

## Tuesday 7 June 2022 – Morning

### GCSE (9–1) Mathematics

#### J560/02 Paper 2 (Foundation Tier)

Time allowed: 1 hour 30 minutes



**You must have:**

- the Formulae Sheet for Foundation Tier (inside this document)

**You can use:**

- geometrical instruments
- tracing paper

**Do not use:**

- a calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

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Last name

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### INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space, use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

### INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [ ].
- This document has **24** pages.

### ADVICE

- Read each question carefully before you start your answer.



Answer **all** the questions.

1 (a) Work out.

(i)  $4 - 5$

(a)(i) .....  $-1$  ..... [1]

(ii)  $2 \times -3$

$$2 \times 3 = 6$$

$$2 \times -3 = -6$$

(ii) .....  $-6$  ..... [1]

(iii)  $\frac{1}{7} + \frac{2}{7}$

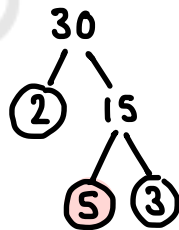
(iii) .....  $\frac{3}{7}$  ..... [1]

(iv)  $\frac{1}{2}$  of  $1\frac{1}{2}$   $\dagger$

$$\frac{1}{2} \times \frac{3}{2} = \frac{3}{4}$$

(iv) .....  $\frac{3}{4}$  ..... [1]

(b) Write down the largest prime factor of 30.



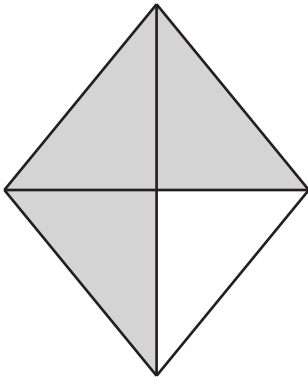
(b) .....  $5$  ..... [2]

- 2 (a) What fraction of this shape is shaded?



(a) .....  $\frac{2}{3}$  ..... [1]

- (b) What percentage of this shape is shaded?



$$\frac{3}{4} \begin{matrix} \xrightarrow{\times 25} \\ = \frac{75}{100} = 75\% \\ \xleftarrow{\times 25} \end{matrix}$$

(b) ..... 75 ..... % [1]

- (c) Write 0.2 as a fraction.  
Give your answer in its simplest form.

$$\begin{aligned} 0.2 &= \frac{2}{10} \begin{matrix} \div 2 \\ \div 2 \end{matrix} \\ &= \frac{1}{5} \end{aligned}$$

(c) .....  $\frac{1}{5}$  ..... [2]

- (d) Work out 80% of 30.

$$\begin{aligned} 100\% &= 30 \\ \div 10 & \quad \div 10 \\ 10\% &= 3 \\ \times 8 & \quad \times 8 \\ 80\% &= 24 \end{aligned}$$

(d) ..... 24 ..... [2]

- 3 Bananas cost 25p each.

How many bananas can be bought for £2?

$$£1 = 100p$$

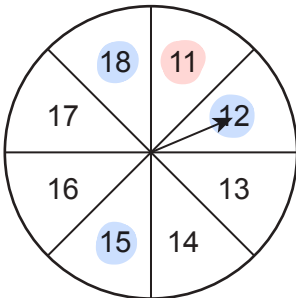
$$£2 = 200p$$

$$\frac{200}{25} \div 25 = \frac{8}{1} = 8$$

8

[2]

- 4 A student makes a fair 8-sided spinner. They write the numbers 11, 12, 13, 14, 15, 16, 17 and 18 on the spinner.



- (a) Write down the probability of the student's spinner landing on a number which is less than 12.

(a)  $\frac{1}{8}$  [1]

- (b) Find the probability of the student's spinner landing on a multiple of 3.

