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Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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0731247115

MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Geometrical instruments
Tracing paper (optional).

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

This document consists of **19** printed pages and **1** blank page.

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1 **(a)** In 2016, a company sold 9600 cars, correct to the nearest hundred.

(i) Write down the lower bound for the number of cars sold.

..... [1]

(ii) The average profit on each car sold was $2430, correct to the nearest $10.

Calculate the lower bound for the total profit.
Write down the exact answer.

$..... [2]

(iii) Write your answer to **part (a)(ii)** correct to 4 significant figures.

$..... [1]

(iv) Write your answer to **part (a)(iii)** in standard form.

$..... [1]

(b) In April, the number of cars sold was 546.
This was an increase of 5% on the number of cars sold in March.

Calculate the number of cars sold in March.

..... [3]

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(c) The price of a new car grows exponentially by 3% per year.
A new car has a price of $3000 in 2013.

Find the price of a new car 4 years later.

$..... [2]

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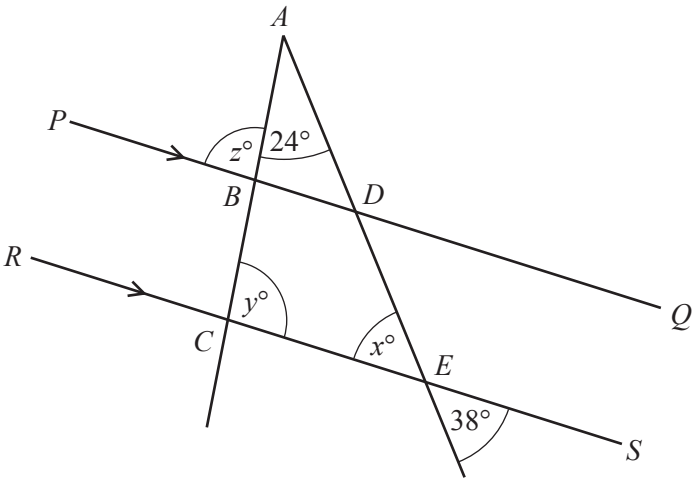
2 (a)



NOT TO SCALE

PQ is parallel to *RS*.
ABC and *ADE* are straight lines.

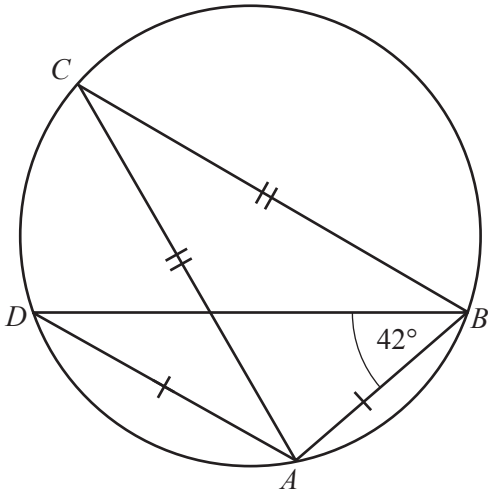
Find the values of x, y and z.

x = ...

y = ...

z = ... [3]

(b)



NOT TO SCALE

The points *A*, *B*, *C* and *D* lie on the circumference of the circle.
$AB = AD$, $AC = BC$ and angle $ABD = 42°$.

Find angle *CAB*.

Angle *CAB* = ... [3]

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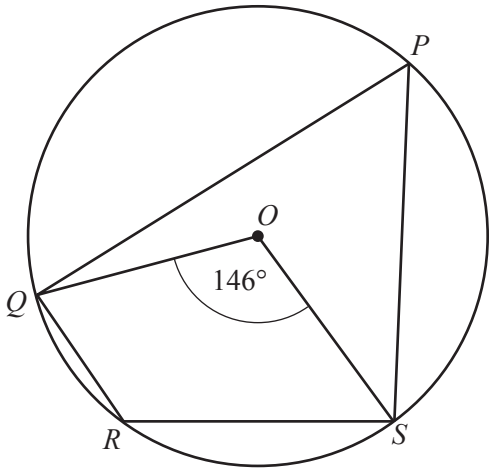
(c)



NOT TO SCALE

The points P, Q, R and S lie on the circumference of the circle, centre O.
Angle $QOS = 146°$.

