OCR
Oxford Cambridge and RSA

Monday 3 June 2024 – 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

F

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. 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 **20** pages.

ADVICE
- Read each question carefully before you start your answer.

1 Work out.

(a) $6.3 + 4.7$

$$\begin{array}{r} {}^{1}6.3 \\ +\ 4.7 \\ \hline 11.0 \end{array}$$

(a) 11.0 **[1]**

(b) £4.50 – £0.27

$$\begin{array}{r} {}^{4}\not{5}{}^{1}0 \\ -\ 0.27 \\ \hline 4.23 \end{array}$$

(b) £ 4.23 **[1]**

2 Work out.

(a) $-7 - 4$

(a) −11 **[1]**

(b) $-42 \div 6$

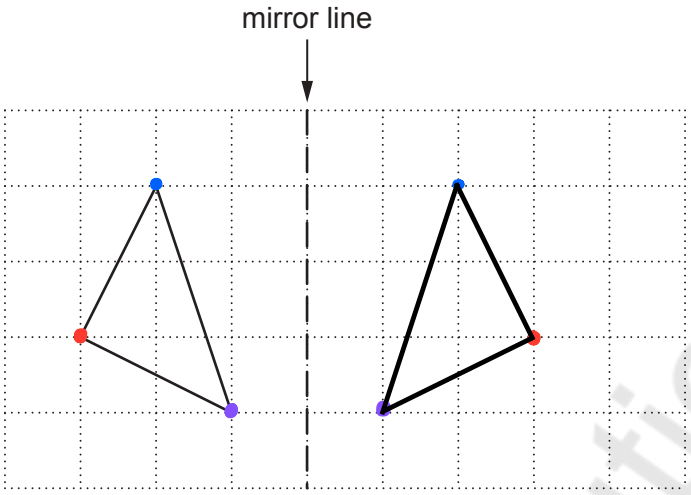
(b) −7 **[1]**

(c) $(-4)^2$

-4×-4

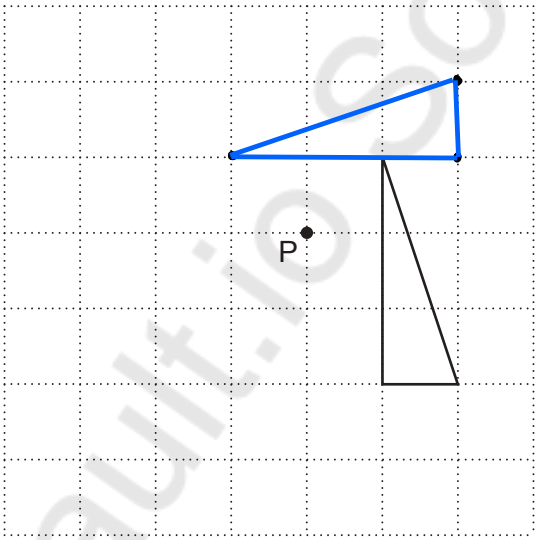
(c) 16 **[1]**

3 **(a)** Reflect the triangle in the mirror line.



[2]

(b) Rotate the triangle 90° anticlockwise around the point P.

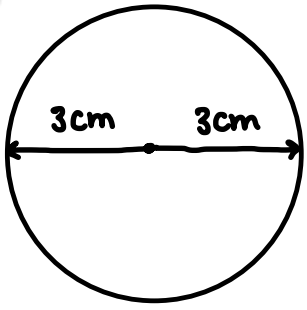


Tracing paper

[2]

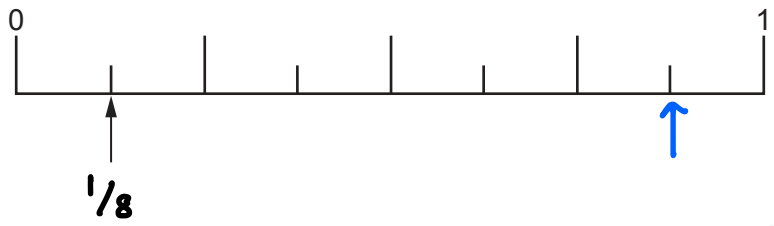
4 The radius of a circle is 3 cm.