(b)  $\frac{3}{8}$  [2]

5 Write the ratio  $5 : 7\frac{1}{2}$  in its simplest form.

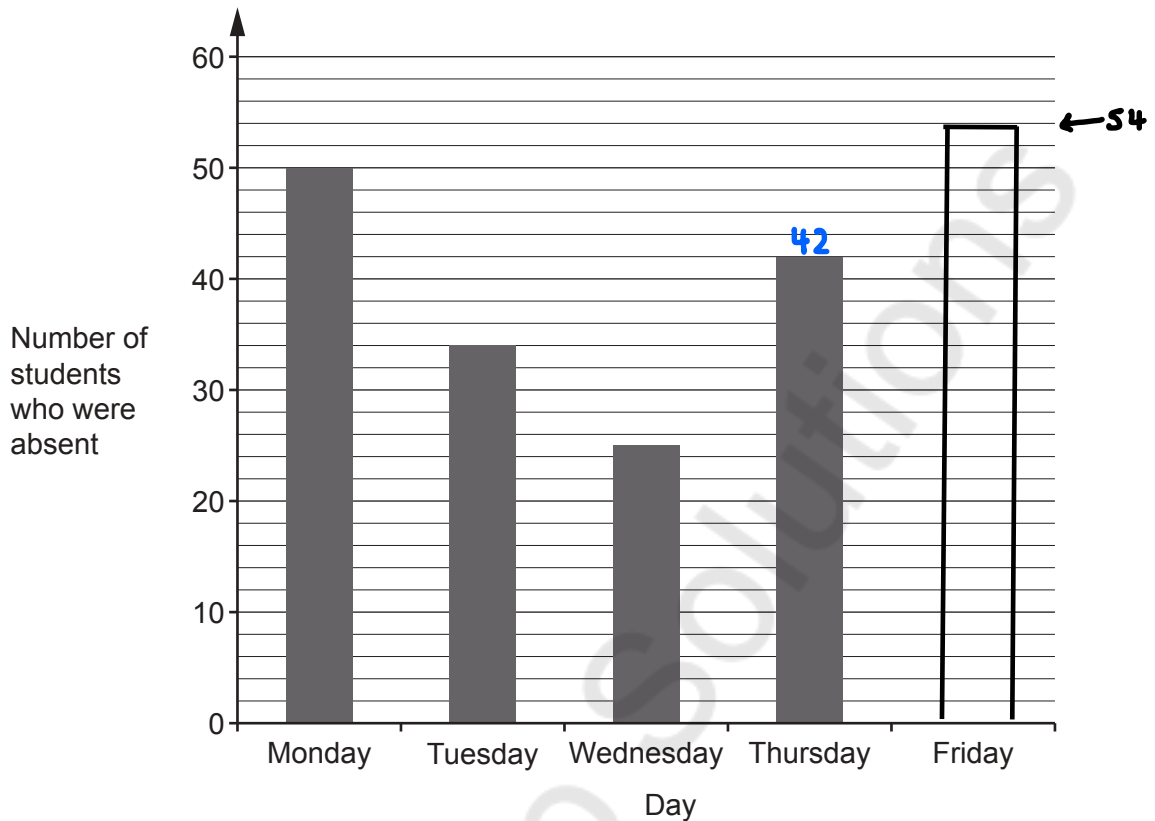
$$\begin{array}{ccc} & 5 : 7.5 & \\ \times 2 & & \times 2 \end{array}$$

$$\begin{array}{ccc} & 10 : 15 & \\ \div 5 & & \div 5 \end{array}$$

$$2 : 3$$

..... **2** : **3** ..... [2]

- 6 Taylor has collected data on the number of students who were absent from their school last week. The bar chart shows the results for the first four days.



- (a) On Friday there were 54 students who were absent from the school.

Show this information on the bar chart.

[1]

- (b) Taylor says

On Monday 150% of the students were absent from my school.

Could this be true?

Explain how you decide.

..... **No. 150% is more than the total students.** .....

.....

..... [1]

- (c) There are 600 students in Taylor's school.  
Find the percentage of students who were absent from Taylor's school on Thursday.

$$\frac{42}{600} = \frac{7}{100} = 7\%$$

$\overset{\div 6}{\curvearrowright}$   
 $\underset{\div 6}{\curvearrowleft}$

(c) ..... 7 ..... % [3]

- 7 (a) Multiply out.

$$5(x+2)$$

$$5x + 10$$

(a) .....  $5x + 10$  ..... [1]

- (b) Rearrange this formula to make  $r$  the subject.

$$p = 3r - 5$$

$$+5 \quad +5$$

$$p + 5 = 3r$$

$$\div 3 \quad \div 3$$

$$\frac{p+5}{3} = r$$

(b) .....  $r = \frac{p+5}{3}$  ..... [2]

8 (a) Work out.

