

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS

Paper 4 (Extended)

0581/41 October/November 2011

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials:

Electronic calculator

Mathematical tables (optional)

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 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 130.

This document consists of **16** printed pages.



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	2	
(a)	Abdullah and Jasmine bought a car for \$9000. Abdullah paid 45% of the \$9000 and Jasmine paid the rest.	For iner's
	Abdullah and Jasmine bought a car for \$9000. Abdullah paid 45% of the \$9000 and Jasmine paid the rest. (i) How much did Jasmine pay towards the cost of the car?	Tode con
	$Answer(a)(i) \$ \qquad [2]$	13
	(ii) Write down the ratio of the payments Abdullah: Jasmine in its simplest form.	
	Answer(a)(ii) : [1]	
(b)	Abdullah, Jasmine and their son Henri share this cost in the ratio 8:3:1. Calculate the amount each paid to run the car.	
	Answer(b) Abdullah \$	
	Jasmine \$	
	Henri \$[3]	
(c)		
	Calculate the value of the truck after three years.	
	Answer(c)(i) [3]	
	(ii) Calculate the overall percentage loss of the truck's value after three years.	
	$Answer(c)(ii) \qquad \qquad \%[3]$	

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10				

(a) Find the integer values for x which satisfy the inequality 2

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(b) Simplify $\frac{x^2 + 3x - 10}{x^2 - 25}$.

Answer(b) [4]

(c) (i) Show that $\frac{5}{x-3} + \frac{2}{x+1} = 3$ can be simplified to $3x^2 - 13x - 8 = 0$.

Answer(c)(i)

[3]

 $3x^2 - 13x - 8 = 0.$ (ii) Solve the equation

Show all your working and give your answers correct to two decimal places.

3 The table shows information about the heights of 120 girls in a swimming club.

Height (h metres)	Frequency
$1.3 < h \le 1.4$	4
$1.4 < h \le 1.5$	13
$1.5 < h \le 1.6$	33
$1.6 < h \le 1.7$	45
$1.7 < h \le 1.8$	19
$1.8 < h \le 1.9$	6

	(9)	***	4	.1	1 1	1
(a)	(i)	Write	down	the	modal	class

Answer(a)(i)	 m[1]

(ii) Calculate an estimate of the mean height. Show all of your working.

- **(b)** Girls from this swimming club are chosen at random to swim in a race. Calculate the probability that
 - (i) the height of the first girl chosen is more than 1.8 metres,

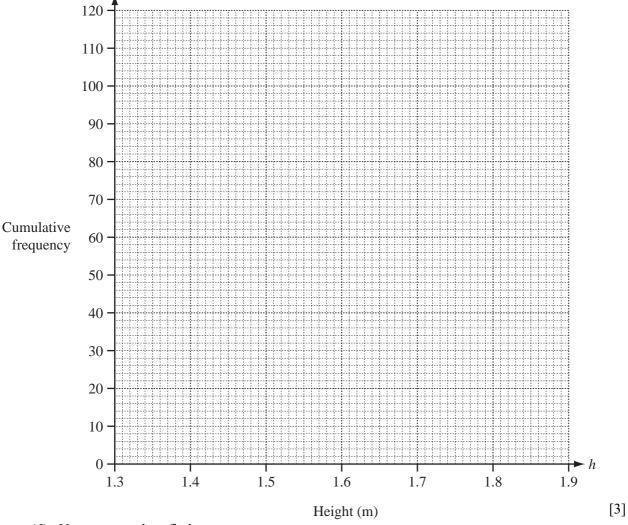
(ii) the heights of **both** the first and second girl chosen are 1.8 metres or less.

(c) (i) Complete the cumulative frequency table for the heights.

Height (h metres)	Cumulative frequency
<i>h</i> ≤ 1.3	0
<i>h</i> ≤ 1.4	4
<i>h</i> ≤ 1.5	17
<i>h</i> ≤ 1.6	50
<i>h</i> ≤ 1.7	
<i>h</i> ≤ 1.8	114
<i>h</i> ≤ 1.9	

[1]

(ii) Draw the cumulative frequency graph on the grid.

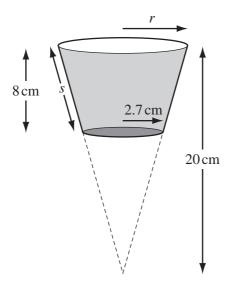


- (d) Use your graph to find
 - (i) the median height,

Answer(d)(i) _____ m [1]

(ii) the 30th percentile.

Answer(d)(ii) m [1]



NOT TO SCALE

The diagram shows a plastic cup in the shape of a cone with the end removed.

The vertical height of the cone in the diagram is 20 cm.

The height of the cup is 8 cm.

The base of the cup has radius 2.7 cm.

(a) (i) Show that the radius, r, of the circular top of the cup is $4.5 \,\mathrm{cm}$.

Answer(a)(i)

[2]

(ii) Calculate the volume of water in the cup when it is full. [The volume, V, of a cone with radius r and height h is $V = \frac{1}{3} \pi r^2 h$.]

