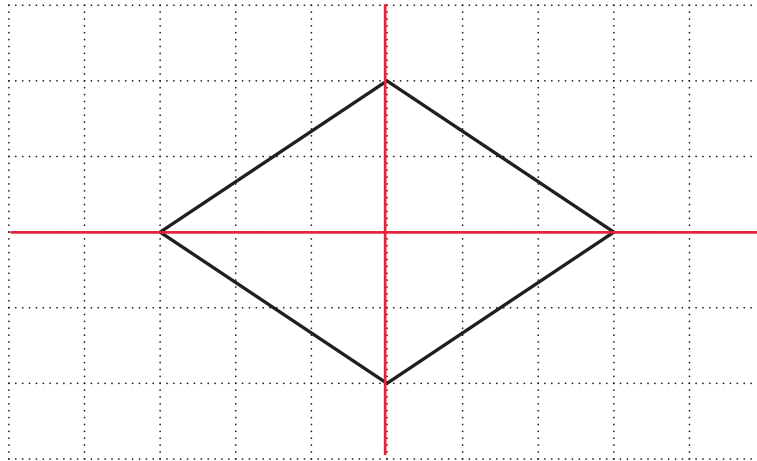
$= \frac{9}{3}$

$= 3$

(ii) .....  $3$  ..... [1]

5

5 A shape is drawn on a one-centimetre grid.



(a) Ring the mathematical name of the shape.

Pentagon

Square

Octagon

Rhombus

[1]

(b) How many lines of symmetry does the shape have?

(b) ..... 2 ..... [1]

(c) Work out the area of the shape.

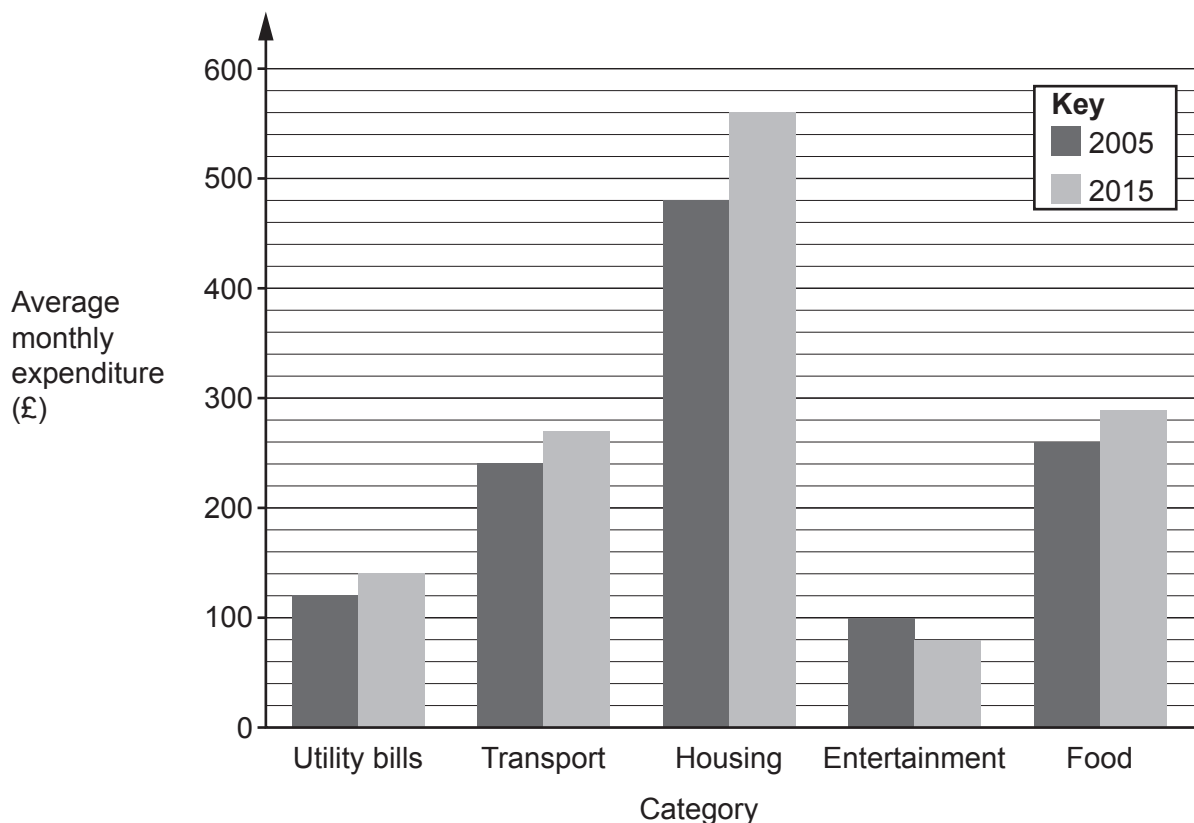
$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$4 \times \frac{1}{2} \times 3 \times 2 = 2 \times 6 \text{ Split into 4 triangles as shown on the diagram.}$$

