Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

B280A

MATHEMATICS C (GRADUATED ASSESSMENT)

MODULE M10 – SECTION A

TUESDAY 23 JUNE 2009: Morning
DURATION: 30 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments
Tracing paper (optional)

WARNING
No calculator can be used for Section A of this paper.

READ INSTRUCTIONS OVERLEAF

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INSTRUCTIONS TO CANDIDATES

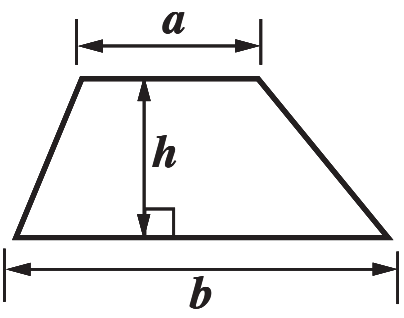
- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Show your working. Marks may be given for a correct method even if the answer is incorrect.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided, however additional paper may be used if necessary.**

INFORMATION FOR CANDIDATES

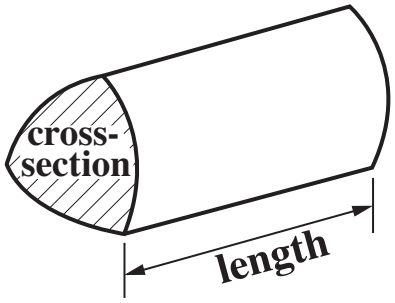
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this Section is 25.**

Formulae Sheet

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = (area of cross-section) × length

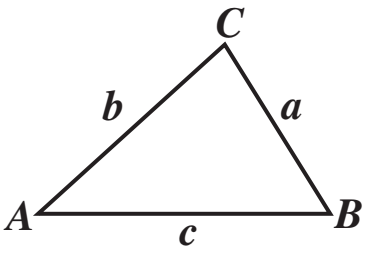


In any triangle ABC

Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

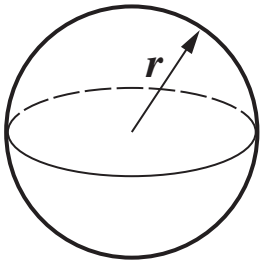
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$



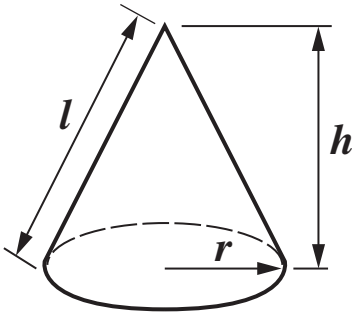
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi rl$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$**, where** $a \neq 0$**, are given by**

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

1 (a) Convert $\frac{2}{15}$ to a decimal.

(a) _____

[2 marks]

(b) Use prime factors to explain why $\frac{1}{80}$ converts to a <u>TERMINATING</u> decimal.

_____

_____

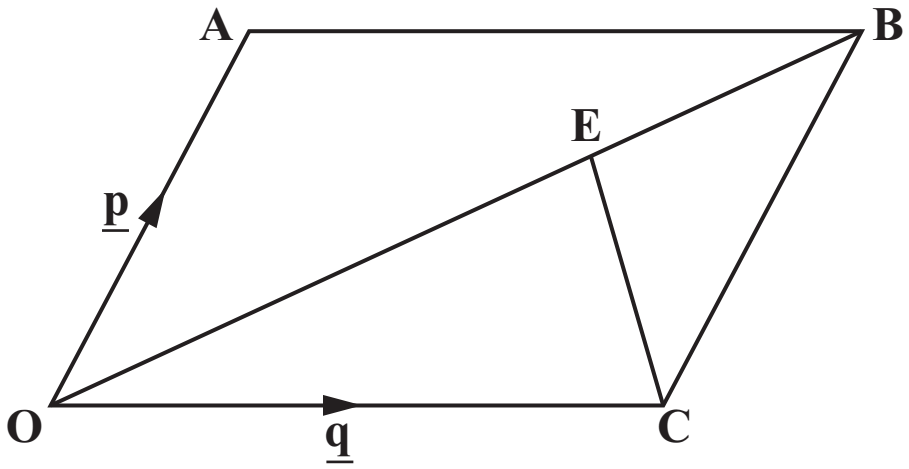
[2 marks]

2 **A pencil case contains only three blue pens and eight red pens.**
Aimee selects one pen at random and <u>DOES NOT</u> replace it.
She then takes a second pen.