Find angle QRS.

Angle QRS = ... [2]

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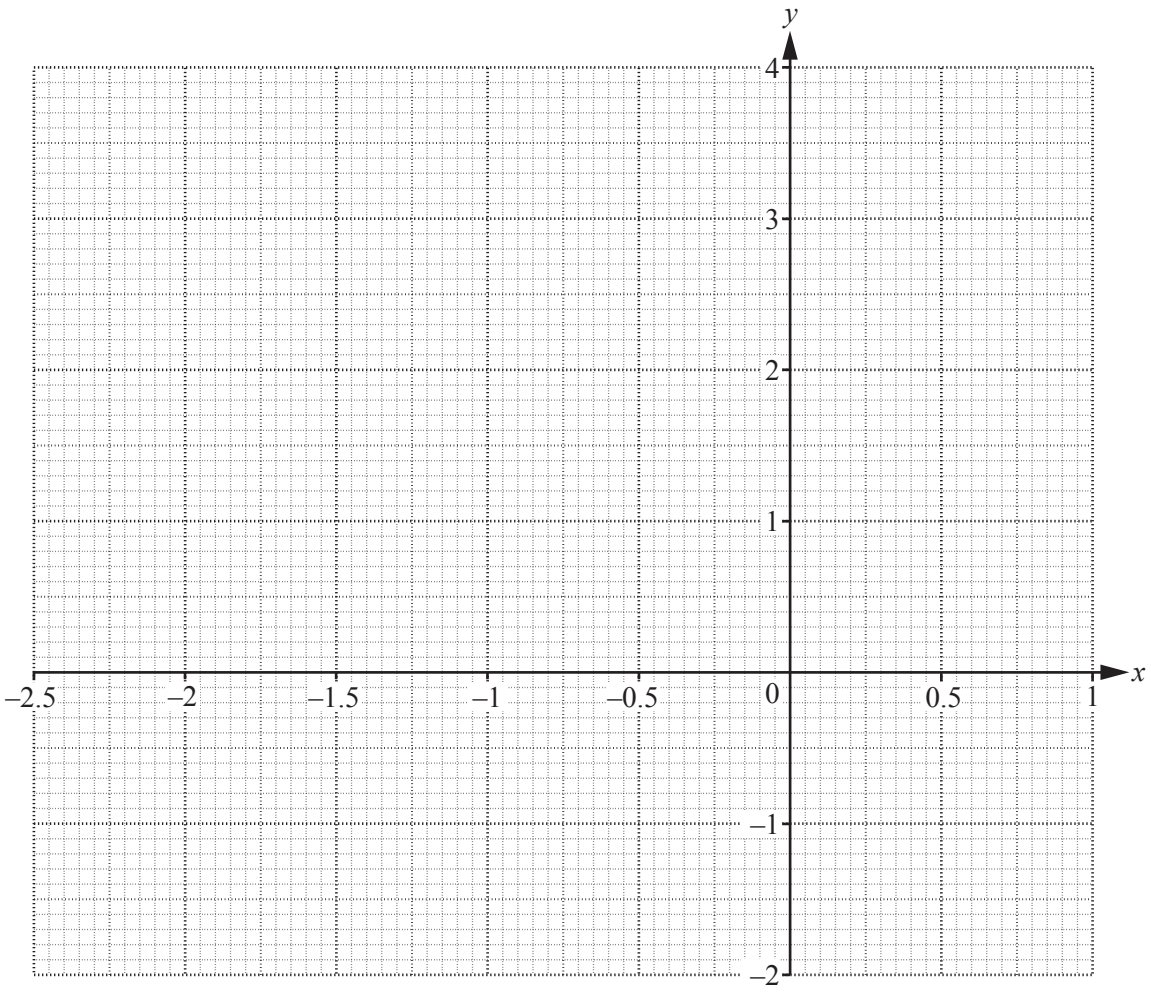
3 The table shows some values for $y = 2x^3 + 4x^2$.

