

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

A502/02

**MATHEMATICS A
Unit B (Higher Tier)**

**THURSDAY 21 MAY 2015: Morning
DURATION: 1 hour
plus your additional time allowance**

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

Insert for Question 4

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

<p>WARNING No calculator can be used for this paper</p>

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.

Use black ink. HB pencil may be used for graphs and diagrams only.

Answer ALL the questions.

Read each question carefully. Make sure you know what you have to do before starting your answer.

Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.

Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

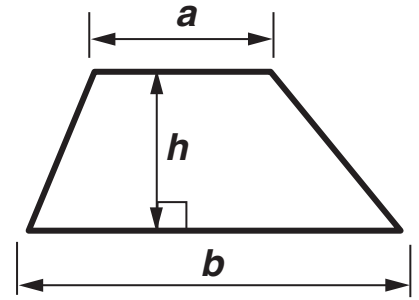
Your quality of written communication is assessed in questions marked with an asterisk (*).

The total number of marks for this paper is 60.

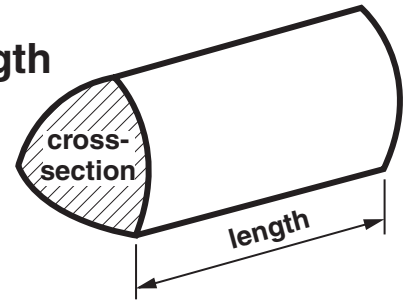
Any blank pages are indicated.

FORMULAE SHEET: HIGHER TIER

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



Volume of prism = (area of cross-section) \times length

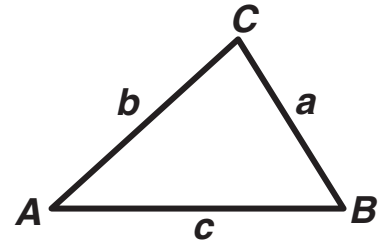


In any triangle *ABC*

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

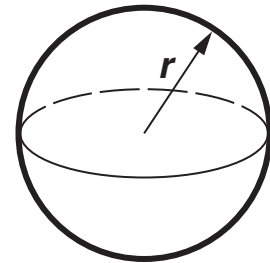
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



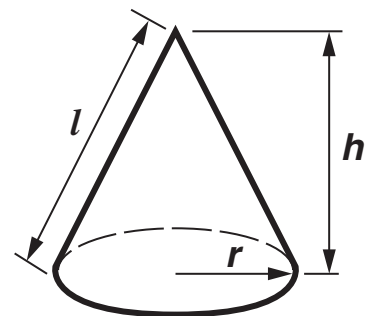
Volume of sphere = $\frac{4}{3} \pi r^3$

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

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

Answer ALL the questions.

1 Complete these calculations.

(a)

$$41 + \boxed{} = 100$$

$$100 - \boxed{} = 72$$

$$7 \times 9 = \boxed{}$$

$$54 \div 9 = \boxed{}$$

[2]

(b) A tap dancer does one tap every 0.05 seconds. Lucy wants to work out how many taps this dancer does in one minute.

(i) What division could Lucy do to work this out?

(b)(i) _____ [1]

(ii) Work out how many taps this dancer could do in one minute.

(ii) _____ [3]

2 (a) Complete this identity.

$$h \times h \times h \times h \times h \times h \equiv h^{\square} \quad [1]$$

(b) Harry is asked to write down the total weight of five onions each weighing m grams. He writes $m5$ grams.

What should Harry have written?

