

OCR

Oxford Cambridge and RSA

F**Tuesday 03 November 2020 – Morning****GCSE (9–1) Mathematics****J560/01 Paper 1 (Foundation Tier)****Time allowed: 1 hour 30 minutes****You can use:**

- a scientific or graphical calculator
- geometrical instruments
- tracing paper

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

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

First name(s)

Last name

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. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- 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.
- Use the π button on your calculator or take π to be 3.142 unless the question says something different.

INFORMATION

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

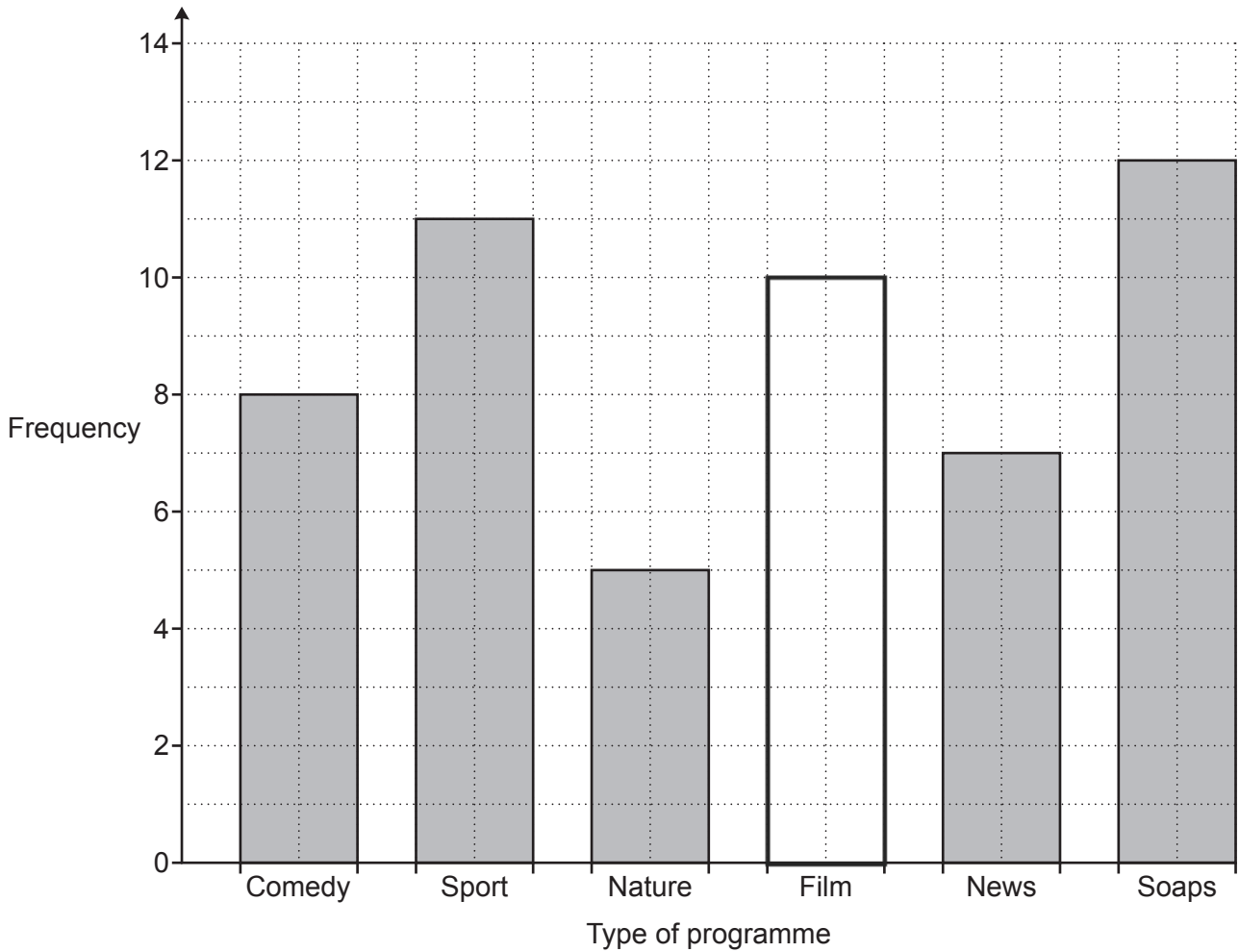
ADVICE

- Read each question carefully before you start your answer.

