



Cambridge IGCSE[™]

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 0580/41

Paper 4 (Extended)

October/November 2021

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

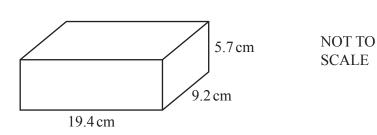
INSTRUCTIONS

- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do not write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [].

This document has 20 pages. Any blank pages are indicated.



The diagram shows a brick in the shape of a cuboid.

(i) Calculate the total surface area of the brick.

cm ⁻ [3		cm^2	[3]
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(ii) The density of the brick is $1.9 \,\mathrm{g/cm^3}$.

Work out the mass of the brick. Give your answer in kilograms. [Density = mass ÷ volume]

 kg	[3]

(b) 9000 bricks are needed to build a house. 200 bricks cost \$175.

Work out the cost of the bricks needed to build 5 houses.

\$	 [3]
Ψ	L]

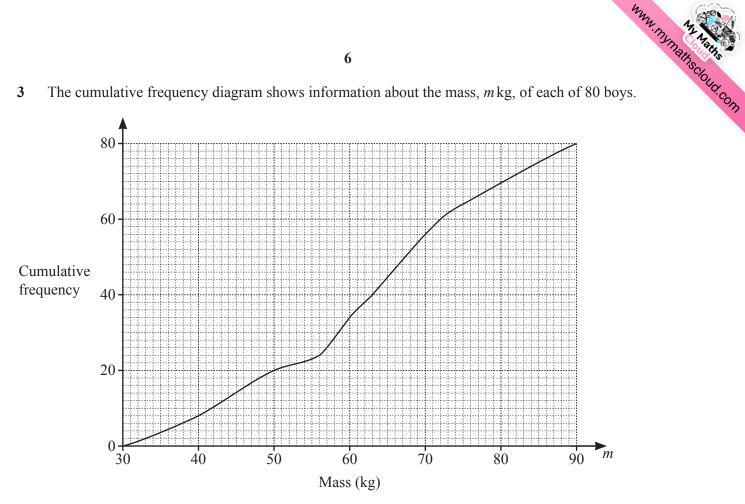
(c)	Saskia builds a wall using 1500 bricks. She can build at the rate of 40 bricks each hour. She works for 9 hours each day. Saskia starts work on 6 July and works every day until the wall is completed.	
	Find the date when she completes the wall.	
		[2]
		[3]
(d)	Rafa has a cylindrical tank. The cylinder has a height of 105 cm and a diameter of 45 cm.	
	Calculate the capacity of the tank in litres.	
	litres	[3]

2

Bol	b, Ch	ao and Mei take part in a run for charity.	
(a)	The	eir times to complete the run are in the ratio Bob: Chao	o: Mei = 4:5:7.
	(i)	Find Chao's time as a percentage of Mei's time.	
			% [1]
	(ii)	Bob's time for the run is 55 minutes 40 seconds.	
		Find Mei's time for the run. Give your answer in minutes and seconds.	
		Give your answer in infinites and seconds.	
			s [3
(b)	Cha	no collects \$47.50 for charity.	IIII 5 [5 _.
(5)	(i)	Bob collects 28% more than Chao.	
	(-)	Find the amount Bob collects.	
		That the amount Boo concets.	
			\$[2]
	(ii)	Chao collects 60% less than Mei.	
	` '	Find how much more money Mei collects than Chao.	
			\$[3

(c)	When running, Chao has a stride length of 70 cm, correct to the nearest 5 cm. Chao runs a distance of 11.2 km, correct to the nearest 0.1 km.	
	Work out the minimum number of strides that Chao could take to complete this distance.	
		[4]
(d)	In 2015, a charity raised a total of \$1.6 million. After 2015, this amount increased exponentially by 2.4% each year for the next 5 years.	
	Work out the amount raised by the charity in 2020.	
	\$ million	[2]

3 The cumulative frequency diagram shows information about the mass, mkg, of each of 80 boys.



(a) 70 30 40 50 60 80 Mass (kg)

On the grid, draw a box-and-whisker plot to show the information in the cumulative frequency diagram. [4]

(b) Use the cumulative frequency diagram to find an estimate of

the 30th percentile, (i)

the number of boys with a mass greater than 75 kg.

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(c) (i) Use the cumulative frequency diagram to complete this frequency table.