(i)  $3.08 + 0.82$

$$\begin{array}{r} 3.08 \\ + 0.82 \\ \hline 3.90 \end{array}$$

(a)(i) ..... **3.9** ..... [1]

(ii)  $7.7 \div 11$

$$11 \overline{) 7.77}$$

(ii) ..... **0.7** ..... [1]

(b) Work out.

$(2.1 - \frac{3}{5}) \times 0.3$

Give your answer as a decimal.

$$\frac{3}{5} = \frac{6}{10} = 0.6$$

$(2.1 - 0.6) \times 0.3$

$$\begin{array}{r} 2.1 \\ - 0.6 \\ \hline 1.5 \end{array}$$

$$\begin{array}{r} 1.5 \times 0.3 \\ \times 10 \quad \times 10 \end{array}$$

$$15 \times 3 = 45 \\ \div 100 = 0.45$$

(b) ..... **0.45** ..... [3]

- 9 A local theatre is putting on a show.  
50 child tickets are sold.  
The ratio of the number of child tickets sold to the number of adult tickets sold is 5 : 2.

The cost of a child ticket is £2.50.  
The cost of an adult ticket is £5.00.

Work out the **total** amount paid for the tickets.

$$\begin{array}{r} C : A \\ 5 : 2 \\ \times 10 \quad \times 10 \\ 50 : 20 \end{array}$$

$$\text{Child} = 50 \times \text{£}2.50 = \text{£}125$$

$$50 \times 2 = \text{£}100$$

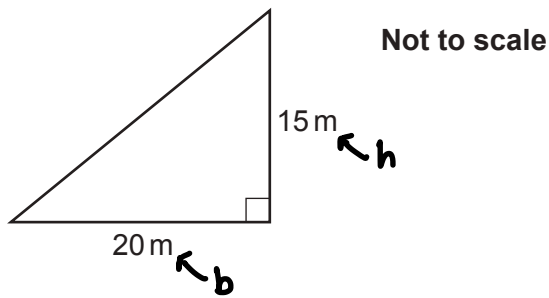
$$50 \times \text{£}0.50 = \text{£}25$$

$$\text{Adult} = 20 \times \text{£}5 = \text{£}100$$

$$\begin{aligned} \text{Total} &= \text{£}125 + \text{£}100 \\ &= \text{£}225 \end{aligned}$$

£ ..... **225** ..... [4]

- 10 The diagram shows Kai's garden.  
It is in the shape of a right-angled triangle.



Kai is going to spread grass seed on the garden.

- A bag of grass seed covers an area of  $35\text{ m}^2$ .
- Each bag of grass seed costs £8.99.

Kai can only buy whole bags of grass seed.

Kai buys the least number of bags needed for the garden.

Calculate the cost of buying the bags of grass seed that Kai needs.  
You must show your working.

$$\begin{aligned}\text{Area} &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 20 \times 15 \\ &= 150\text{ m}^2\end{aligned}$$

$$\text{Number of bags} = 150 \div 35$$

$$\begin{array}{r} 4.2 \\ 35 \overline{) 150.00} \\ \underline{140} \phantom{00} \\ 100 \phantom{0} \\ \underline{70} \phantom{0} \\ 300 \\ \underline{280} \\ 200 \\ \underline{175} \\ 250 \\ \underline{245} \\ 50 \end{array}$$

