

## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CANDIDATE NAME					
CENTRE NUMBER		CANDIDATE NUMBER			
MATHEMATICS			0580/42		
Paper 4 (Extended)		October/November 2013			
			2 hours 30 minutes		
Candidates answer or	the Question Paper.				
Additional Materials: Electronic calculator Tracing paper (optional)		Geometrical instrume	nts		

## **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  $\pi$ , 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.

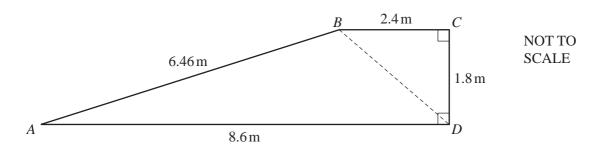
The total of the marks for this paper is 130.



1	Last year Mukthar earned \$18900 .  He did not pay tax on \$5500 of his earnings.  He paid 24% tax on his remaining earnings.								
	(a)	(i)	Calculate how much tax Mukthar paid last year.						
			$Answer(a)(i) \$ \dots [2]$						
		<b>(ii)</b>	Calculate how much Mukthar earned each month after tax had been paid.						
			<i>Answer(a)</i> (ii) \$ [2]						
	<b>(b)</b>	Thi	s year Mukthar now earns \$19750.50.						
		Cal	culate the percentage increase from \$18900.						
			Answer(b) % [2]						
	(c)	Mu	kthar has \$1500 to invest in one of the following ways.						
			• Account A paying simple interest at a rate of 4.1% per year						
			• Account <b>B</b> paying compound interest at a rate of 3.3% per year						
		Wh	ich account will be worth more after 3 years and by how much?						
			$Answer(c) Account \dots by \$ \dots [5]$						

2

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The diagram shows the cross section, ABCD, of a ramp.

(a) Calculate angle *DBC*.

$$Answer(a)$$
 Angle  $DBC = \dots [2]$ 

(b) (i) Show that BD is exactly 3 m. Answer(b)(i)

[2]

(ii) Use the cosine rule to calculate angle *ABD*.

$$Answer(b)$$
(ii) Angle  $ABD =$  [4]

(c) The ramp is a prism of width 4 m.Calculate the volume of this prism.

Answer(c) ...... m<sup>3</sup> [3]

	For Examiner's Use
[3]	
[4]	

3	(a)	Write oc o	cinala	fraction	in ita	simplast form
3	(a)	wille as a	single	nachon	III Its	simplest form.

$$\frac{2x-1}{2} - \frac{3x+1}{5}$$

(b) Expand and simplify. 
$$(2x-3)^2 - 3x(x-4)$$

(c) (i) Factorise. 
$$2x^2 + 5x - 3$$

(ii) Simplify. 
$$\frac{2x^2 + 5x - 3}{2x^2 - 18}$$

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4

8 cm
A
NOT TO
SCALE

A wedge of cheese in the shape of a prism is cut from a cylinder of cheese of height h cm. The radius of the cylinder, OA, is 8 cm and the angle  $AOB = 42^{\circ}$ .

(a) (i) The volume of the wedge of cheese is 90 cm<sup>3</sup>.

Show that the value of h is 3.84 cm correct to 2 decimal places.

Answer(a)(i)

[4]

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(ii) Calculate the total surface area of the wedge of cheese.

Answer(a)(ii) ...... cm<sup>2</sup> [5]

**(b)** A mathematically similar wedge of cheese has a volume of 22.5 cm<sup>3</sup>.

Calculate the height of this wedge.