2

Answer **all** the questions.

- 1 Reece asked some friends what type of programme they watch most on television. The bar chart shows some of his results.



- (a) 10 people answered Film.

Complete the bar chart to show this information.

[1]

- (b) Complete these sentences.

(i) Soaps was chosen by the most people.

[1]

(ii) 7 people chose News.

[1]

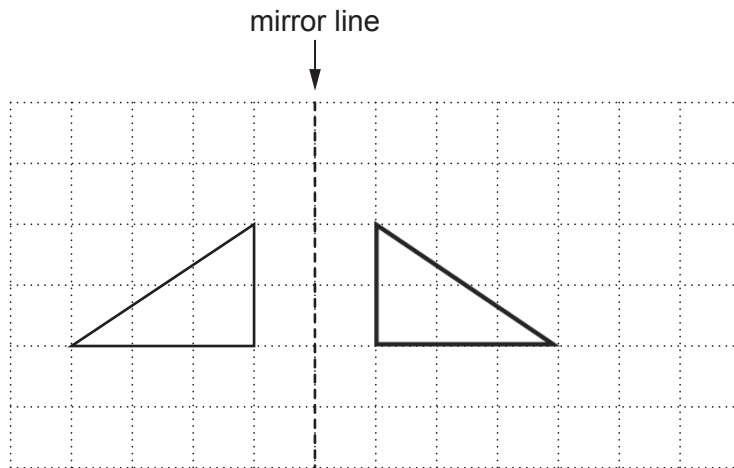
(iii) 3 **fewer** people chose Nature than Comedy.

[1]

*↳ find the difference between Nature and Comedy
(8 - 5 = 3)*

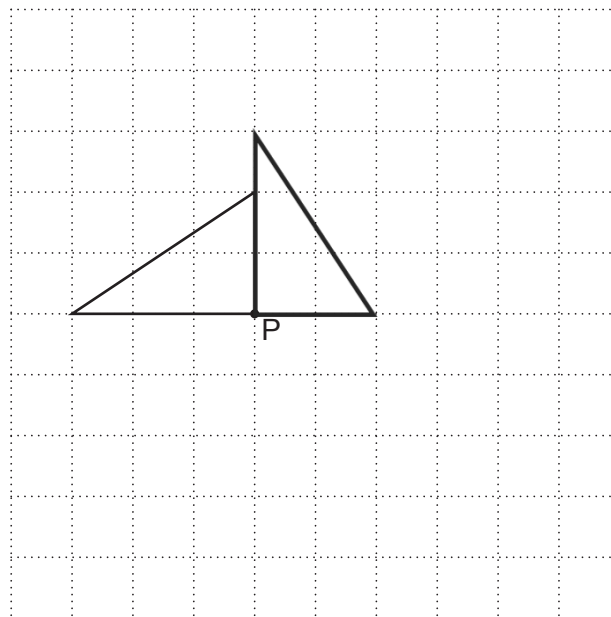
3

- 2 (a) Reflect the triangle in the mirror line.



[2]

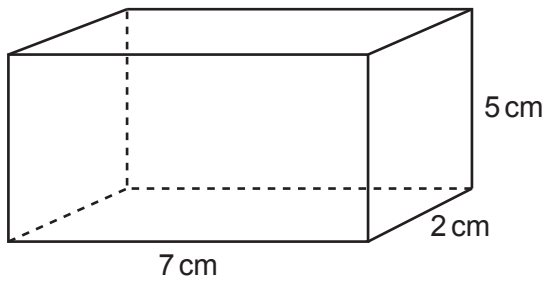
- (b) Rotate the triangle 90° clockwise about the point P.



