General Certificate of Secondary Education

MATHEMATICS C   **1966/2343A**
(Graduated Assessment)

HIGHER TERMINAL PAPER – SECTION A

Tuesday   **7 JUNE 2005**   Afternoon   1 hour

Candidates answer on the question paper.
Additional materials:
    Geometrical instruments
    Tracing paper (optional)

	Candidate Name		Centre Number	Candidate Number

TIME   1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, on the dotted lines unless the question says otherwise.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.

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 50.
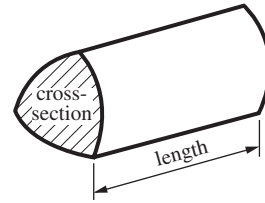
WARNING

You are not allowed to use a calculator in Section A of this paper.

FOR EXAMINER'S USE	
Section A	
Section B	
TOTAL	

This question paper consists of 13 printed pages and 3 blank pages.

Formulae Sheet: Higher Tier

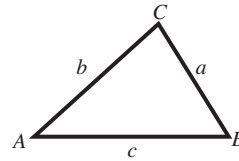**Volume of prism** = (area of cross-section) × length

In any triangle *ABC*

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

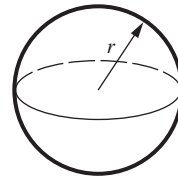**Cosine rule** $a^2 = b^2 + c^2 - 2bc \cos A$

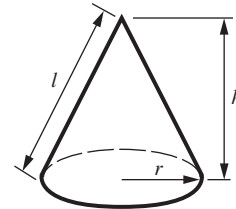**Area of triangle** = $\frac{1}{2} ab \sin C$

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 = $\pi r l$

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   The cost of renting a holiday villa has increased from £1600 in 2004 to £1800 in 2005.

2004 Idyllic Villa	2005 Idyllic Villa
£1600	£1800
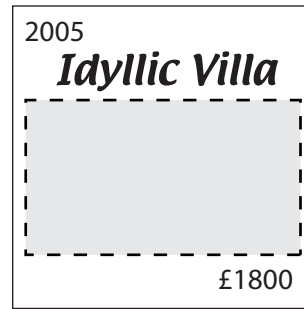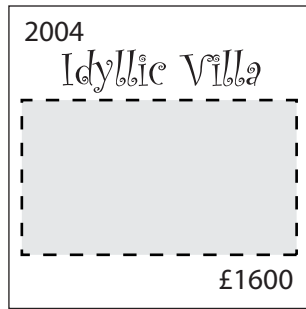
2 images of a villa have been removed from above due to third party copyright restrictions

(a)   Calculate the percentage increase in the cost of renting the villa.

(a)   ....% [3]

(b)   Two families, the Browns and the Greens, decide to share the villa
at a cost of £1800.
There are five people in the Brown family and three in the Green family.
They share the rent in the ratio 5 : 3.

How much should the Browns pay?

(b) £ ....[3]

6

[Turn over

2   Solve.

$$x - 6 = 3(x + 7)$$

....[3]

3

3
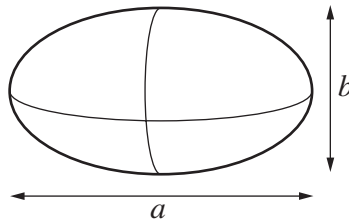
One of these formulae gives the volume of this solid.

$$\frac{\pi(a + b)}{6} \qquad \frac{\pi ab}{6} \qquad \frac{\pi(ab)^2}{6} \qquad \frac{\pi ab^2}{6} \qquad \frac{\pi(a^2 + b)}{6}$$

Which is the correct formula?
Give a reason for your answer.

.... because ....

....[2]

2

4 **(a)** Solve, algebraically, these simultaneous equations.

$$5x - 2y = 13$$
$$7x + 8y = 2$$

(a) $x =$ ....