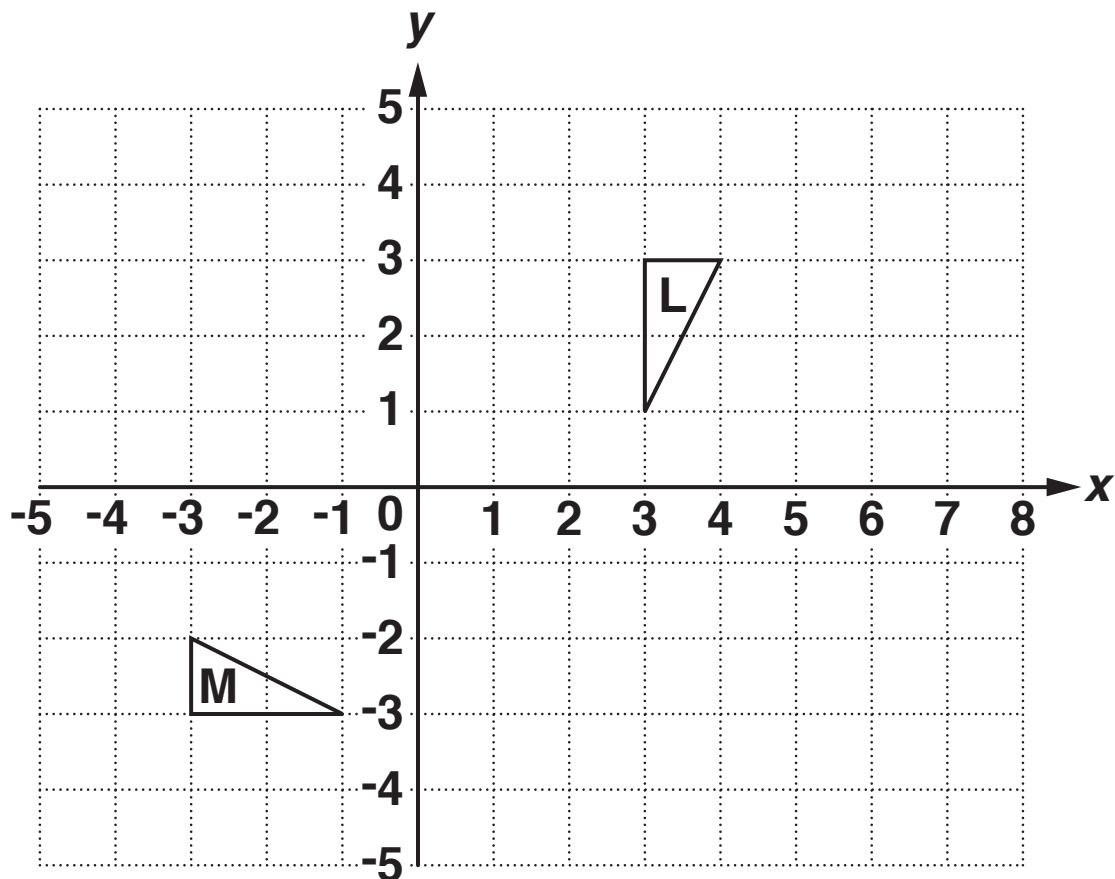
(b) _____ grams [1]

(c) Decide whether each of the following is an equation, a formula, an identity or an expression. For each one, put a tick (\checkmark) in the correct column.

	Equation	Identity	Formula	Expression
$3x - 7 = 12$				
$s = ut - \frac{1}{2}gt^2$				
$\frac{4}{3}\pi r^3$				
$r^2 = a^2 + b^2$				

[3]

3 Triangles L and M are drawn on the grid below.



(a) Describe fully the SINGLE transformation that maps triangle L onto triangle M.

[3]

(b) Translate triangle L using the vector $\begin{pmatrix} 2 \\ -4 \end{pmatrix}$. Label your image T. [2]

- (c) With the transformations in (a) and (b) both the lengths AND the angles in the image are the same as in the original shape.**

Describe what would happen to the lengths and angles of triangle L after an enlargement of scale factor 4.

[2]

4 The table on the insert shows the average price of a house in the UK every five years from 1952 to 2012. The prices are given to the nearest £1000.

(a) Complete the time series graph on the insert to show all the data. [2]

(b) In which 5 year period did the average house price increase the most?

(b) from _____ to _____ [1]

(c) Helen said that house prices did not increase from 1952 to 1957.

Explain why Helen might be wrong. Use figures to support your answer.

_____ [2]

5 Arjun buys family size cartons of orange juice. Each carton holds 1.75 litres.

(a) How many millilitres of juice does one carton contain?

(a) _____ ml [1]

(b) One day Arjun uses $\frac{1}{6}$ of a carton of this juice.

**What DIVISION should Arjun do to work out how many millilitres of juice he uses?
You do not need to calculate the answer.**

(b) _____ [1]

(c) Arjun's family drinks $\frac{3}{4}$ of a carton each day.