[2]

4

3 Work out the volume of this cuboid.



$$\begin{aligned} \text{Volume} &= \text{length} \times \text{width} \times \text{height} \\ &= 7 \times 2 \times 5 \\ &= 70 \text{ cm}^3 \end{aligned}$$

$$\begin{array}{r} 7 \\ \times 2 \\ \hline 14 \\ \times 5 \\ \hline 70 \end{array}$$

..... 70 cm³ [2]

4 (a) Write 2% as a decimal.

$$\frac{2}{100} = 0.\overbrace{02} = 0.02$$

(a) 0.02 [1]

(b) Write $\frac{11}{20}$ as a percentage.

$$\frac{11 \times 5}{20 \times 5} = \frac{55}{100} = 55\%$$

change denominator to 100

(b) 55 % [1]

5 Use one of the symbols <, = or > to make each statement true.

(a) 0.7 $>$ $\frac{2}{3}$ (0.66...) $\sqrt[3]{\frac{20}{18}} = \frac{20}{20}$ [1]

(b) 27.06 $<$ 27.59 [1]

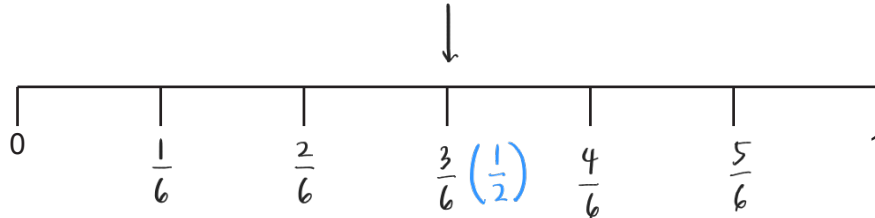
5

- 6 A bag contains 12 counters.
6 are red, 4 are blue and 2 are yellow.
A counter is taken from the bag at random.

Mark with an arrow (\downarrow) the probability the counter is

- (a) red,

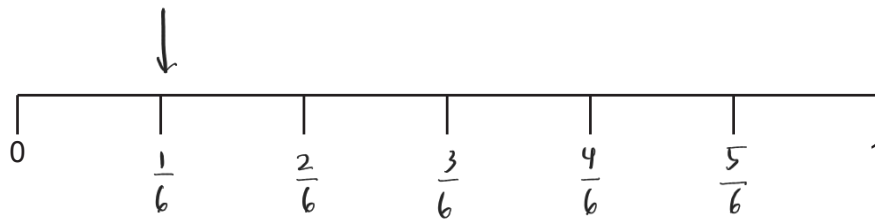
$$P(\text{red}) = \frac{6}{12} = \frac{1}{2} = 0.5$$



[1]

- (b) yellow,

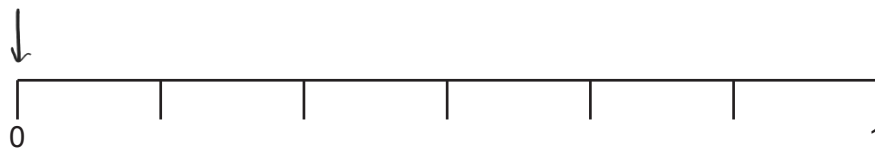
$$P(\text{yellow}) = \frac{2}{12} = \frac{1}{6}$$



[1]

- (c) green.

$$\text{There are no green counters} = \frac{0}{12} = 0$$



[1]

6

- 7 (a) Divide 72 in the ratio 4 : 5.

$4 + 5 = 9$ (total parts)

$\times 8 \left(\begin{array}{l} 4 = 32 \\ 5 = 40 \end{array} \right) \times 8$

$1 \text{ part} = 8$

$$\begin{array}{r} 8 \\ 9 \overline{)72} \\ \underline{72} \\ 0 \end{array}$$

(a) 32 : 40 [2]

- (b) In one year, Clara and Dave borrowed books from a library in the ratio 3 : 7.
 Dave borrowed 35 books.

Work out the number of books borrowed by Clara.

$\times 5 \left(\begin{array}{l} 3 = 15 \\ 7 = 35 \end{array} \right) \times 5$

$3 \times 5 = x$

$x = 15$

Clara borrowed 15 books

(b) 15 books [2]

- 8 Yoghurts are packed in trays.
 Each tray holds 12 yoghurts.

What is the smallest number of trays needed to pack 460 yoghurts?

