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Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

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9926605767

MATHEMATICS **0580/42**

Paper 4 (Extended) **February/March 2019**

2 hours 30 minutes

Candidates answer on the Question Paper.

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

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 Amol and Priya deliver 645 parcels in the ratio Amol : Priya = 11 : 4.

(a) Calculate the number of parcels Amol delivers.

..... [2]

(b) Amol drives his truck at an average speed of 50 km/h.
He leaves at 07 00 and arrives at 11 15.

Calculate the distance he drives.

..... km [2]

(c) Priya drives her van a distance of 54 km.
She leaves at 10 55 and arrives at 12 38.

Calculate her average speed.

..... km/h [3]

(d) Priya has 50 identical parcels.
Each parcel has a mass of 17 kg, correct to the nearest kilogram.

Find the upper bound for the total mass of the 50 parcels.

..... kg [1]

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(e) 67 of the 645 parcels are damaged on the journey.

Calculate the percentage of parcels that are damaged.

..... % [1]

(f) **(i)** 29 parcels each have a value of $68.

By writing each of these numbers correct to 1 significant figure, find an estimate for the total value of these 29 parcels.

$ ..... [1]

(ii) Without doing any calculation, complete this statement.

The actual total value of these 29 parcels is less than the answer to **part (f)(i)**

because ..... [1]

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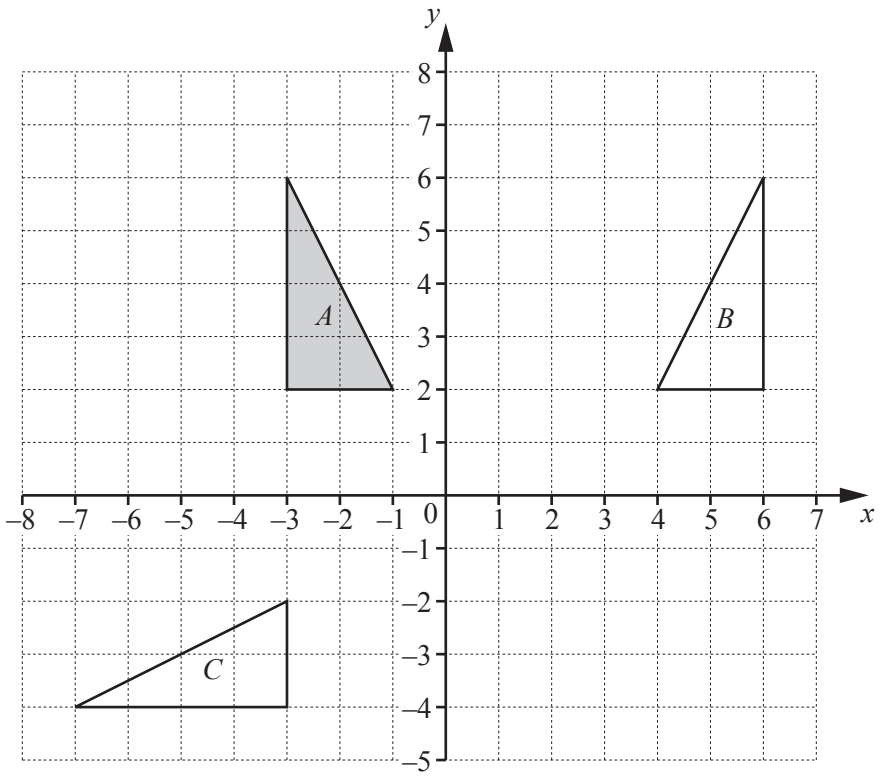
2



(a) Describe fully the **single** transformation that maps

(i) triangle A onto triangle B,

.....

..... [2]

(ii) triangle A onto triangle C.

.....

..... [3]

(b) On the grid, draw the image of

(i) triangle A after an enlargement, scale factor $-\frac{1}{2}$, centre (3, 0), [2]

(ii) triangle A after a translation by the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$, [2]

(iii) triangle A after the transformation that is represented by the matrix $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

[3]

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3 Sushila, Ravi and Talika each have a bag of balls.
Each of the bags contains 10 red balls and 8 blue balls.

(a) Sushila takes one ball at random from her bag.

Find the probability that she takes a red ball.

..... [1]

(b) Ravi takes two balls at random from his bag, without replacement.

Find the probability that one ball is red and one ball is blue.

