

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CANDIDATE NAME								
CENTRE NUMBER					CANDID NUMBEI			

MATHEMATICS 0581/21

Paper 2 (Extended) October/November 2012

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator Geometrical instruments

Mathematical tables (optional) 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 a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, 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 70.

www.PapaCambridge.com On a mountain, the temperature decreases by 6.5 °C for every 1000 metres increase in height. 1 At 2000 metres the temperature is 10 °C.

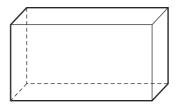
Find the temperature at 6000 metres.

Answer	 °C	[2]

Use your calculator to find the value of 2

$$\frac{8.1^2 + 6.2^2 - 4.3^2}{2 \times 8.1 \times 6.2}$$
.

(a) The diagram shows a cuboid. 3



How many planes of symmetry does this cuboid have?

(b) Write down the order of rotational symmetry for the following diagram.



Answer(b)		[1]
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Answer

[2]

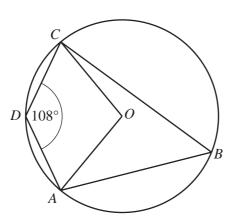
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5 Simplify the expression.

$$(a^{\frac{1}{2}} - b^{\frac{1}{2}})(a^{\frac{1}{2}} + b^{\frac{1}{2}})$$

Answer [2]

6



NOT TO SCALE

A, B, C and D lie on a circle centre O. Angle $ADC = 108^{\circ}$.

Work out the obtuse angle AOC.

Answer Angle AOC = [2]

Calculate the train fare in pounds (£).

Answer £	 [2]

8 Acri invested \$500 for 3 years at a rate of 2.8% per year compound interest.

Calculate the final amount he has after 3 years.

9 Solve the inequality.

$$\frac{2x-3}{5} - \frac{x}{3} \le 2$$

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	dy.	
-	74	iner's

10 A large water bottle holds 25 litres of water correct to the nearest litre. A drinking glass holds 0.3 litres correct to the nearest 0.1 litre.

Calculate the lower bound for the number of glasses of water which can be filled from the bottle.

Answer	
1116 WC1	[3]

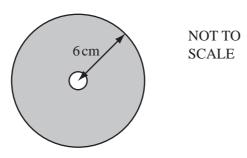
11 The electrical resistance, R, of a length of cylindrical wire varies inversely as the square of the diameter, d, of the wire.

$$R = 10$$
 when $d = 2$.

Find *R* when d = 4.

$$Answer R =$$
 [3]

12



The diagram shows a circular disc with radius 6 cm. In the centre of the disc there is a circular hole with radius 0.5 cm.

Calculate the area of the shaded section.

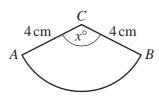
Answer	 cm^2	[3]

x axis its for iner's

Answer

[3]

14



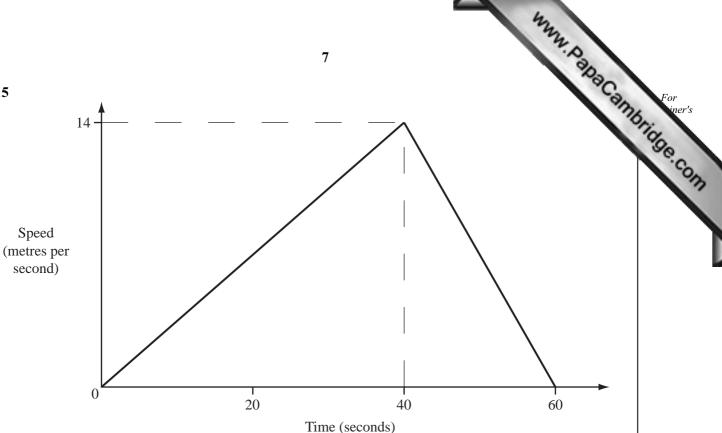
NOT TO SCALE

ABC is a sector of a circle, radius 4 cm and centre C. The length of the arc AB is 8 cm and angle $ACB = x^{\circ}$.

Calculate the value of x.

Answer x = [3]





7

The diagram shows the speed-time graph of a bus journey between two bus stops.

Hamid runs at a constant speed of 4 m/s along the bus route.

He passes the bus as it leaves the first bus stop.

The bus arrives at the second bus stop after 60 seconds.

How many metres from the bus is Hamid at this time?

