Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5134426042

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2018**

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.

1 **(a)** Here is a list of ingredients to make 20 biscuits.

260 g of butter
500 g of sugar
650 g of flour
425 g of rice

(i) Find the mass of rice as a percentage of the mass of sugar.

..... % [1]

(ii) Find the mass of butter needed to make 35 of these biscuits.

..... g [2]

(iii) Michel has 2 kg of each ingredient.

Work out the greatest number of these biscuits that he can make.

..... [3]

(b) A company makes these biscuits at a cost of $1.35 per packet.
These biscuits are sold for $1.89 per packet.

(i) Calculate the percentage profit the company makes on each packet.

..... % [3]

(ii) The selling price of $1.89 has increased by 8% from last year.

Calculate the selling price last year.

$ ..... [3]

(c) Over a period of 3 years, the company's sales of biscuits increased from 15.6 million packets to 20.8 million packets.
The sales increased exponentially by the same percentage each year.

Calculate the percentage increase **each year**.

..... % [3]

(d) The people who work for the company are in the following age groups.

Group A	Group B	Group C
Under 30 years	30 to 50 years	Over 50 years

The ratio of the number in group A to the number in group B is 7 : 10.
The ratio of the number in group B to the number in group C is 4 : 3.

(i) Find the ratio of the number in group A to the number in group C.
Give your answer in its simplest form.

..... : ..... [3]

(ii) There are 45 people in group C.

Find the total number of people who work for the company.

..... [3]

2 The time taken for each of 120 students to complete a cooking challenge is shown in the table.

Time (t minutes)	$20 < t \leqslant 25$	$25 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 40$	$40 < t \leqslant 45$
Frequency	44	32	28	12	4

(a) (i) Write down the modal time interval.

..... $< t \leqslant$ ..... [1]

(ii) Write down the interval containing the median time.

..... $< t \leqslant$ ..... [1]

(iii) Calculate an estimate of the mean time.

..... min [4]

(iv) A student is chosen at random.

Find the probability that this student takes more than 40 minutes.

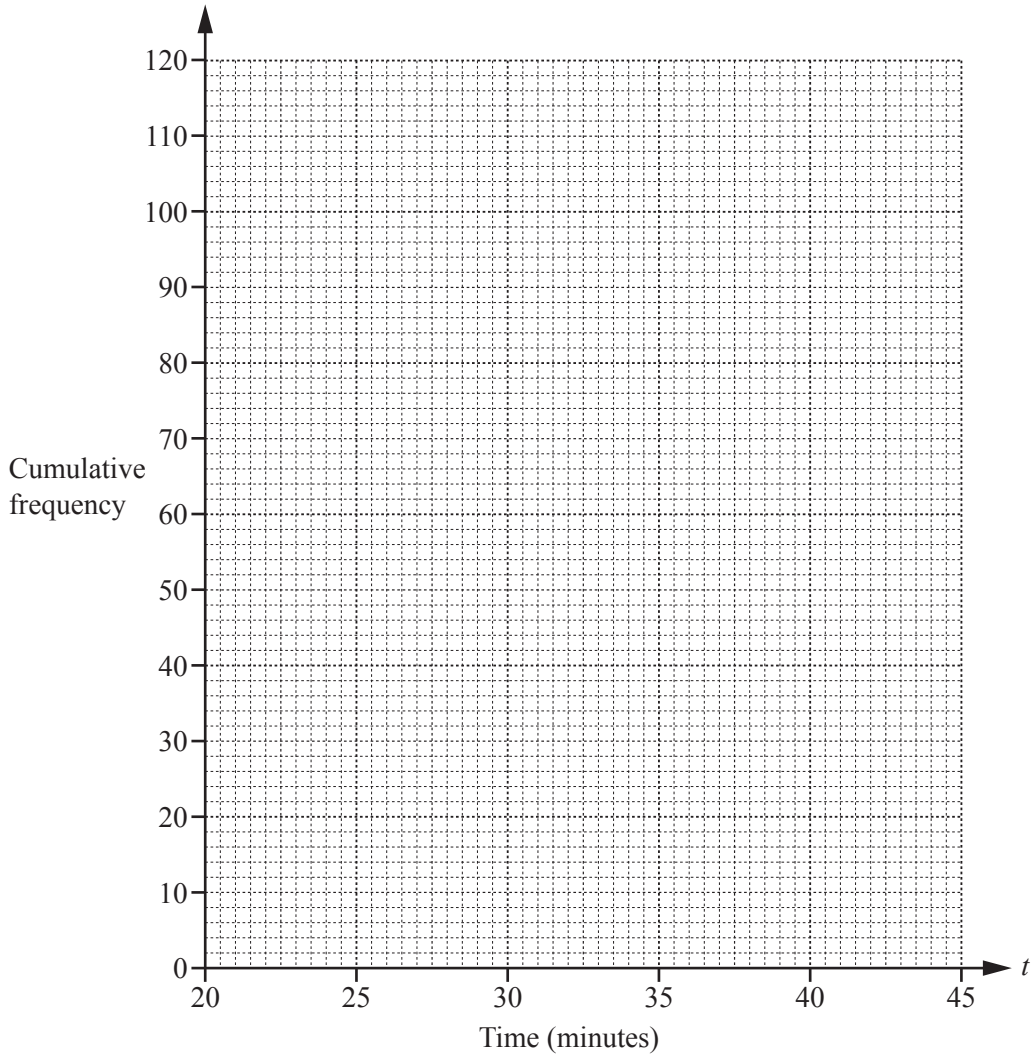
..... [1]