$38.33... \text{ (round up to accommodate all yoghurts)}$

$$\begin{array}{r} 12 \overline{)46000} \\ \underline{36} \\ 100 \\ \underline{96} \\ 40 \\ \underline{36} \\ 40 \\ \underline{36} \\ 4 \end{array}$$

Smallest number of trays needed = 39

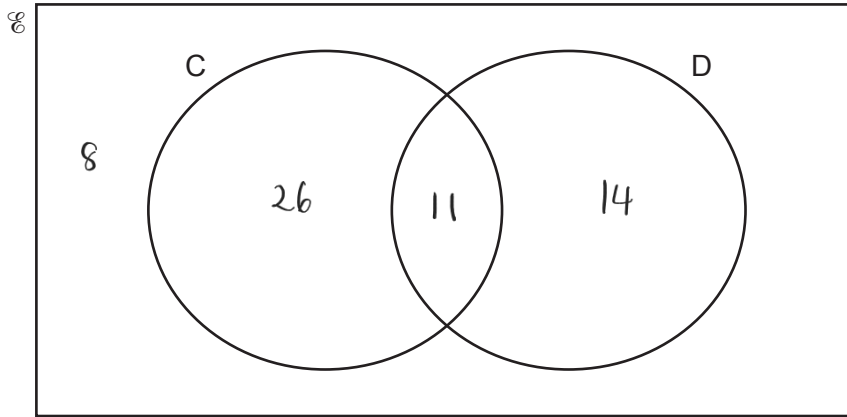
39 trays

..... [2]

9 59 families are asked whether they have a cat (C) or a dog (D).

- 26 only have a cat.
- 14 only have a dog.
- 11 have both a cat and a dog.

(a) Show this information on the Venn diagram.



[1]

(b) (i) How many of the families do not have a cat or a dog? $(59 - 26 - 14)$

$$\begin{array}{r}
 59 \\
 - 26 \\
 \hline
 33 \\
 - 14 \\
 \hline
 19
 \end{array}$$

$19 - 11 = 8$ families

(b)(i) 8 families [1]

(ii) Write your answer in the correct place on the Venn diagram. [1]

(c) One of the families is chosen at random.

Write down the probability that they have a dog.

$$P(\text{dog}) = \frac{(14 + 11)}{59} = \frac{25}{59}$$

(c) $\frac{25}{59}$ [2]

9

- 12 (a) A train is travelling with a velocity of 15 m/s.
It then accelerates at 0.5 m/s² for 6 seconds.

Use the formula $v = u + at$ to calculate the velocity of the train after the 6 seconds.

$$\begin{array}{l} u = 15 \text{ m/s} \quad (\text{initial velocity}) \\ a = 0.5 \text{ m/s}^2 \quad (\text{acceleration}) \\ t = 6 \text{ s} \quad (\text{time}) \end{array} \quad \begin{array}{r} 6 \\ \times 0.5 \\ \hline 3.0 \end{array}$$

$$\begin{array}{l} v = u + at \\ = 15 + 0.5(6) \\ = 15 + 3 \\ = 18 \text{ m/s} \end{array} \quad \begin{array}{r} + 15 \\ + 3 \\ \hline 18 \end{array}$$

(a) 18 m/s [2]

- (b) Rearrange the formula $v = u + at$ to make a the subject.

$$\begin{array}{l} -u \left(\begin{array}{l} v = u + at \\ v - u = at \end{array} \right) -u \\ \div t \left(\begin{array}{l} \frac{v-u}{t} = a \end{array} \right) \div t \\ a = \frac{v-u}{t} \end{array}$$

(b) $a = \frac{v-u}{t}$ [2]

13 Choose a word from this list that best describes each statement.

Identity	Expression	Formula	Term	Equation
(a) $8 = n + 2$			(a)	Equation [1]
(b) $3x + 2y$			(b)	Expression [1]
(c) $(a + b)(a - b) = a^2 - b^2$			(c)	Identity [1]

14 Harry is paid £8.60 per hour for the first 30 hours he works each week. After 30 hours he is paid $1\frac{1}{2}$ times the hourly rate.

Last week, Harry worked for 33 hours.

He was also paid a bonus of $\frac{1}{10}$ of his earnings for that week.

Calculate how much Harry was paid **in total** last week.