..... [3]

(c) Talika takes three balls at random from her bag, without replacement.

Calculate the probability that the three balls are the same colour.

..... [4]

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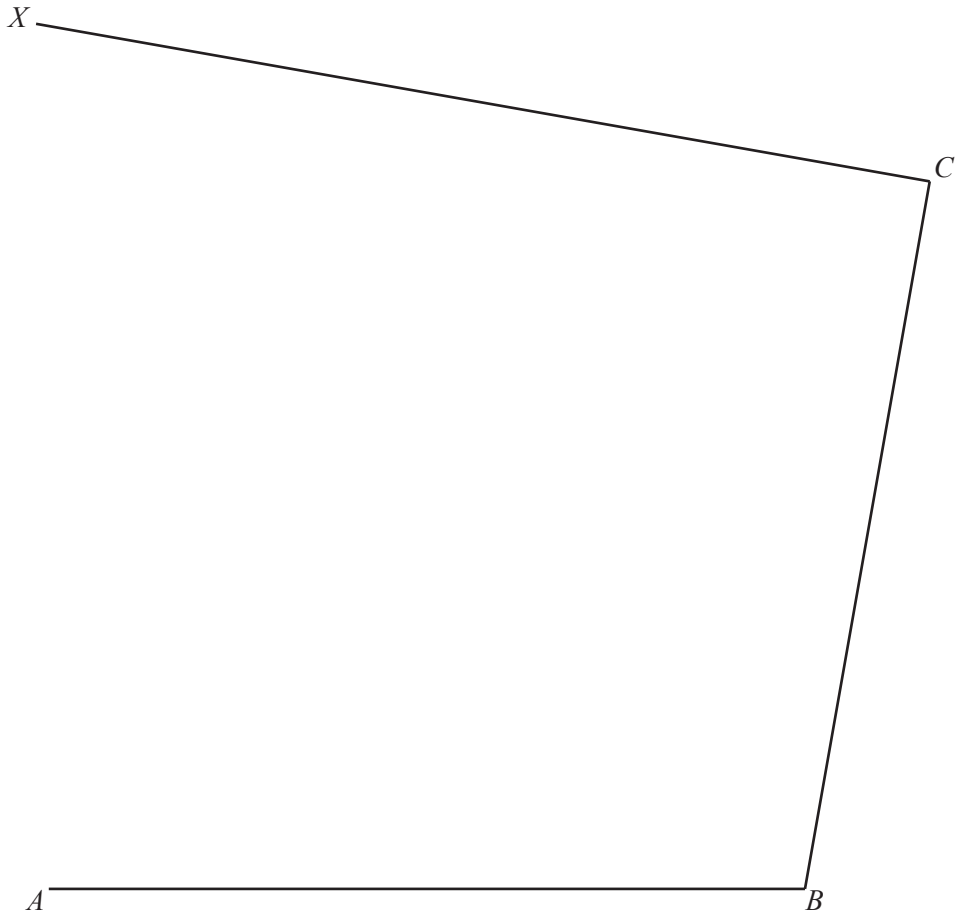
4 The diagram shows an incomplete scale drawing of a market place, *ABCD*, where *D* is on *CX*.
The scale is 1 centimetre represents 5 metres.



Scale : 1 cm to 5 m

D lies on *CX* such that angle $DAB = 75°$.

(a) On the diagram, draw the line *AD* and mark the position of *D*. [2]

(b) Find the actual length of the side *BC* of the market place.

..... m [2]

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(c) In this part, use a ruler and compasses only.

Street sellers are allowed in the part of the market place that is

- more than 35 metres from A

and

- nearer to C than to B

and

- nearer to CD than to BC.

On the diagram, construct and shade the region where street sellers are allowed. [7]

(d) Write the scale of the drawing in the form $1 : n$.

