MODEL SOLUTIONS

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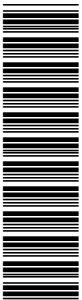
OCR
Oxford Cambridge and RSA

GCSE (9–1) Mathematics
J560/01 Paper 1 (Foundation Tier)
Practice Paper

Date – Morning/Afternoon
Time allowed: 1 hour 30 minutes

You may use:
• A scientific or graphical calculator
• Geometrical instruments
• Tracing paper

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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 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 bar codes.

INFORMATION
• The total mark for this paper is **100**.
• The marks for each question are shown in brackets **[ ]**.
• Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
• This document consists of **24** pages.

Turn over

Answer **all** the questions

1 Leah asked some people about their favourite type of holiday.
The pictogram shows her results.

Beach	▭ ▭ ▭
Walking	▭ ▭ ◻
Cruising	▭ ▭ ▭ ▭ ▭ ◻
Adventure	▭ ▭ ▭ ▭
Sightseeing	▭ ▭ ◻
Other	▭ ▭ ▭ ▫

Key : ▭ represents 4 people.

(a) How many people answered Beach?

$3 \times 4 = 12$

(a) .... 12 .... **[1]**

(b) 10 people answered Sightseeing.

Show this on the pictogram. **[1]**

(c) How many **more** people answered Cruising than Other?

$5\frac{1}{2} \times 4 - 3\frac{1}{4} \times 4 = 9$
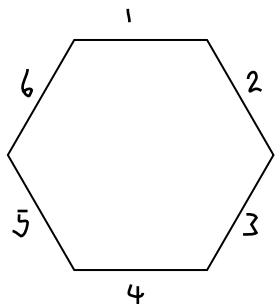
(c) .... 9 .... **[1]**

(d) How many people were asked altogether?

$(3 \times 4) + (2\frac{1}{2} \times 4) + (5\frac{1}{2} \times 4) + (4 \times 4) + (10) + (3\frac{1}{4} \times 4) = 83$
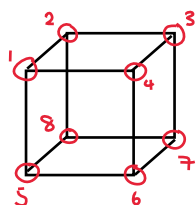
(d) .... 83 .... **[2]**

2 **(a)** Write down the mathematical name of this shape.

= 6 sides so hexagon

(a) .... *hexagon* .... **[1]**

(b) How many vertices does a cube have?

Vertices are corners.

(b) .... *8* .... **[1]**

(c) Sketch an isosceles triangle.

Mark the triangle to show that it is isosceles. **[1]**
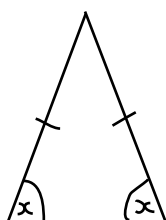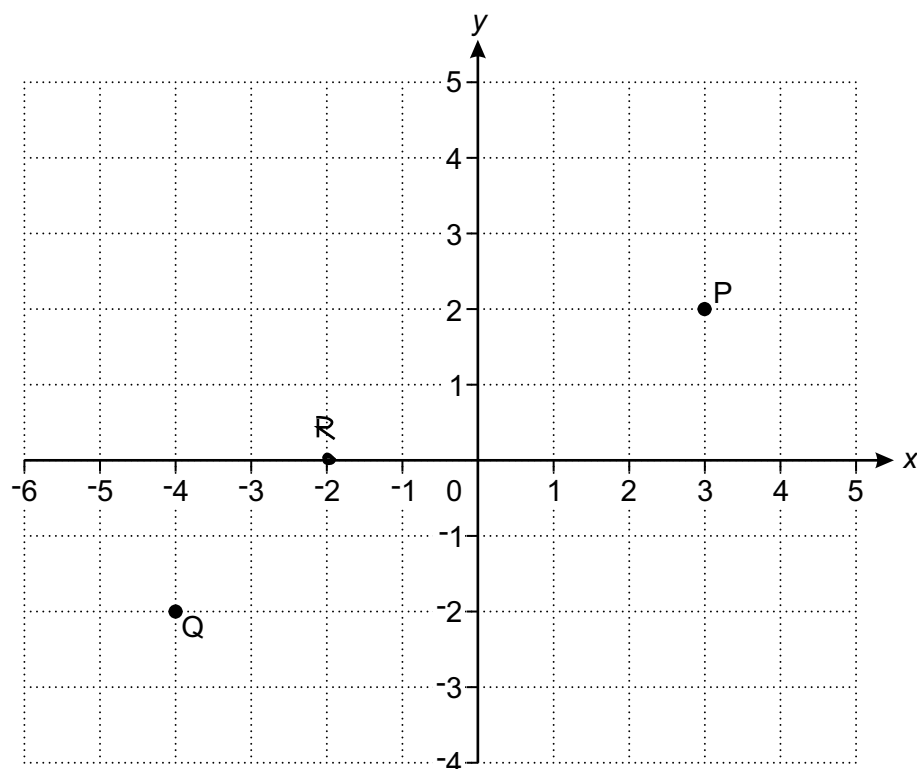
Isosceles: 2 equal sides, 2 equal angles