$y =$ ....[3]

(b) (i) Factorise.

$$x^2 - 7x + 10$$

(b)(i) ....[2]

(ii) Hence solve.

$$x^2 - 7x + 10 = 0$$

(ii) ....[1]

6

[Turn over

5 All the lengths in this question are in metres.
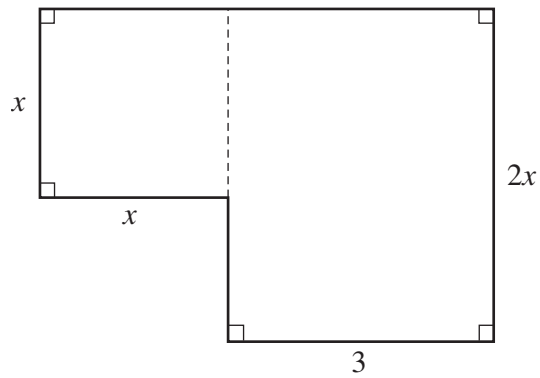
The diagram shows the plan of a room.

(a) Show that the area, A, of the room is given by

$$A = x^2 + 6x.$$

....

....

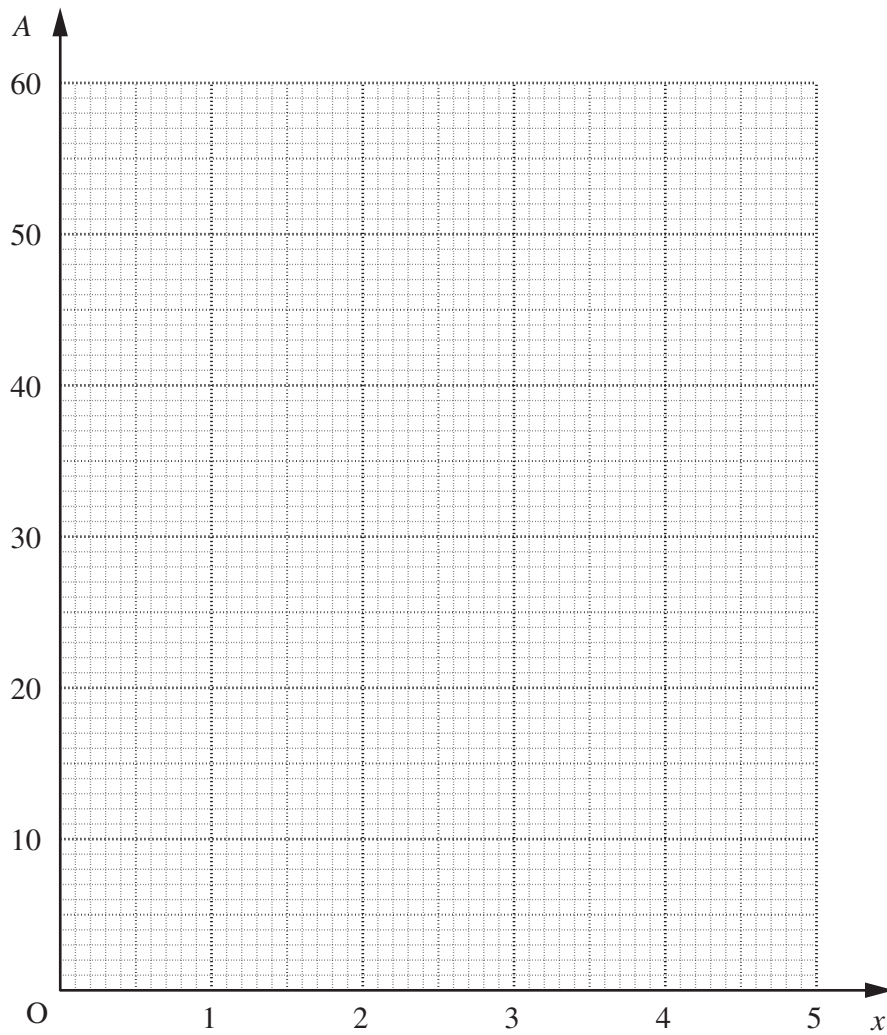..

....[2]

(b) Complete the table for $A = x^2 + 6x$.

x	0	1	2	3	4	5
A	0		16	27	40	

[2]

(c) Draw the graph of $A = x^2 + 6x$ on the grid below.

[2]

(d) The area of the room is $35\,\text{m}^2$.

Use your graph to find the length of the side x.