1 : ..... [1]

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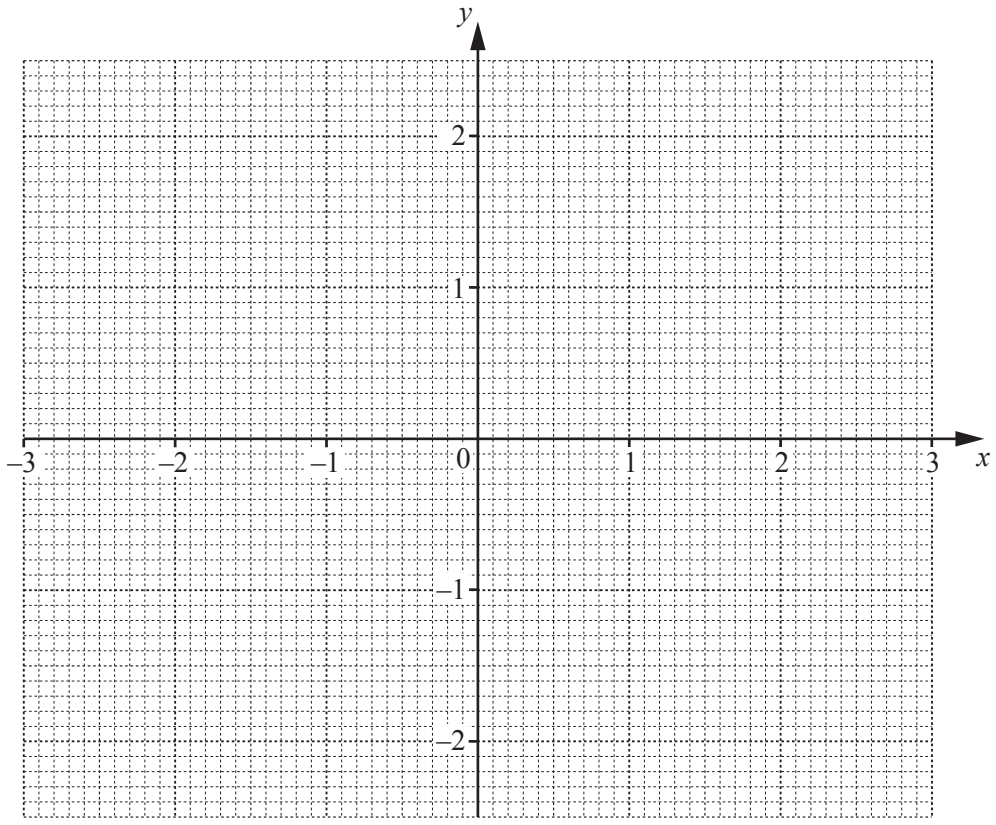
5 The table shows some values for $y = \frac{3}{10}x^3 - 2x$ for $-3 \leqslant x \leqslant 3$.

x	−3	−2	−1.5	−1	0	1	1.5	2	3
y			2.0	1.7	0		−2.0	−1.6	

(a) Complete the table. [3]

(b) On the grid, draw the graph of $y = \frac{3}{10}x^3 - 2x$ for $-3 \leqslant x \leqslant 3$.



[4]

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(c) On the grid opposite, draw a suitable straight line to solve the equation $\frac{3}{10}x^3 - 2x = \frac{1}{2}(1-x)$ for $-3 \leqslant x \leqslant 3$.

$x =$ ..... or $x =$ ..... or $x =$ ..... [4]

(d) For $-3 \leqslant x \leqslant 3$, the equation $\frac{3}{10}x^3 - 2x = 1$ has n solutions.

Write down the value of n.

$n =$ ..... [1]

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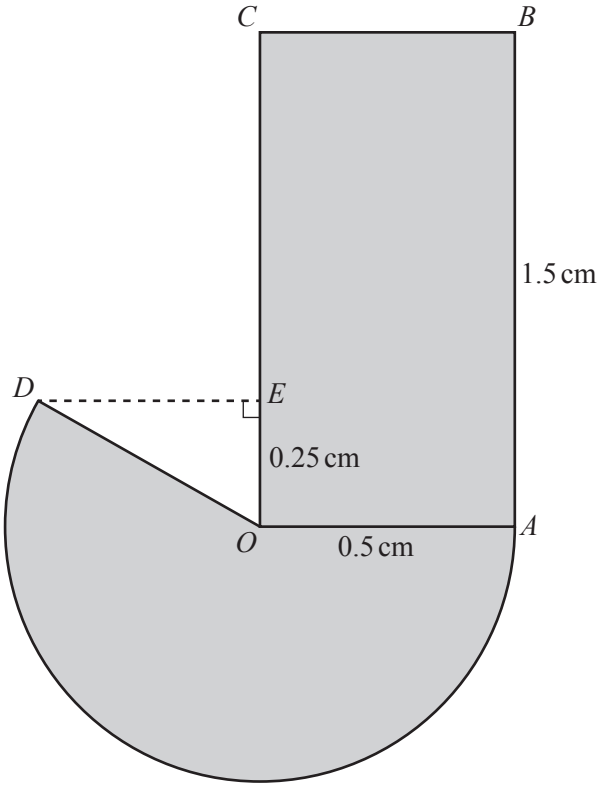
6



NOT TO SCALE

The diagram shows a company logo made from a rectangle and a major sector of a circle.
The circle has centre O and radius OA.
$OA = OD = 0.5$ cm and $AB = 1.5$ cm.
E is a point on OC such that $OE = 0.25$ cm and angle $OED = 90°$.

