

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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NAME								
CENTRE NUMBER					CANDIE NUMBE			

MATHEMATICS 0580/42

Paper 4 (Extended) May/June 2012

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.

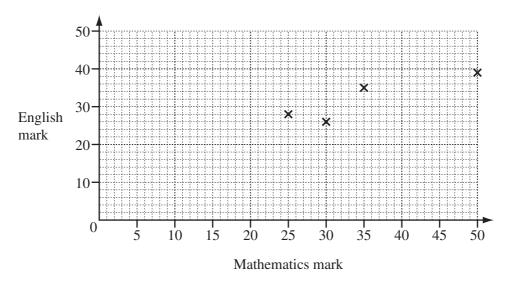
1

Mathematics mark	30	50	35	25	5	39	48	40	10	15
English mark	26	39	35	28	9	37	45	33	16	12

For Examiner's Use

The table shows the test marks in Mathematics and English for 10 students.

(a) (i) On the grid, complete the scatter diagram to show the Mathematics and English marks for the 10 students. The first four points have been plotted for you.



(ii) What type of correlation does your scatter diagram show?

l <i>nswer(a)</i> (ii)	[1	1	

(iii) Draw a line of best fit on the grid.

[1]

[2]

(iv) Ann missed the English test but scored 22 marks in the Mathematics test. Use your line of best fit to estimate a possible English mark for Ann.

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

(b) Show that the mean English mark for the 10 students is 28.

Answer(b)

[2]

(c) Two new students do the English test. They both score the **same** mark. The mean English mark for the 12 students is 31. Calculate the English mark for the new students.

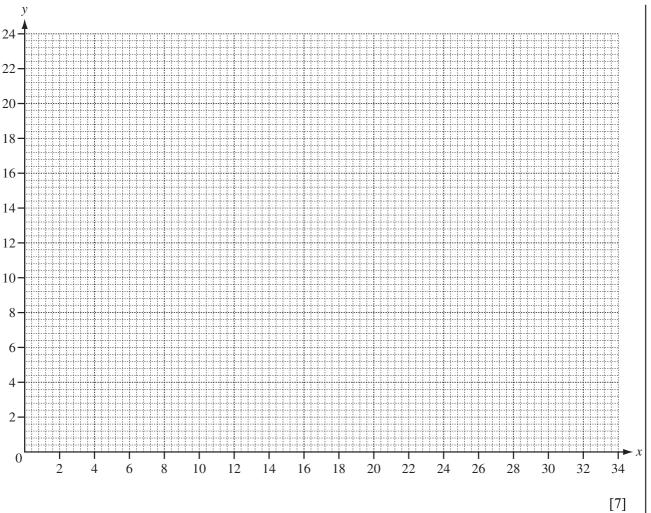
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Answer(c)	1.5
TITIS WEI (C)	 12

2 (a	1)	In a sale, Jen buys a laptop for \$351.55. This price is 21% less than the price before the sale.	For Examiner Use
		Calculate the price before the sale.	
		<i>Answer(a)</i> \$[3]	
(b))	Alex invests \$4000 at a rate of 8% per year simple interest for 2 years. Bob invests \$4000 at a rate of 7.5% per year compound interest for 2 years.	
		Who receives more interest and by how much?	
		Answer(b) receives \$ more interest. [6]	
		Answer (0) receives \$ more interest. [0]	

3

Pablo p	plants x lemon trees and y orange trees.	
(a) (i)	He plants at least 4 lemon trees.	
	Write down an inequality in x to show this information.	
	Answer(a)(i)	[1]
(ii)		[*]
	Write down an inequality in y to show this information.	
	Answer(a)(ii)	[1]
(iii)		
	Write down an inequality in x and y to show this information.	
	Answer(a)(iii)	[1]
(b) Le	emon trees cost \$5 each and orange trees cost \$10 each.	
Tł	ne maximum Pablo can spend is \$170.	
W	rite down an inequality in x and y and show that it simplifies to $x + 2y \le 34$.	
Ai	aswer (b)	
		[1]
(c) (i)	On the grid opposite, draw four lines to show the four inequalities and shade the unwant region.	ed





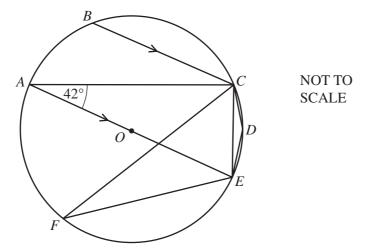
(ii) Calculate the smallest cost when Pablo buys a total of 20 trees.

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

Examiner's Use

[2]

(a)



A, B, C, D, E and F are points on the circumference of a circle centre O. AE is a diameter of the circle.

