UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

9185886726

MATHEMATICS **0580/21**

Paper 2 (Extended) **May/June 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.

For Examiner's Use

1 Write the numbers in order of size with the **smallest** first.

$\sqrt{10}$ 3.14 $\frac{22}{7}$ π

Answer ..... < ..... < ..... < ..... [2]

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2 Michel changed \$600 into pounds (£) when the exchange rate was £1 = \$2.40.
He later changed all the pounds back into dollars when the exchange rate was £1 = \$2.60.

How many dollars did he receive?

Answer \$ ..... [2]

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3 p is the largest prime number between 50 and 100.
q is the smallest prime number between 50 and 100.

Calculate the value of $p - q$.

Answer ..... [2]

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4 A person in a car, travelling at 108 kilometres per hour, takes 1 second to go past a building on the side of the road.

Calculate the length of the building in metres.

Answer ..... m [2]

For Examiner's Use

5 Calculate the value of $5(6 \times 10^3 + 400)$, giving your answer in standard form.

Answer ..... [2]

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6 Calculate the value of $\frac{1}{2}\sqrt{\frac{1}{2}+\frac{1}{2}\sqrt{\frac{1}{2}}}$

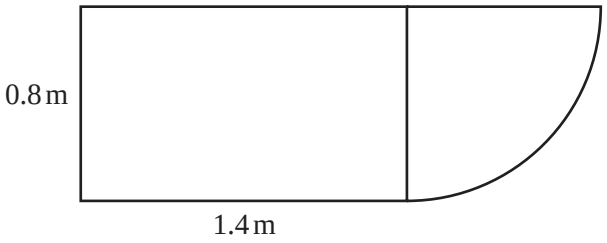
(a) writing down all the figures in your calculator answer,

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

(b) writing your answer correct to 4 significant figures.

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

7



NOT TO SCALE

The top of a desk is made from a rectangle and a quarter circle.
The rectangle measures 0.8m by 1.4m.

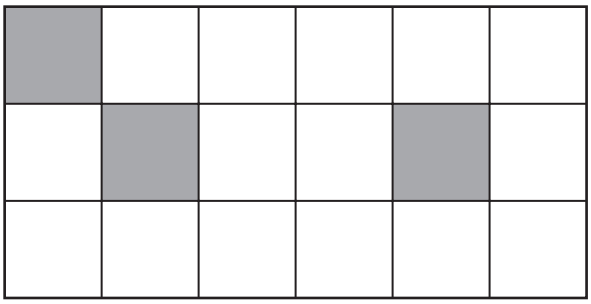
Calculate the surface area of the top of the desk.

Answer ..... m^2 [3]

For Examiner's Use

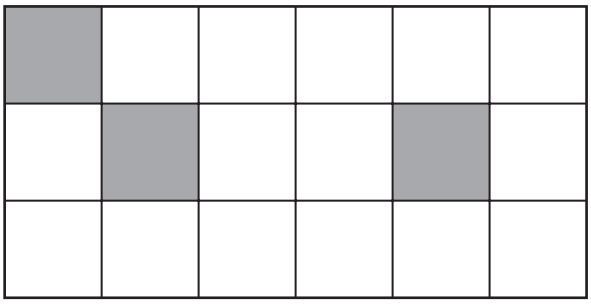
8 **(a)** Shade **one** square in each diagram so that there is

(i) one line of symmetry,



[1]

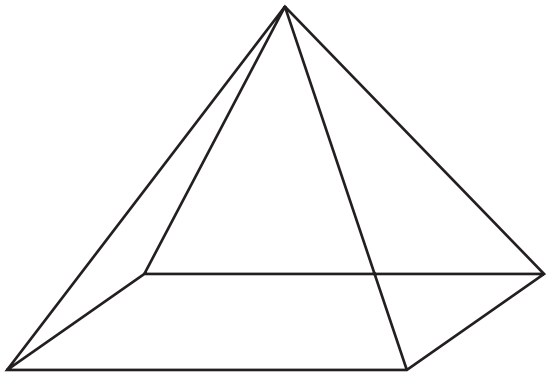
(ii) rotational symmetry of order 2.



