UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

8109969876

MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2010**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
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 70.

This document consists of **12** printed pages.

UNIVERSITY of CAMBRIDGE International Examinations

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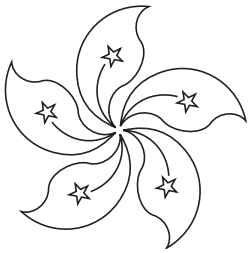
For Examiner's Use

1



For the diagram, write down

(a) the order of rotational symmetry,

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

(b) the number of lines of symmetry.

Answer(b) ..... [1]

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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.

Answer ..... [2]

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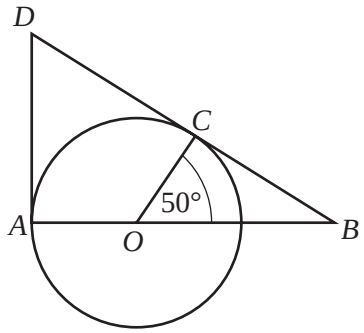
3 Rearrange the formula $J = mv - mu$ to make m the subject.

Answer $m =$ [2]

For Examiner's Use

4



NOT TO SCALE

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°.
Calculate

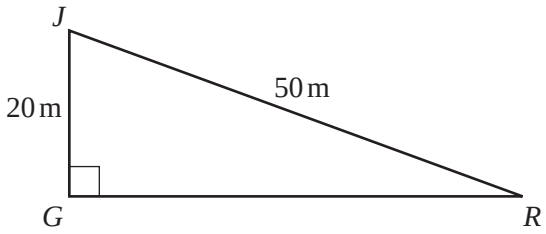
(a) angle *CBO*,

Answer(a) Angle *CBO* = ... [1]

(b) angle *DOC*.

Answer(b) Angle *DOC* = ... [1]

5



NOT TO SCALE

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,

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

(b) correct to 2 significant figures.

Answer(b) ..... [1]

For Examiner's Use

7 $\overrightarrow{AB} = \mathbf{a} + t\mathbf{b}$ and $\overrightarrow{CD} = \mathbf{a} + (3t - 5)\mathbf{b}$ where t is a number.

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]

---

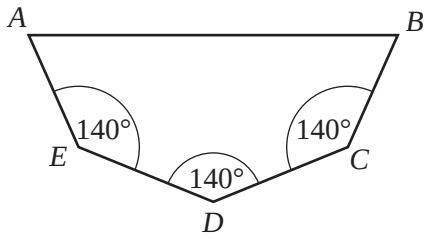
9 When a car wheel turns once, the car travels 120 cm, correct to the nearest centimetre.

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]

10



NOT TO SCALE

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]

For Examiner's Use

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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]

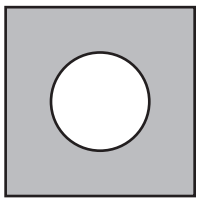
---

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

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

Answer [3]

13



NOT TO SCALE

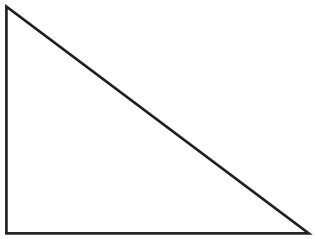
The diagram shows a circle of radius 5cm in a square of side 18cm.

Calculate the shaded area.

Answer ..... cm^2 [3]

For Examiner's Use

14



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

For Examiner's Use

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 .

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]

---

16 Simplify

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

Answer(a) ..... [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]

18

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

For Examiner's Use

(a) Work out **AB**.

Answer(a) [2]

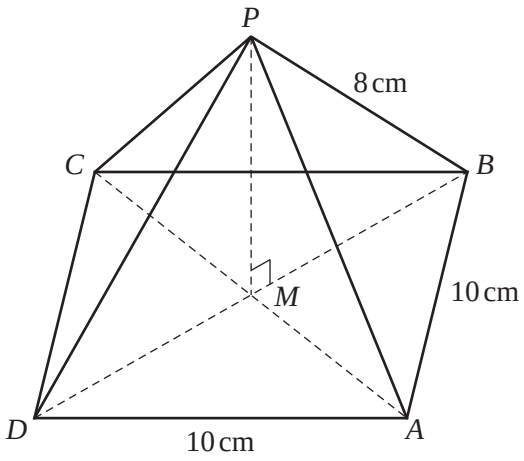
(b) Find $|\mathbf{B}|$, the determinant of **B**.

Answer(b) ..... [1]

(c) **I** is the (2 × 2) identity matrix.
Find the matrix **C**, where $\mathbf{C} = \mathbf{A} - 7\mathbf{I}$.