Work out the probability that she takes 2 pens of the same colour.
[4 marks]

3 In the diagram below, OABC is a parallelogram.
$\overrightarrow{OA} = \underline{p}$ and $\overrightarrow{OC} = \underline{q}$.
E lies on OB so that OE : EB = 2 : 1.

Find the following vectors in terms of $\underline{p}$ and $\underline{q}$.



(a) $\overrightarrow{OB}$

(a) _____

[1 mark]

(b) $\overrightarrow{OE}$

(b) _____

[1 mark]

(c) $\overrightarrow{CE}$

(c) _____

[1 mark]

4 (a) Write $y = x^2 - 6x + 28$ in the form $y = (x - a)^2 + b$.

(a) _____

[3 marks]

(b) Hence state

(i) the minimum value of $y = x^2 - 6x + 28$,

(b)(i) _____

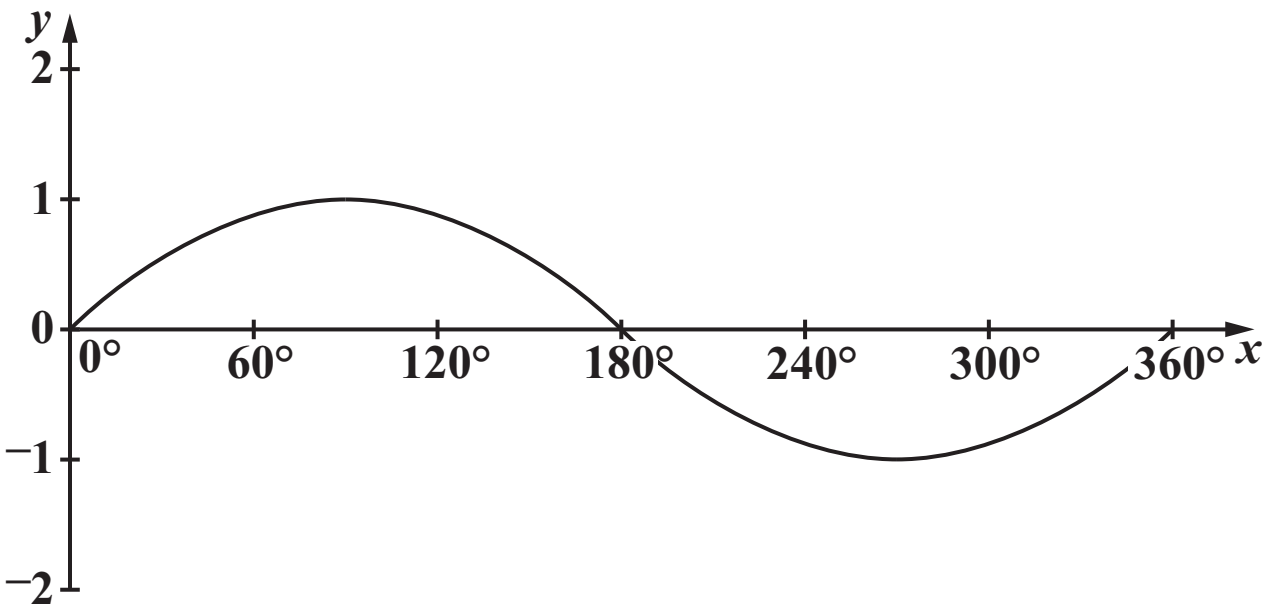
[1 mark]

(ii) the equation of the line of symmetry of the graph of $y = x^2 - 6x + 28$.

(ii) _____

[1 mark]

5 (a) The graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$ is drawn below.



