

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

MATHEMATICS 0580/31

Paper 3 (Core) October/November 2010

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator Geor Mathematical tables (optional) Trace

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 104.

1	()	XX7 .	1
	(a)	Write	COMM

((i)	a multi	ple	of 7	between	80	and	90.

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

(ii) a prime number between 30 and 40,

(iii) a square number between 120 and 130,

(iv) a cube number between 100 and 200.

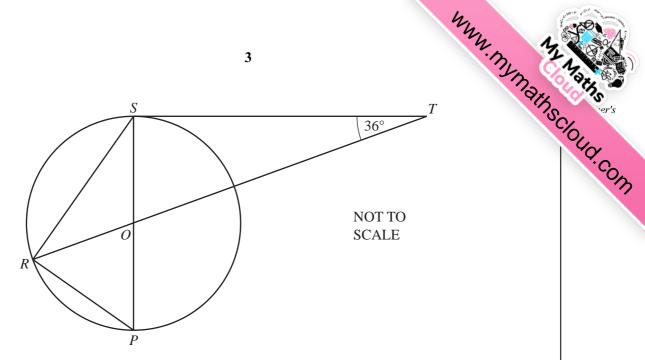
$$Answer(a)(iv) \qquad [1]$$

(b) Write the following numbers in order, starting with the smallest.

$$\sqrt{0.31}$$
 $\frac{5}{9}$ 55%

$$Answer(b) \qquad \qquad < \qquad \qquad [2]$$

2



The points P, R and S lie on a circle, centre O. *ROT* is a straight line and *TS* is a tangent to the circle at *S*. Angle $STO = 36^{\circ}$.

(a) Write down the size of angle *TSO*, giving a reason for your answer.

Answer(a) Angle TSO =	 because	
	 	 [2]

(b) (i) Calculate the size of angle *TOS*.

$$Answer(b)(i) Angle TOS = [1]$$

(ii) Show that angle $OPR = 63^{\circ}$.

Answer(b)(ii)

[2]

(c) (i) Write down the size of angle *PRS*.

$$Answer(c)(i) Angle PRS = [1]$$

(ii) Calculate the size of angle *PSR*.

$$Answer(c)(ii) Angle PSR = [1]$$

3

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Month	Total rainfall (mm)	Average daily sunshine (hours)	.30
January	79	6	
February	84	7]
March	62	4.5]
April	46	1.5]
May	53	3.5]
June	54	1.5]

The table shows some data about rainfall and sunshine.

	_					
(a)	For	the	rainfall,	ca	lcul	late

(i) the mean,

	(ii) the range.	Answer(a)(i)	 mm	[2]
(b)	For the sunshine , find	Answer(a)(ii)	 mm	[1]
	(i) the mode,(ii) the median.	Answer(b)(i)	 h	[1]
		Answer(b)(ii)	h	[2]

Calculate the sector angle for **February**.

(c) Dinesh draws a pie chart to display the rainfall data.

[2]

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(d) Amalia draws a pictogram to display the **sunshine data** for January and February.

January	
February	*****
March	

(i) Complete the key for the pictogram.

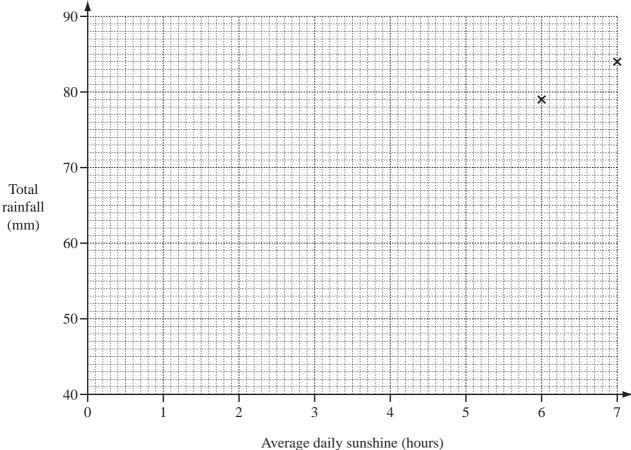
represents	

[1]

(ii) Complete the pictogram for March.

[1]

- (e) Priya draws a scatter diagram to find the correlation between rainfall and sunshine for January to June.
 - Complete the scatter diagram below. January and February are plotted for you.