Find the length of the diameter of the circle.



6 ..... cm **[1]**

5 This probability scale shows the probability of picking a blue counter from a bag of counters.



(a) Write down, as a fraction, the probability of picking a blue counter.

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

(b) On the probability scale above, mark with an arrow (↑) the probability of **not** picking a blue counter. **[1]**

$1 - \frac{1}{8} = \frac{7}{8}$

6 A bathroom shower uses water at a rate of 15 litres per minute.

How much water is used in a bathroom shower that lasts 12 minutes?

15 L × 12

$$\begin{array}{r} {}^{1}15 \\ \times\ 12 \\ \hline 30 \\ 150 \\ \hline 180 \end{array}$$

180 ..... litres **[2]**

7 **(a)** Write 0.6 as a fraction in its simplest form.

$\frac{6}{10} \overset{\div 2}{=} \frac{3}{5}$

(a) $\frac{3}{5}$ ..... **[2]**

(b) Write $\frac{17}{5}$ as a mixed number.

$3\frac{2}{5}$

(b) $3\frac{2}{5}$ ..... **[1]**

8 Use one of these symbols $<$, $>$ or $=$ to make each statement true.

1 cm = 10 mm
6 cm = 60 mm
(x6 / x6)

60 mm ..... = ... 6 cm

320 g ..... < ..... 3.2 kg

$1\frac{3}{4}$ km ..... < ..... 17500 m

1 km = 1000 m (x1000)
1.75 km x 1000 = 1750 m

1 kg = 1000 g (x1000)
3.2 x 1000 = 3200 g

[3]

9 Work out the following, giving each answer as a fraction in its simplest form.

(a) $\frac{7}{16} - \frac{1}{4}$

$\frac{1}{4}$ (x4, x4) $= \frac{4}{16}$

$\frac{7}{16} - \frac{4}{16} = \frac{3}{16}$

(a) $\frac{3}{16}$ **[2]**

(b) $\frac{5}{12} \div \frac{5}{9}$

$\frac{5}{12} \times \frac{9}{5} = \frac{45}{60}$ (÷15, ÷15) $= \frac{3}{4}$

(b) $\frac{3}{4}$ **[3]**

10 Simplify.

(a) $3y + 6x - y + 5x$

$3y - y = 2y$

$6x + 5x = 11x$

(a) $2y + 11x$ **[2]**

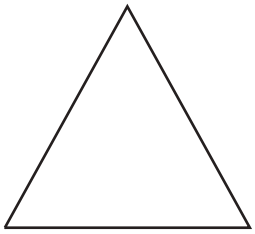
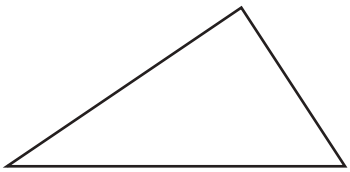
(b) $5a \times 6b$

$30ab$

(b) $30ab$ **[1]**

11 The table shows the plan view and front elevation of some 3D solids.

Write the name of each 3D solid in the third column of the table.

Plan view	Front elevation	Name of 3D solid
		Cuboid
		Cone
		Triangular Prism

[3]

12 Complete each statement by writing the missing power in the box.

(a) $6^3 \times 6^4 = 6^{\boxed{7}}$ **[1]**

(b) $(2^2)^4 = 2^{\boxed{8}}$ **[1]**

13 **(a)** Work out the next term in this sequence.

+2 +3 +4 +5

1 3 6 10 15

[1]

(b) In the Fibonacci sequence below, the next term is found by adding the two previous terms. The second term is 7, the third term is 10 and the fourth term is 17.

Work out the first and fifth terms of the sequence.