Mass (m kg)	$30 < m \leqslant 40$	$40 < m \leqslant 50$	$50 < m \le 60$	$60 < m \leqslant 70$	$70 < m \le 80$	$80 < m \leqslant 90$
Frequency	8	12			14	10

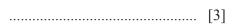
[1]

(ii)	Calculate an	estimate	of the	mean	mass	of the	boys
٦		, Cuiculate all	Cotililate	or the	moun	mass	or the	OU y S.

k	κg	[4]
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(iii) Two boys are chosen at random from those with a mass greater than 70 kg.

Find the probability that one of them has a mass greater than $80\,\mathrm{kg}$ and the other has a mass of $80\,\mathrm{kg}$ or less.



4 (a) Solve.

(i)
$$6(7-2x) = 3x-8$$

(ii)
$$\frac{2x}{x-5} = \frac{2}{3}$$

$$x =$$
 [3]

$$x = \dots [3]$$

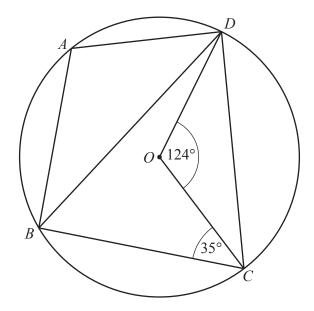
(b) Factorise completely.

(i)
$$2x^2 - 288y^2$$

(ii)
$$5x^2 + 17x - 40$$

(c) Solve $x^3 + 4x^2 - 17x = x^3 - 9$. You must show all your working and give your answers correct to 2 decimal places.

$$x =$$
 or $x =$ [5]



NOT TO SCALE

A, B, C and D are points on a circle, centre O. Angle $COD = 124^{\circ}$ and angle $BCO = 35^{\circ}$.

(i)	Work out angle <i>CBD</i> .
	Give a geometrical reason for your answer

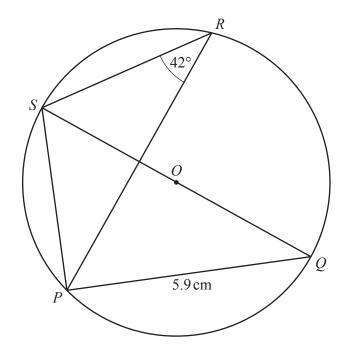
Angle <i>CBD</i> =	because	
		21

(ii) Work out angle *BAD*. Give a geometrical reason for each step of your working.

Angle $BAD = \dots$	because	
		Γ 4 1
•••••	······	Γ',

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(b)



NOT TO SCALE

P, Q, R and S are points on a circle, centre O. QS is a diameter. Angle $PRS = 42^{\circ}$ and PQ = 5.9 cm.

Calculate the circumference of the circle.

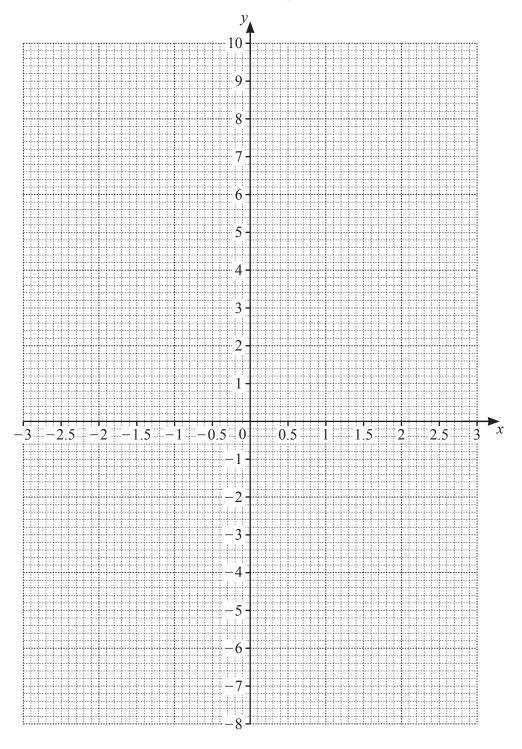
 cm	5

The tal	ble shows	some va	lues for	$y = x^2 -$	$\frac{3}{2x}, x \neq$	0,	given co	rrect to 1	decimal _I	place.	mm.m.	MANAINS CIOUC.COM
x	-3	-2	-1	-0.5	-0.2		0.2	0.5	1	2	3	
У			2.5	3.3	7.5		-7.5	-2.8	-0.5	3.3		

(a) (i) Complete the table.

[3]

On the grid, draw the graph of $y = x^2 - \frac{3}{2x}$ for $-3 \le x \le -0.2$ and $0.2 \le x \le 3$.