First 30 hours hourly rate = £8.60

Next 3 hours hourly rate = £8.60 × 1.5
= £12.90

$$\begin{array}{r} 8.60 \\ \times 1.5 \\ \hline 4300 \\ 860 \\ \hline 12.900 \end{array}$$

Harry's earnings (w/o bonus) = $(8.60 \times 30) + (12.90 \times 3)$
= £258 + £38.7

$$\begin{array}{r} 8.60 \\ \times 30 \\ \hline 258.00 \\ 12.90 \\ \times 3 \\ \hline 38.70 \end{array}$$

= £296.70

$$\begin{array}{r} 258 \\ + 38.76 \\ \hline 296.76 \end{array}$$

Bonus = $\frac{1}{10} \times 296.70$
= 29.67

Total Harry's earnings + bonus = £296.70 + £29.67
= £326.37

$$\begin{array}{r} 296.70 \\ + 29.67 \\ \hline 326.37 \end{array}$$

£ 326.37 [6]

11

15 (a) Solve.

$$\frac{x}{2} + 5 = 15$$

$$\frac{x}{2} + 5 = 15$$

$$\frac{x}{2} = 15 - 5$$

$$\frac{x}{2} = 10$$

$$x = 10 \times 2$$

$$x = 20$$

$$(a) \quad x = \dots\dots\dots 20 \dots\dots\dots [2]$$

(b) Factorise.

$$5a^2 - 10a \quad = \quad 5 \text{ and } a \text{ are common factors}$$

$$5a(a - 2)$$

$$(b) \quad \dots\dots\dots 5a(a - 2) \dots\dots\dots [2]$$

(c) Solve by factorising.

$$x^2 + 15x + 56 = 0$$

Factor pairs for 56 :

$$\times \quad 1 \times 56$$

$$\times \quad 2 \times 28$$

$$\times \quad 4 \times 14$$

$$\checkmark \quad 7 \times 8$$

$$(x + 7)(x + 8) = 0$$

$$x + 7 = 0 \quad \text{or} \quad x + 8 = 0$$

$$x = -7 \quad \text{or} \quad x = -8$$

Factor pairs when added up together = 15

$$7 + 8 = 15$$

$$(c) \quad x = \dots\dots\dots -7 \dots\dots\dots \text{ or } x = \dots\dots\dots -8 \dots\dots\dots [3]$$

16 The height, h , of a lorry is 4.3 metres, correct to 1 decimal place.Complete the error interval for the height, h .

$$1 \text{ dp} = 0.1$$

$$\text{error interval} = 0.1 \div 2 = 0.05$$

lower interval
upper interval

$$4.3 - 0.05 \leq h < 4.3 + 0.05$$

$$4.25 \leq h < 4.35$$

$$\dots\dots\dots 4.25 \dots\dots\dots \leq h < \dots\dots\dots 4.35 \dots\dots\dots [2]$$

17 The table below shows the number of barrels of oil produced per day by some countries.

Country	Barrels of oil produced per day
USA	1.17×10^7
China	3.98×10^6
UK	9.39×10^5
Cameroon	9.32×10^4
Japan	3.92×10^3

(a) Write the number of barrels of oil produced per day by Cameroon as an ordinary number.

$$9.320000 \times 10^4 = 932000$$

(a) 93200 barrels [1]

(b) How many more barrels of oil per day did China produce than the UK?
Give your answer in standard form, correct to 3 significant figures.

$$\text{China} = 3.98 \times 10^6 \rightarrow 3.980000 = 3980000$$

$$\text{UK} = 9.39 \times 10^5 \rightarrow 9.39000 = 939000$$

$$\begin{array}{r} 3980000 \\ - 939000 \\ \hline 3041000 \end{array} \quad \begin{array}{l} 3041000 = 3.041 \times 10^6 \\ \approx 3.04 \times 10^6 \text{ (3sf)} \end{array}$$

(b) 3.04×10^6 [4]

(c) Jamal says the USA produced approximately three times more barrels of oil than Japan.

Is he correct?
Show how you decide.

$$\text{USA} = 1.17 \times 10^7 \rightarrow 1.1700000 = 11700000$$

$$\text{Japan} = 3.92 \times 10^3 \rightarrow 3.920 = 3920$$

$$\begin{array}{r} 2 \\ 3920 \\ \times \quad 3 \\ \hline 11760 \end{array}$$

$$1.1760 \rightarrow 1.176 \times 10^4$$

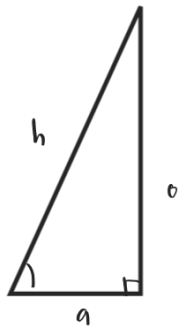
1.176×10^4 is not similar to 1.17×10^7

Jamal is wrong because 11760 is three times bigger than 3920 which is not the similar amount USA produced. [2]

13

- 18 A triangle has sides of length 14.1 cm, 14.8 cm and 19.5 cm.