$$\begin{array}{r} 35 \\ 70 \\ 105 \\ 140 \\ 175 \end{array}$$

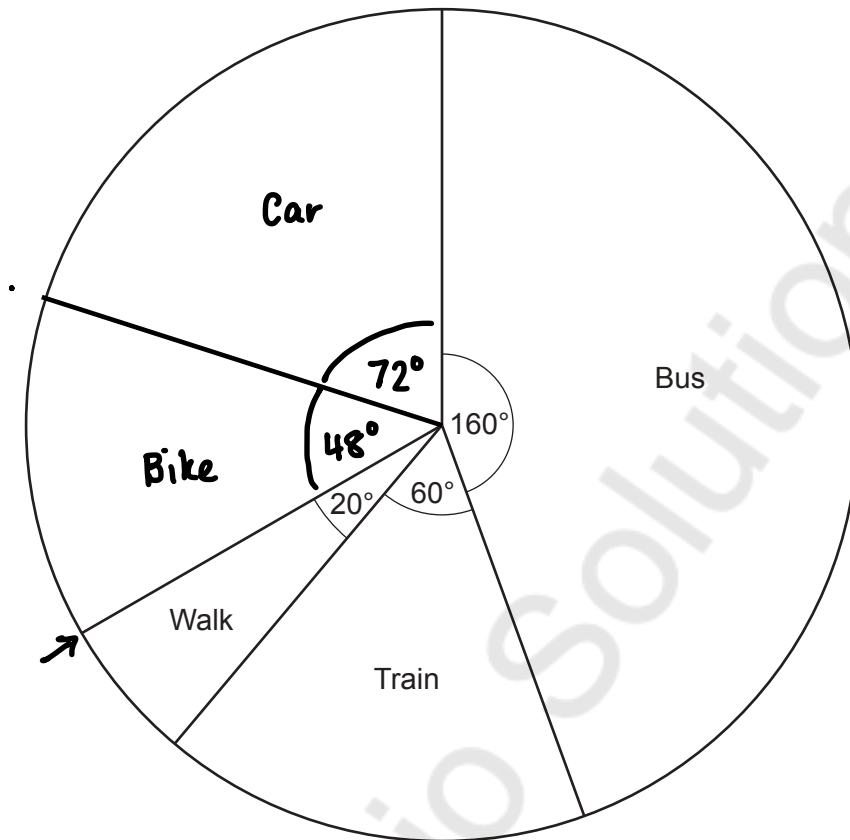
5 bags needed.

$$\text{Cost} = 5 \times \text{£}8.99$$

$$\begin{array}{r} 4899 \\ \times \quad 5 \\ \hline 4495 \end{array} \div 100 = 44.95$$

£ 44.95 ..... [6]

- 11 Some students were asked how they travel to school.  
Each student gave one answer.  
The pie chart shows the proportion who travel by bus, by train or walk.



- (a) All of the remaining students travel to school either by bike or by car.  
The ratio of the number who travel by bike to the number who travel by car is 2 : 3.

Complete the pie chart.

You must show your working.

[6]

$$20^\circ + 60^\circ + 160^\circ = 240^\circ$$

$$360^\circ - 240^\circ = 120^\circ$$

$$B : C$$

$$2 : 3 = 5 \text{ parts} \quad 120^\circ \div 5 = 24^\circ$$

$$\text{Bike} = 2 \times 24^\circ = 48^\circ$$

$$\text{Car} = 3 \times 24^\circ = 72^\circ$$

- (b) Which way of travelling to school is the mode?

↑  
most  
common

..... Bus ..... [1]

Turn over

- 12 Dinosaurs first appeared on Earth  $2.4 \times 10^8$  years ago.  
Dinosaurs became extinct on Earth  $7 \times 10^7$  years ago.

(a) Explain why it is appropriate to use standard form for these numbers.

..... The ordinary numbers are very large. ....  
.....  
..... [1]

(b) Use the given information to work out how long dinosaurs existed on Earth.  
Give your answer in standard form.

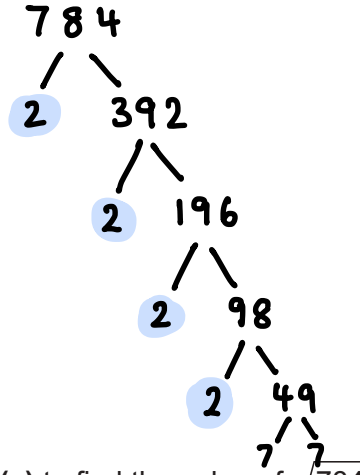
$$\begin{aligned} & (2.4 \times 10^8) - (7 \times 10^7) \\ & \qquad \qquad \qquad \downarrow \div 10 \quad \downarrow +1 \\ & (2.4 \times 10^8) - (0.7 \times 10^8) \\ & \begin{array}{r} 2.4 \\ - 0.7 \\ \hline 1.7 \end{array} \\ & 1.7 \times 10^8 \end{aligned}$$