..... 3 7 10 17 27

10 + 17

[2]

14 Use the formula

$v^2 = u^2 + 2as$

to find the final velocity when

- the initial velocity is 6 m/s $= u$
- the acceleration is 4 m/s^2 $= a$
- the distance travelled is 8 m. $= s$

$v^2 = (6)^2 + 2(4)(8)$

$= 36 + 64$

$= 100$

$v = \sqrt{100}$

$= 10$

..... 10 m/s **[3]**

15 Compost is used to grow plants.
Ivan has a sack containing 50 litres of compost.
He uses this compost to fill pots for his plants.

(a) Ivan fills six large pots each holding 7.5 litres.

Work out how much compost is left in the sack.

6×7.5

$\downarrow \times 10$

6×75

75
$\times \quad 6$
450

$\downarrow \div 10$

45

$50L - 45L = 5L$

(a) ..... 5 ..... litres **[2]**

(b) Ivan uses the remaining compost to fill small pots each holding 400 ml.

Work out the maximum number of small pots Ivan can fill with the remaining compost.

$1L = 1000ml$

$\times 1000$

$5L \times 1000 = 5000ml$

$\frac{5000}{400} = \frac{25}{2} = 12.5$

(b) ..... 12 ..... **[3]**

(c) Work out how much compost will then be left in the sack.

$12 \times 400ml = 4800ml$

$5000ml - 4800ml = 200ml$

(c) ..... 200 ..... ml **[2]**

16 The table shows how much Amaya earns per hour.

Work done on Monday to Friday	£20.15 per hour
Work done on Saturday or Sunday	£30.23 per hour

One week Amaya works for $40\frac{1}{3}$ hours between Monday and Friday and then for $4\frac{1}{4}$ hours on Saturday.

(a) Amaya says

I will earn at least £900 for my work this week.

By rounding each value to the nearest integer, use estimation to show that Amaya may be correct. **[5]**

Mon – Fri

£20.15 ≈ £20 p/hour

$40\frac{1}{3}$h ≈ 40 hours

£20 x 40 = £800

Saturday

£30.23 ≈ £30 p/hour

$4\frac{1}{4}$ ≈ 4 hours

£30 x 4 = £120

Total = £800 + £120

= £920

£920 > £900

(b) Give **one** reason why your working in part **(a)** shows that Amaya can be **certain** of earning at least £900 for her work in this week.

The calculation is an underestimate, so the actual amount will be greater than £920. **[1]**

17 Work out.

$1.2 \div 0.03$

$\frac{1.2}{0.03} \overset{\times 100}{\underset{\times 100}{=}} \frac{120}{3} = 40$

40 ..... **[2]**

18 Kai has these four number cards.

0	2	5	9

Kai takes two of the cards at random without replacement and finds the positive difference between the two numbers.

(a) Complete the table to show all of the possible differences.

		First card		
Second card	Difference	0	2	5	9
	0		2	5	9
	2	2		3	7
	5	5	3		4
	9	9	7	4	

[2]