Is this a right-angled triangle?
Show how you decide.



a right angled triangle would mean it has a hypotenuse. And the hypotenuse is usually the longest side of all.

$$\begin{aligned} \text{hypotenuse} &= \sqrt{(14.1)^2 + (14.8)^2} \\ &= \sqrt{198.81 + 219.04} \\ &= \sqrt{417.85} \\ &= 20.44 \text{ cm} \end{aligned}$$

The hypotenuse should be 20.4 cm. But the length given is 19.5 cm which indicates the triangle is not right-angled.

No because the sides should be 14.1 cm, 14.8 cm and 20.4 cm for the triangle to be right angled. But the hypotenuse given is 19.5 cm which is ^{wrong} [4]

- 19 One morning Kai records the colour of the cars passing his house. He then works out the relative frequency of each colour. Some of his results are shown in this table.

Colour	Silver	Red	Green	Black	Other
Relative frequency	0.18	0.16	0.10	0.24	0.32

The following morning, Kai is going to record the colour of the first 200 cars to pass his house.

Work out an estimate for the total number of cars, coloured silver or red, that he should expect to see.

$$\begin{aligned} \text{Relative frequency for silver} &= 1 - 0.16 - 0.10 - 0.24 - 0.32 \\ &= 0.18 \end{aligned}$$

$$\text{Number of red cars} : 0.16 \times 200 = 32 \text{ cars}$$

$$\text{Number of silver cars} : 0.18 \times 200 = 36 \text{ cars}$$

$$\text{Number of red + silver cars} : 32 + 36 = 68 \text{ cars}$$

68 silver/red cars [4]

14

- 20 James is taking three examination papers in Spanish.
Here are his first two results.

$$\text{Paper 1: } \frac{43}{80}$$

$$\text{Paper 2: } \frac{38}{65}$$

Paper 3 is out of 95.

The marks in each of the three papers are added together.

Find the lowest mark that James needs in Paper 3 to achieve 60% of the total marks.

$$60\% = \frac{60}{100}$$

$$\begin{aligned} \text{Total marks from 3 papers} &= 80 + 65 + 95 \\ &= 240 \end{aligned}$$

$$\frac{60}{100} \times 240 = 144 \quad \text{marks needed for all 3 papers to score } 60\%$$

$$\begin{aligned} \text{lowest marks needed for Paper 3} &= 144 - 43 - 38 \\ &= 63 \text{ marks} \end{aligned}$$

63 marks

..... [4]

- 21 Three people take $2\frac{1}{2}$ hours to deliver leaflets to 270 houses.

Assuming all people deliver leaflets at the same rate, how long will it take five people to deliver leaflets to 405 houses?

Give your answer in hours and minutes.

$$\begin{array}{l}
 \frac{270 \text{ houses}}{3 \text{ people}} : 2.5 \text{ hours} \\
 \frac{405 \text{ houses}}{5 \text{ people}} : x
 \end{array}$$

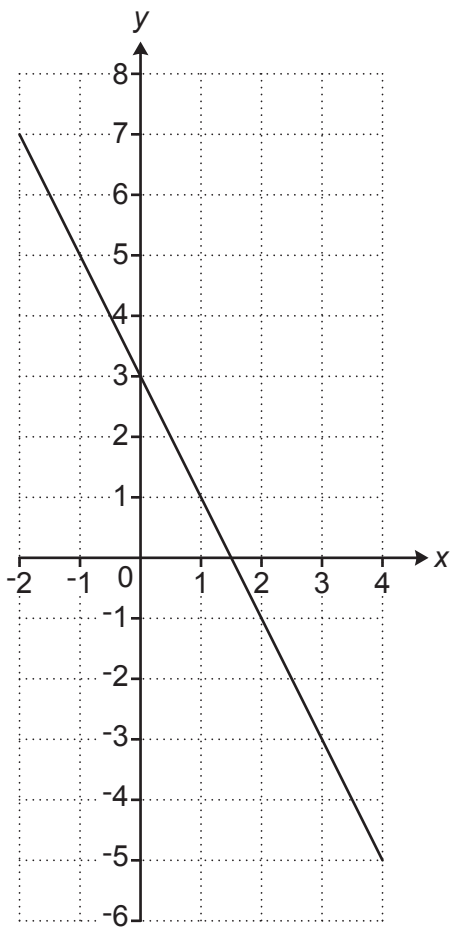
$\left. \begin{array}{l} \text{ } \\ \text{ } \end{array} \right\} xy$