(b) (i) Complete the cumulative frequency table.

Time (t minutes)	$t \leqslant 20$	$t \leqslant 25$	$t \leqslant 30$	$t \leqslant 35$	$t \leqslant 40$	$t \leqslant 45$
Cumulative frequency	0	44				

[2]

(ii) On the grid, draw a cumulative frequency diagram to show this information.



[3]

(iii) Find the median time.

..... min [1]

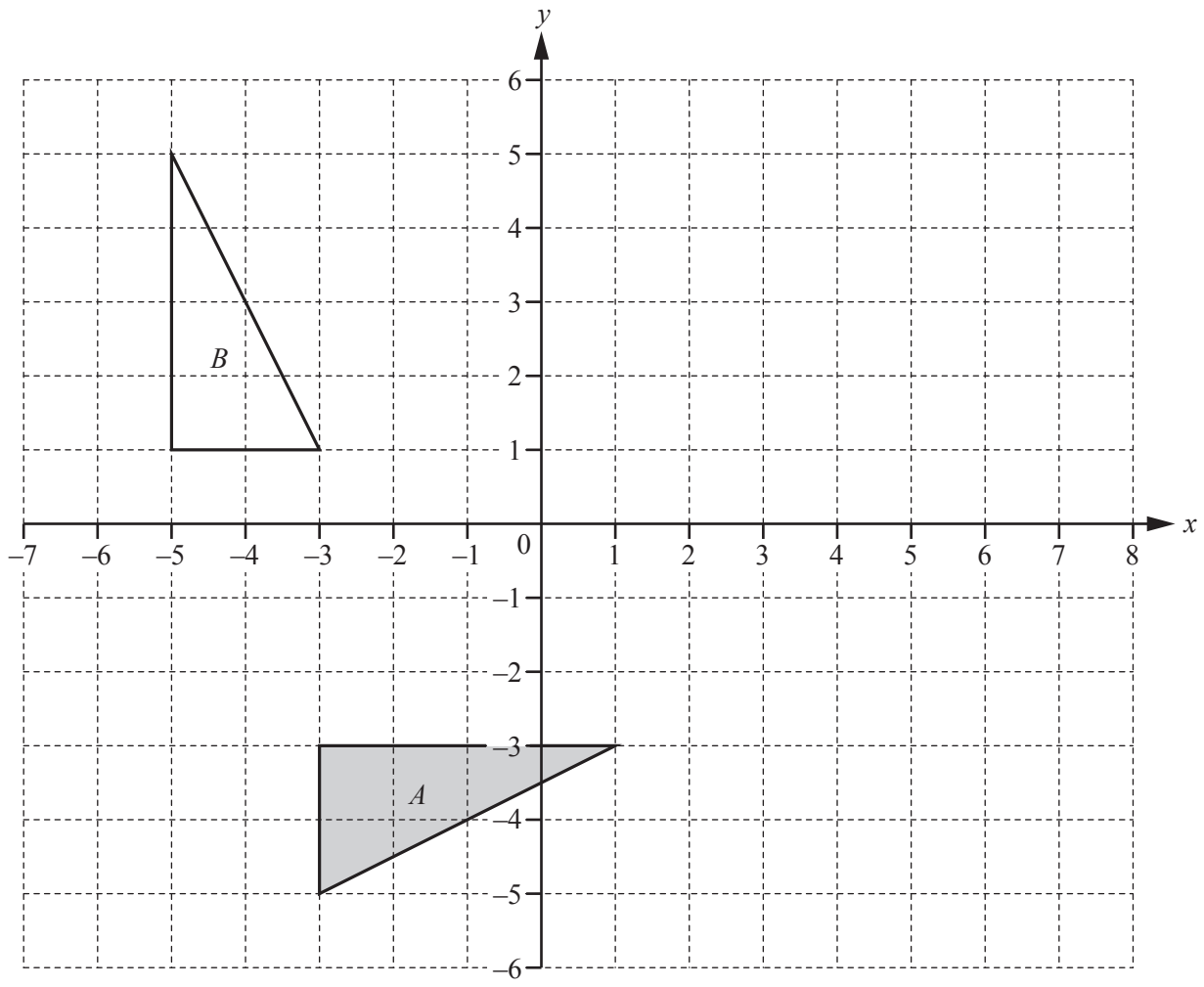
(iv) Find the interquartile range.