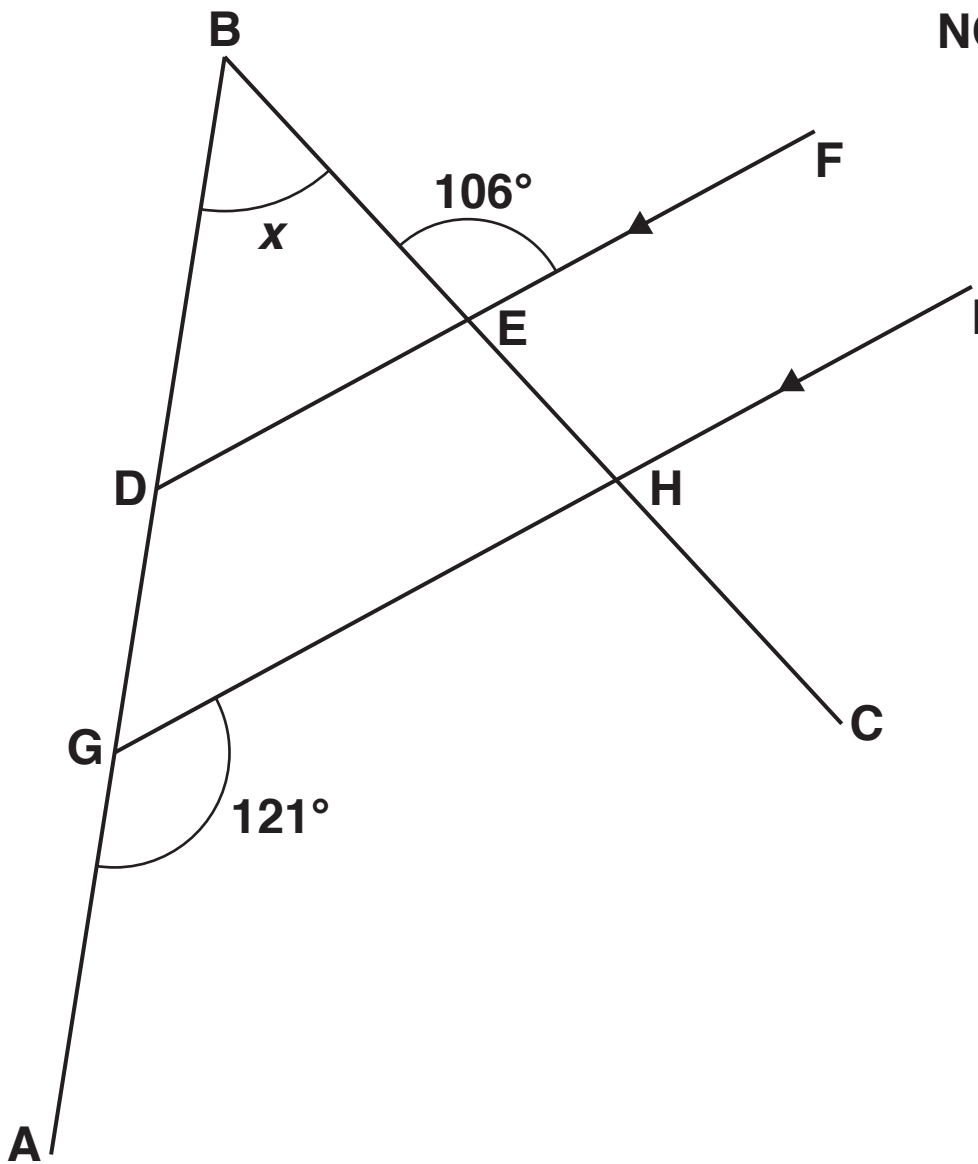
**Calculate how many LITRES of orange juice
Arjun's family drinks each day.**

**Give your answer as a mixed number in its
simplest form.**

(c) _____ litres [4]

6* The diagram is made from four straight lines. DEF and GHI are parallel.