Answer(c) [2]

19



NOT TO SCALE

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 = ... cm [2]

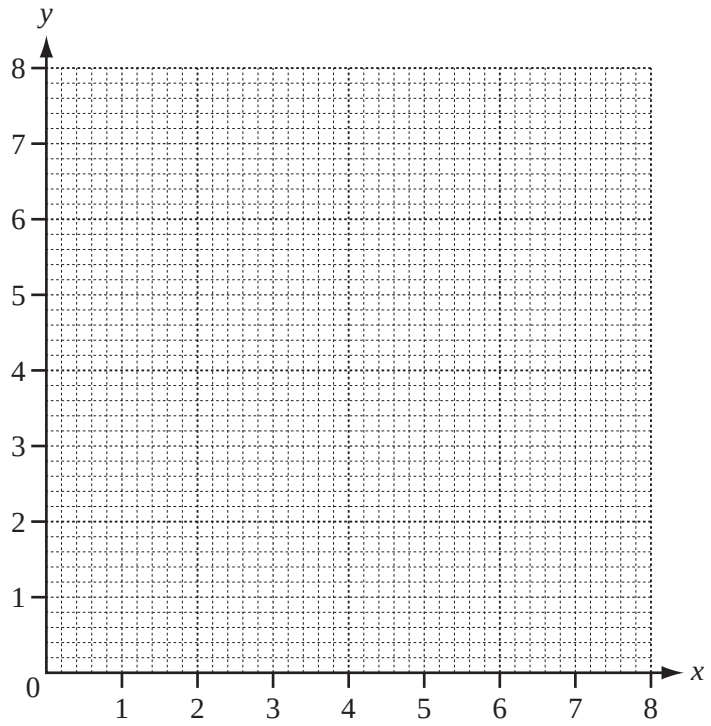
(b) Calculate *MP*, the height of the pyramid.

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

[Turn over

20

For Examiner's Use



(a) Draw the lines $y = 2$, $x + y = 6$ and $y = 2x$ on the grid above. [4]

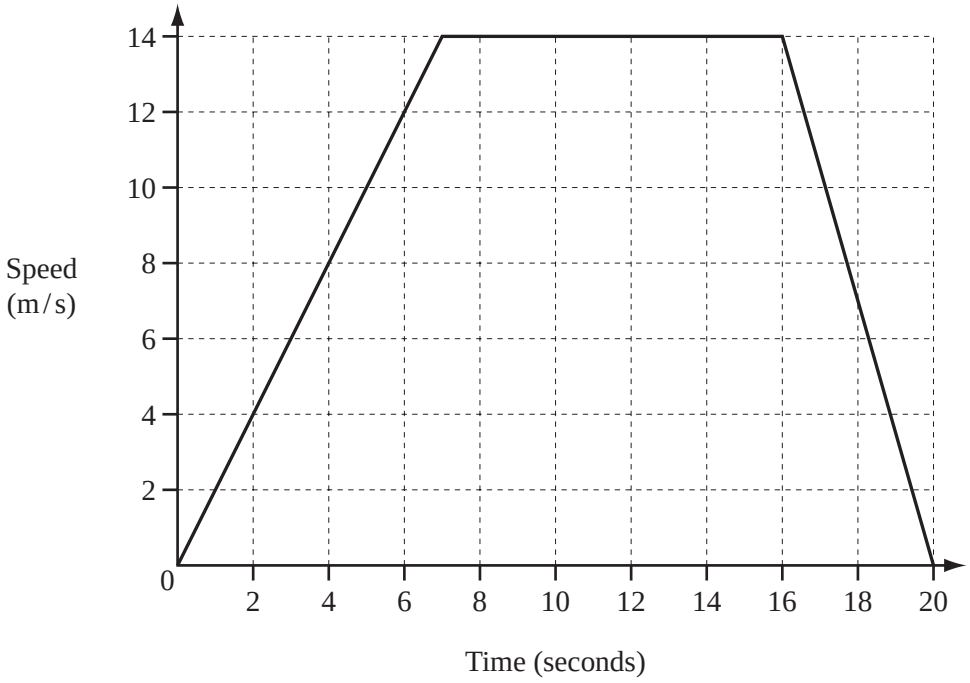
(b) Label the region R which satisfies the three inequalities

$x + y \geqslant 6$, $y \geqslant 2$ and $y \leqslant 2x$. [1]

For Examiner's Use

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.

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.

For Examiner's Use

22 **(a)** The line $y = 2x + 7$ meets the y-axis at A.

Write down the co-ordinates of A.

Answer(a) $A = ($ ..... , ... $)$ [1]

(b) A line parallel to $y = 2x + 7$ passes through $B(0, 3)$.

(i) Find the equation of this line.

Answer(b)(i) ..... [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) (..... , ...) [3]