3 Write the following numbers in order of size, smallest first.

60.6   6.601   6.106   0.6   6.06

0.6   *6.06*   *6.106*   *6.601*   *60.6*

.... **[2]**
smallest

4 Points P and Q are shown on this grid.

(a) **(i)** Write down the coordinates of point P.

(3 across, 2 up from 0)

(a)(i) (....3.... , ...2....) **[1]**

(ii) Write down the coordinates of point Q.

(-4 across, -2 down from 0)

(ii) (....-4.... , ...-2....) **[1]**

(b) Plot point R at (⁻2, 0). **[1]**

(-2 across 0 down from 0)

5 A game is played by rolling a fair ordinary dice and throwing a fair coin.

(a) List all the possible outcomes.

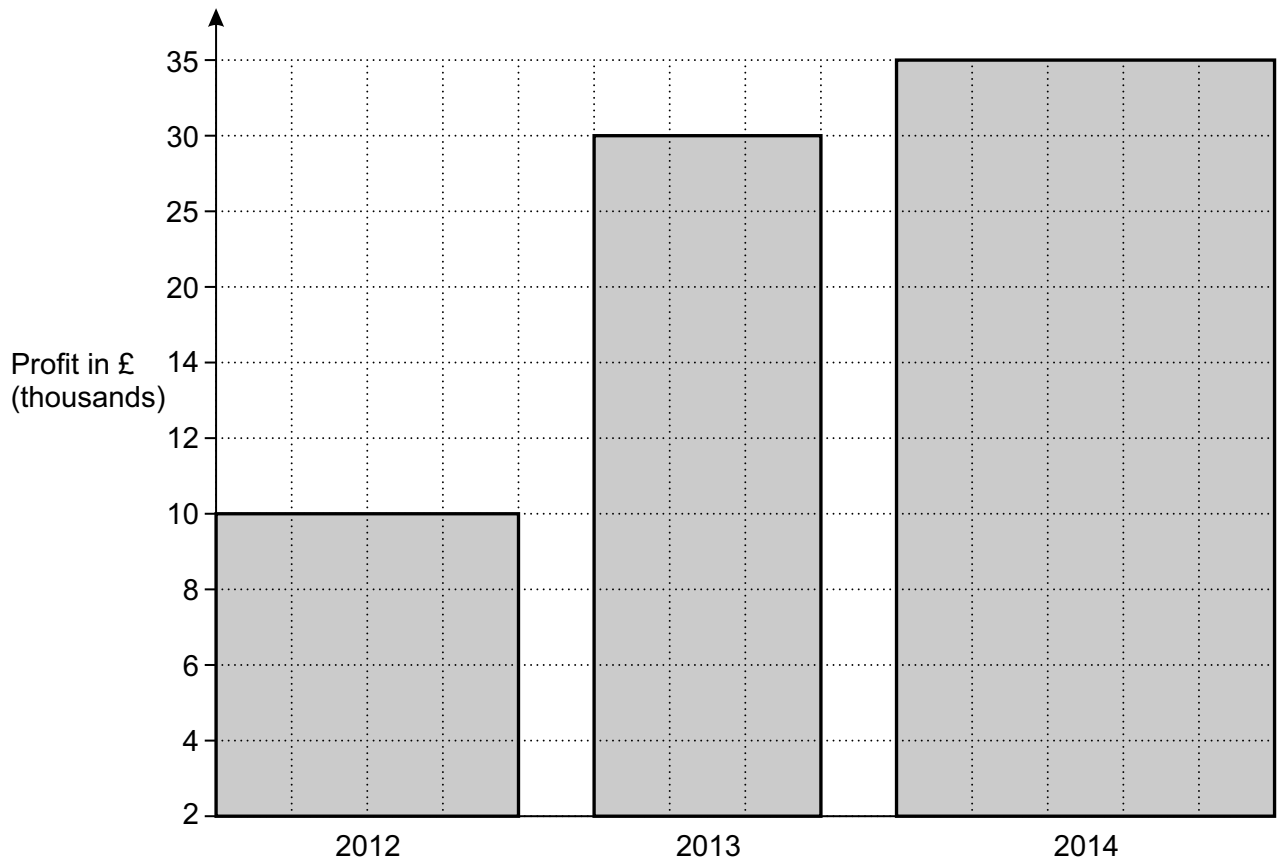| Dice	Coin
1	H
2	H
3	H
4	H
5	H
6	H
1	T
2	T
3	T
4	T
5	T
6	T