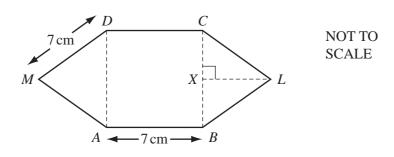
[2]

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

Answer(e)(ii)	[1]
	 L-1

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4



In the diagram, *ABCD* is a square of side 7 cm. *BLC* and *DMA* are **equilateral** triangles.

(a) Find the perimeter of the shape ABLCDM.

Answer(a)		cm	[1]
-----------	--	----	-----

(b) (i) Write down the size of angle *CBL*.

$$Answer(b)(i)$$
 Angle $CBL =$ [1]

(ii) Calculate the length of LX.

$$Answer(b)$$
(ii) $LX =$ cm [2]

(c) (i) Calculate the area of triangle *BLC*.

$$Answer(c)(i) \qquad cm^2 \qquad [2]$$

(ii) Calculate the area of the shape ABLCDM.

Man Man Man

5	A a1	honk	eeper buys cheese for \$3.75 per kilogram and sells it for \$5.10 per kilogram.
3		•	
	(a)	Car	culate his percentage profit.
			4 ()
	a >	3.5	Answer(a)
	(b)		s Garcia buys cheese from the shopkeeper.
		Cal	culate the number of grams of cheese she can buy for \$2.04.
			$Answer(b) \qquad \qquad g [2]$
	(c)	The	e shopkeeper sells 7 kg of cheese and has 3 kg left.
		(i)	He reduces his selling price of \$5.10 per kilogram by 70%.
			Calculate the reduced price.
			4 ()(;) ¢ [2]
			Answer(c)(i) [2]
		(ii)	He sells the 3kg of cheese at the reduced price.
			Calculate the total amount of money he receives by selling all the cheese.

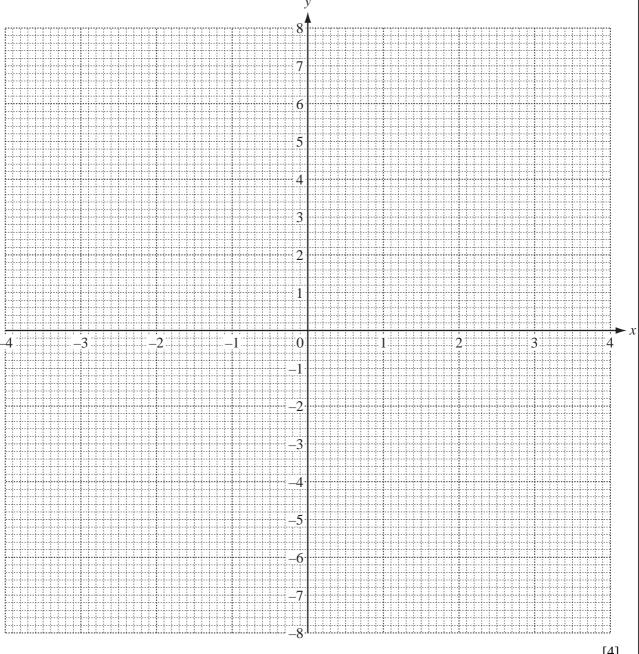
Answer(c)(ii) \$ _____ [2]

(a) Complete the table of values for $y = \frac{4}{x}, x \neq 0$.

х	-4	-3	-2	-1	- 0.5	0.5	1	2	3	4
у		-1.3	-2		-8	8	4	2		

[2]

(b) On the grid below, draw the graph of $y = \frac{4}{x}$, for $-4 \le x \le -0.5$ and $0.5 \le x \le 4$.



[4]

(c) Complete the following statement.

The point (-2.5,) lies on the graph of
$$y = \frac{4}{x}$$
.

(d) (i) On the grid, draw the line
$$y = 5$$
.

(ii) Use your graphs to solve the equation
$$\frac{4}{x} = 5$$
.

$$Answer(d)(ii) x =$$
 [1]

(e) (i) On the grid, draw the straight line joining the points
$$(-0.5, -8)$$
 and $(2, 2)$. [2]

(ii) Find the gradient of this line.