(b) .....  $1.7 \times 10^8$  ..... [3]

13 (a) Complete this statement by writing the missing power in the box.

$$784 = 2^{\boxed{4}} \times 7^2$$

[1]



(b) Use your answer to part (a) to find the value of  $\sqrt{784}$ .

$$\sqrt{2^4 \times 7^2}$$

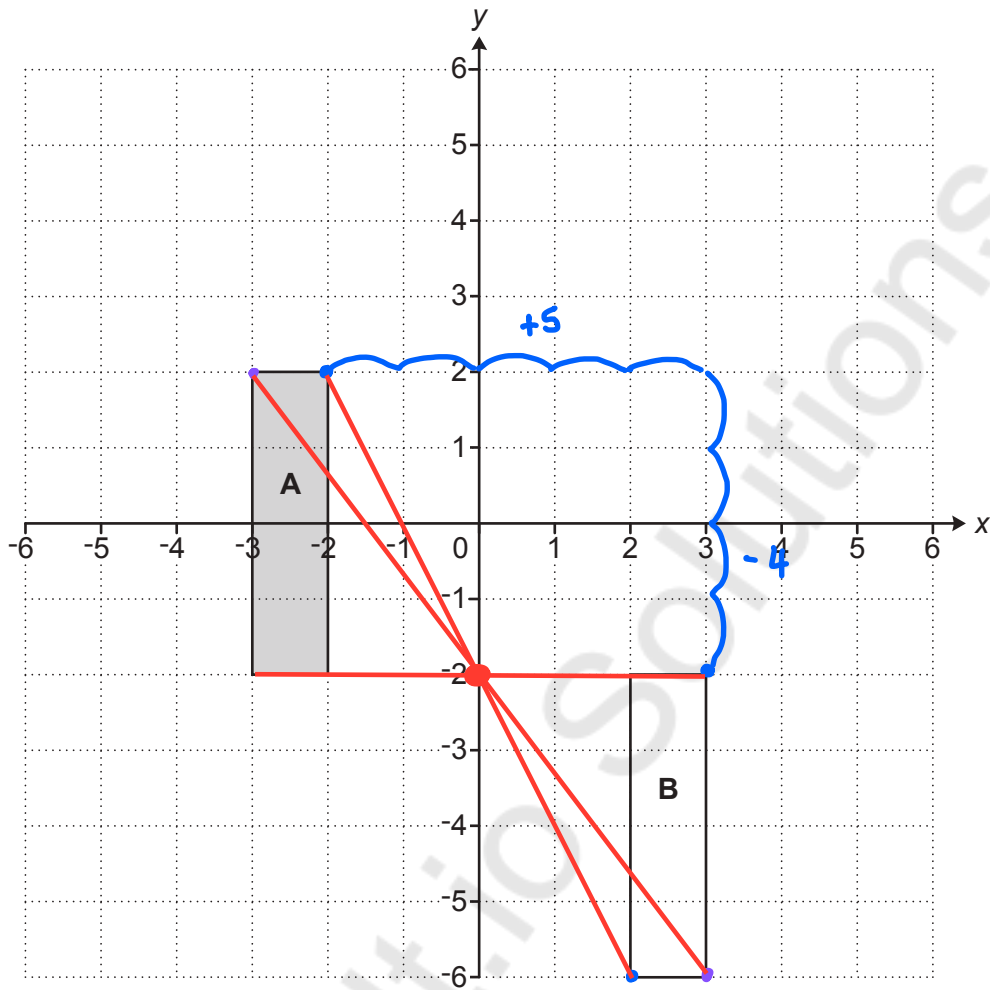
$$= 2^2 \times 7$$

$$= 4 \times 7$$

$$= 28$$

(b) ..... **28** ..... [2]

14 Rectangle **A** and rectangle **B** are drawn on the coordinate grid.



Describe fully **two** different **single** transformations that map rectangle **A** onto rectangle **B**.

