

CANDIDATE NAME

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 0580/42

Paper 4 (Extended) May/June 2011

2 hours 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.

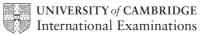
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

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 130.



(a) Work out the following. 1

(i)
$$\frac{1}{0.2^2}$$

(ii)
$$\sqrt{5.1^2 + 4 \times 7.3^2}$$

(iii)
$$25^{\frac{1}{2}} \times 1000^{-\frac{2}{3}}$$

(b) Mia invests \$7500 at 3.5% per year **simple** interest. Calculate the total amount she has after 5 years.

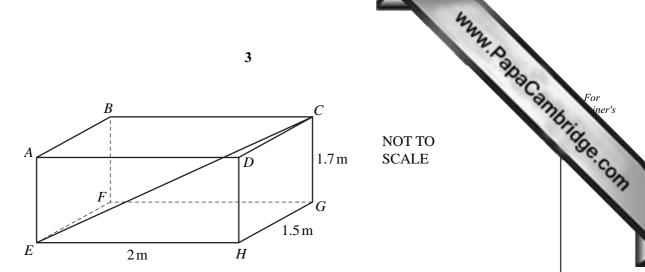
- (c) Written as the product of prime factors $48 = 2^4 \times 3$.
 - (i) Write 60 as the product of prime factors.

(ii) Work out the highest common factor (HCF) of 48 and 60.

(iii) Work out the lowest common multiple (LCM) of 48 and 60.

$$Answer(c)$$
(iii) [2]

2



The diagram shows a box ABCDEFGH in the shape of a cuboid measuring 2 m by 1.5 m by 1.7 m.

(a) Calculate the length of the diagonal EC.

(b) Calculate the angle between *EC* and the base *EFGH*.

$$Answer(b)$$
 [3]

(c) (i) A rod has length 2.9 m, correct to 1 decimal place.

What is the upper bound for the length of the rod?

$$Answer(c)(i)$$
 m [1]

(ii) Will the rod fit completely in the box?

Give a reason for your answer.

Answer(c)(ii) [1]

North
North

3

The scale drawing shows the positions of two towns A and C on a map. On the map, 1 centimetre represents 20 kilometres.

(i) Find the distance in kilometres from town A to town C.

Answer(a)(i) km [2]

(ii) Measure and write down the bearing of town C from town A.

Answer(a)(ii) [1]

[2]

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(iii) Town B is $140 \,\mathrm{km}$ from town C on a bearing of 150° .

Mark accurately the position of town *B* on the scale drawing.

(iv) Find the bearing of town C from town B.

 $Answer(a)(iv) \qquad [1]$

(v) A lake on the map has an area of $0.15 \,\mathrm{cm}^2$.

Work out the actual area of the lake.

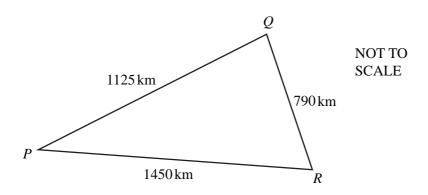
Answer(a)(v) km² [2]

(b) A plane leaves town C at 11 57 and flies 1500 km to another town, landing at 14 12. Calculate the average speed of the plane.

12. For iner's

Answer(b)	km/h	[3]
Answer (U)	 K111/11	ادا

(c)



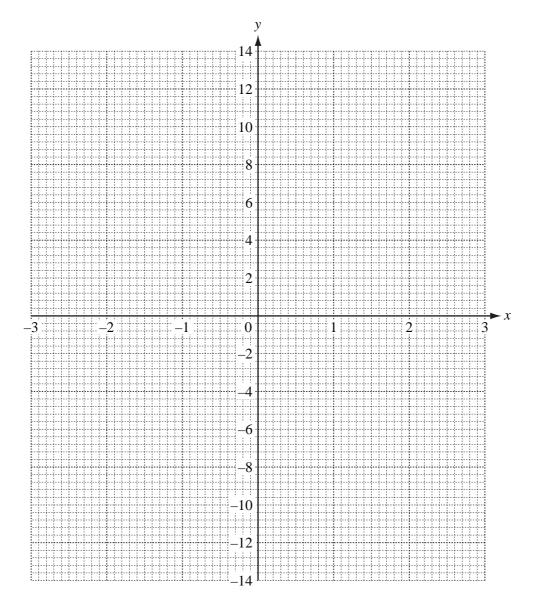
The diagram shows the distances between three towns P, Q and R.