(iii) Write down the equation of this line in the form y = mx + c.

$$Answer(e)(iii) y =$$
 [2]

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7 (a) Solve the equation.

$$4x + 3 = 2 + 6x$$

$$Answer(a) x =$$
 [2]

(b) Simplify.

$$7(3x - 4y) - 3(5x + 2y)$$

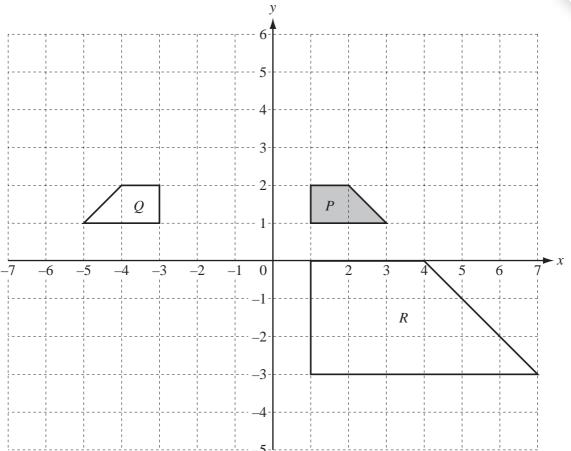
 $Answer(b) \qquad [2]$

(c) Factorise completely.

$$6g^2-3g^3$$

Answer(c) [2]

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Shapes P, Q, and R are shown on the grid.

(a) On the grid, draw the image of shape P after

(i) a rotation through 180° about the origin, [2]

(ii) a reflection in the line y = 3, [2]

(iii) a translation by the vector $\begin{pmatrix} -5\\3 \end{pmatrix}$. [2]

(b) Describe fully the **single** transformation which maps

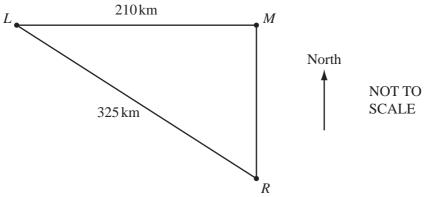
(i) shape P onto shape Q,

Answer(b)(i) [2]

(ii) shape P onto shape R.

Answer(b)(ii) [3]

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The diagram shows three islands, L, M and R.

L is due west of M and R is due south of M.

LM = 210 km and LR = 325 km.

(a) Calculate the distance RM.

Answer(a)
$$RM =$$
 km [3]

(b) (i) Use trigonometry to calculate angle *LRM*.

$$Answer(b)(i)$$
 Angle $LRM =$ [2]

(ii) Find the bearing of L from R.

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(c)	(i)	A ferry travels directly from M to L .
		It leaves M at 06 15 and arrives at L at 13 45

Calculate the average speed of the ferry in kilometres per hour.

	Answer(c)(i) km/h	[2]
(ii)	The ferry then travels the 325 km from L to R at an average speed of 37 km/h.	
	Calculate the time taken. Give your answer in hours and minutes, to the nearest minute.	
	Answer(c)(ii) h min	[3]
(iii)	The ferry leaves L at 1400.	
	Use your answer to part (c)(ii) to find the time it arrives at R.	
	Answer(c)(iii)	[1]

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Diagram 1 Diagram 2 Diagram 3

Diagram 4

Diagram 5

Each of the diagrams above shows one small shaded square and a number of small unshaded squares. The diagrams form a sequence.

(a) Complete Diagram 5.

[1]

(b) Complete the table.

Diagram	1	2	3	4	5		50		n
Total number of small squares	1	4	9	16		_		_	
Number of small shaded squares	1	1	1	1		_		_	
Number of small unshaded squares	0	3	8	15		_		_	

[7]

(c) Diagram *p* has 9999 small unshaded squares. Find p.

> Answer(c) p =[1]

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11 Roberto earns a total of \$p\$ per week.

He works for t hours each week and is paid a fixed amount per hour.

He also receives a bonus of \$k\$ every week.

The formula for p is

$$p = 8t + k$$
.

(a) Write down how much Roberto is paid per hour.

Answer(a) \$	[1]
11.15	 L * J

(b) (i) Find how much Roberto earns in a week when he works for 40 hours and his bonus is \$35.

(ii) Find how many hours Roberto works in a week when he earns \$288 and his bonus is \$24.

(c) Make t the subject of the formula.

$$Answer(c) t = [2]$$

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