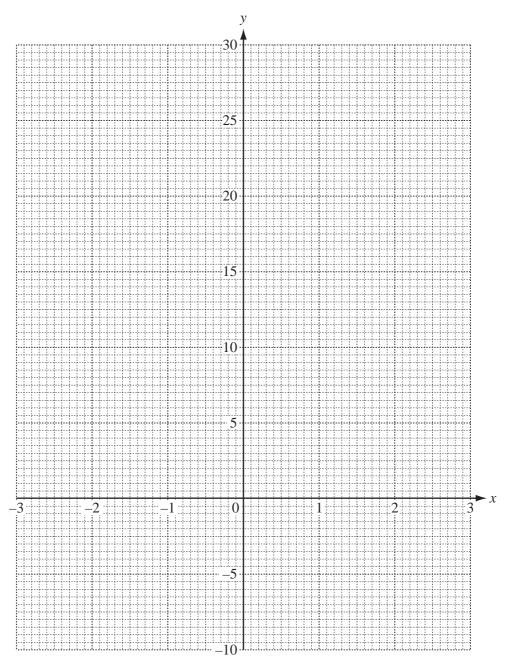
Answer(b) ...... cm [3]

5 (a) Complete the table of values for  $y = \frac{2}{x^2} - \frac{1}{x} - 3x$ .

х	-3	-2	-1	-0.5	-0.3	0.3	0.5	1	2	3
у	9.6		6		26.5	18.0		-2	-6	-9.1

[3]

**(b)** Draw the graph of  $y = \frac{2}{x^2} - \frac{1}{x} - 3x$  for  $-3 \le x \le -0.3$  and  $0.3 \le x \le 3$ .



[5]

(c) Use your graph to solve these equations.

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

(ii) 
$$\frac{2}{x^2} - \frac{1}{x} - 3x - 7.5 = 0$$

Answer(c)(ii) 
$$x = ....$$
 or  $x = ...$  [3]

(d) (i) By drawing a suitable straight line on the graph, solve the equation  $\frac{2}{x^2} - \frac{1}{x} - 3x = 10 - 3x$ .

Answer(d)(i) 
$$x = .....$$
 or  $x = .....$  [4]

(ii) The equation  $\frac{2}{x^2} - \frac{1}{x} - 3x = 10 - 3x$  can be written in the form  $ax^2 + bx + c = 0$  where a, b and c are integers.

Find the values of a, b and c.

Answer(d)(ii) 
$$a = \dots, b = \dots, c = \dots$$
 [3]

6								
	E	N	L	A	R	G	E	M

Prettie picks a card at random from the 11 cards above and does not replace it. She then picks a second card at random and does not replace it.

(a)	Find the	probability	that she	picks
()		1		I

(i) the letter L and then the letter G,

*Answer(a)*(i) ...... [2]

E

(ii) the letter E twice,

(iii) two letters that are the same.

<b>(b)</b>	Pret	tie now picks a third card at random.	Examiner's
	Fino	d the probability that the three letters	Use
	(i)	are all the same,	
		Answer(b)(i)	
	(ii)	do not include a letter E,	
	( )	,	
		Answer(b)(ii)	
	(iii)	include exactly two letters that are the same.	
		Answer(b)(iii)	

7	Noma flies from Johannesburg to Hong Kong. Her plane leaves Johannesburg at 1845 and arrives in Hong Kong 13 hours and 25 minutes later. The local time in Hong Kong is 6 hours ahead of the time in Johannesburg.							
	(a)	At what time does Noma arrive in Hong Kong?						
		<i>Answer(a)</i> [2]						
	(b)	Noma sleeps for part of the journey. The time that she spends sleeping is given by the ratio						
		sleeping: awake = 3:4.  Calculate how long Noma sleeps during the journey.  Give your answer in hours and minutes.						
		Answer(b) h min [2]						

(c)	(1)	The distance from Hong Kong to Johannesburg is 10/12km.  The time taken for the journey is 13 hours and 25 minutes.	Examiner's Use
		Calculate the average speed of the plane for this journey.	
		Answer(c)(i) km/h [2]	
	(ii)	The plane uses fuel at the rate of 1 litre for every 59 metres travelled.	
		Calculate the number of litres of fuel used for the journey from Johannesburg to Hong Kong. Give your answer in standard form.	
		$Answer(c)(ii) \qquad \qquad litres [4]$	
( <b>d</b> )		e cost of Noma's journey is 10148 South African Rand (R). s is an increase of 18% on the cost of the journey one year ago.	
	Cal	culate the cost of the same journey one year ago.	
		$Answer(d) R \dots [3]$	
		Aliswer(a) K	