1 Translation by  $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

2 Rotation  $180^\circ$  about  $(0, -2)$

[6]

- 15  $y$  is inversely proportional to  $x$ .  
 $y = 20$  when  $x = 3$ .

Find the value of  $y$  when  $x = 12$ .

$$y \propto \frac{1}{x}$$

$$y = \frac{k}{x}$$

$$20 = \frac{k}{3}$$

$\times 3$

$\times 3$

$$60 = k$$

$\therefore$

$$y = \frac{60}{x}$$

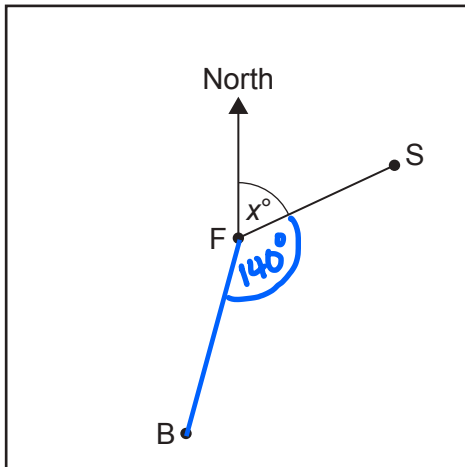
$$y = \frac{60}{12}$$

$$= 5$$

$$y = \mathbf{5} \dots\dots\dots [3]$$

- 16 A town square has a fountain (F) at the centre. There is also a bell tower (B) and a statue (S).

The bearing of the statue from the fountain is  $x^\circ$ .



Not to scale

- (a) The bearing of the bell tower from the fountain is  $140^\circ$  more than the bearing of the statue from the fountain.

Write down, in terms of  $x$ , the bearing of the bell tower from the fountain.

(a) .....  $x + 140$  .....  $^\circ$  [1]

- (b) The bearing of the bell tower from the fountain is also three times the bearing of the statue from the fountain.

$$x + 140$$

$x$

Work out the bearing of the bell tower from the fountain.

$$3x = x + 140$$

$$-x \quad -x$$

$$2x = 140$$

$$\div 2 \quad \div 2$$

$$x = 70$$

$$70 + 140 = 210$$

(b) .....  $210$  .....  $^\circ$  [4]

- 17 Morgan is playing a computer game.  
They can score 0, 1, 2 or 3 points on each turn.  
They record their scores for 100 turns.  
The table shows the relative frequencies of their scores.

Score	0	1	2	3
Relative frequency	0.08	0.42	0.38	<b>0.12</b>

- (a) Complete the table.

$$\begin{array}{r} 0.08 \\ 0.42 \\ + 0.38 \\ \hline 0.88 \end{array}$$

$$\begin{array}{r} 0.88 \\ - 0.88 \\ \hline 0.12 \end{array}$$

[2]

- (b) Morgan says

I scored more than 160 points in total in my 100 turns.

Is Morgan correct?  
Show how you decide.

**Score**

$$0 \quad 100 \times 0.08 = 8 \quad (0 \text{ pts})$$

$$1 \quad 100 \times 0.42 = 42 \quad (42 \text{ pts})$$

$$2 \quad 100 \times 0.38 = 38 \quad (76 \text{ pts})$$

$$3 \quad 100 \times 0.12 = 12 \quad (36 \text{ pts})$$

$$\begin{array}{r} 42 \\ 76 \\ + 36 \\ \hline 154 \end{array}$$

..... **No, 154 < 160.** ..... [4]

18 A bag only contains red marbles, blue marbles and yellow marbles.

- The probability of picking a red marble is  $\frac{2}{5}$ .
- There are nine yellow marbles.
- The probability of picking a blue marble is three times as likely as picking a yellow marble.

Work out the **total** number of marbles in the bag.