x	–2.2	–2	–1.5	–1	–0.5	0	0.5	0.8
y	–1.94				0.75	0		3.58

(a) Complete the table. [4]

(b) Draw the graph of $y = 2x^3 + 4x^2$ for $-2.2 \leqslant x \leqslant 0.8$.



[4]

(c) Find the number of solutions to the equation $2x^3 + 4x^2 = 3$.

..... [1]

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(d) **(i)** The equation $2x^3 + 4x^2 - x = 1$ can be solved by drawing a straight line on the grid.

Write down the equation of this straight line.

$y =$ ..... [1]

(ii) Use your graph to solve the equation $2x^3 + 4x^2 - x = 1$.

$x =$ ..... or $x =$ ..... or $x =$ .....[3]

(e) The tangent to the graph of $y = 2x^3 + 4x^2$ has a negative gradient when $x = k$.

Complete the inequality for k.

..... $< k <$ .....[2]

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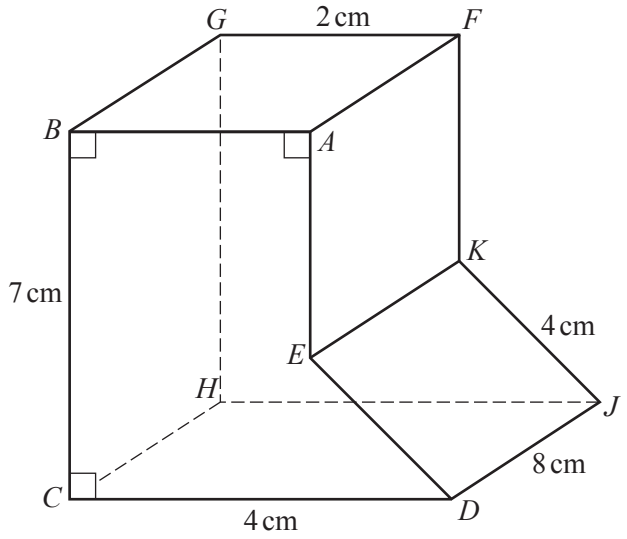
4 **(a)** The diagram shows a solid metal prism with cross section *ABCDE*.



(i) Calculate the area of the cross section *ABCDE*.

.....cm^2 [6]

(ii) The prism is of length 8 cm.

Calculate the volume of the prism.

.....cm^3 [1]

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(b) A cylinder of length 13 cm has volume 280 cm^3.

(i) Calculate the radius of the cylinder.

..... cm [3]

(ii) The cylinder is placed in a box that is a cube of side 14 cm.

Calculate the percentage of the volume of the box that is occupied by the cylinder.

.....% [3]