**8** 
$$f(x) = 4x + 3$$

$$f(x) = 4x + 3$$
  $g(x) = \frac{7}{x+1} (x \neq -1)$   $h(x) = x^2 + 5x$ 

$$h(x) = x^2 + 5x$$

- (a) Work out
  - (i) h(-3),

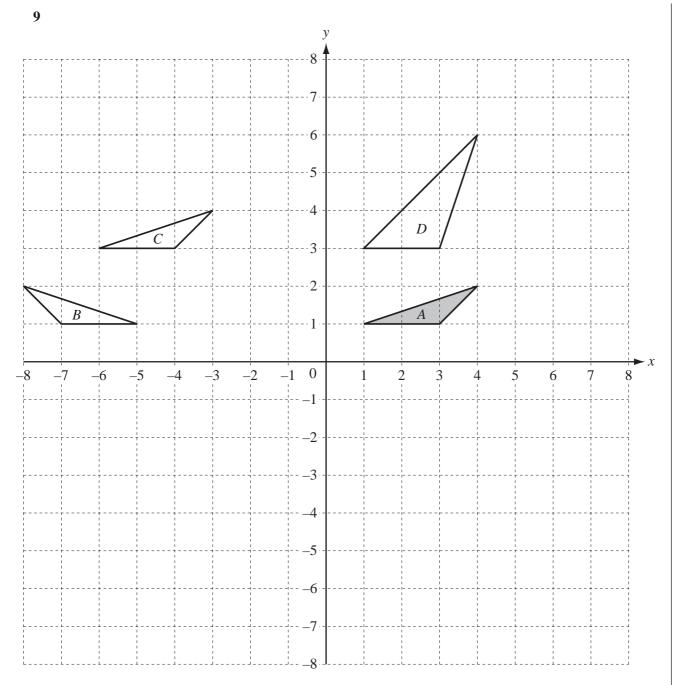
*Answer(a)*(i) ...... [1]

(ii) hg(13).

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

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

(c)	(i)	Solve the equation	f(x) = 23.	
			$Answer(c)(i) x = \dots$	[2]
	(ii)	Solve the equation	h(x) = 7.	
		Show all your worki	ing and give your answers correct to 2 decimal places.	
			Answer(c)(ii) $x =$ or $x =$	[5]



- (a) Describe fully the **single** transformation that maps triangle A onto
  - (i) triangle *B*,

 $Answer(a)(i) \qquad [2]$ 

(ii) triangle C,

(iii) triangle D.

<b>(b)</b> On	the grid, draw		For Examiner's
(i)	the rotation of triangle A about $(6, 0)$ through $90^{\circ}$ clockwise,	[2]	Use
(ii)	the enlargement of triangle $A$ by scale factor $-2$ with centre $(0, -1)$ ,	[2]	
(iii)	the shear of triangle $A$ by shear factor $-2$ with the $y$ -axis invariant.	[2]	
(a) E:	I do not significant and the second distribution in a section in a section in the second distribution		
(c) Fin	d the matrix that represents the transformation in <b>part</b> ( <b>b</b> )(iii).		
	Answer(c)	[2]	
		r-1	

Question 10 is printed on the next page.

10 Complete the table for the following sequences. The first row has been completed for you.

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	Sequence				Next two terms	<i>n</i> th term	
	1	5	9	13	17 21	4 <i>n</i> – 3	
(a)	12	21	30	39			[3]
(b)	80	74	68	62			[3]
(c)	1	8	27	64			[2]
(d)	2	10	30	68			[2]

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