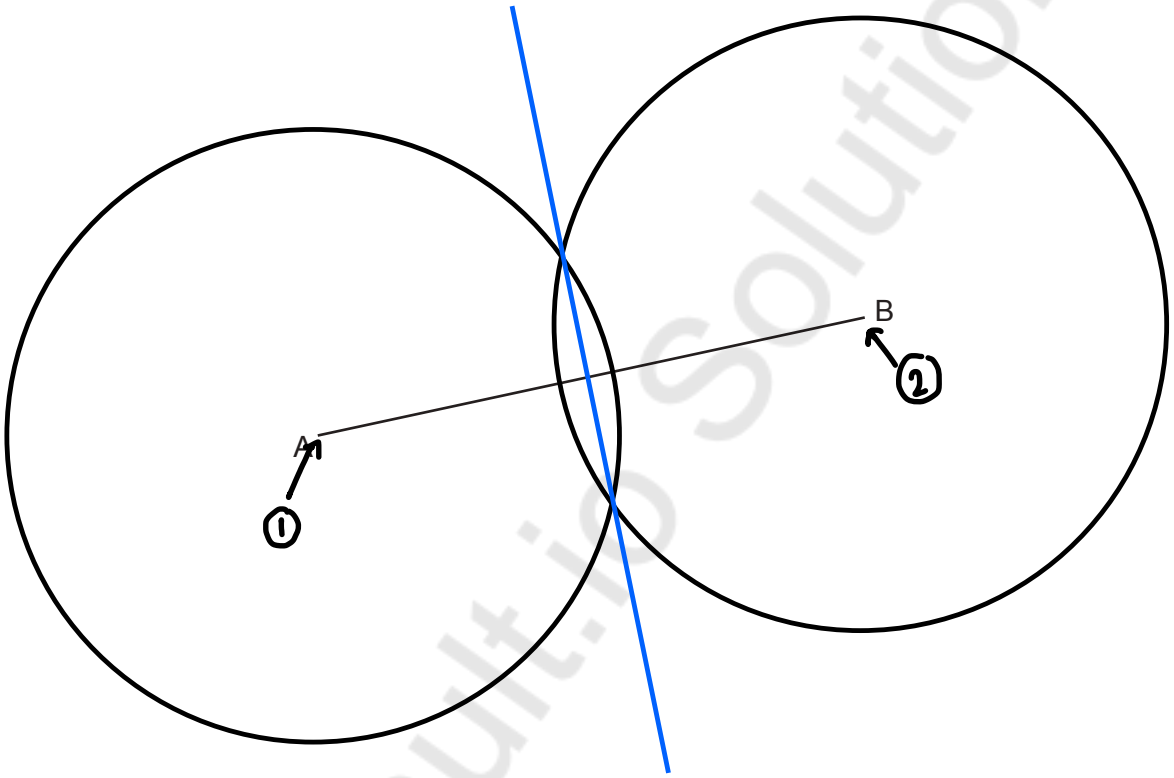
(b) Find the probability that Kai takes two cards with a difference that is an even number or a factor of 10.

1, 2, 5, 10

(b) $\frac{6}{12}$ ..... **[2]**

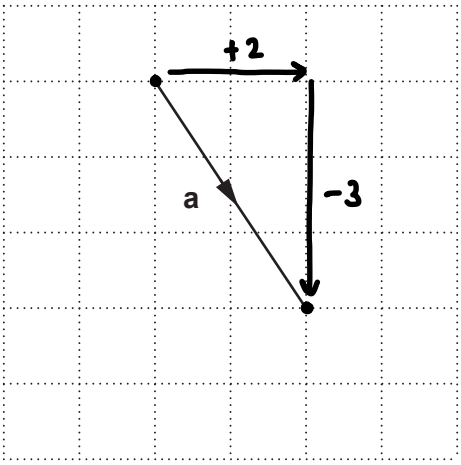
19 **Using ruler and compasses only**, construct the perpendicular bisector of the line AB.

Leave your construction lines visible.



[2]

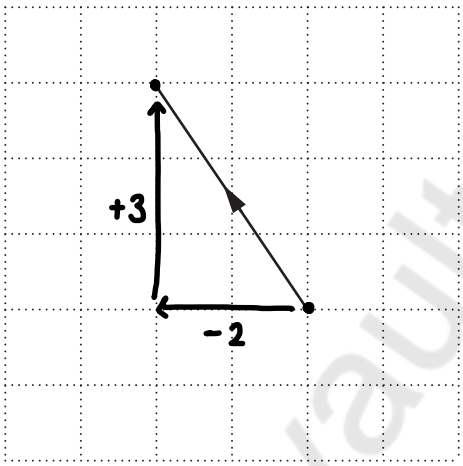
20 Vector **a** is drawn on this grid.



(a) Write vector **a** as a column vector.

(a) $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$ **[2]**

(b) A vector is drawn on this grid.



Write this vector in terms of **a**.