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

(c) ..... 12 ..... cm<sup>2</sup> [2]

- 6 This bar chart shows the average monthly expenditure, by category, of households in a particular town in 2005 and 2015.



- (a) In which category was there a decrease in the average monthly expenditure between 2005 and 2015?

(a) Entertainment [1]

- (b) How much more was the average monthly expenditure on housing in 2015 than in 2005?

$$560 - 480 = \text{£}80$$

(b) £80 [2]

- (c) The total average monthly expenditure in 2005 was £1200.

What percentage of this was spent on transport?

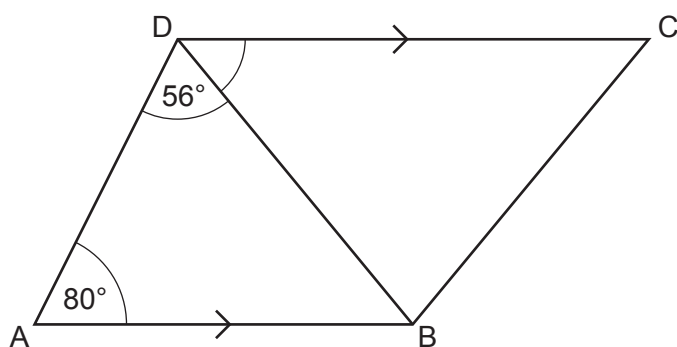
$$\frac{240}{1200} = \frac{2}{10}$$

$$= 0.2$$

$$0.2 \times 100 = 20\%$$

(c) 20% [3]

7 In the diagram, AB is parallel to DC.



Not to scale

Work out angle BDC.  
Give a reason for each angle you work out.

$$\begin{aligned} \hat{ADC} &= 180 - 80 \\ &= 100^\circ \end{aligned}$$

Co-interior angles add up to 180.

$$\begin{aligned} \hat{BDC} &= 100 - 56 \\ &= 44^\circ \end{aligned}$$

..... 44 ..... ° [4]

- 8 Liam is 0.83 metres tall.  
William is 1.31 metres tall.  
Jacob is taller than Liam by half the difference between Liam's height and William's height.

How tall is Jacob?

$$1.31 - 0.83 = 0.48 \text{ (difference between heights).}$$

$$0.48 \div 2 = 0.24 \text{ (half the difference between heights).}$$

$$0.83 + 0.24 = 1.07\text{m (Liam's height plus half the difference)}$$

..... 1.07 ..... m [3]



- 9 (a) Elise wants to divide a sum of money between Hannah and Adil in the ratio 2 : 3.

Elise says:

Hannah will get  $\frac{2}{3}$  of the money.

Explain why Elise is not correct.

$2 + 3 = 5$  parts. Hannah will get  $\frac{2}{5}$  of the money.

..... [1]

- (b) George has a different sum of money.  
He divides the money between Siobhan and Iwan.

Iwan receives  $\frac{11}{17}$  of the money.

Write the ratio of the money that Siobhan receives to the money that Iwan receives.