H = HEADS
T = TAILS

[2]

(b) Natalie wins if she gets an even number and a head.

What is the probability she wins?

$$\frac{3}{12} = \frac{1}{4}$$

(b) .... $\frac{1}{4}$ .... **[1]**

Turn over

6 This chart shows a firm's profit for each of 3 years.

Give **two** reasons why the chart is misleading.

Reason 1 ....The bars are different widths...

....

Reason 2 ....The scale on the y-axis is not linear...
....Starts in steps of 2 then increases in steps of 5.............. **[2]**

7 **(a)** Simplify.

$$a \times a \times a \times a \times a$$
$$1 \quad 2 \quad 3 \quad 4 \quad 5$$

(a) .... a^5 .... **[1]**

(b) Solve.

$$3x + 7 = 19$$

$$3x + 7 = 19$$
$$-7 \quad 3x = 12 \quad -7$$
$$\div 3 \quad x = 4 \div 3$$

(b) $x =$ .... 4 .... **[2]**

(c) Here is a formula.

$$T = 5r + 3u$$

Work out the value of T when $r = 8$ and $u = 9$.

$$T = 5(r) + 3(u)$$
$$T = 5(8) + 3(9)$$
$$T = (5 \times 8) + (3 \times 9)$$
$$T = 40 + 27$$
$$T = 67$$

(c) .... 67 .... **[2]**

8 **(a)** **(i)** Write 1.85 metres in centimetres.

1m = 100cm, so 1.85 × 100

(a)(i) ....185.................. cm **[1]**

(ii) Write 2086 grams in kilograms.

1kg = 1000g, so 2086 ÷ 1000

(ii) ....2.086................. kg **[1]**

(b) In a box of 12 eggs, 5 are cracked.

What fraction is cracked?

5 out of 12 = $\frac{5}{12}$

(b) ....$\frac{5}{12}$................ **[1]**

(c) **(i)** Write 45 : 15 as a ratio in its simplest form.

÷15 45 : 15 ÷15
     3 : 1

(c)(i) ....3.......... : ....1.......... **[1]**

(ii) Divide 32 in the ratio 5 : 3.