Answer	m	Γ 3 1
Answei	 111	וטו

16 Rearrange the formula $y = \frac{x+2}{x-4}$ to make x the subject.

$$Answer x = [4]$$

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AB is the diameter of a circle.

C is a point on AB such that AC = 4 cm.

(a) Using a straight edge and compasses only, construct

(i) the locus of points which are equidistant from A and from B,

C

[2]

(ii) the locus of points which are 4 cm from C.

[1]

(b) Shade the region in the diagram which is

nearer to B than to A

and

less than 4 cm from C.

[1]

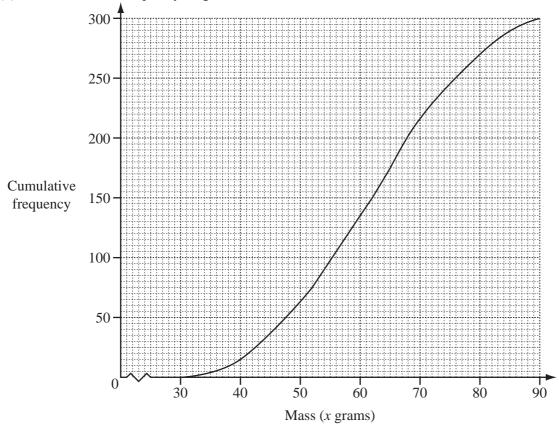
18 Lauris records the mass and grade of 300 eggs. The table shows the results.

Mass (x grams)	$30 < x \le 40$ $40 < x \le 50$		$50 < x \le 60$	$60 < x \le 70$	$70 < x \le 80$	80 < x <	
Frequency	15 48		72	81	54	30	
Grade	sm	nall	medium	large	very large		

	(a)	Find the pr	robability t	that an e	egg chosen	at random	is graded	very	large
--	-----	-------------	--------------	-----------	------------	-----------	-----------	------	-------

Answer(a)	[1]
	 L-1

(b) The cumulative frequency diagram shows the results from the table.



Use the cumulative frequency diagram to find

(i) the median	ı,
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Answer(b)(i) g [1]

(ii) the lower quartile,

Answer(b)(ii) g [1]

(iii) the inter-quartile range,

Answer(b)(iii) g [1]

(iv) the number of eggs with a mass greater than 65 grams.

Answer(b)(iv) [2]

For niner's

$$\mathbf{M} = \left(\begin{array}{cc} 5 & -4 \\ 2 & 3 \end{array} \right)$$

Find

(a) M^2 ,

(b) 2M,

$$Answer(b) \qquad \qquad \boxed{ \qquad }$$

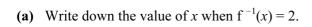
(c) $|\mathbf{M}|$, the determinant of \mathbf{M} ,

$$Answer(c)$$
 [1]

(d) M^{-1} .

$$Answer(d) \qquad [2]$$

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



$$Answer(a) x =$$
 [1]

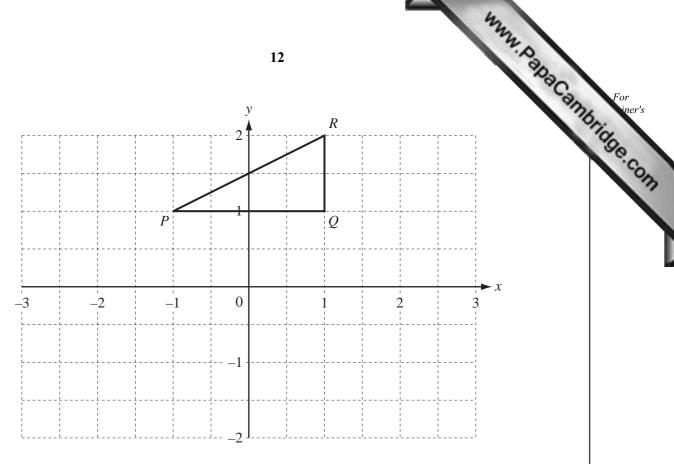
(b) Find fg(x). Give your answer in its simplest form.

Answer(b)
$$fg(x) =$$
 [2]

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

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

21



The triangle PQR has co-ordinates P(-1, 1), Q(1, 1) and R(1, 2).

(a) Rotate triangle PQR by 90° clockwise about (0, 0). Label your image P'Q'R'.

[2]

(b) Reflect your triangle P'Q'R' in the line y = -x. Label your image P"Q"R".

[2]

(c) Describe fully the **single** transformation which maps triangle PQR onto triangle P''Q''R''.

Answer(c) [2]

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