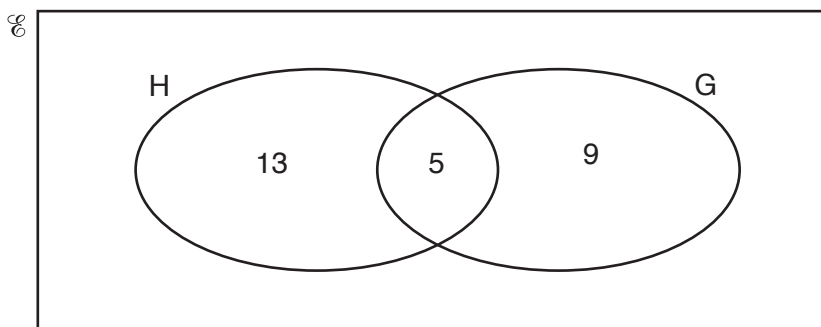
17 parts in total.

$17 - 11 = 6$  (Siobhan's parts).

6 : 11

(b)  $\frac{6}{11}$  : ..... [1]

- 10 (a) This Venn diagram shows the number of students in a Year 10 tutor group who study History (H) and Geography (G).



There are 29 students in the tutor group.

- (i) How many students in the tutor group do not study History or Geography?

$$13 + 5 + 9 = 27$$

$$29 - 27 = 2 \text{ students}$$

(a)(i) ..... 2 ..... [2]

- (ii) How many students in the tutor group study History?

$$13 + 5 = 18$$

(ii) ..... 18 ..... [1]

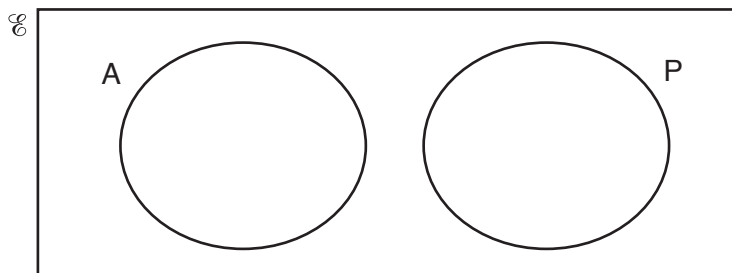
- (iii) One of the 29 students is selected at random. What is the probability that they study Geography but do not study History?

9 students study G but not H.

$$\frac{9}{29} = p$$

(iii) .....  $\frac{9}{29}$  ..... [1]

- (b) This diagram represents students in a tutor group who study Art (A) and Physics (P).



How many students study both Art and Physics?

There is no intersection between A and P, so no students study both.

(b) ..... 0 ..... [1]

11 (a) Liu has a bag only containing red grapes and green grapes.

$\frac{4}{9}$  of the grapes are red.

If there are 8 red grapes in the bag, how many grapes are green?

$$\frac{4}{9} \stackrel{\times 2}{=} \frac{8}{18}$$

$$18 - 8 = 10 \text{ green grapes}$$

(a) ..... 10 ..... [3]

(b) Sophia has a different bag only containing red grapes and green grapes.

The number of grapes in her bag is different, but  $\frac{4}{9}$  of the grapes are also red.

She picks out a red grape from her bag and eats it.

$\frac{3}{7}$  of the remaining grapes in her bag are red.

How many of the remaining grapes in her bag are red and how many are green?

$$\begin{aligned} \text{red} = r \quad \text{green} = g \quad r : g &= 4 : 5 \quad \textcircled{1} \\ r = \frac{4}{9} \quad \text{so } g &= \frac{5}{9} \quad \frac{r}{g} = \frac{4}{5} \xrightarrow{\times g} r = \frac{4}{5}g \end{aligned}$$

$$\begin{aligned} \text{she eats 1r so now:} \quad r - 1 : g &= 3 : 4 \quad \textcircled{2} \\ r - 1 = \frac{3}{7} \quad g = \frac{4}{7} \quad \frac{r - 1}{g} = \frac{3}{4} \xrightarrow{\times g} r - 1 &= \frac{3}{4}g \end{aligned}$$

sub  $\textcircled{1}$  into  $\textcircled{2}$ :

$$\frac{4}{5}g - 1 = \frac{3}{4}g \rightarrow \frac{16}{20}g - 1 = \frac{15}{20}g$$

$$\frac{1}{20}g - 1 = 0 \quad - \frac{15}{20}g$$

$$\frac{1}{20}g = 1 \quad \times 20$$

$$g = 20$$

$$r - 1 = \frac{3}{4} \times 20$$

$$r = 15 \quad \text{Sub in } g = 20$$

(b) ..... 15 ..... red grapes  
 ..... 20 ..... green grapes [2]