Calculate angle *PQR*.

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

					6					m	1 Pap	For iner's
a) C	omplete t	he table o	of values	for the fu	nction y	= ;	$x^2-\frac{3}{x},$	$x \neq 0$.			Si	For iner's
x	-3	-2	-1	-0.5	-0.25	_	0.25	0.5	1	2	3	ate Co.
у	10	5.5		6.3	12.1		-11.9			2.5	8	13
	•	,								•	[3]

(b) Draw the graph of $y = x^2 - \frac{3}{x}$ for $-3 \le x \le -0.25$ and $0.25 \le x \le 3$.



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	[3]	COM

(c) Use your graph to solve $x^2 - \frac{3}{x} = 7$.

(d) Draw the tangent to the curve where x = -2. Use the tangent to calculate an estimate of the gradient of the curve where x = -2.

Answer(d)	[3]
miswer (a)	 ارحا

(a) Solve $9 < 3n + 6 \le 21$ for integer values of n.

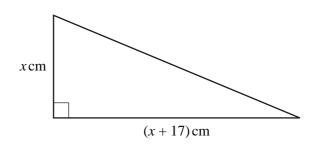
4 ()		гэ
Answer(a)		3
\ /		

- **(b)** Factorise completely.
 - (i) $2x^2 + 10xy$

$$Answer(b)(i)$$
 [2]

(ii)
$$3a^2 - 12b^2$$

(c)



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The area of this triangle is 84 cm².

(i) Show that $x^2 + 17x - 168 = 0$.

Answer (c)(i)

[2]

(ii) Factorise
$$x^2 + 17x - 168$$
.

$$Answer(c)(ii)$$
 [2]

(iii) Solve
$$x^2 + 17x - 168 = 0$$
.

$$\frac{15 - x}{2} = 3 - 2x.$$

For iner's

$$Answer(d) x =$$
 [3]

(e) Solve
$$2x^2 - 5x - 6 = 0$$
.

Show all your working and give your answers correct to 2 decimal places.

6

Time (t mins)	$0 < t \le 20$	$20 < t \le 35$	35 < <i>t</i> ≤ 45	45 < <i>t</i> ≤ 55	$55 < t \le 70$	70 < t
Frequency	6	15	19	37	53	20

The table shows the times taken, in minutes, by 150 students to complete their homework on one day.

(a) (i) In which interval is the median time?

Answer(a)(i)	Г17
111115 WC1 (U)(1)	1 1

(ii) Using the mid-interval values 10, 27.5,calculate an estimate of the mean time.

Answer(a)(ii) min [3]

(b) (i) Complete the table of cumulative frequencies.

Time (t mins)	<i>t</i> ≤ 20	<i>t</i> ≤ 35	<i>t</i> ≤ 45	<i>t</i> ≤ 55	<i>t</i> ≤ 70	<i>t</i> ≤ 80
Cumulative frequency	6	21				

[2]

(ii) On the grid, label the horizontal axis from 0 to 80, using the scale 1 cm represents 5 minutes and the vertical axis from 0 to 150, using the scale 1 cm represents 10 students.

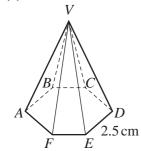
Draw a cumulative frequency diagram to show this information. [5]

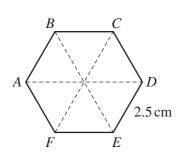
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	+++					
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+	+++					
	111					
-1-1-1-1-1						
	+++					
	+++					
-1-1-1-1-1						
	444					
-1-1-1-1-1						
#####	+++					
-}}-						
	+++					
	+++					
-1-1-1-1-1	-1111					
(c)	Use	your graph to estimate				
	(i)	the median time,	Answer(c)(i) \min [1]			
	(-)	the median time,	<i>Inswer(e)</i> (1)			
(ii)	the inter-quartile range,				
Ì			$Answer(c)(ii) \qquad min \qquad [2]$			
(i	ii)	the number of students who	ose time was in the range $50 < t \le 60$,			
			Answer(c)(iii) [1]			
(iv) the probability, as a fraction, that a student, chosen at random, took longer than 50 minutes,						
(iv) the probability, as a fraction, that a student, chosen at random, took longer than 50 minutes,						
			$Answer(c)(iv) \qquad [2]$			
			[2]			
((v)	the probability, as a fraction	n, that two students, chosen at random, both took longer than 50			
·	•	minutes.				