32 ÷ (5 + 3) = 32 ÷ 8
            = 4

4 × 5 = 20
4 × 3 = 12
20 : 12 = 5 : 3

(ii) ....20.......... ....12.......... **[3]**

(d) The price of a watch is £230.
In a sale this price is reduced by 16%.

Calculate the sale price.

100 − 16 = 84% ← 84% = $\frac{84}{100}$ = 0.84
230 × 0.84 = £193.20

(d) £ ....193.20.................. **[3]**

9 (a) Round 27 146 correct to

(i) the nearest ten,

$27\,146 \uparrow 27\,150$

(a)(i) .... 27,150 .... **[1]**

(ii) the nearest thousand.

$27\,146 \downarrow 27\,000$

(ii) .... 27,000 .... **[1]**

(b) The width of a bench, b, is 984.8 cm correct to one decimal place.

Write down the error interval for the width of the bench.

984.75 is the smallest number that rounds up to 984.8
984.849999... is the largest number that rounds down to
984.8.

(b) .... 984.75 .... $\leqslant b <$ .... 985.85 .... **[2]**

(c) (i) Write 856 000 000 in standard form.

$\underline{8.56} \times 10^{\underline{8}}$ 8 places to the left

number
1-10

(c)(i) .... 8.56×10^8 .... **[1]**

(ii) Write 4.31×10^{-3} as an ordinary number.

0.00431 (moves 3 places to the right)

(ii) .... 0.00431 .... **[1]**

(d) Work out.

$\sqrt[3]{27} + \sqrt{25}$ $= 3 + 5$
                               $= 8$

(d) .... 8 .... **[2]**

Turn over

10 (a) Write down a factor of 15.

$1 \times 15 = 15$
$3 \times 5 = 15$

(a) .... 3 .... **[1]**

(b) Write 360 as the product of its prime factors.

360
2 / 180
2 / 90
2 / 45
5 / 9
3 / 3

$360 = 2 \times 2 \times 2 \times 5 \times 3 \times 3$
$= 2^3 \times 3^2 \times 5$
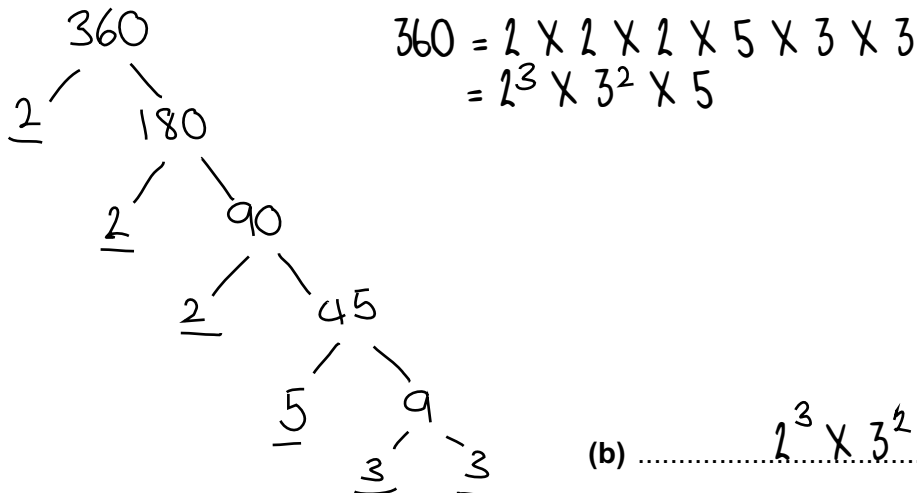
(b) .... $2^3 \times 3^2 \times 5$ .... **[2]**

(c) Gary's alarm and Ian's alarm both bleep at 7:50 am.
Then Gary's alarm bleeps every 6 minutes and Ian's alarm bleeps every 4 minutes.

What is the next time both alarms bleep together?