$$y = \frac{405}{5} \times \frac{3}{270} = \frac{9}{10}$$

$$\begin{aligned}
 x &= 2.5 \text{ hours} \times \frac{9}{10} \\
 &= 2.25 \text{ hours} \\
 &= 2 \text{ hours } \left(\frac{1}{4} \times 60\right) \text{ mins} \\
 &= 2 \text{ hours } 15 \text{ mins}
 \end{aligned}$$

..... 2 15 hours mins [4]

22 This graph shows part of a straight line.



(a) Write down the y-intercept.

(a) ³ [1]

(b) Show that the gradient of the line is -2. [1]

$$\text{Point 1} = (0, 3)$$

$$\text{Point 2} = (3, -3)$$

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{3 - (-3)}{0 - 3} = \frac{6}{-3} = -2$$

17

(c) Write down the equation of the line.

$$y = mx + c$$

$$m = -2 \quad c = 3$$

$$(c) \quad y = -2x + 3 \quad [1]$$

(d) The line continues to the right.

Will this line pass through the point (50, -103)?
Show how you decide.

$$(50, -103) = \text{when } x = 50, y = -103$$

$$y = -2x + 3 \quad (\text{substitute } x \text{ in to the line equation})$$

$$y = -2(50) + 3$$

$$= -100 + 3$$

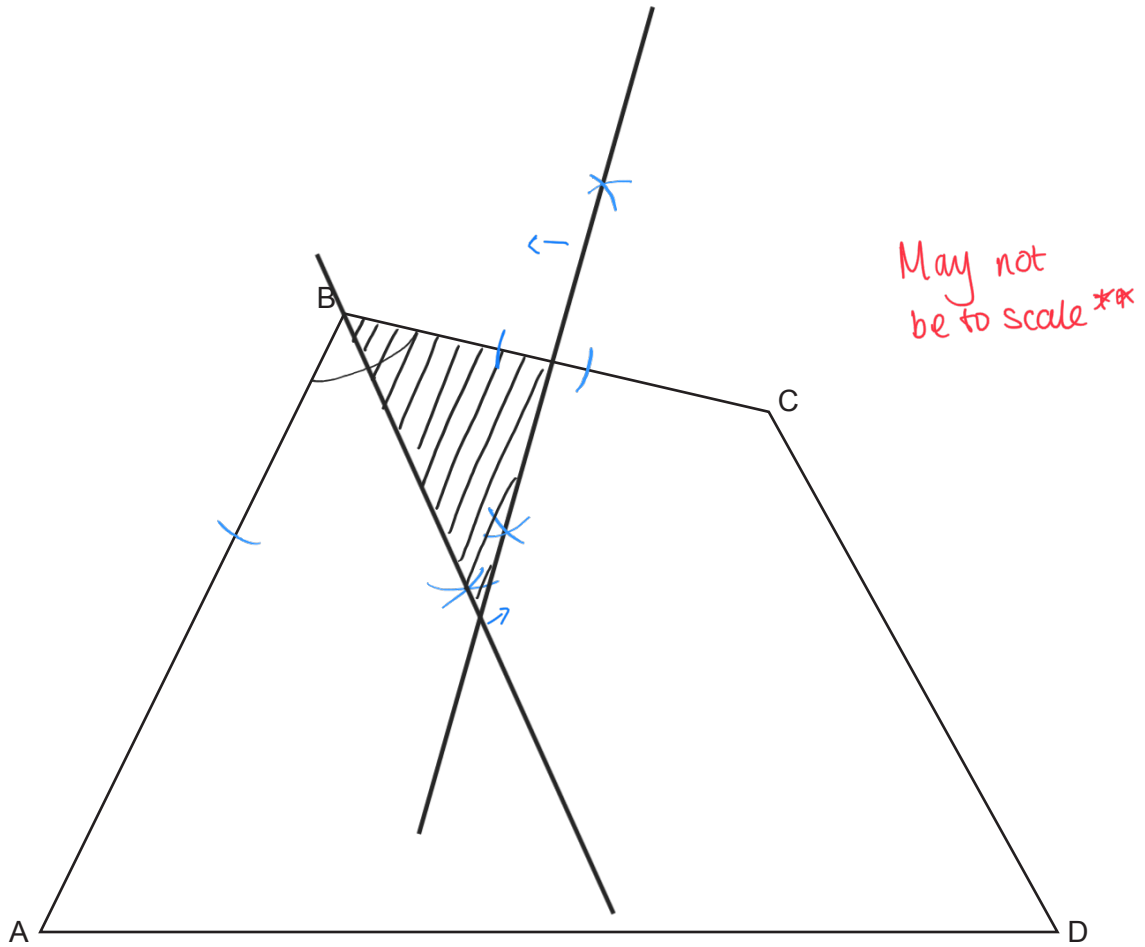
$$= -97$$

when $x = 50$, y should be equal to -97

No because when $x = 50$, y should be -97 .

..... [2]

23 ABCD is a quadrilateral.



(a) Construct the bisector of angle ABC.
Show all your construction lines. [2]

(b) Construct the perpendicular bisector of BC.
Show all your construction lines. [2]

(c) Shade the region which is

- nearer to BC than to AB
- and
- nearer to B than to C.

[1]

24 Lily buys and sells microwaves.

She buys each one for £32 and sells it for £60.
She also pays £7 for the delivery of each microwave she sells.

If she sells a microwave that is faulty then Lily must pay for its repair and redelivery. This costs her another £25 for each faulty microwave.

Last month, 6 out of the 80 microwaves Lily sold were faulty.

This month she has orders for 133 microwaves.

Calculate her expected percentage profit on this month's order.