(a) Calculate the perimeter of the logo.

..... cm [5]

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(b) Calculate the area of the logo.

..... cm^2 [3]

(c) A mathematically similar logo is drawn.
The area of this logo is $77.44\,cm^2$.

(i) Calculate the radius of the major sector in this logo.

..... cm [3]

(ii) A gold model is made.
This model is a prism with a cross-section of area $77.44\,cm^2$.

This gold model is 15 mm thick.
One cubic centimetre of gold has a mass of 19 grams.

Calculate the mass of the gold model in kilograms.

..... kg [3]

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7 **(a)** 20 students each record the mass, p grams, of their pencil case.
The table below shows the results.

Mass (p grams)	$0 < p \leqslant 50$	$50 < p \leqslant 100$	$100 < p \leqslant 125$	$125 < p \leqslant 150$	$150 < p \leqslant 200$
Frequency	2	5	4	6	3

(i) Calculate an estimate of the mean mass.

..... g [4]

(ii) Use the frequency table above to complete the cumulative frequency table.

Mass (p grams)	$p \leqslant 50$	$p \leqslant 100$	$p \leqslant 125$	$p \leqslant 150$	$p \leqslant 200$
Cumulative frequency					20

[2]

(iii) A student is chosen at random.

Find the probability that this student has a pencil case with a mass greater than 150 g.

..... [1]

(b) Some students each record the mass, m kg, of their school bag.
Adil wants to draw a histogram to show this information.

Complete the table below.

Mass (m kg)	$0 < m \leqslant 4$	$4 < m \leqslant 6$	$6 < m \leqslant 7$	$7 < m \leqslant 10$
Frequency	32			42
Height of bar on histogram (cm)	1.6	2	1.2	2.8

[2]

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(c) The frequency table below shows information about the number of books read by some students in a reading marathon.

Number of books read	1	2	3	4	5	6	7	8
Frequency	2	2	16	10	9	4	x	2

(i) The mean number of books read is 4.28 .

Find the value of x.

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

(ii) Write down the mode.

..... [1]

(iii) Write down the median.

..... [1]

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8 $f(x) = \frac{3}{x+2}$, $x \neq -2$ $\quad$ $g(x) = 8x - 5$ $\quad$ $h(x) = x^2 + 6$

(a) Work out $g\left(\frac{1}{4}\right)$.

..... [1]

(b) Work out $ff(2)$.

..... [2]

(c) Find $gg(x)$, giving your answer in its simplest form.

..... [2]

(d) Find $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [2]

(e) Write $g(x) - f(x)$ as a single fraction in its simplest form.

..... [3]

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(f) **(i)** Show that $\text{hg}(x) = 19$ simplifies to $16x^2 - 20x + 3 = 0$.

[3]

(ii) Use the quadratic formula to solve $16x^2 - 20x + 3 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

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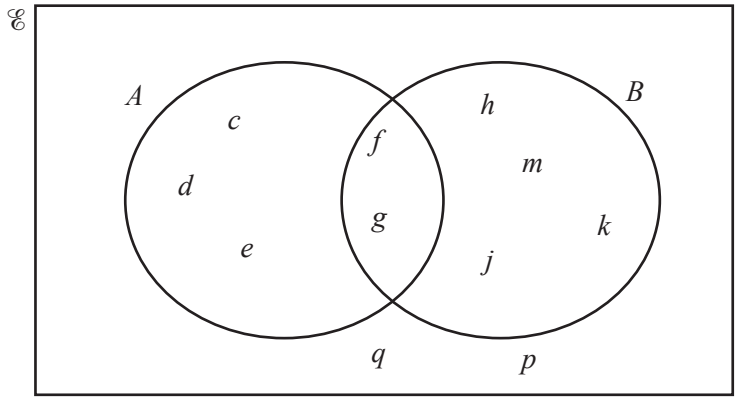
9 **(a)** The Venn diagram shows two sets, A and B.