$6 = 2 \times 3$ and $4 = 2 \times 2$

(write 6 and 4 as products of their prime factors)

6 ⟨3⟩ ⟨2⟩ ⟨2⟩ 4
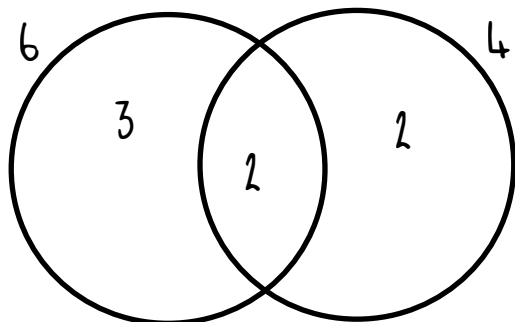
$LCM = 6 \cup 4 = 3 \times 2 \times 2$
$= 12$ minutes

7:50am + 12 minutes = 8:02am

(c) .... 8:02am .... **[4]**

11 (a) Put brackets in these calculations to make them correct.

(i) $5 - 3 \times 12 \div 4 = 6$ **[1]**

$(5-3) \times 12 \div 4 = 6$ BIDMAS

(ii) $6 \times 4 + 3^2 - 5 = 289$ **[1]**

$6 \times (4 + 3)^2 - 5 = 289$ BIDMAS

(b) Calculate.

$$\frac{7.5 \times 3.4}{15.2 - 12.8}$$

Give your answer correct to 2 decimal places.

$$\frac{7.5 \times 3.4}{15.2 - 12.8} = \frac{25.5}{2.4}$$
$$= 10.625$$
$$= 10.63 \text{ 2dp}$$

(b) .... 10.63 .... **[2]**

12 Katy organised a wedding.
Guests had to choose their meal from pasta, chicken or beef.

- $\frac{1}{3}$ of the guests chose pasta.

- $\frac{5}{12}$ of the guests chose chicken.

- 24 of the guests chose beef.

How many guests were at the wedding?

$1 - (\frac{1}{3} + \frac{5}{12}) = \frac{1}{4}$
(All fractions must sum to 1.)

$\frac{1}{4}$ of the guests = 24 guests
Number of guests = 24 × 4
= 96

................................96................................ **[4]**

13 Bridget took a maths test. She scored 28 marks out of 40.
Sam took an English test. He scored 32 marks out of 47.

Sam said

I did better than Bridget as I scored more marks.

By writing each score as a percentage, show that Sam is wrong. **[3]**

$$\text{Bridget} = \frac{28}{40} \times 100 = 70\%$$

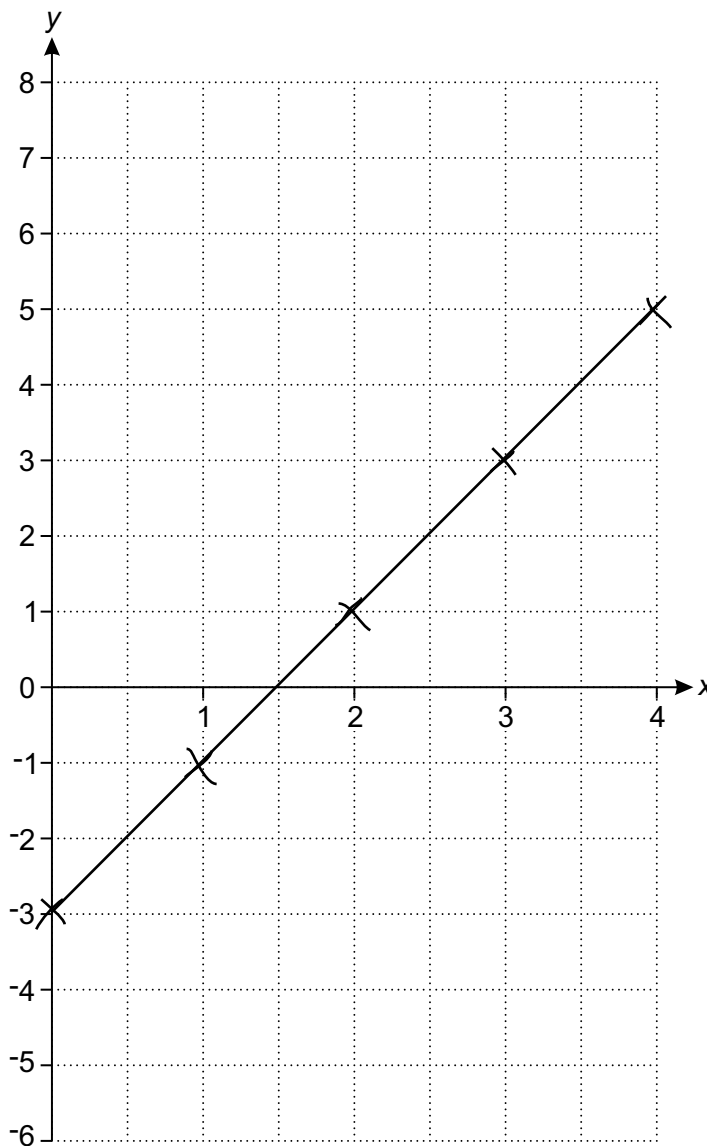$$\text{Sam} = \frac{32}{47} \times 100 = 68.1\%$$