..... min [2]

(v) Find the number of students who took more than 37 minutes to complete the cooking challenge.

..... [2]

3



(a) **(i)** Draw the image of triangle A after a reflection in the line $x = 2$. [2]

(ii) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} -2 \\ 4 \end{pmatrix}$. [2]

(iii) Draw the image of triangle A after an enlargement by scale factor $-\frac{1}{2}$, centre (3, 1). [3]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(c) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$.

.....

..... [2]

4 **(a)** Simplify.

(i) $(3p^2)^5$

..... [2]

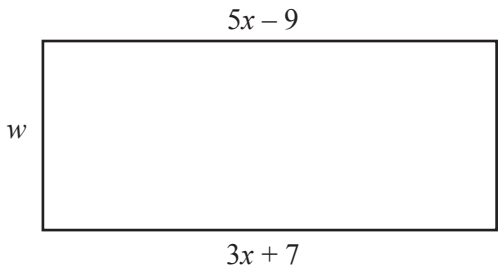
(ii) $18x^2y^6 \div 2xy^2$

..... [2]

(iii) $\left(\frac{5}{m}\right)^{-2}$

..... [1]

(b) In this part, all measurements are in metres.



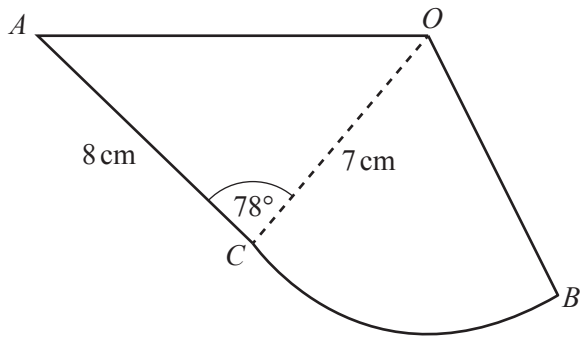
NOT TO SCALE

The diagram shows a rectangle.
The area of the rectangle is 310 m^2.

Work out the value of w.

$w =$ ..... [4]

5



NOT TO SCALE

The diagram shows a design made from a triangle AOC joined to a sector OCB.
$AC = 8$ cm, $OB = OC = 7$ cm and angle $ACO = 78°$.

(a) Use the cosine rule to show that $OA = 9.47$ cm, correct to 2 decimal places.

[4]

(b) Calculate angle OAC.