$\begin{pmatrix} -2 \\ 3 \end{pmatrix} = -1 \times a = -a$

(b) $-a$ **[1]**

21 **(a)** Ryan makes a journey of 200 miles from his home to the coast.

① $\frac{1}{10}$ of the journey is on roads with a speed limit of 40 miles per hour.

② 40% of the journey is on roads with a speed limit of 50 miles per hour.

③ The remainder of the journey takes a time of 1 hour 30 minutes.

D
S T

Ryan leaves home at 08 50 and does not exceed the speed limits on the journey.

Find the earliest time that Ryan could arrive at the coast.
You must show your working.

① $S = 40$ mph

$D = \frac{1}{10}$ of $200 = 200 \div 10 = 20$ miles

$T = \frac{D}{S} = \frac{20}{40} = \frac{1}{2}$ h or 30 mins

② $S = 50$ mph

$D = 40\%$ of $200 = 80$ miles

$T = \frac{D}{S} = \frac{80}{50} = \frac{8}{5} = 1.6$ h $= 1$h 36 mins

$5\overline{)8.30}$ → 1.6

0.6h x 60 = 36

③ $D = 200 - 20 - 80 = 100$ miles

$T = 1$h 30 mins

Total time: 30 mins + 1h 36 mins = 2h 6 mins

2h 6 mins + 1h 30 mins = 3h 36 mins

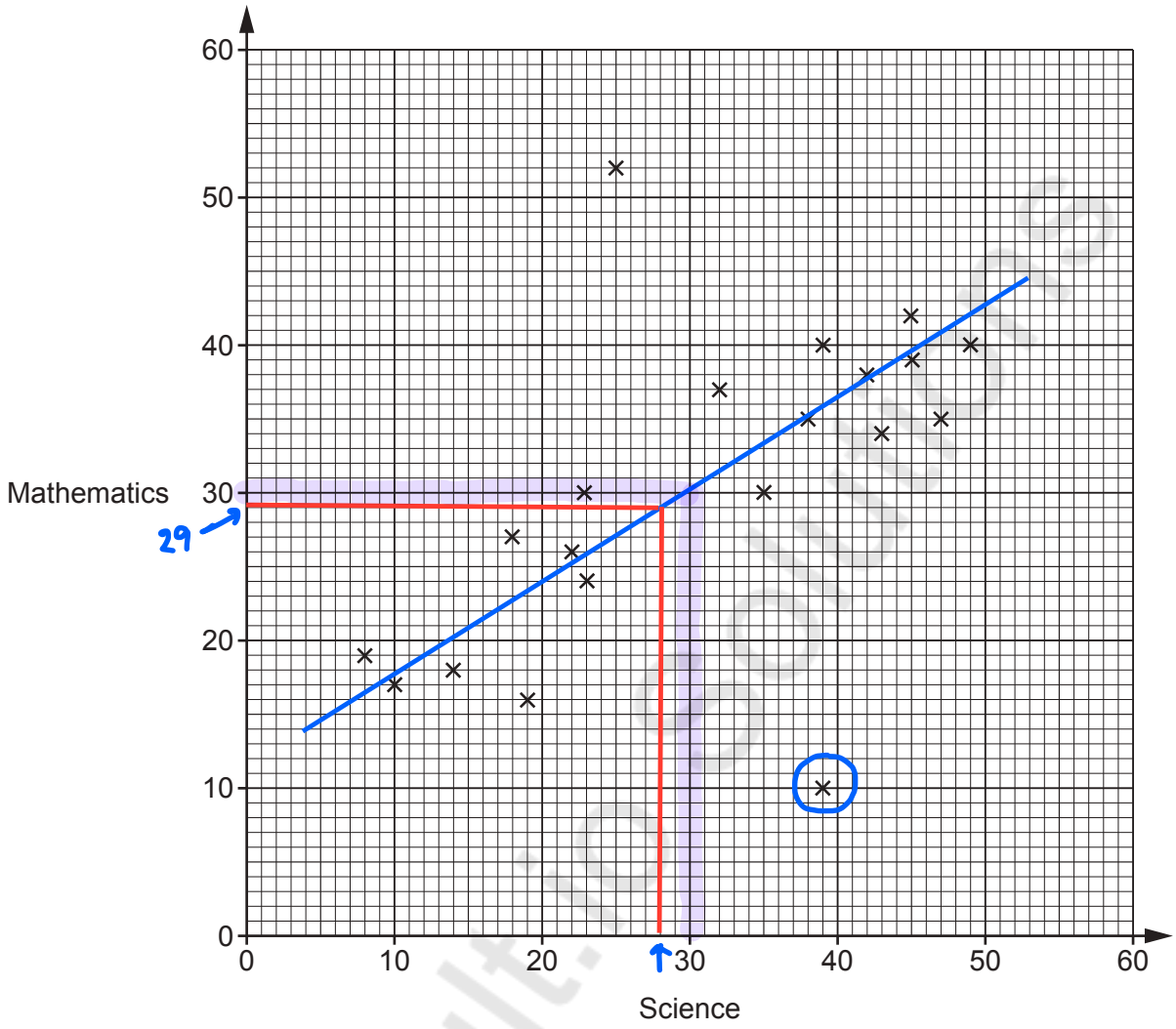
Arrival time: 08 50 + 3h = 11:50 am + 36 mins = 12:26 pm