BC is parallel to *AE* and angle $CAE = 42^{\circ}$.

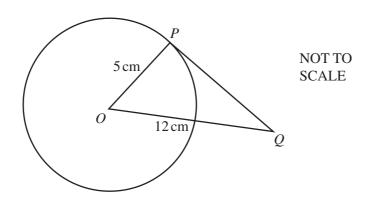
Giving a reason for each answer, find

(i) angle BCA,

	Answer(a)(i)	Angle BCA =	: 	
		Reason		[2]
(ii)	angle ACE,			
	Answer(a)(ii)	Angle ACE =	-	
		Reason		[2]
(iii)	angle CFE,			
	Answer(a)(iii)	Angle CFE =	=	
		Reason		[2]
(iv)	angle CDE.			
	Answer(a)(iv)	Angle CDE =	: 	

Reason

(b)



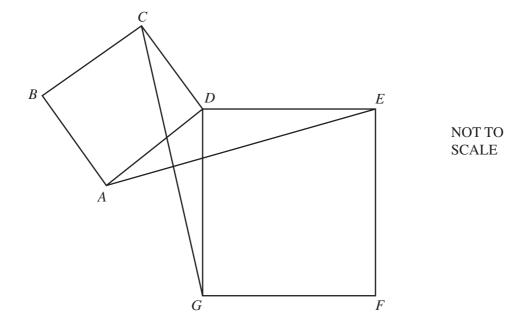
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In the diagram, O is the centre of the circle and PQ is a tangent to the circle at P. OP = 5 cm and OQ = 12 cm.

Calculate PQ.



(c)



In the diagram, ABCD and DEFG are squares.

(i) In the triangles *CDG* and *ADE*, explain with a reason which sides and/or angles are equal.

Answer (c)(i)

[3]

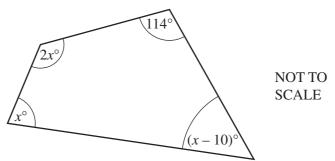
(ii) Complete the following statement.

Triangle CDG is to triangle ADE. [1]

5

(a)	In Portugal, Miguel buys a book about planets. The book costs $\in 34.95$. In England the same book costs £27.50. The exchange rate is £1 = $\in 1.17$.
	Calculate the difference in pounds (£) between the cost of the book in Portugal and England.
	Answer(a) £ [2]
(b)	In the book, the distance between two planets is given as 4.07×10^{12} kilometres. The speed of light is 1.1×10^9 kilometres per hour.
	Calculate the time taken for light to travel from one of these planets to the other. Give your answer in days and hours.
	Answer(b) days hours [3]
(c)	In one of the pictures in the book, a rectangle is drawn. The rectangle has length 9.3 cm and width 5.6 cm, both correct to one decimal place.
	(i) What is the lower bound for the length?
	Answer(c)(i) cm [1]
	(ii) Work out the lower and upper bounds for the area of the rectangle.
	Answer(c)(ii) Lower bound = cm ²
	Upper bound = cm^2 [2]

6 (a)



Find the value of x.

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

(b) (i) Write the four missing terms in the table for sequences A, B, C and D.

Term	1	2	3	4	5	n
Sequence A	-4		2	5	8	3n - 7
Sequence B	1	4	9	16	25	
Sequence C	5	10	15	20	25	
Sequence D	6	14	24	36	50	

(ii) Which term in sequence D is equal to 500?

[4]

(c) Simplify
$$\frac{x^2 - 16}{2x^2 + 7x - 4}$$
.

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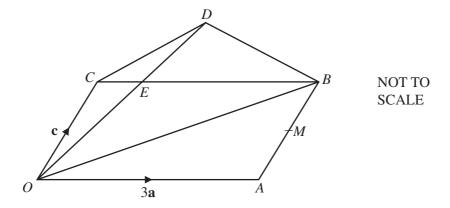
Examiner's Use

7	(a)	P is the point (2, 5) and $\overrightarrow{PQ} =$	$\begin{pmatrix} 3 \\ -2 \end{pmatrix}$).
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Write down the co-ordinates of Q.

Answer(a) (, , ,) [1]

(b)



O is the origin and OABC is a parallelogram.

M is the midpoint of AB.

$$\overrightarrow{OC} = \mathbf{c}$$
, $\overrightarrow{OA} = 3\mathbf{a}$ and $CE = \frac{1}{3}CB$.

OED is a straight line with OE:ED=2:1.