Showing your working in the boxes below may help you present your work.

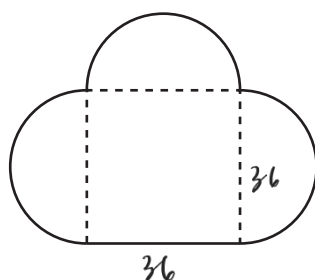
<p>Expected number of faulty microwaves:</p> $\frac{6}{80} \times 133 = 9.975$ $\approx 10 \text{ microwaves}$	<p>Expected costs:</p> <p>Cost for 1 microwave = £32 + £7 = £39</p> <p>£39 × 133 = £5187</p> <p>Costs for faulty microwaves : £25 × 10 = £250</p> <p>Total expected cost : £5187 + £250 : £5437</p>
<p>Income from sales:</p> $133 \times £60 = £7980$	<p>Expected percentage profit:</p> <p>Profit : £7980 - £5437 : £2543</p> <p>Percentage profit : $\frac{2543}{5437} \times 100 = 46.77\%$</p>

46.77

..... % [6]

Turn over for Question 25

- 25 The diagram shows Jane's lawn.
It is in the shape of a square of side 36 m and three semi-circles.



Not to scale

She is going to spread fertiliser on the lawn at a rate of 30 g per square metre.
The fertiliser is only sold in 10 kg bags costing £15.80 each.

Calculate the cost of buying the bags of fertiliser for her lawn.
You must show all your working.

$$\text{Area of the square base} : 36 \times 36 = 1296 \text{ m}^2$$

$$\begin{aligned} \text{Area of 1 semicircle} & : \frac{1}{2} \times \pi r^2 = \frac{1}{2} \times \pi (36 \div 2)^2 \\ & = \frac{1}{2} \times \pi (18)^2 = 162 \pi \end{aligned}$$

$$\text{Area of 3 semicircle} = 3 \times 162 \pi = 1526.81 \text{ m}^2$$

$$\text{Total surface area} : 1526.81 + 1296 = 2822.81 \text{ m}^2$$

$$\text{Total fertiliser needed} : 2822.81 \times 30 \text{ g} = 84684.3 \text{ g}$$

$$84684.3 \text{ g} \xrightarrow{\div 1000} 84.6843 \text{ kg} \approx 90 \text{ kg fertiliser bags needed (round up)}$$

$$\begin{array}{l} \times 9 \left(\begin{array}{l} 10 \text{ kg} \\ 90 \text{ kg} \end{array} \right) = \begin{array}{l} \text{£ } 15.80 \\ \text{£ } 142.20 \end{array} \end{array}$$

£..... 142.20 [6]

END OF QUESTION PAPER

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.