$$70\% > 68.1\%$$

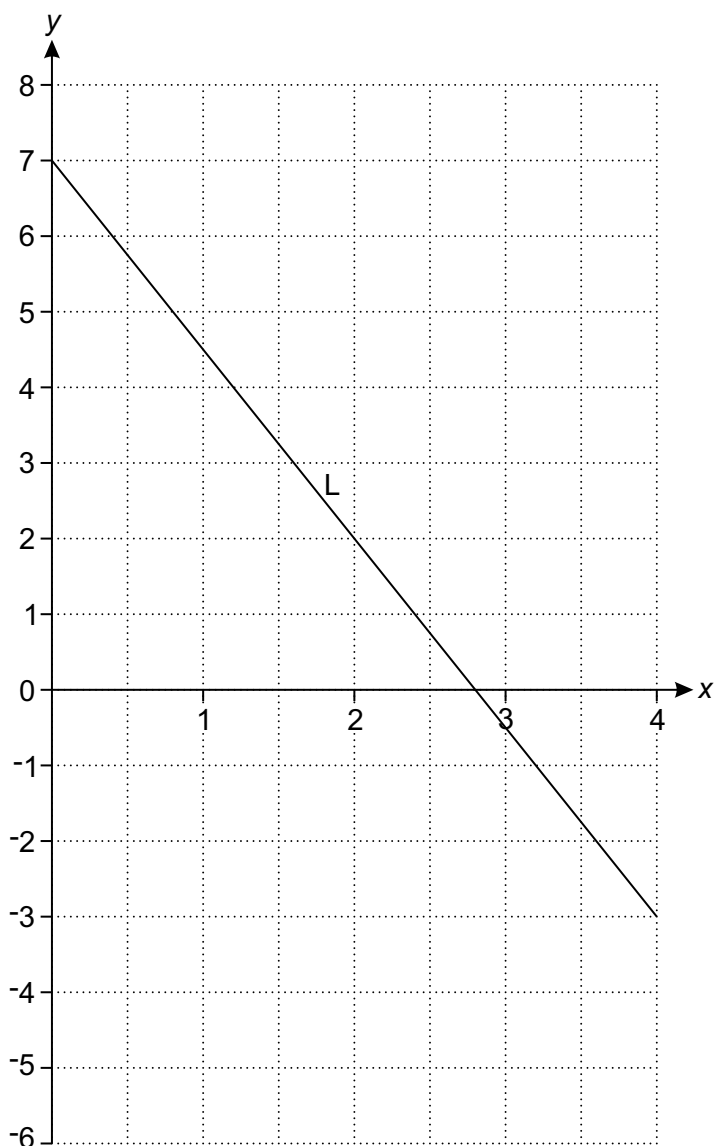**14 (a)** Complete this table for $y = 2x - 3$.

x	0	1	2	3	4
y	-3	-1	1	3	5

[1]

(b) On the grid below, draw the graph of $y = 2x - 3$ for values of x from 0 to 4.