[1]

(b) The pyramid below has a rectangular base.
The vertex of the pyramid is vertically above the centre of the base.

Write down the number of **planes** of symmetry for the pyramid.



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

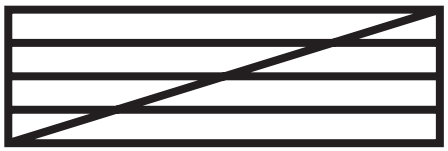
For Examiner's Use

9 A cyclist left Melbourne on Wednesday 21 May at 09 45 to travel to Sydney.
The journey took 97 hours.

Write down the day, date and time that the cyclist arrived in Sydney.

Answer Day ..... Date ..... Time ..... [3]

10



NOT TO SCALE

The diagram represents a rectangular gate measuring 1.5m by 3.5m.
It is made from eight lengths of wood.

Calculate the total length of wood needed to make the gate.

Answer ..... m [3]

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11 Make d the subject of the formula $c = \dfrac{5d + 4w}{2w}$.

Answer $d =$

[3]

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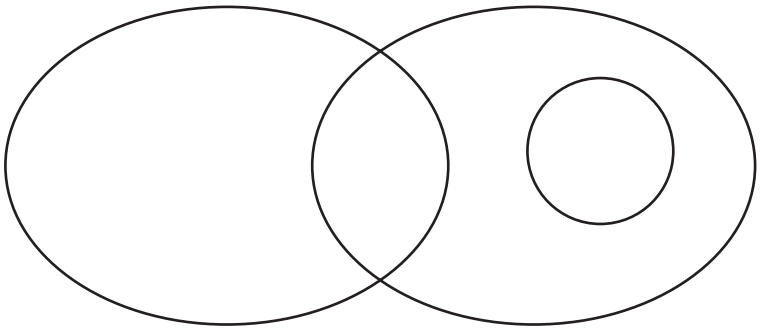
12 $Q = \{2, 4, 6, 8, 10\}$ and $R = \{5, 10, 15, 20\}$.
$15 \in P$, $n(P) = 1$ and $P \cap Q = \varnothing$.

Label each set and complete the Venn diagram to show this information.



[3]

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13 Solve the simultaneous equations.

$$\frac{2x + y}{2} = 7$$

$$\frac{2x - y}{2} = 17$$

Answer $x =$ .....

$y =$ ..... [3]

For Examiner's Use

14 y varies inversely as the square of x.
$y = 1.5$ when $x = 8$.

Find y when $x = 5$.

Answer $y =$ ..... [3]

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15 The points (2, 5), (3, 3) and (k, 1) all lie in a straight line.

(a) Find the value of k.

Answer(a) $k =$ ..... [1]

(b) Find the equation of the line.

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

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16 Simplify

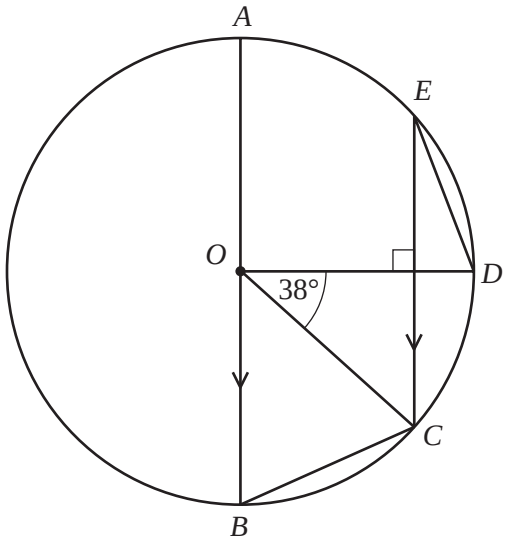
(a) $\left(\frac{p^4}{16}\right)^{0.75}$,

Answer(a) ..... [2]

(b) $3^2q^{-3} \div 2^3q^{-2}$.