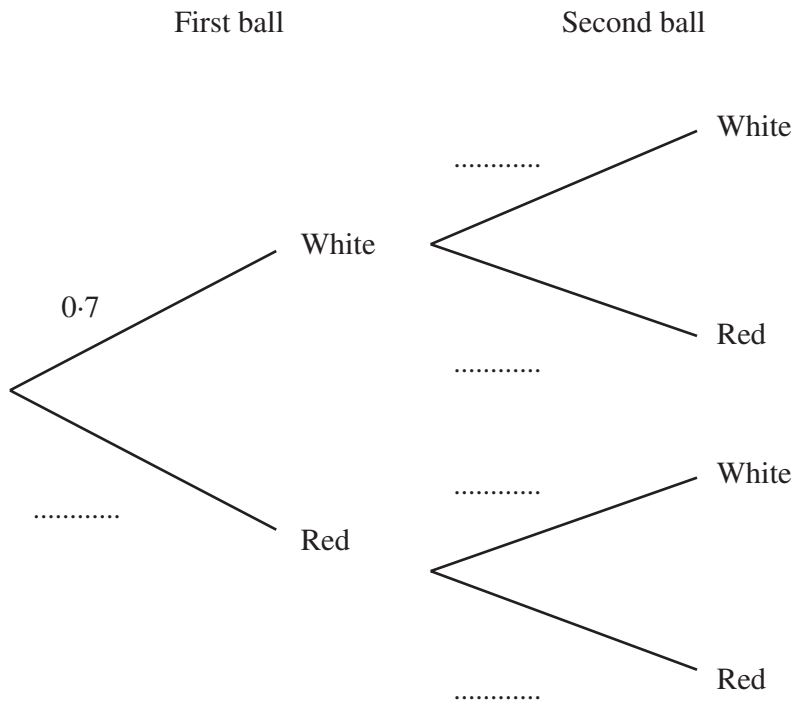**(d)** ....m [1]

[Turn over

6 **(a)** A bag contains only white balls and red balls.

The probability of picking a white ball is 0·7.

Janet picks a ball from the bag without looking.
She notes its colour and replaces it.
She then picks another ball.

(i) Complete the tree diagram.

<div align="center">First ball   Second ball</div>

```
                                         ............        White
                      White
            0·7                      <
                                         ............        Red

                      Red                ............        White
            ............            <
                                         ............        Red
```

[2]

(ii) What is the probability that Janet picks one ball of each colour?

(ii) ....[3]

(b) Sarah has a different bag containing only blue balls and green balls.

Sarah picks a ball from the bag without looking.
She notes its colour and replaces it.
She then picks another ball.

The probability that Sarah picks a blue ball is *p*.

(i) Write down an expression, in terms of *p*, for the probability
that Sarah picks two blue balls.

(b)(i) ....[1]

(ii) The probability that Sarah picks two blue balls is 0·64.
There are 50 balls altogether in the bag.

How many blue balls are in the bag?

(ii) ....[2]

8

[Turn over

7 Decide if each statement in the table is

always true   or   **sometimes true**   or   **never true**.

Give a reason for each answer.
The first statement has been completed for you.

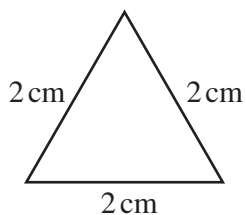| Statement	Decision	Reason
$3n$ is even	Sometimes true	$3 \times 4 = 12$ even, $3 \times 5 = 15$ odd
$7^n \times 7^{-n} = 7$		
$\dfrac{n^3}{n^2 \times n^2} < 0$		

[4]

4

8 Rearrange this formula to make d the subject.

$$c = \sqrt{(t - 2d)}$$

....[3]

3

9 An equilateral triangle has side 2 cm.

2 cm   2 cm

2 cm

(a) Use the triangle to find the value of

(i) $\cos 60°$,

(a)(i) ....[1]

(ii) $\sin 60°$.
Leave your answer in surd form.

(ii) ....[2]

(b) Two of the triangles below are congruent.