Turn over

12 (a) Multiply out.

$$\begin{aligned}
 & 4c(d-5) \\
 & = 4 \times cd - 4c \times 5 \\
 & = 4cd - 20c
 \end{aligned}$$

(a) .....  $4cd - 20c$  ..... [2]

(b) Multiply out and simplify.

$$\begin{aligned}
 & (3x+2)(x-4) \\
 & = 3x \times x + 3x \times -4 + 2 \times x + 2 \times -4 \\
 & = 3x^2 - 12x + 2x - 8 \\
 & = 3x^2 + 10x - 8
 \end{aligned}$$

(b) .....  $3x^2 + 10x - 8$  ..... [2]

(c) Solve.

$$3x - 2 \leq 22$$

$$3x - 2 \leq 22$$

$$\begin{aligned}
 & 3x \leq 24 \\
 & \div 3 \quad \quad \quad \div 3 \\
 & x \leq 8
 \end{aligned}$$

(c) .....  $x \leq 8$  ..... [2]

13 (a) Calculate.

$$\frac{3}{5} + \frac{5}{8}$$

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

$$\text{LCM} = 5 \times 8 \quad \frac{3}{5} \overset{\times 8}{=} \frac{24}{40} \quad \text{and} \quad \frac{5}{8} \overset{\times 5}{=} \frac{25}{40}$$

$$\frac{24}{40} + \frac{25}{40} = \frac{49}{40} = 1 \frac{9}{40}$$

(a) .....  $1 \frac{9}{40}$  [3]

(b) Work out.

$$5 \times 10^4 - 1.6 \times 10^3$$

Give your answer in standard form.

$$1.6 \times 10^3 = 0.16 \times 10^4$$

$$5 \times 10^4 - 0.16 \times 10^4 = 4.84 \times 10^4$$

(b) .....  $4.84 \times 10^4$  [3]

14 Here is the nutritional information for a 110g serving of cereal.

Carbohydrates	99.4 g
Proteins	9.5 g
Fats	1.1 g

Emily says that more than 90% of this serving is carbohydrates.

Is she correct?

Explain your reasoning.

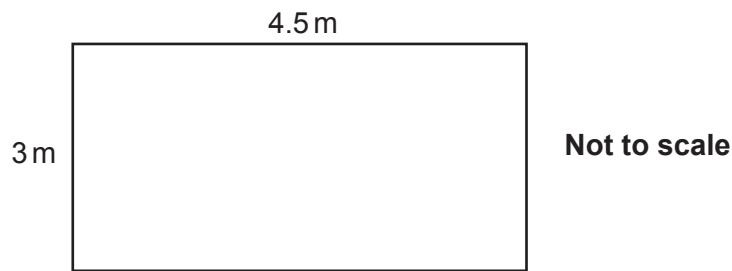
$$10\% = 110 \div 10 = 11$$

$$90\% = 9 \times 11 = 99\text{g}$$

99.4 > 99 so Emily is correct.

.....  
 ..... [3]

- 15 Here is the floor plan of a rectangular room.



Tim buys carpet tiles for this room.

Each tile is a square measuring 50 cm by 50 cm.

The tiles are only sold in packs of ten.

Each pack costs £20.

Tim pays for fitting at a rate of £7.50 per square metre, with any fraction of a square metre rounded up.

Work out the **total** cost of the tiles and fitting.

$$\begin{aligned} 4.5\text{m} &= 9 \times 0.5\text{m} \text{ so } 9 \text{ tiles wide.} \\ 3\text{m} &= 6 \times 0.5\text{m} \text{ so } 6 \text{ tiles deep.} \\ 9 \times 6 &= 54 \text{ so } 54 \text{ tiles needed.} \end{aligned}$$

54 rounds up to 60 because Tim can only buy them in packs of 10.  
 $60 \div 10 = 6$  packs needed.

$$6 \times £20 = £120 \text{ to buy the tiles.}$$

$$4.5 \times 3 = 13.50\text{m}^2$$

$$\begin{array}{r} 4.5 \\ \times 3.0 \\ \hline 13.50\text{m}^2 \end{array}$$

13.50 rounds up to 14m because it must be a whole number.