[5]

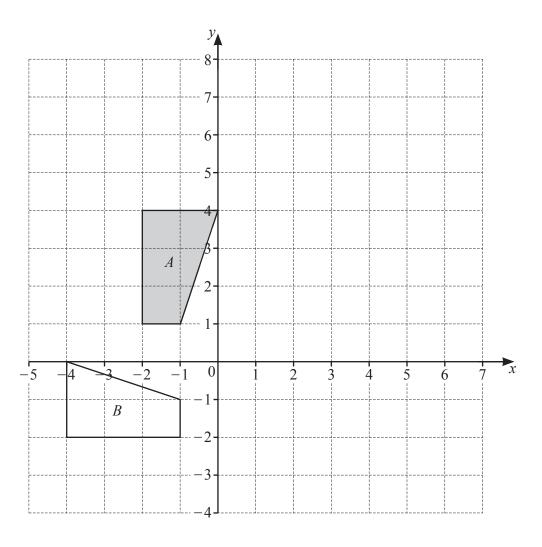
(b) By drawing a suitable straight line on the grid, solve the equation $x^2 - \frac{3}{2x} = \frac{24}{5} - 2x$ for $-3 \le x \le -0.2$ and $0.2 \le x \le 3$.

x =	 or $x =$	Γ 4
~	 OI N	 ויו

(c) The solutions to the equation $x^2 - \frac{3}{2x} = \frac{24}{5} - 2x$ are also the solutions to an equation of the form $ax^3 + bx^2 + cx - 15 = 0$ where a, b and c are integers.

Find the values of a, b and c.



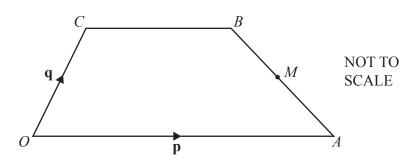


- (i) On the grid, draw the image of
 - (a) shape A after an enlargement, scale factor 2, centre (0, 1), [2]
 - (b) shape A after a reflection in the line y = x 1. [3]
- (ii) Describe fully the **single** transformation that maps shape A onto shape B.

______[3

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(b)



OABC is a trapezium and O is the origin. M is the midpoint of AB. $\overrightarrow{OA} = \mathbf{p}$, $\overrightarrow{OC} = \mathbf{q}$ and OA = 2CB.

Find, in terms of \mathbf{p} and \mathbf{q} , the position vector of M. Give your answer in its simplest form.

 [3]

8 (a) f(x) = 3 - 5x

(i) Find x when f(x) = -5.

 $x = \dots$ [2]

(ii) Find $f^{-1}(x)$.

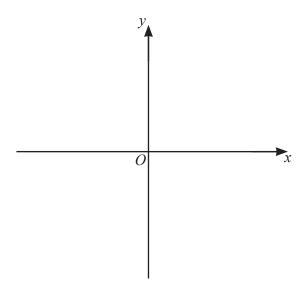
 $f^{-1}(x) = \dots [2]$

(b) $g(x) = 18 - 3x - x^2$

(i) Write g(x) in the form $b - (a+x)^2$.

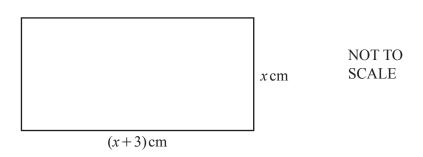
.....[3]

(ii) Sketch the graph of y = g(x). On your sketch, show the coordinates of the turning point.



(iii) Find the equation of the tangent to the graph of $y = 18 - 3x - x^2$ at x = 4. Give your answer in the form y = mx + c.

$$y =$$
 [6]

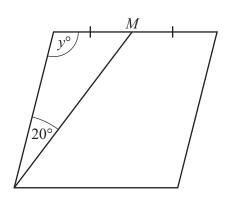


This rectangle has perimeter 20 cm.

Find the value of x.



(b)



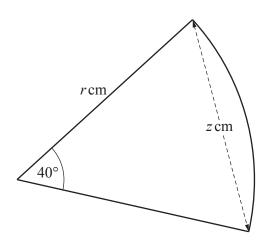
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This rhombus has perimeter $20 \,\mathrm{cm}$ and angle y is obtuse. M is the midpoint of one of the sides.

Find the value of *y*.

v =	 [5]
,	L I

(c)



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This sector of a circle has radius r and perimeter 20 cm.

Find the value of z.

$$z = \dots$$
 [6]

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