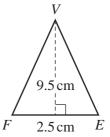
Answer(c)(v)

[2]

7 (a)





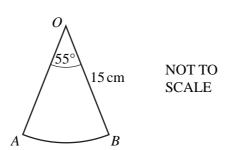


A solid pyramid has a **regular hexagon** of side 2.5 cm as its base. Each sloping face is an isosceles triangle with base 2.5 cm and height 9.5 cm.

Calculate the **total** surface area of the pyramid.

Answer(a)	 cm^2	[4]
(/		

(b)

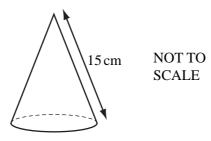


A sector *OAB* has an angle of 55° and a radius of 15 cm.

Calculate the area of the sector and show that it rounds to 108 cm², correct to 3 significant figures.

Answer (b)

(c)



The sector radii OA and OB in **part (b)** are joined to form a cone.

(i) Calculate the base radius of the cone. [The curved surface area, A, of a cone with radius r and slant height l is $A = \pi r l$.]

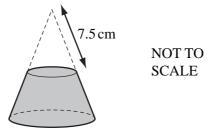
Answer(c)(i)	cm	- [2]
Answer(C)(1)	 CIII	141

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(ii) Calculate the perpendicular height of the cone.

Answer(c)(ii)	 cm	[3]
Answer (c)(11)	 CIII	LJ.

(d)



A solid cone has the same dimensions as the cone in **part** (c).

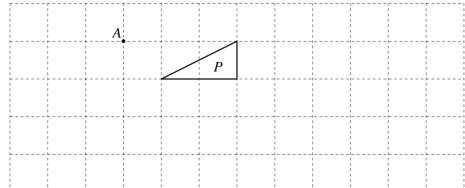
A small cone with slant height 7.5 cm is removed by cutting parallel to the base.

Calculate the volume of the remaining solid.

[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3} \pi r^2 h$.]

Answer(d)	 cm^3	[3]

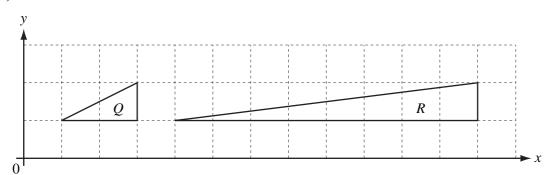
8 (a)



Draw the enlargement of triangle P with centre A and scale factor 2.

[2]

(b)



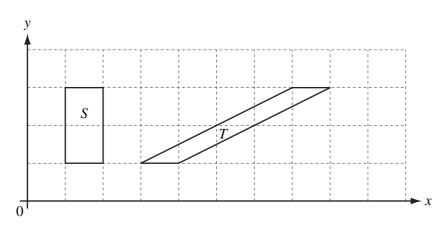
(i) Describe fully the **single** transformation which maps shape Q onto shape R.

4 (1)(')	ГΩ	٦.
Answerthill	13	1
111113111111111111111111111111111111111	 12	

(ii) Find the matrix which represents this transformation.

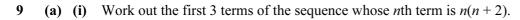
Answer(b)(ii)	[2]

(c)



Describe fully the **single** transformation which maps shape *S* onto shape *T*.

Answer(c) [3]



www.PapaCambridge.com Answer(a)(i) ,

(ii) Which term in this sequence is equal to 168?

Answer(a)(ii) [3]

(b) Find a formula for the *n*th term of the following sequences.

17 (i) 5 11 14

> Answer(b)(i) [2]

8 16 **(ii)** 1 2

> Answer(b)(ii) [2]

(c)



Diagram 1



Diagram 2

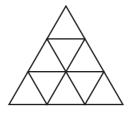


Diagram 3

A sequence of diagrams is formed by drawing equilateral triangles each of side one centimetre. Diagram 1 has 3 one centimetre lines.

Diagram 2 has 9 one centimetre lines.

The formula for the total number of one centimetre lines needed to draw all of the first ndiagrams is

$$an^3 + bn^2 + n$$
.

Find the values of a and b.

Answer(c) a =.....

$$b = \qquad [6]$$

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