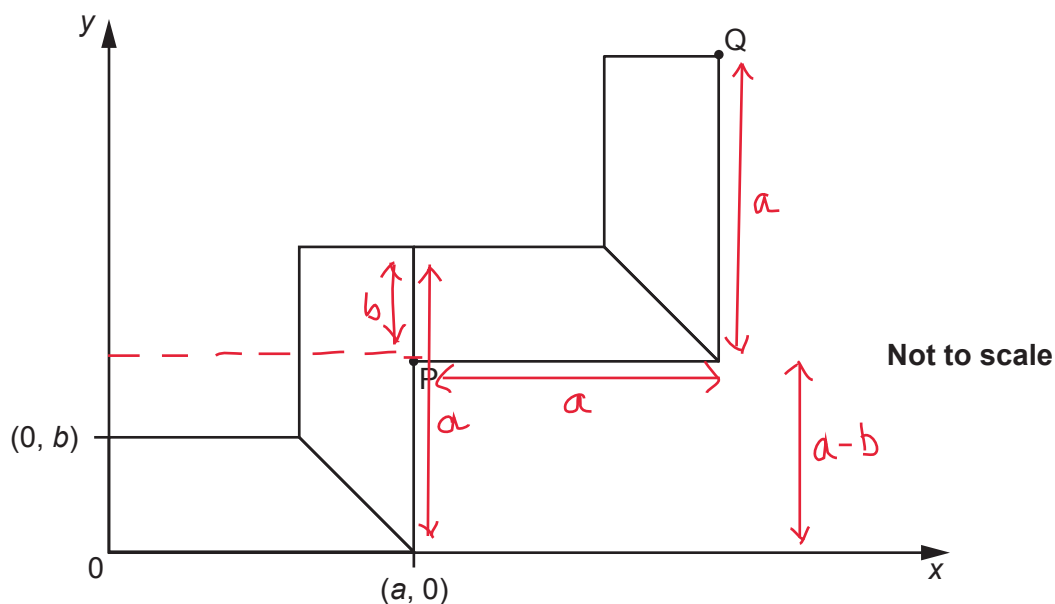
$$14 \times £7.50 = £105.00 \text{ to fit the tiles.}$$

$$120 + 105 = £225 \text{ total cost.}$$

$$\begin{array}{r} 14.00 \\ \times 7.50 \\ \hline 30.00 \\ + 75.00 \\ \hline 105.00 \end{array}$$

£ ..... 225 ..... [6]

16 Four identical trapeziums are placed on a coordinate grid as shown.



(a) Write down algebraic expressions for the coordinates of point P.

(a) ( ..... a ..... , ..... a - b ..... ) [2]

(b) The coordinates of point Q are (16, 13).

Work out the value of  $a$  and the value of  $b$ .