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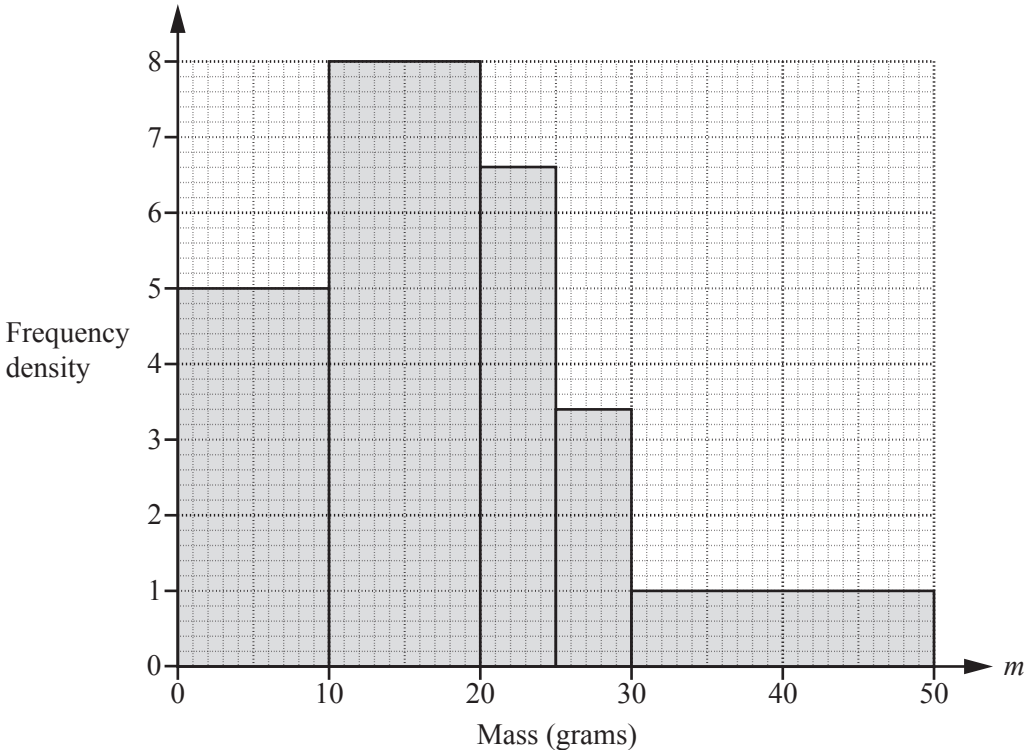
5 **(a)** Haroon has 200 letters to post.
The histogram shows information about the masses, m grams, of the letters.



(i) Complete the frequency table for the 200 letters.

Mass (m grams)	$0 < m \leqslant 10$	$10 < m \leqslant 20$	$20 < m \leqslant 25$	$25 < m \leqslant 30$	$30 < m \leqslant 50$
Frequency	50			17	

[3]

(ii) Calculate an estimate of the mean mass.

..... g [4]

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(b) Haroon has 15 parcels to post.
The table shows information about the sizes of these parcels.

Size	Small	Large
Frequency	9	6

Two parcels are selected at random.

Find the probability that

(i) both parcels are large,

..... [2]

(ii) one parcel is small and the other is large.

..... [3]

(c) The probability that a parcel arrives late is $\frac{3}{80}$.
4000 parcels are posted.

Calculate an estimate of the number of parcels expected to arrive late.

..... [1]