Answer(b) ..... [2]

17



NOT TO SCALE

AB is the diameter of a circle, centre *O*. *C*, *D* and *E* lie on the circle.
EC is parallel to *AB* and perpendicular to *OD*. Angle *DOC* is 38°.

Work out

(a) angle *BOC* ,

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

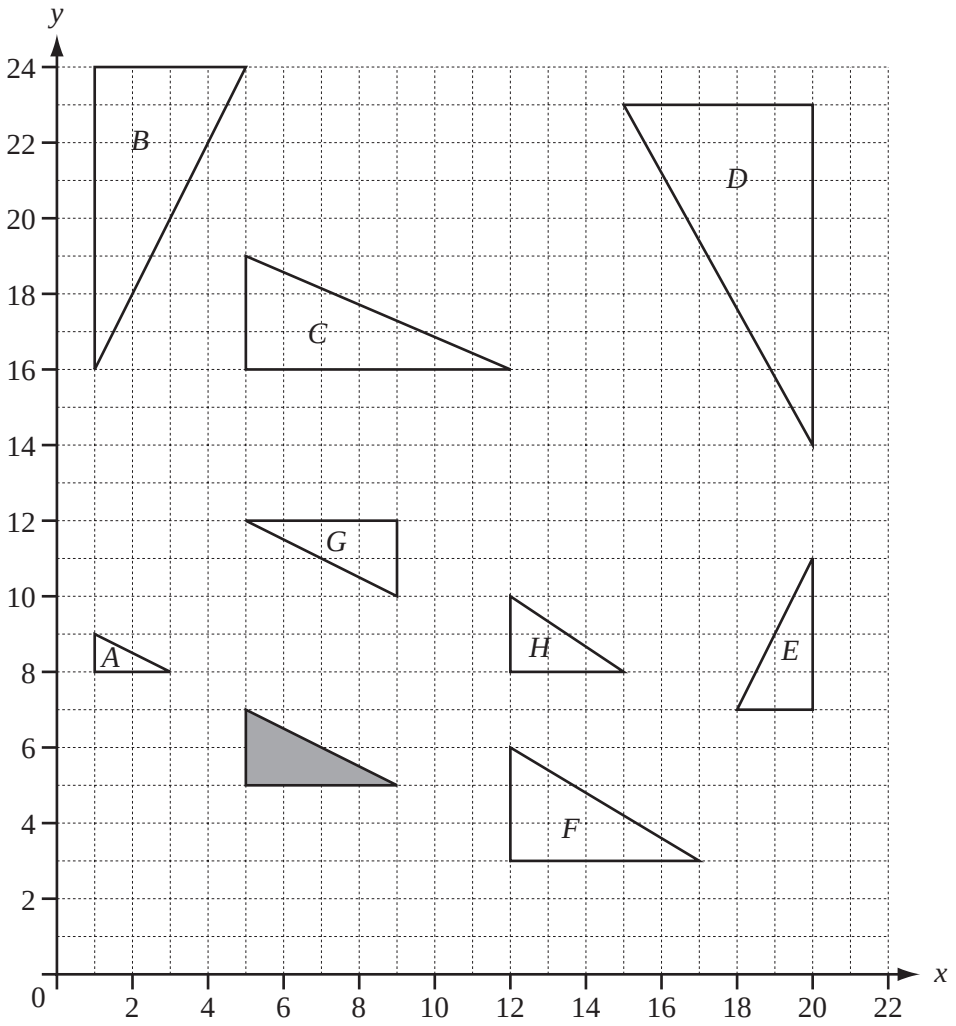
(b) angle *CBO*,

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

(c) angle *EDO* .

Answer(c) Angle *EDO* = ... [2]

18



Write down the letters of all the triangles which are

(a) congruent to the shaded triangle,

Answer(a) ..... [2]

(b) similar, but not congruent, to the shaded triangle.