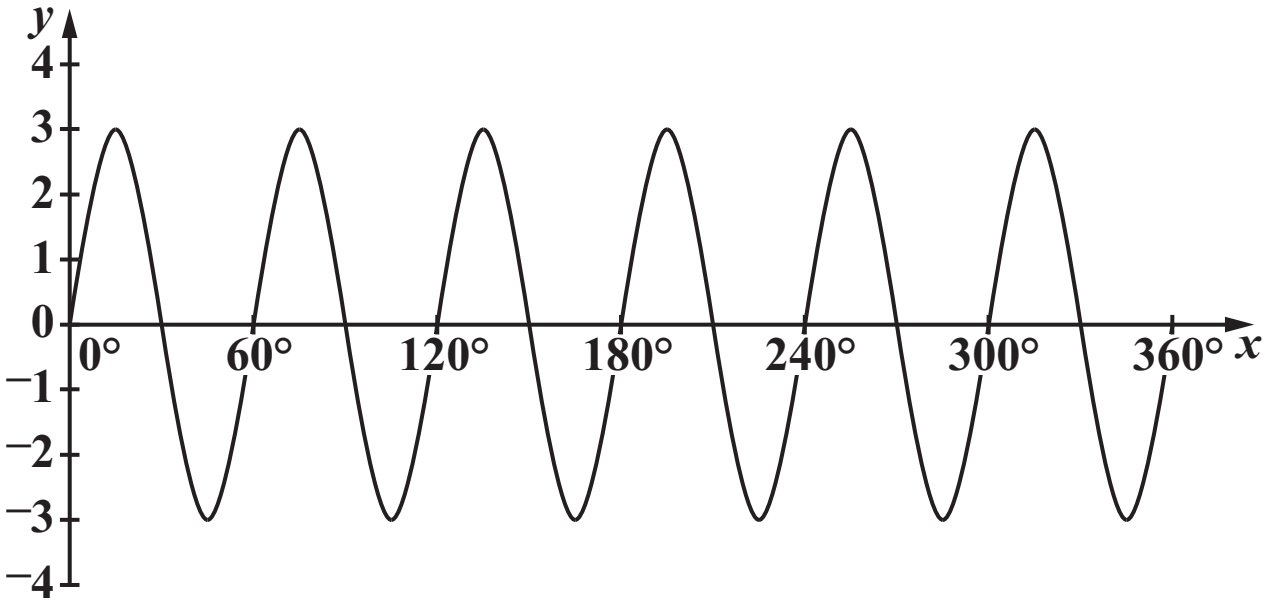
One solution to the equation $\sin x = 0{\cdot}4$ is $x = 24°$, correct to the nearest degree.

Use this information to solve $\sin x = {}^{-}0{\cdot}4$ for $0° \leqslant x < 360°$.

(a) _____° and _____°

[2 marks]

(b) The graph below has an equation of the form $y = 3 \sin kx$.



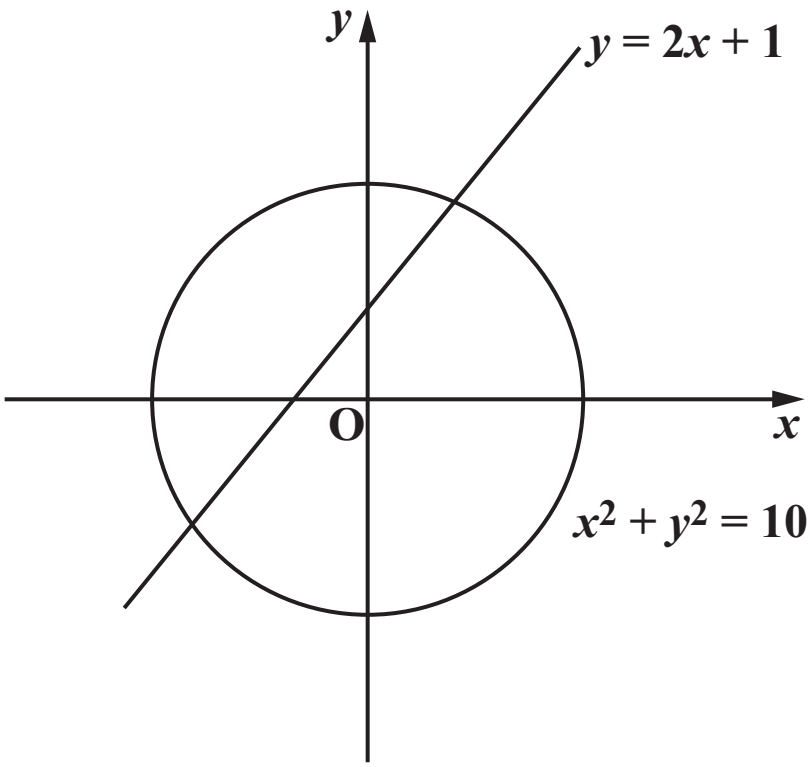
State the value of k, giving a reason for your answer.

k = _____ because _____

_____

[1 mark]

6 The sketch below shows a circle with equation $x^2 + y^2 = 10$ and a straight line with equation $y = 2x + 1$.



Not to scale

(a) Show that the values of x at the points of intersection of the circle and the line satisfy the equation $5x^2 + 4x - 9 = 0$.
[3 marks]

(b) By solving the equation $5x^2 + 4x - 9 = 0$, find the values of x at these points of intersection.
[3 marks]

(b) _____

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