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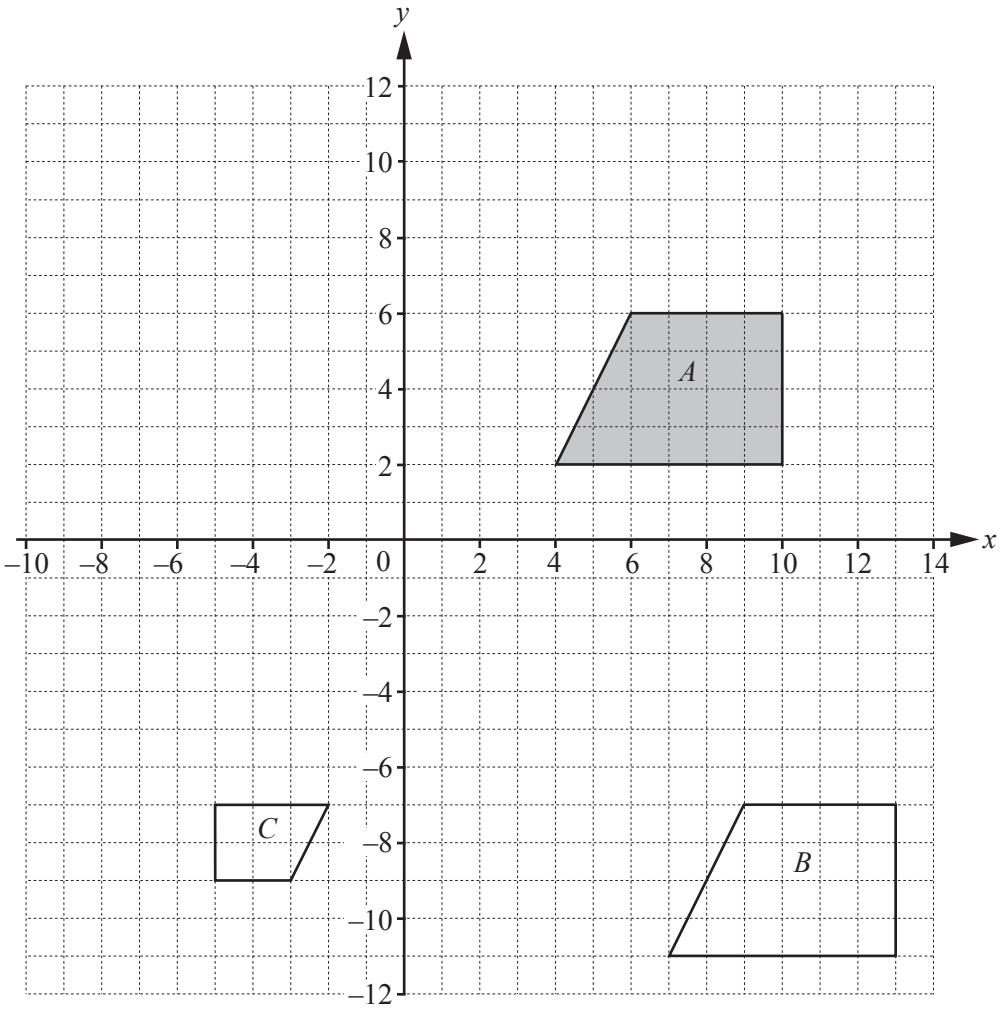
6



(a) Describe fully the **single** transformation that maps shape *A* onto

(i) shape *B*,

.....

..... [2]

(ii) shape *C*.

.....

..... [3]

(b) Draw the image of shape *A* after rotation through 90° anticlockwise about the point (3, −1). [2]

(c) Draw the image of shape *A* after reflection in $y = 1$. [2]

(d) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$.

.....

..... [3]

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7 **(a)** Solve the simultaneous equations.
You must show all your working.

$$2x + 3y = 11$$
$$3x - 5y = -50$$

$x =$ .....

$y =$ ..... [4]

(b) $x^2 - 12x + a = (x + b)^2$

Find the value of a and the value of b.

$a =$ .....

$b =$ ..... [3]

(c) Write as a single fraction in its simplest form.

$$\frac{x}{2x-5} + \frac{3x+2}{x-1}$$

..... [4]