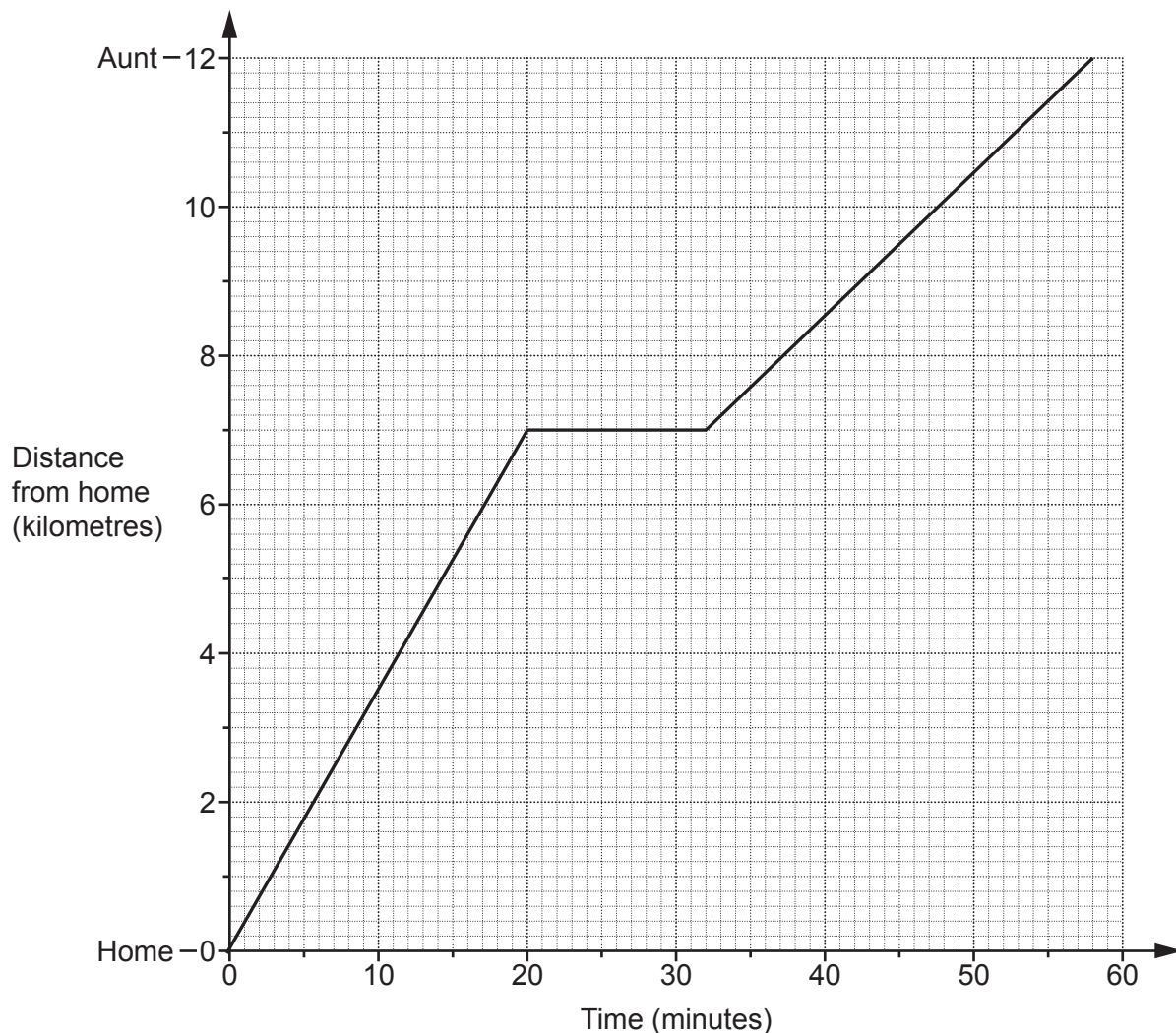
Vertical:  $\textcircled{1} a + a - b = 13 \quad 2a - b = 13$

Horizontal:  $\textcircled{2} 2a = 16 \quad (\div 2) \quad \underline{a = 8}$

$16 - b = 13$  sub  $\textcircled{1}$  into 2  
 $-16 - b = -3 - 16$   
 $b = 3$   
 $\times(-1) \quad \times(-1)$

(b)  $a = \dots\dots\dots 8 \dots\dots\dots$   
 $b = \dots\dots\dots 3 \dots\dots\dots$  [4]

- 17 Viraj cycled from his home to visit his aunt. He drew this graph to show his journey. He stopped at a shop 7 km from his home.



- (a) State one assumption that Viraj made when he drew his graph.

Viraj travelled at a constant speed.

[1]

- (b) For how long did Viraj stop at the shop?

$$32 - 20 = 12 \text{ minutes}$$

(b) 12 minutes [1]



- (c) Work out Viraj's average speed between his home and the shop.  
Give your answer in metres per minute.

$$7\text{km} = 7000\text{m}$$

$$\begin{aligned} \text{speed} &= \text{distance} \div \text{time} \\ &= 7000 \div 20 \\ &= 350\text{m/minute} \end{aligned}$$

(c) .....350..... metres per minute [3]

- (d) How can you tell, without doing any calculations, that Viraj's average speed between his home and the shop is greater than his average speed between the shop and his aunt?

The gradient is steeper for the first part of the journey.

Speed = gradient.