P   Q   R   S

30°   8   16   16

Not to scale

60°

8   8   8
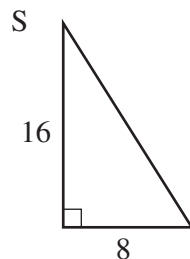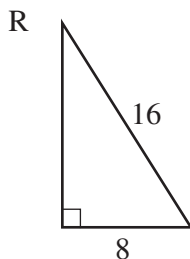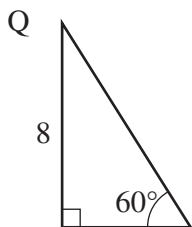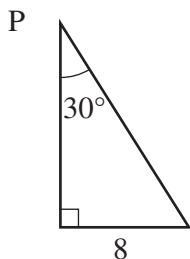
Identify the two congruent triangles and justify your answer.

.... and .... because ....

....

....

....[3]

6

[Turn over

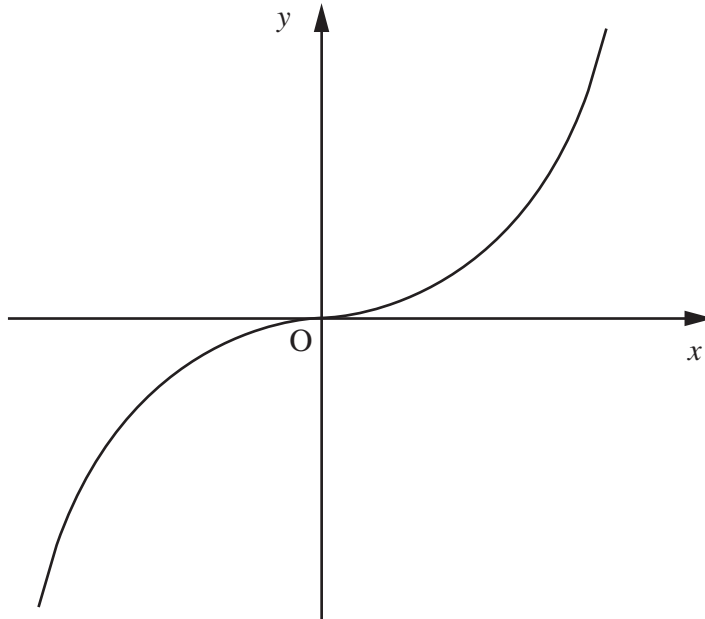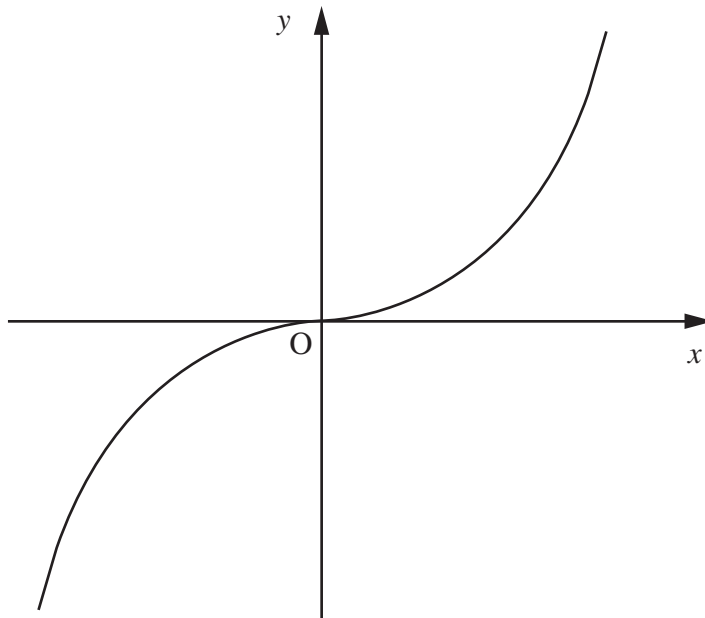**10** Sketch the following graphs on the axes below.
In each case the graph of $y = x^3$ is given to help you.

(a) $y = 2x^3$

[1]

(b) $y = (x - 2)^3$

[1]

2

11 Work out as surds in their simplest form.

   (a) $\sqrt{3} \times \sqrt{6}$

   (a) ....[1]

   (b) $(\sqrt{3} - \sqrt{6})^2$

   (b) ....[2]

   3

14

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15

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