(a) 12:26 **[6]**

(b) Write down an assumption you have made when working out the answer to part **(a)**.

Ryan drives at the speed limit and does not drive slower and no delays. **[1]**

22 The scatter diagram shows the test scores for 20 pupils in Science and Mathematics.



(a) Describe the type of correlation shown in the scatter diagram.

(a) Positive **[1]**

(b) One pupil took the Science test but was then ill during the Mathematics test and had to leave early.

On the scatter diagram, circle the point that is most likely to represent this pupil. **[1]**

(c) By drawing a line of best fit, estimate the test score in Mathematics for a pupil who scored 28 in the Science test.

(c) 29 **[2]**

(d) Explain why using the scatter diagram to estimate the test score in Mathematics for a pupil who scored 60 in Science may be unreliable.

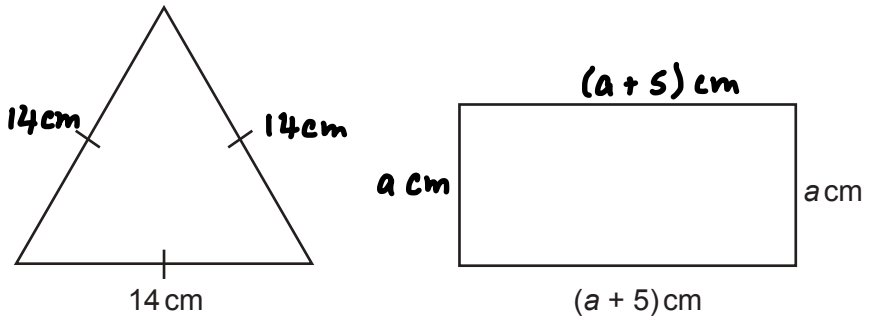
It is beyond the range of data provided on the scatter diagram. **[1]**

(e) Find the percentage of the 20 pupils who scored less than 30 marks in **both** Science and Mathematics.

$\frac{7}{20} \overset{\times 5}{=} \frac{35}{100} = 35\%$

(e) 35 % **[3]**

23 The diagram shows an equilateral triangle and a rectangle.



Not to scale

The equilateral triangle has the same perimeter as the rectangle.

Find the value of a.