Answer(b) ..... [2]

19 The position vector **r** is given by $\mathbf{r} = 2\mathbf{p} + t(\mathbf{p} + \mathbf{q})$.

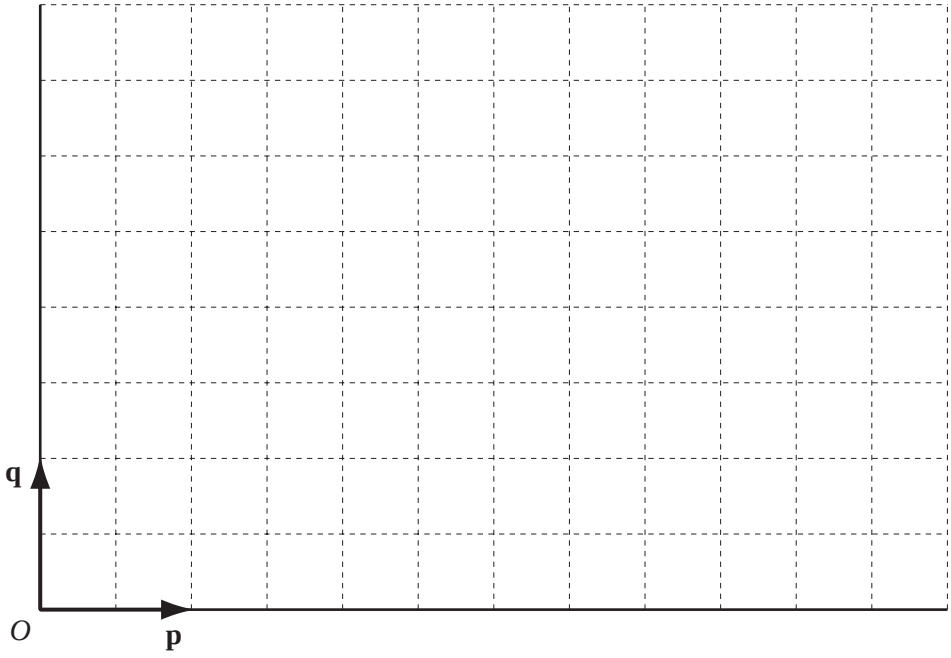
(a) Complete the table below for the given values of t.
Write each vector in its simplest form.
One result has been done for you.

t	0	1	2	3
r			$4\mathbf{p} + 2\mathbf{q}$	

[3]

(b) O is the origin and **p** and **q** are shown on the diagram.

(i) Plot the 4 points given by the position vectors in the table.



[2]

(ii) What can you say about these four points?

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

For Examiner's Use

20 $f(x) = (x - 1)^3$ $g(x) = (x - 1)^2$ $h(x) = 3x + 1$

(a) Work out fg(-1).

Answer(a) ..... [2]

(b) Find gh(x) in its simplest form.

Answer(b) ..... [2]

(c) Find $f^{-1}(x)$.

Answer(c) ..... [2]

Question 21 is printed on the next page.

For Examiner's Use

21 (a) **A** is a (2 × 4) matrix, **B** is a (3 × 2) matrix and **C** is a (1 × 3) matrix.

Which two of the following matrix products is it possible to work out?

$\mathbf{A}^2$ $\mathbf{B}^2$ $\mathbf{C}^2$ **AB** **AC** **BA** **BC** **CA** **CB**

Answer(a) ..... and ..... [2]

(b) Find the inverse of $\begin{pmatrix} \frac{1}{2} & \frac{3}{4} \\ \frac{1}{8} & \frac{1}{4} \end{pmatrix}$.

Simplify your answer as far as possible.

Answer(b) $\begin{pmatrix} & \\ & \end{pmatrix}$ [3]

(c) Explain why the matrix $\begin{pmatrix} 4 & 2 \\ 6 & 3 \end{pmatrix}$ does not have an inverse.

Answer(c) ..... [1]