

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

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

## 8 1 0 9 9 9 6 8 7 6

MATHEMATICS 0580/22

Paper 2 (Extended) October/November 2010

1 hour 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  $\pi$ , 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 70.

This document consists of 12 printed pages.



Examiner's Use



For the diagram, write down

			_	~			
(	(a)	the	order	of ro	otational	symme	etry,

	E 4 7
Answer(a)	111
Answeriai	111

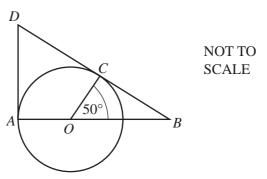
**(b)** the number of lines of symmetry.

2 In a group of 30 students, 18 have visited Australia, 15 have visited Botswana and 5 have not visited either country.

Work out the number of students who have visited Australia but not Botswana.

3 Rearrange the formula J = mv - mu to make m the subject.

$$Answer m = [2]$$



For Examiner's Use

O is the centre of the circle.

DA is the tangent to the circle at A and DB is the tangent to the circle at C. AOB is a straight line. Angle  $COB = 50^{\circ}$ . Calculate

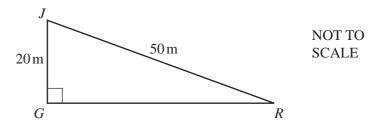
(a) angle CBO,

$$Answer(a) \text{ Angle } CBO = \qquad [1]$$

**(b)** angle *DOC*.

$$Answer(b) \text{ Angle } DOC =$$
 [1]

5



JGR is a right-angled triangle. JR = 50m and JG = 20m. Calculate angle JRG.

Answer Angle 
$$JRG =$$
 [2]

- **6** Write 0.00658
  - (a) in standard form,

**(b)** correct to 2 significant figures.

Answer(b)	[1]	1
11.10	 LŤ.	J

	$\rightarrow$		<b>→</b>		
7	$AB = \mathbf{a} + t\mathbf{b}$	and (	$CD = \mathbf{a} + (3t -$	5) <b>b</b>	where <i>t</i> is a number.

Examiner's Use

Find the value of t when  $\overrightarrow{AB} = \overrightarrow{CD}$ .

Answer 
$$t =$$
 [2]

8 Show that 
$$\frac{7}{27} + 1\frac{7}{9} = 2\frac{1}{27}$$
.

Write down all the steps in your working.

Answer

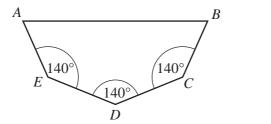
[2]

9 When a car wheel turns once, the car travels 120 cm, correct to the nearest centimetre.

Calculate the lower and upper bounds for the distance travelled by the car when the wheel turns 20 times.

Answer lower bound \_\_\_\_\_ cm

upper bound \_\_\_\_ cm [2]



For Examiner's Use

The pentagon has three angles which are each 140°.

The other two interior angles are equal.

Calculate the size of one of these angles.

Answer	[3]

NOT TO SCALE

11 The resistance, R, of an object being towed through the water varies directly as the **square** of the speed, v.

R = 50 when v = 10.

Find R when v = 16.

Answer 
$$R =$$
 [3]

12 Write as a single fraction, in its simplest form.

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

Answer [3]



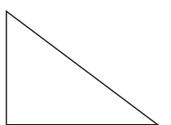
For Examiner's Use

The diagram shows a circle of radius 5cm in a square of side 18cm.

Calculate the shaded area.

Answer	 $cm^2$	[3]

14



Draw, accurately, the locus of all the points **outside** the triangle which are 3 centimetres away from the triangle. [3]

15 The air fare from Singapore to Stockholm can be paid for in Singapore dollars (S\$) or Malaysian Ringitts (RM).
One day the fare was S\$740 or RM1900 and the exchange rate was S\$1= RM2.448.

For Examiner's Use

How much less would it cost to pay in Singapore dollars? Give your answer in Singapore dollars correct to the nearest Singapore dollar.

Answer S\$	[3]
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16 Simplify

(a) 
$$\left(\frac{16}{81}x^{16}\right)^{\frac{1}{2}}$$
,

**(b)** 
$$\frac{16y^{10} \times 4y^{-4}}{32y^{7}}.$$

$$Answer(b)$$
 [2]

17

	Boys	Girls	Total
Asia	62	28	
Europe	35	45	
Africa		17	
Total			255

For a small international school, the holiday destinations of the 255 students are shown in the table.