Angle $OAC =$ ..... [3]

(c) The perimeter of the design is 29.5 cm.

Show that angle $COB = 41.2°$, correct to 1 decimal place.

[5]

(d) Calculate the total area of the design.

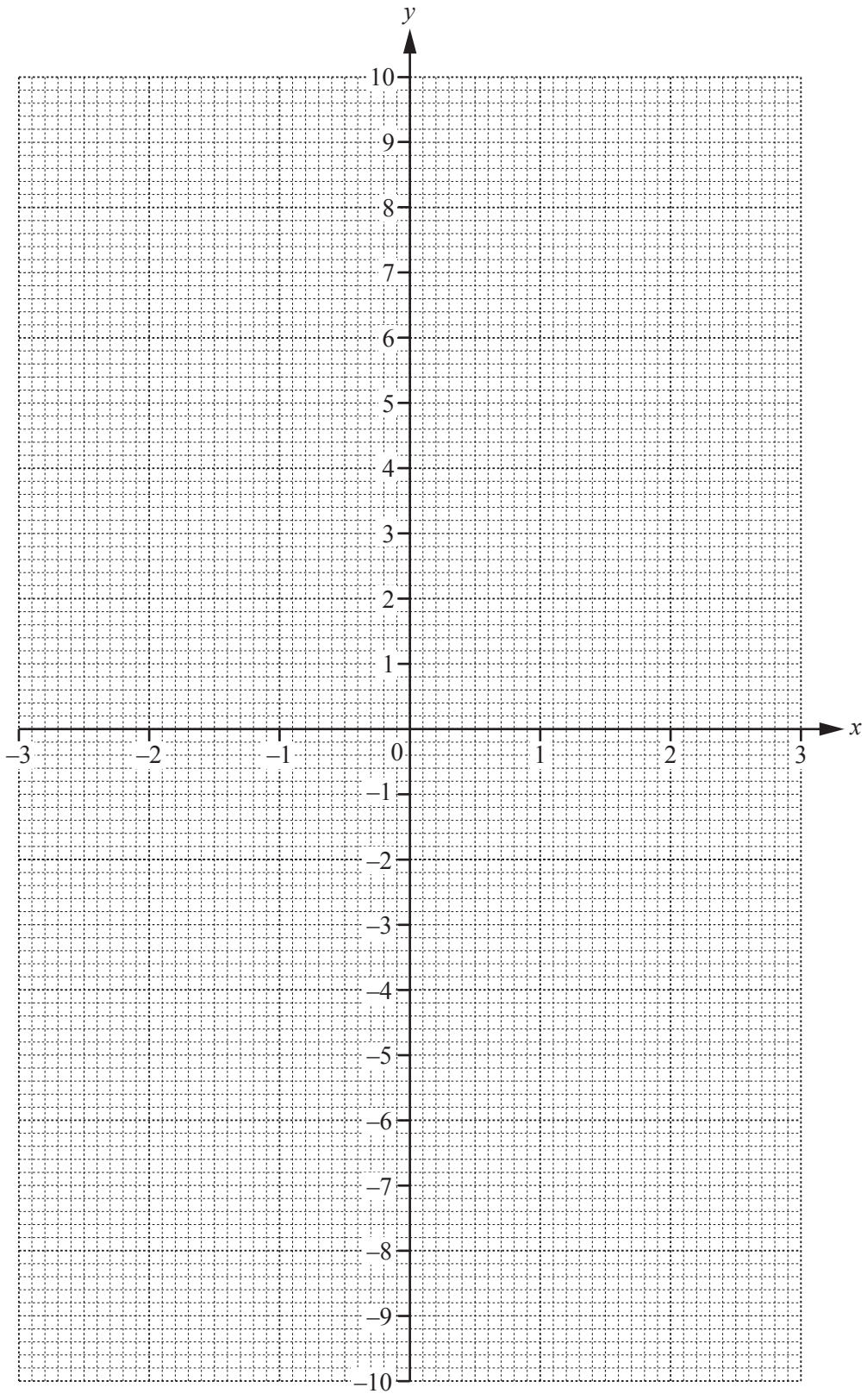
..... cm^2 [4]

6 **(a)** Complete the table of values for $y = \frac{x^3}{3} - \frac{1}{2x^2}$, $x \neq 0$.

x	-3	-2	-1	-0.5	-0.3		0.3	0.5	1	2	3
y	-9.1	-2.8	-0.8		-5.6		-5.5	-2.0			8.9

[3]

(b) On the grid, draw the graph of $y = \frac{x^3}{3} - \frac{1}{2x^2}$ for $-3 \leqslant x \leqslant -0.3$ and $0.3 \leqslant x \leqslant 3$.