You must show your working.

$$p(\text{red}) = \frac{2}{5} \quad p(\text{yellow}) = \frac{9}{x} \quad p(\text{blue}) = \frac{9}{x} \times 3$$

$$= \frac{27}{x}$$

$$p(\text{blue or yellow}) = 1 - \frac{2}{5} = \frac{3}{5}$$

$$\frac{9}{x} + \frac{27}{x} = \frac{3}{5}$$

$$\frac{36}{x} = \frac{3}{5}$$

$$x = 5 \times 12$$

$$= 60$$

60

[5]

19 (a) Circle the value of  $\sin 30^\circ$ .

$$\left(\frac{1}{2}\right)$$

$$\frac{\sqrt{3}}{2}$$

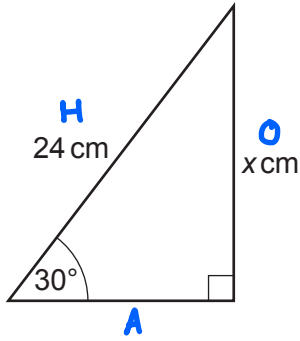
$$\frac{1}{3}$$

$$\frac{\sqrt{3}}{3}$$

$$\frac{1}{4}$$

[1]

(b) Here is a right-angled triangle.



Work out the value of  $x$ .

Not to scale

S O ✓ H ✓    C A    H ✓    T O ✓ A



$$\sin \theta = \frac{O}{H}$$

$$\sin 30 = \frac{x}{24}$$

x 24

x 24

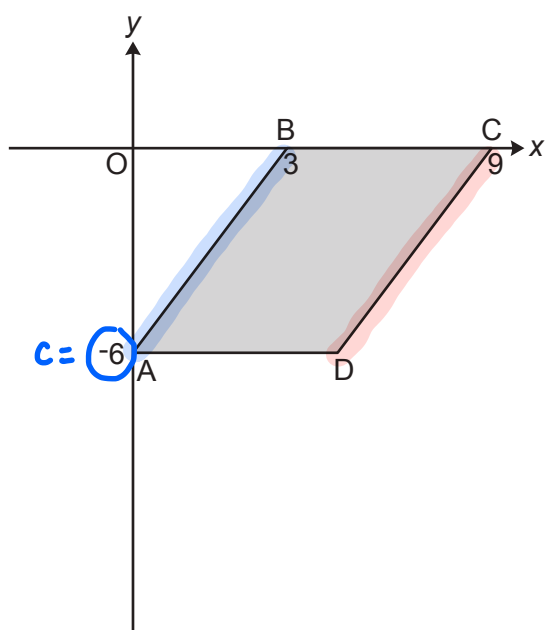
$$x = 24 \times \sin 30^\circ$$

$$= 24 \times \frac{1}{2}$$

$$= 12$$

(b)  $x =$  12 ..... [2]

20 The graph shows a parallelogram ABCD.



A has coordinates (0, -6), B has coordinates (3, 0) and C has coordinates (9, 0).

Find the equation of the line that passes through the points C and D, giving your answer in the form  $y = mx + c$ .

You must show your working.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \begin{matrix} (0, -6) & (3, 0) \\ x_1, y_1 & x_2, y_2 \end{matrix}$$

$$= \frac{0 - (-6)}{3 - 0}$$

$$= \frac{6}{3}$$

$$= 2$$

$$y = 2x + 6$$

$$m = 2 \quad \begin{matrix} (9, 0) \\ x \quad y \end{matrix}$$

$$y = mx + c$$

$$0 = 2(9) + c$$

$$0 = 18 + c$$

$$-18 = c$$

$$y = 2x - 18$$

.....  $y = 2x - 18$  ..... [5]

21 (a)

$$(x+4)(x+3) = x^2 + 7x + 12$$

Darcy says that the statement in the box is an equation.

Ellis says that the statement in the box is an identity.

One of them is correct.

Explain which one of Darcy or Ellis is correct.

Ellis is correct because both sides are identical  
and we cannot solve for  $x$ .