Find in terms of a and c, in their simplest forms

(i) \overrightarrow{OB} ,

$$Answer(b)(i) \overrightarrow{OB} =$$
 [1]

(ii) the position vector of M,

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

(iii) \overrightarrow{OE} ,

$$Answer(b)(iii) \overrightarrow{OE} =$$
 [1]

(iv) \overrightarrow{CD} .

$$Answer(b)(iv) \overrightarrow{CD} =$$
 [2]

(c) Write down two facts about the lines CD and OB.

Answer (c)	
	[2]

8	In all parts of this question give your answer as a fraction in its lowest terms.

(a) (i) The probability that it will rain today is $\frac{1}{3}$.

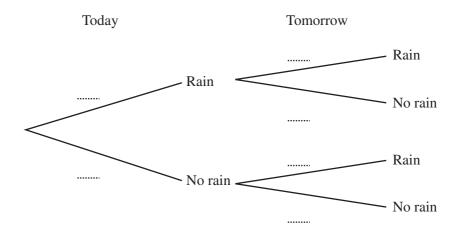
What is the probability that it will not rain today?

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

(ii) If it rains today, the probability that it will rain tomorrow is $\frac{2}{5}$.

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$.

Complete the tree diagram.



[2]

(b) Find the probability that it will rain on at least one of these two days.

Answer(b) [3]

(c) Find the probability that it will rain on only one of these two days.

Answer(c) [3]

9

Scale 1:10 000

The diagram is a scale drawing of a park *EFGH*. The scale is 1:10000.

A statue is to be placed in the park so that it is

- nearer to G than to H
- nearer to HG than to FG
- more than 550 metres from F.

Construct accurately the boundaries of the region R in which the statue can be placed.

Leave in all your construction arcs and shade the region R.

[7]

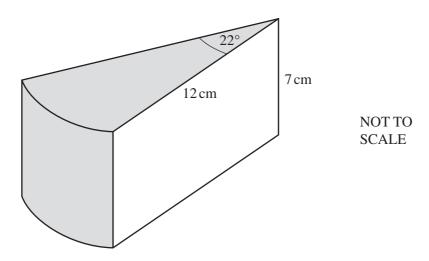
Examiner's Use

		13		
10	(a)	Simplify		
		(i) $(2x^2y^3)^3$,		
			Answer(a)(i)	[2]
		$\left(-\frac{1}{2} \right)$		
		(ii) $\left(\frac{27}{x^6}\right)^{\frac{1}{3}}$.		
			Answer(a)(ii)	[3]
	(b)	Multiply out and simplify.		
		(3x-2y)(2x+5y)		
		Answe	r(b)	[3]
	(c)	Make <i>h</i> the subject of		
		(i) $V = \pi r^3 + 2\pi r^2 h$,		
			Answer(c)(i) h =	[2]
		(ii) $V = \sqrt{3h}$.		
			Answer(c)(ii) h =	[2]
	(d)	Write as a single fraction in its simplest form.		
		$\frac{x}{2} + \frac{5x}{3} - \frac{7x}{4}$		
		2 3 4		
			Answer(d)	[2]

11 (a) Calculate the area of a circle with radius 12 cm.

For Examiner's Use

(b)



A circular cake has radius 12 cm and height 7 cm.

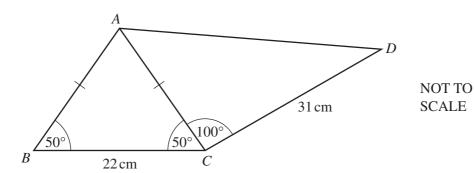
The uniform cross-section of a slice of the cake is a sector with angle 22°.

The top and the curved surface of the slice, shaded in the diagram, are covered with chocolate.

Calculate the area of the slice which is covered with chocolate.

Answer(b)	cm^2	[5]
(-)		ъ.

(c)



For Examiner's Use

The frame of a child's bicycle is made from metal rods. ABC is an isosceles triangle with base 22 cm and base angles 50° . Angle $ACD = 100^{\circ}$ and CD = 31 cm.

Calculate the length AD.

 $Answer(c) AD = \qquad cm \quad [6]$

Question 12 is printed on the next page.

[4]

12	(a)	The cost of 1 kg of tomatoes is x and the cost of 1 kg of onions is y .		
		Ian pays a total of \$10.70 for 10 kg of tomatoes and 4 kg of onions.	Examiner's Use	
		Jao pays a total of \$10.10 for 8 kg of tomatoes and 6 kg of onions.		
		Write down simultaneous equations and solve them to find x and y .		
		$Answer(a) x = \underline{\hspace{1cm}}$		
		y = [6]		
	(b)	Solve $2x^2 - 5x - 8 = 0$.		
		Give your answers correct to 2 decimal places. Show all your working.		
		Show all your working.		

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