(a) Complete the table.

[3]

(b) What is the probability that a student chosen at random is a girl going on holiday to Europe?

Answer(b) [1]

$$\mathbf{A} = \begin{pmatrix} 2 & 4 \\ 5 & 3 \end{pmatrix}$$

$$\mathbf{B} = \begin{pmatrix} 3 & -4 \\ -5 & 2 \end{pmatrix}$$

For Examiner's Use

(a) Work out AB.

Answer(a) [2]

(b) Find |B|, the determinant of **B**.

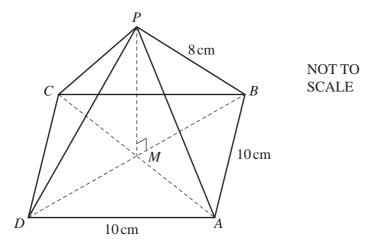
Answer(b) [1]

(c) I is the  $(2 \times 2)$  identity matrix. Find the matrix C, where C = A - 7I.

Answer(c)

[2]

For Examiner's Use



The diagram represents a pyramid with a square base of side 10 cm.

The diagonals AC and BD meet at M. P is vertically above M and PB = 8cm.

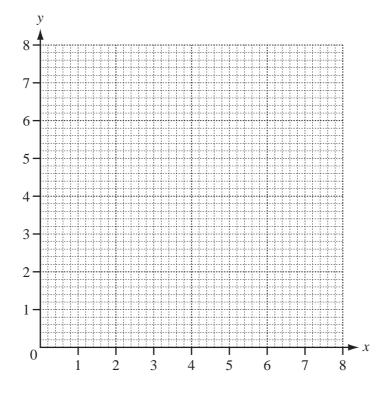
(a) Calculate the length of BD.

$$Answer(a) BD = \qquad \qquad cm \qquad [2]$$

**(b)** Calculate MP, the height of the pyramid.

Answer(b) 
$$MP =$$
 cm [3]

For Examiner's Use



(a) Draw the lines y = 2, x + y = 6 and y = 2x on the grid above.

[4]

**(b)** Label the region R which satisfies the three inequalities

$$x + y \ge 6$$
,

$$y \ge 2$$

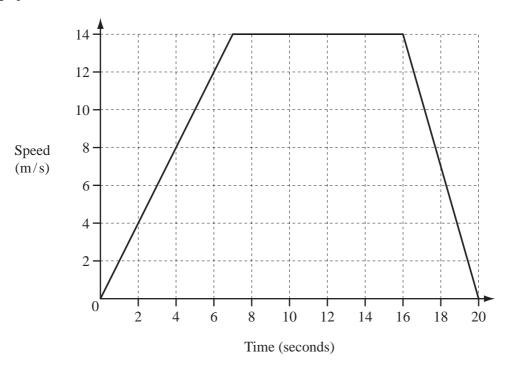
$$y \le 2x$$
.

[1]

21 An animal starts from rest and accelerates to its top speed in 7 seconds. It continues at this speed for 9 seconds and then slows to a stop in a further 4 seconds.

For Examiner's Use

The graph shows this information.



(a) Calculate its acceleration during the first seven seconds.

Answer(a)  $m/s^2$  [1]

**(b)** Write down its speed 18 seconds after the start.

Answer(b) ..... m/s [1]

(c) Calculate the total distance that the animal travelled.

Answer(c) \_\_\_\_\_ m [3]

Question 22 is printed on the next page.

22	(a)	The line $y = 2x + 7$ meets the y-axis at A.	For
		Write down the co-ordinates of $A$ .	Examiner's Use
		Answer(a) A = (	
	(b)	A line parallel to $y = 2x + 7$ passes through $B(0, 3)$ .	
		(i) Find the equation of this line.	
		$Answer(b)(i) \qquad [2]$	
		(ii) C is the point on the line $y = 2x + 1$ where $x = 2$ .	
		Find the co-ordinates of the midpoint of $BC$ .	
		Answer(b)(ii) (	

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