[1]

- 18 The table shows the relative frequencies of the results for a football team after a number of games.

<b>Result of game</b>	won	lost	drew
<b>Relative frequency</b>	0.2	0.45	0.35

- (a) Complete the table.

[2]

$$\begin{aligned} 0.2 + 0.45 &= 0.65 \\ 1 - 0.65 &= 0.35 \end{aligned}$$

- (b) The team lost 10 more games than they won.

How many games did the team play altogether?

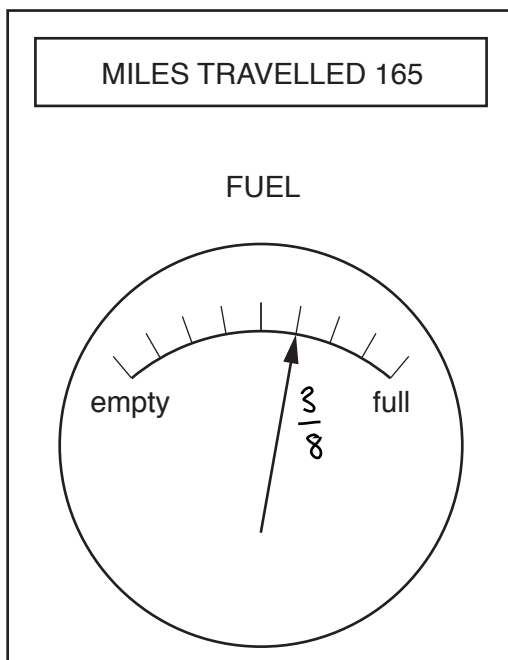
$$0.45 - 0.2 = 0.25$$

$$0.25 = 10$$

$$\begin{aligned} \times 4 & & \times 4 \\ 1 &= 40 \end{aligned}$$

(b) .....40..... [3]

- 19 Ifsaw noticed this information on her car's dashboard at the end of her journey. She started her journey with a full tank of fuel and her miles travelled set to zero.



- (a) Work out how far Ifsaw's car can travel on a full tank of fuel.

$$\frac{3}{8} \text{ fuel} = 165 \text{ miles}$$

$$165 \div 3 = 55 \text{ miles so } \frac{1}{8} \text{ does } 55 \text{ miles.}$$

$$55 \times 8 = 440 \text{ miles}$$

$$\begin{array}{r} 055 \\ 3 \overline{) 165} \end{array}$$

$$\begin{array}{r} 55 \\ \times 8 \\ \hline 440 \\ \ast \ast \end{array}$$

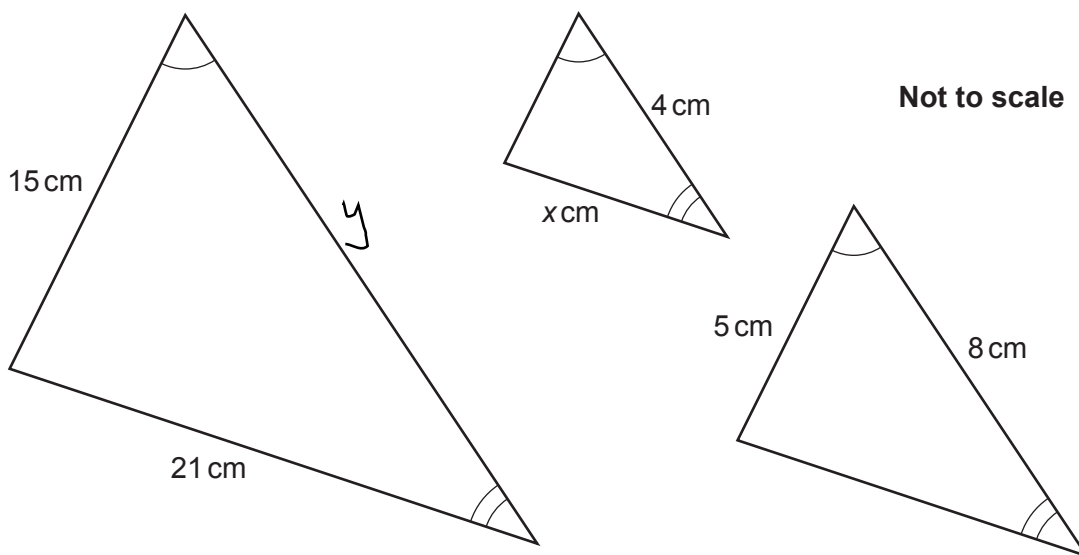
(a) .....440..... miles [3]

- (b) What assumption have you made when answering part (a)?