[2]

(c) Line L is drawn on the grid below.

Work out the equation of line L.

gradient $= \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{7 - (-3)}{0 - 4} = -\dfrac{5}{2}$ *using the points (0,7) and (4,-3)*

$y = mx + c$

$7 = -\dfrac{5}{2} \times 0 + c$ *find c by sub in the gradient, m and the point (0,7)*

$7 = c$

$y = -\dfrac{5}{2}x + 7$

(c) $y = -\dfrac{5}{2}x + 7$ .... **[3]**

15 Eddie and Caroline are going to the school play.

Eddie buys 6 adult tickets and 2 child tickets. He pays £39.
Caroline buys 5 adult tickets and 3 child tickets. She pays £36.50.

Work out the cost of an adult ticket and the cost of a child ticket.

a = adult ticket, c = child ticket.

$6a + 2c = 39$ (×3) $18a + 6c = 117$ ①   make the coefficients of the
$5a + 3c = 36.5$ (×2) $\underline{10a + 6c = 73}$ ②   c terms equal.

$\qquad\qquad\qquad\qquad 8a \qquad = 44$
$\qquad\qquad\qquad\qquad a = £5.50$

$6(£5.50) + 2c = £39$ sub adult ticket = £5.50 into ①
$\qquad £33 + 2c = £39$
$\qquad\quad^{-33}\ 2c = £6\ ^{-33}$
$\qquad\quad^{÷2}c = £3\ ^{÷2}$

Adult ticket £ ....5.50.....................

Child ticket £ ....3..................... **[5]**

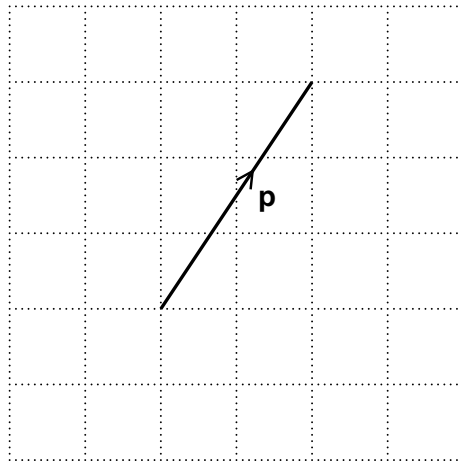**16** Show that $3r = 2(5k^2 - 2r)$ can be rearranged to $k = \sqrt{\dfrac{7r}{10}}$. **[4]**

$$3r = 2(5k^2 - 2r)$$
$$3r = 10k^2 - 4r$$
$$+4r \quad 7r = 10k^2 + 4r$$
$$\div 10 \quad \frac{7r}{10} = k^2 \div 10$$
$$\sqrt{\frac{7r}{10}} = k$$

Turn over

17 (a) Vector **p** is shown on a unit grid.

Write **p** as a column vector.

2 right across, 3 up

(a) $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ **[1]**

(b) $\mathbf{q} = \begin{pmatrix} -2 \\ 4 \end{pmatrix}$ $\mathbf{r} = \begin{pmatrix} 5 \\ -3 \end{pmatrix}$

Work out **q + r**.

$$\begin{pmatrix} -2 \\ 4 \end{pmatrix} + \begin{pmatrix} 5 \\ 3 \end{pmatrix} = \begin{pmatrix} -2 + 5 \\ 4 + (-3) \end{pmatrix}$$

$$= \begin{pmatrix} 3 \\ 1 \end{pmatrix}$$

(b) $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ **[2]**

18 A shop has a sale that offers 20% off all prices.
On the final day they reduce all sale prices by 25%.
Alex buys a hairdryer on the final day.