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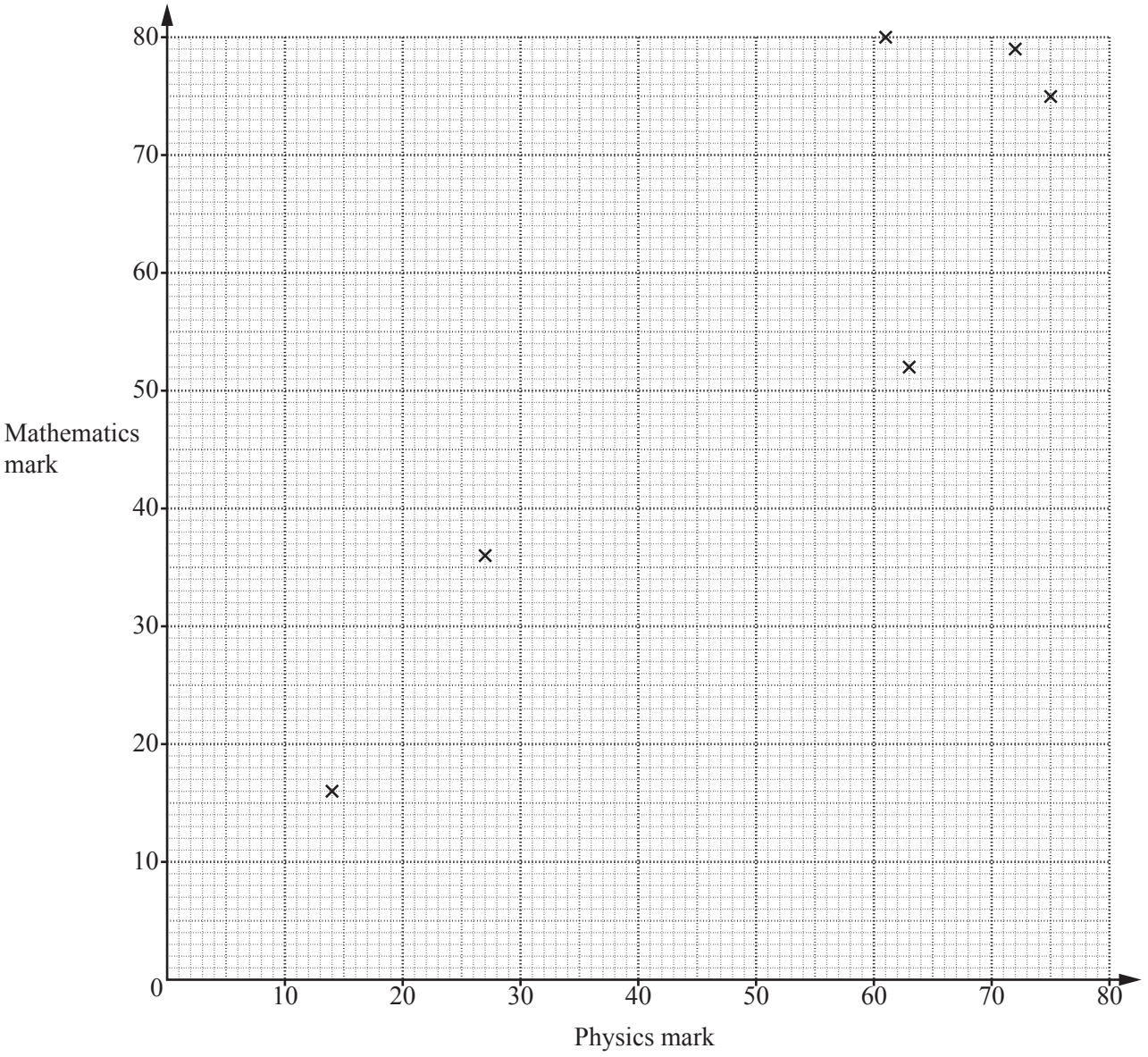
8 **(a)** The table shows the marks gained by 10 students in their physics test and their mathematics test.

Physics mark	63	61	14	27	72	75	44	40	28	50
Mathematics mark	52	80	16	36	79	75	51	35	24	63

(i) Complete the scatter diagram below.
The first six points have been plotted for you.



[2]

(ii) What type of correlation is shown in the scatter diagram?

..... [1]

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(b) The marks of 30 students in a spelling test are shown in the table below.

Mark	0	1	2	3	4	5
Frequency	2	4	5	5	6	8

Find the mean, median, mode and range of these marks.

Mean = ...

Median = ...

Mode = ...

Range = ... [7]

(c) The table shows the marks gained by some students in their English test.

Mark	52	75	91
Number of students	x	45	11

The mean mark for these students is 70.3 .