.....Rate of fuel consumption is constant.....

..... [1]

20 (a) Here are three similar triangles.



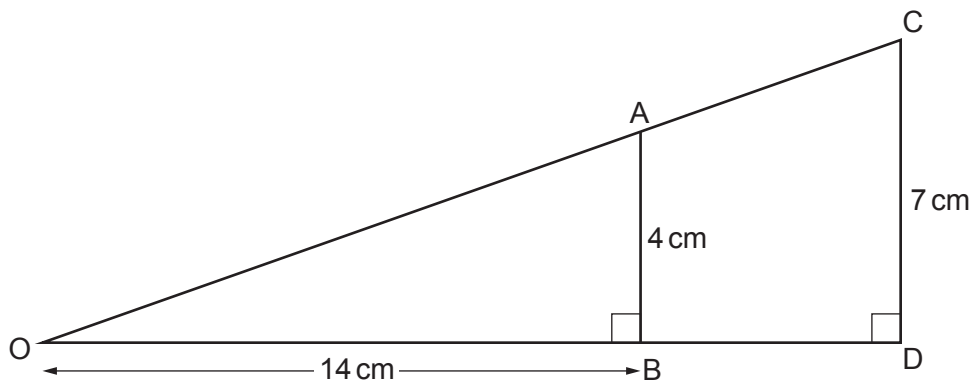
Work out the value of x.

$$\frac{15}{15} = \frac{y}{8} \quad 3 = \frac{y}{8} \quad y = 24$$

$$\frac{4}{y} = \frac{x}{21} \quad \frac{4}{24} = \frac{x}{21} \quad \frac{1}{6} = \frac{x}{21} \quad x = \frac{21}{6} = \frac{7}{2}$$

(a)  $x = \frac{7}{2}$  [3]

(b) The diagram shows two right-angled triangles, OAB and OCD.



Work out the length of BD.

$$\frac{7}{4} = \frac{OD}{14}$$

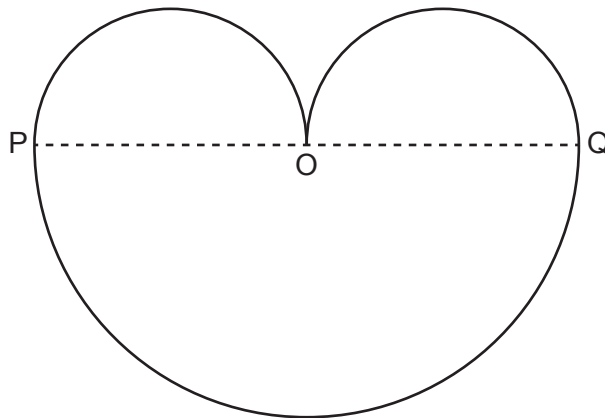
$$24.5 - 14 = 10.5 \text{ cm} = \text{BD}$$

$$\frac{14 \times 7}{4} = OD$$

$$\frac{98}{4} = 24.5 = OD$$

(b)  $10.5$  cm [3]

21 This shape consists of three semicircles.



$OP = OQ$ .

The length of  $PQ$  is  $4x$  cm.

Show that the area, in  $\text{cm}^2$ , of the whole shape is  $3\pi x^2$ .

[5]

$$4x \div 2 = 2x$$

$$\begin{aligned} \text{Area} &= \pi r^2 \\ &= \pi \times (2x)^2 \\ &= \pi \times 4x^2 \\ &= 4\pi x^2 \end{aligned}$$

$$\frac{1}{2} \times 4\pi x^2 = 2\pi x^2 \quad 2x^2 \div 2 = x^2$$

$$2 \times \frac{1}{2} \times \pi \times x^2 = x^2 \pi$$

$$2\pi x^2 + \pi x^2 = 3\pi x^2$$

END OF QUESTION PAPER

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