[2]

(b) Solve by factorising.

$$x^2 + 4x - 12 = 0$$

$$\begin{array}{r} -12 \\ \hline -2 \quad 6 \end{array}$$

$$(x - 2)(x + 6) = 0$$

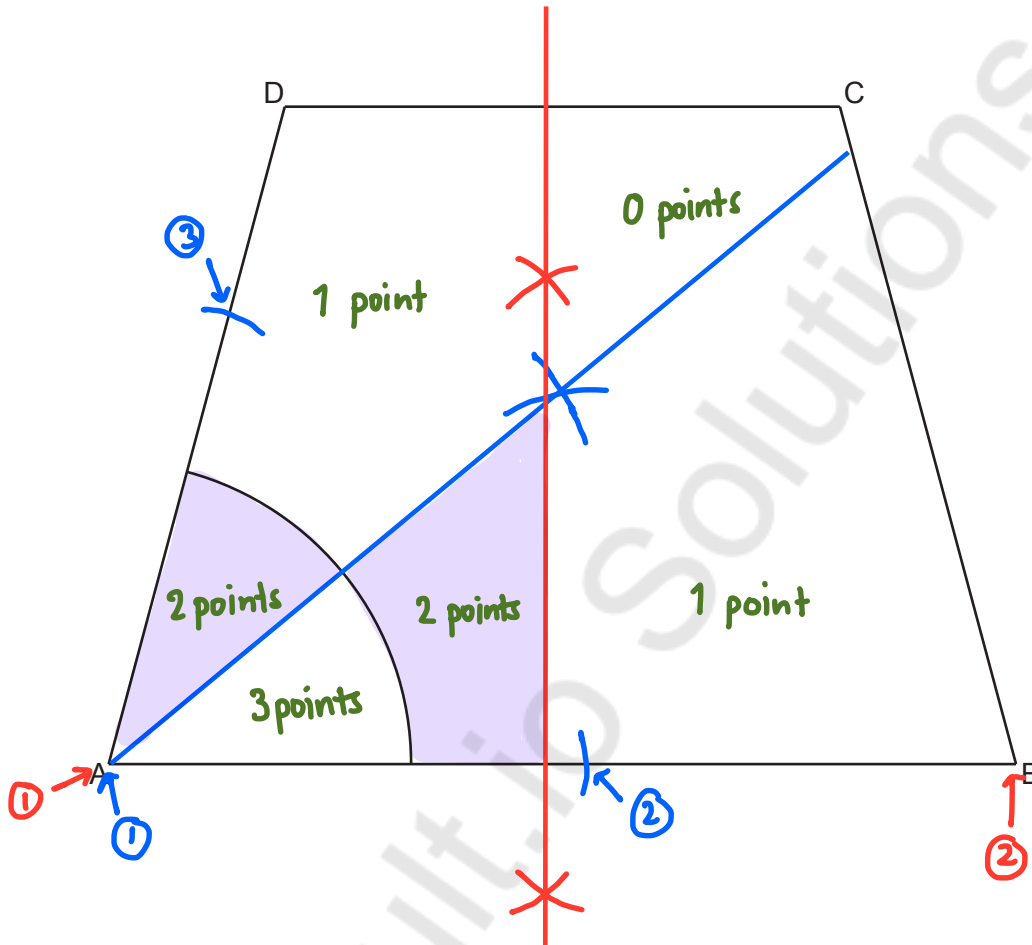
$$\begin{array}{l} x - 2 = 0 \\ +2 \quad +2 \end{array} \quad \begin{array}{l} x + 6 = 0 \\ -6 \quad -6 \end{array}$$

$$x = 2 \quad x = -6$$

(b)  $x = 2$  or  $x = -6$  [3]

- 22 The diagram shows the scale drawing of a sandpit, ABCD. It also shows the arc of all points in the sandpit that are 80 cm from corner A.

Scale: 1 cm represents 20 cm



A game is played by throwing a ball into the sandpit. Points may be scored when the ball lands in the sandpit.

- 1 point if the ball lands within 80 cm of corner A, ✓
- and
- 1 point if the ball is closer to side AB than side AD, *angle bisector*
- and
- 1 point if the ball is closer to corner A than corner B. *perpendicular bisector on AB*

By completing the construction, find and shade the regions where 2 points can be scored. Show all your construction lines.

[6]

END OF QUESTION PAPER

**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

The form consists of a vertical solid line on the left side, creating a margin. To the right of this line are horizontal dotted lines spaced evenly down the page, providing a grid for writing answers. A large, light gray watermark reading "Mathvault.io Solutions" is oriented diagonally from the bottom-left towards the top-right across the entire page.

Handwriting practice area with horizontal dotted lines and a vertical solid line on the left side.

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