Work out the **overall** percentage reduction on the price of the hairdryer.

$100 - 20 = 80\%$
$100 - 25 = 75\%$

$80\% = \dfrac{80}{100} = 0.8$

$0.8 \times 0.75 = 0.6$
$1 - 0.6 = 0.4$
$\quad\quad = 40\%$

................40................ % **[6]**

19 Some of the children at a nursery arrive by car.

- 40% of the children at the nursery are boys.
- 70% of the boys at the nursery arrive by car.
- 60% of the girls at the nursery arrive by car.

What is the probability that a child chosen at random from the nursery arrives by car?

girls = 100 − 40 = 60%   60% = $\frac{60}{100}$ = 0·6

0.4 X 0.7 + 0.6 X 0.6 = 0.64
(and)   (or)   (and)

0.64 .... **[5]**

20 The rectangle ABCD represents a park.

Not to scale
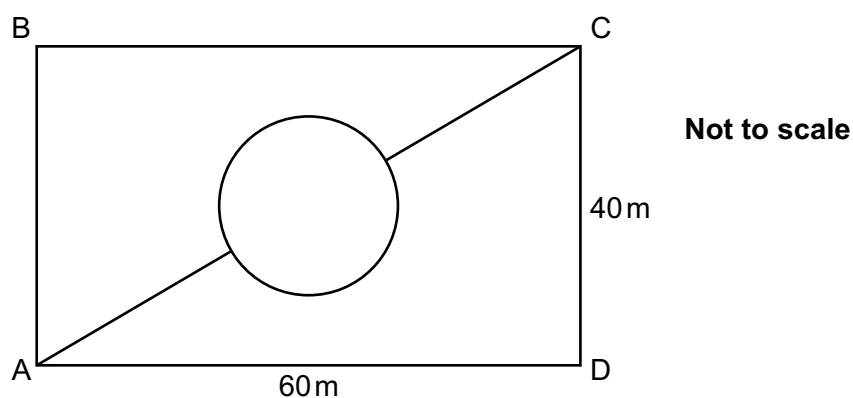
The lines show all the paths in the park.
The circular path is in the centre of the rectangle and has a diameter of 10 m.

Calculate the shortest distance from A to C across the park, using only the paths shown.

$$\sqrt{40^2 + 60^2} = 20\sqrt{13}$$

$$20\sqrt{13} - 10 = 20\sqrt{13} - 10$$

$$\frac{1}{2} \times \pi \times 10 = 5$$

$$20\sqrt{13} - 10 + 5\pi = 77.8m$$

....77.8.. m **[6]**

21 Four solid balls are packed in a cylindrical container.
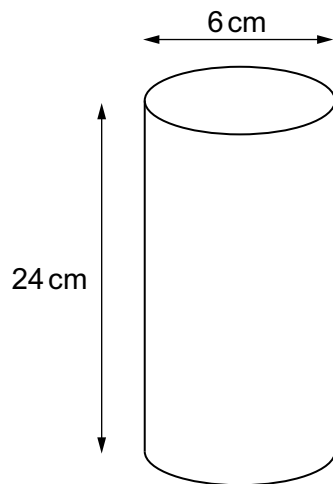
The diameter of each ball is 6 cm.
The cylinder has diameter 6 cm and height 24 cm.

Calculate the volume of unused space in the cylinder.

[The volume V of a sphere is $V = \frac{4}{3}\pi r^3$ where r is the radius.]

$r = \frac{6}{2} = 3$

V of balls $= 4 \times \frac{4}{3} \times \pi \times 3^3$
$\qquad = 144\pi \text{ cm}^3$

V of cylinder $=$ cross-sectional area $\times$ height
$\qquad = \pi \times 3^2 \times 24$
$\qquad = 216\pi \text{ cm}^3$

$216\pi - 144\pi = 72\pi$
$\qquad = 226 \text{ cm}^3$

.................226................. cm³ **[6]**

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