[5]

(c) **(i)** By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = -2$.

..... [3]

(ii) Write down the equation of the tangent to the curve at $x = -2$.
Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

(d) Use your graph to solve the equations.

(i) $\frac{x^3}{3} - \frac{1}{2x^2} = 0$

$x =$ ..... [1]

(ii) $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$

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

(e) The equation $\frac{x^3}{3} - \frac{1}{2x^2} + 4 = 0$ can be written in the form $ax^n + bx^{n-3} - 3 = 0$.

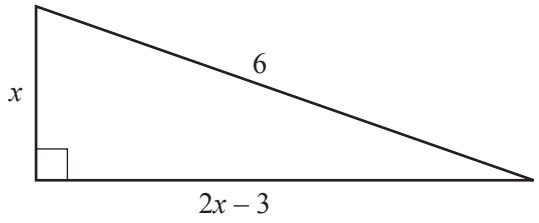
Find the value of a, the value of b and the value of n.

$a =$ .....

$b =$ .....

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

7 In this question, all measurements are in metres.



NOT TO SCALE

The diagram shows a right-angled triangle.

(a) Show that $5x^2 - 12x - 27 = 0$.

[3]

(b) Solve $5x^2 - 12x - 27 = 0$.
Show all your working and give your answers correct to 2 decimal places.

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

(c) Calculate the perimeter of the triangle.

..... m [2]

(d) Calculate the smallest angle of the triangle.

..... [2]

8 $f(x) = 8 - 3x$ $g(x) = \frac{10}{x+1}$, $x \neq -1$ $h(x) = 2^x$

(a) Find

(i) $hf\left(\frac{8}{3}\right)$,

..... [2]

(ii) $gh(-2)$,

..... [2]

(iii) $g^{-1}(x)$,

$g^{-1}(x) =$ ..... [3]

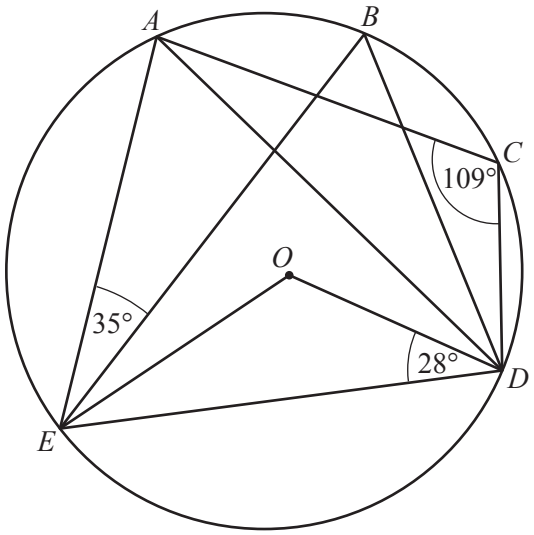
(iv) $f^{-1}f(5)$.

..... [1]

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

..... [3]

9 (a)



NOT TO SCALE

A, B, C, D and E lie on the circle, centre O.
Angle $AEB = 35°$, angle $ODE = 28°$ and angle $ACD = 109°$.

(i) Work out the following angles, giving reasons for your answers.

(a) Angle $EBD =$ ..... because .....

.....

..... [3]

(b) Angle $EAD =$ ..... because .....

..... [2]

(ii) Work out angle BEO.

Angle $BEO =$ ..... [3]

(b) In a regular polygon, the interior angle is 11 times the exterior angle.

(i) Work out the number of sides of this polygon.

..... [3]

(ii) Find the sum of the interior angles of this polygon.

..... [2]

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