Perimeter triangle = 14 + 14 + 14
= 42cm

Perimeter rectangle = a + a + a + 5 + a + 5
42 = 4a + 10
−10 −10
32 = 4a
÷4 ÷4
8 = a

a = 8 **[4]**

24 Charlie invests £1200 at a rate of 5% per year compound interest.

Show that the total amount of interest Charlie will have received after 2 years is £123. **[4]**

Year 1 5% of £1200

÷20 (100% of 1200 = 1200 ; 5% of 1200 = £60) ÷20

£60 interest

1200 + 60 = 1260

Year 2 5% of 1260

÷20 (100% of 1260 = 1260 ; 5% of 1260 = £63) ÷20

$\frac{1260}{20} = \frac{126}{2} = 63$

£63 interest

Total interest = £60 + £63

= £123

25 A machine makes bolts that should be 30.0 mm long, correct to 1 decimal place.

Jane checks the accuracy of the machine by taking a random sample of 10 of the bolts.
Here are the lengths, in mm correct to 1 decimal place, of the bolts in Jane's sample.

29.5 29.1 30.0 30.0 30.2 30.0 30.0 30.0 30.5 30.0

The machine makes 2000 of these bolts that day.

Jane says

6 of the 10 bolts in the sample are of the correct length. That is 60%.
Therefore, 1200 of the 2000 bolts will be of the correct length because that is 60%.

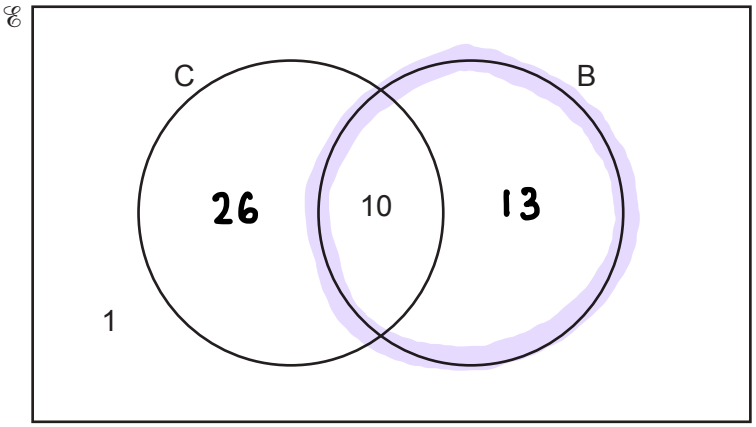
Give a reason why Jane's claim may be unreliable.

Her sample is too small.

..... **[1]**

26 In a survey, 50 people were asked whether they have a car (C) or a bicycle (B).

The Venn diagram shows some of the results.



The ratio of those that **only** have a car to those that **only** have a bicycle is 2 : 1.

One of the 50 people is chosen at random.

Find the probability that they have a **bicycle**.
You must show your working.

$50 - 11 = 39$

C : B

2 : 1 (3 parts)

$39 \div 3 = 13$

×13 ×13

26 : 13

$$\frac{10 + 13}{50} = \frac{23}{50}$$

$\frac{23}{50}$ ..... **[5]**

27 In this question, all lengths are in centimetres.

Not to scale

The area of the rectangle is $70\,\text{cm}^2$.

(a) Show that $x^2 + 5x - 84 = 0$. **[4]**

$A = l \times w$

$70 = (x + 7)(x - 2)$

$70 = x^2 - 2x + 7x - 14$

$70 = x^2 + 5x - 14$

$-70 \qquad -70$

$0 = x^2 + 5x - 84$

$x^2 + 5x - 84 = 0$

(b) (i) Solve by factorising.

$x^2 + 5x - 84 = 0$

-84

$-7 + 12$

$(x + 12)(x - 7) = 0$

$x + 12 = 0$ or $x - 7 = 0$

$-12 \quad -12 \qquad +7 \quad +7$

$x = -12 \qquad x = 7$

(b)(i) $x =$ ..... -12 ..... or $x =$ ..... 7 ..... **[3]**

(ii) Find the length of the longer side of the rectangle.

$x = 7$

(ii) ..... 14 ..... cm **[1]**

END OF QUESTION PAPER

EXTRA ANSWER SPACE

If you need extra space use this lined page. You must write the question numbers clearly in the margin.