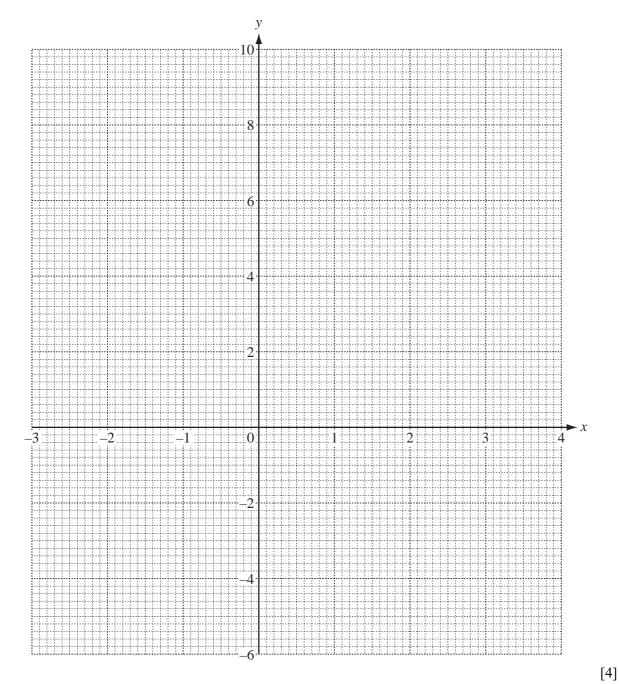
(b)	(i)	Show that the slant height, s , of the cup is $8.2 \mathrm{cm}$.		Car
		Answer(b)(i)	•	Camil
				[3]
((ii)	Calculate the curved surface area of the outside of the cup. [The curved surface area, A , of a cone with radius r and slant height l is $A = \pi r l$.]		
		Answer(b)(ii)	cm ²	[5]

[3]

(a) Complete the table for the function $f(x) = \frac{x^3}{2} - 3x - 1$.

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Complete	e the tabl	le for the	function	f(x) =	$\frac{x^3}{2}$ - 3	3x-1.					For iner's
х	-3	-2	-1.5	-1	0	1	1.5	2	3	3.5	Se. COM
f(x)	-5.5		1.8	1.5		-3.5	-3.8	-3		9.9	

(b) On the grid draw the graph of y = f(x) for $-3 \le x \le 3.5$.



- (c) Use your graph to
 - (i) solve f(x) = 0.5,

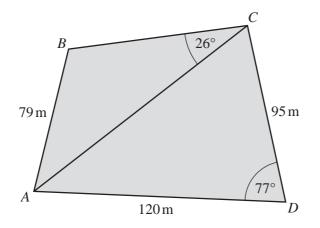
(ii) find the inequalities for k, so that f(x) = k has only 1 answer.

$$k >$$
 [2]

- (d) (i) On the same grid, draw the graph of y = 3x 2 for $-1 \le x \le 3.5$. [3]
 - (ii) The equation $\frac{x^3}{2} 3x 1 = 3x 2$ can be written in the form $x^3 + ax + b = 0$. Find the values of a and b.

$$Answer(d)(ii) a = and b = [2]$$

(iii) Use your graph to find the **positive** answers to $\frac{x^3}{2} - 3x - 1 = 3x - 2$ for $-3 \le x \le 3.5$.



NOT TO SCALE

The quadrilateral ABCD represents an area of land.

There is a straight road from A to C.

 $AB = 79 \,\mathrm{m}$, $AD = 120 \,\mathrm{m}$ and $CD = 95 \,\mathrm{m}$.

Angle $BCA = 26^{\circ}$ and angle $CDA = 77^{\circ}$.

(a) Show that the length of the road, AC, is 135 m correct to the nearest metre.

Answer(a)

[4]

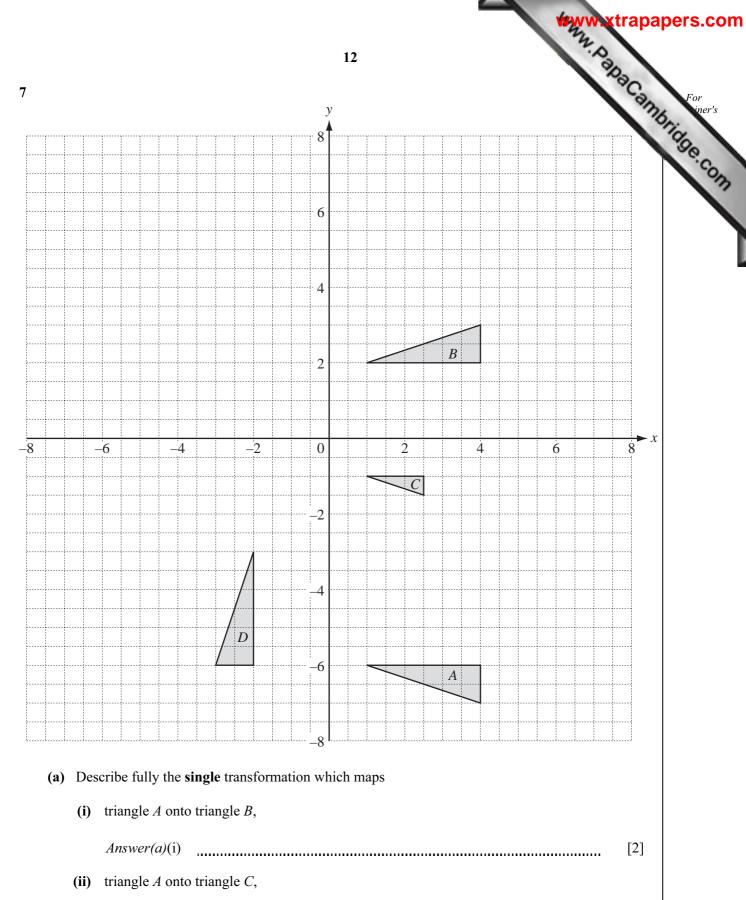
(b) Calculate the size of the **obtuse** angle *ABC*.