Find the value of x.

x = ... [3]

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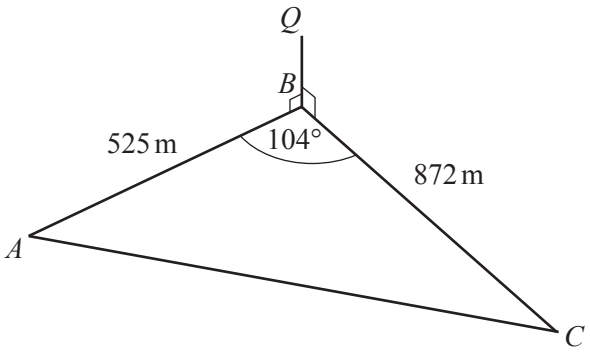
9



NOT TO SCALE

ABC is a triangular field on horizontal ground.
There is a vertical pole *BQ* at *B*.
AB = 525 m, *BC* = 872 m and angle *ABC* = 104°.

(a) Use the cosine rule to calculate the distance *AC*.

AC = ... m [4]

(b) The angle of elevation of *Q* from *C* is 1.0°.

Showing all your working, calculate the angle of elevation of *Q* from *A*.

..... [4]

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(c) **(i)** Calculate the area of the field.

..... m^2 [2]

(ii) The field is drawn on a map with the scale 1 : 20 000.

Calculate the area of the field on the map in cm^2.

.....cm^2 [2]

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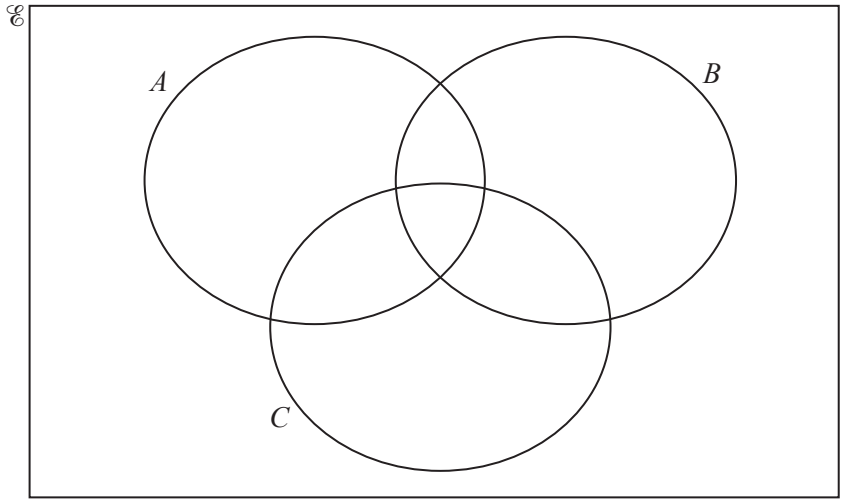
10 $\mathscr{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
$A = \{ x : x \text{ is a multiple of } 3\}$
$B = \{ x : x \text{ is prime}\}$
$C = \{ x : x \leqslant 25\}$

(a) Complete the Venn diagram.



[4]

(b) Use set notation to complete the statements.

(i) 26 ..... B [1]

(ii) $A \cap B =$ ..... [1]

(c) List the elements of $B \cup (C \cap A)$.

..... [2]

(d) Find

(i) n(C),

..... [1]

(ii) $n(B' \cup (B \cap C))$.

..... [1]

(e) $(A \cap C)$ is a subset of $(A \cup C)$.

Complete this statement using set notation.

$(A \cap C)$ ..... $(A \cup C)$ [1]

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11 The table shows the first four terms in sequences A, B, C and D.

Complete the table.

Sequence	1st term	2nd term	3rd term	4th term	5th term		nth term
A	16	25	36	49			
B	5	8	11	14			
C	11	17	25	35			
D	$\frac{3}{2}$	$\frac{4}{3}$	$\frac{5}{4}$	$\frac{6}{5}$			

[12]

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