(i) Use set notation to complete the statements.

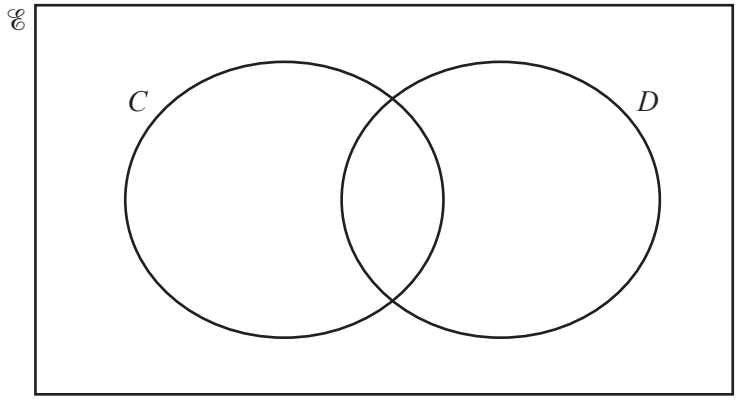
(a) d ..... A [1]

(b) $\{f, g\}$ = ... [1]

(ii) Complete the statement.

n (.....) = 6 [1]

(b) In the Venn diagram below, shade $C \cap D'$.



[1]

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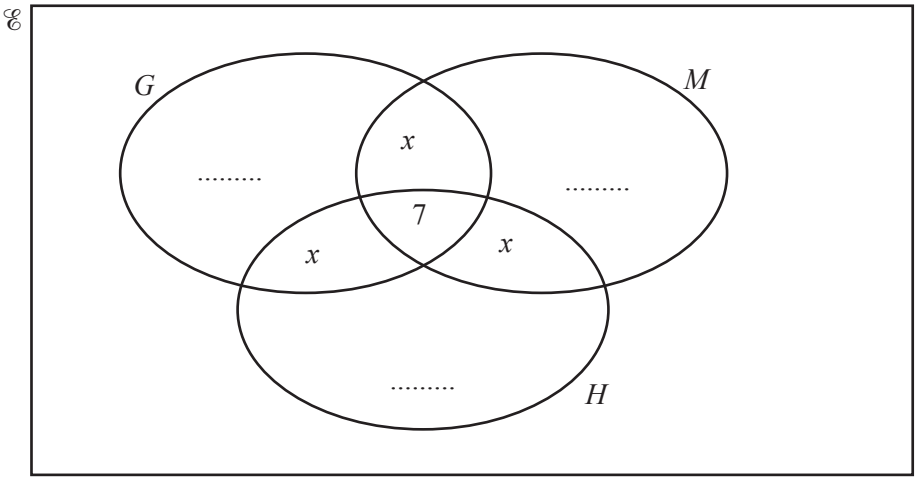
(c) 50 students study at least one of the subjects geography (G), mathematics (M) and history (H).

18 study only mathematics.
19 study two or three of these subjects.
23 study geography.

The Venn diagram below is to be used to show this information.



(i) Show that $x = 4$.

[2]

(ii) Complete the Venn diagram. [2]

(iii) Use set notation to complete this statement.

$(G \cup M \cup H)' =$ ..... [1]

(iv) Find $n(G \cap (M \cup H))$.

..... [1]

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

$$6x + 5y = 27$$
$$5x - 3y = 44$$

$x =$ .....

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

(b) y is inversely proportional to $(x+3)^2$.
When $x = 2$, $y = 8$.

Find y when $x = 7$.

$y =$ ..... [3]

(c) Solve the inequality.

$$3(x-2) < 7(x+2)$$

..... [3]

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11 **(a)** The table shows the first five terms of sequence A and sequence B.

Term	1	2	3	4	5	6
Sequence A	7	13	23	37	55	
Sequence B	1	3	9	27	81	

(i) Complete the table for the 6th term of each sequence. [2]

(ii) Find the nth term of

(a) sequence A,

..... [2]

(b) sequence B.

..... [2]

(b) The nth term of another sequence is $4n^2 + n + 3$.

Find

(i) the 2nd term,

..... [1]

(ii) the value of n when the nth term is 498.

$n =$ ..... [3]

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