$$Answer(b)$$
 Angle $ABC =$ [4]

(c)	A straight path is to be built from B to the nearest point	nt on the ro	oad AC.	aCan.
	Calculate the length of this path.			
	. A	Answer(c)		m[3]
(d)	Houses are to be built on the land in triangle ACD . Each house needs at least $180 \mathrm{m}^2$ of land.			
	Calculate the maximum number of houses which can Show all of your working.	be built.		
	Ai	nswer(d)		[4]

[3]

[3]



Answer(a)(ii)

Answer(a)(iii)

(iii) triangle A onto triangle D.

- **(b)** Draw the image of
 - (i) triangle B after a translation of $\begin{pmatrix} -5\\2 \end{pmatrix}$,
 - (ii) triangle *B* after a transformation by the matrix $\begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$.

(c)	Describe fully the single transformation represented by the matrix	(1	0	
		0	2	١.

Answer(c)	
	[3]

8 Mr Chang hires x large coaches and y small coaches to take 300 students on a school trip. Large coaches can carry 50 students and small coaches 30 students. There is a maximum of 5 large coaches.



(a) Explain clearly how the following two inequalities satisfy these conditions.

(i)	r	<	5
\1 /	л	_	J

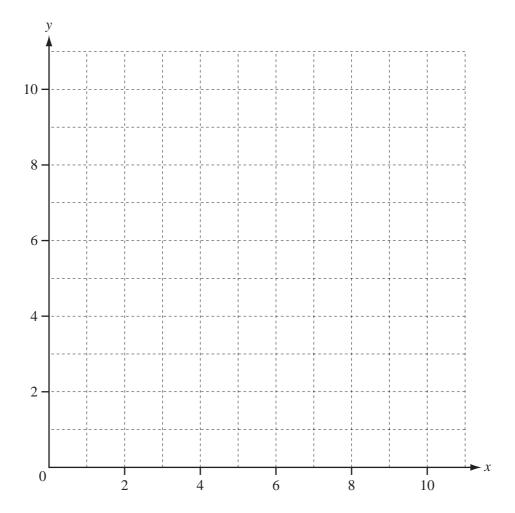
Angwar(a)(i)	Г	1
Answer(a)(1)	- 1	1

(ii)
$$5x + 3y \ge 30$$

Answer(a)(ii)	
	[2]

Mr Chang also knows that $x + y \le 10$.

(b) On the grid, show the information above by drawing three straight lines and shading the unwanted regions.



[5]

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-47					

[2]

		15			
(c)	A large coach costs \$450 to hire and a small coach costs \$350.				
	(i)	Find the number of large coaches and the number of small coaches that would give minimum hire cost for this school trip.	e th		
	(# <u>)</u>	Answer(c)(i) Large coaches Small coaches Calculate this minimum cost.	[2]		
	(ii)	Calculate this minimum cost.			
		Answer(c)(ii) \$	[1]		
(a)	72	$= 2 \times 2 \times 2 \times 3 \times 3$ written as a product of prime factors.			
	(i)	Write the number 126 as a product of prime factors.			
		Answer(a)(i) 126 =	[2]		
	(ii)	Find the value of the highest common factor of 72 and 126.			
		Answer(a)(ii)	[1]		
	(iii)	Find the value of the lowest common multiple of 72 and 126.			

9

The rest of question 9 is printed on the next page.

Answer(a)(iii)

(b)	John wants to estimate the value of π . He measures the circumference of a circular pizza as 105 cm and its diameter as 34 cm, correct to the nearest centimetre.	2
	Calculate the lower bound of his estimate of the value of π . Give your answer correct to 3 decimal places.	
	<i>Answer(b)</i> [4]	
(c)	The volume of a cylindrical can is 550 cm ³ , correct to the nearest 10 cm ³ . The height of the can is 12 cm correct to the nearest centimetre.	
	Calculate the upper bound of the radius of the can. Give your answer correct to 3 decimal places.	
	Answer(c) cm [5]	

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