NOT TO SCALE

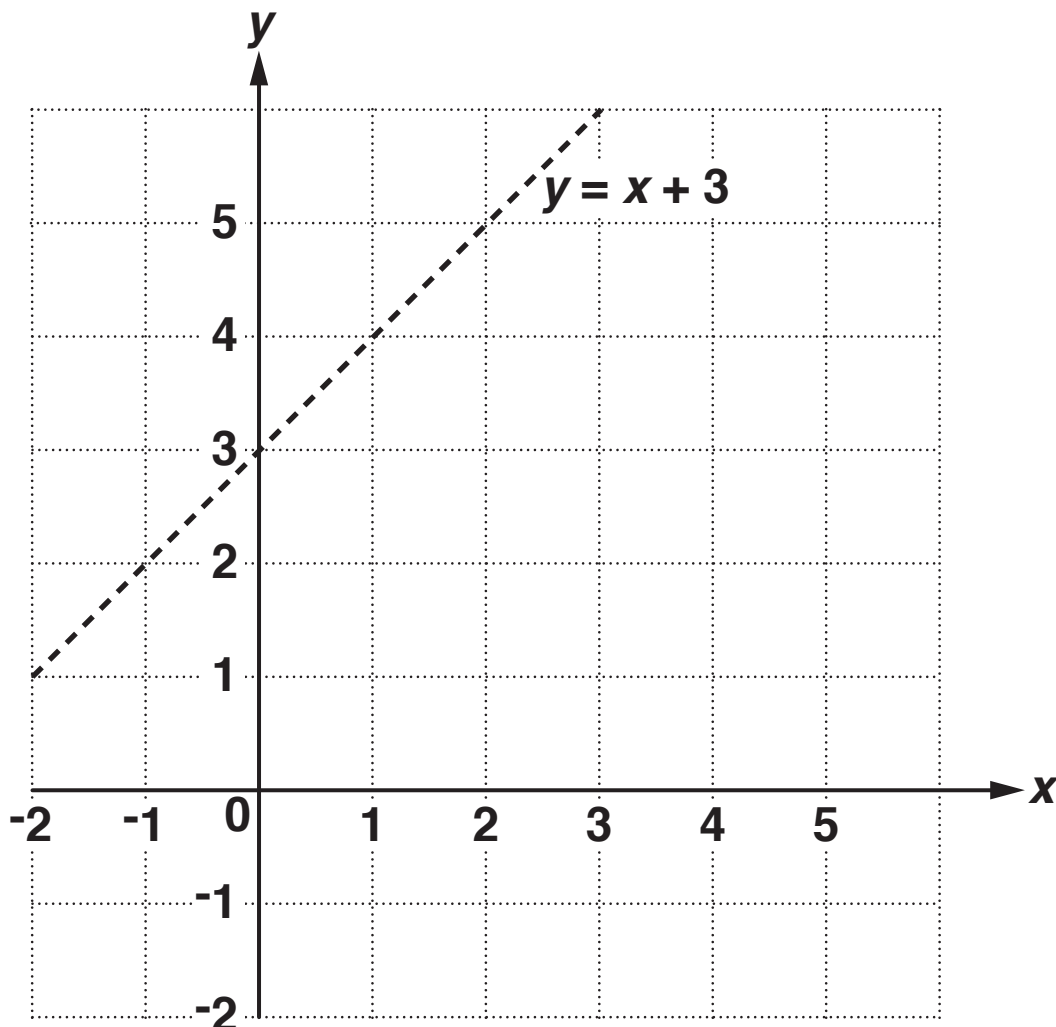


**Calculate the size of angle x .
Give a reason for each stage of your working.**

_____° [5]

- 7 In this question, represent the inequalities by shading the area NOT required.

On the grid below, the line $y = x + 3$ is shown.



- (a) Indicate clearly the region $y < x + 3$ by shading the area NOT required. [1]
- (b) Indicate clearly the region $x + y < 5$.

Shade the area NOT required. [2]

- (c) You are given that x and y are integers that satisfy these THREE inequalities.

$$y < x + 3$$

$$x + y < 5$$

$$y > 2$$

Use your diagram to find x and y .

(c) $x =$ _____

$y =$ _____ [3]

**8 Richard is a window cleaner.
For each house he visits, he charges a fixed amount
of £5 plus 60p for each window cleaned.**

(a) Sam's house has 10 windows.

**How much does Richard charge to clean Sam's
windows?**

(a) _____ [1]

**(b) Richard's charges lead to the formula
 $C = 0.6w + 5$, where C is the charge in £ for
cleaning the windows of a house with w windows.**

**Anna is also a window cleaner.
For each house she visits, she charges a fixed
amount of £8 plus 20p for each window cleaned.**

**(i) Write down the formula to give the charge £ C
for Anna to clean the windows of a house with
 w windows.**

(b)(i) _____ [1]

(ii) Use algebra to find the value of w that gives the same charge for both Richard and Anna.

(ii) _____ [3]

(iii) Comment on what your answer to part (b)(ii) means in real life.

_____ [1]

9 Use division to express $\frac{4}{11}$ as a recurring decimal.

_____ [2]

10 Simplify the following, giving your answer in the form $k\sqrt{2}$, where k is an integer.

$$8\sqrt{50} + \frac{30}{\sqrt{2}}$$

_____ [4]

11 Given that $f(x) = x^2 - 3x + 1$, find and simplify an expression for $f(-4x)$.

_____ **[3]**

12 (a) Find the resultant of $\begin{pmatrix} 8 \\ -1 \end{pmatrix}$ and $\begin{pmatrix} -2 \\ -5 \end{pmatrix}$.

(a) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

(b) You are given that $p + q = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

Write the following as column vectors.

(i) $\left[\begin{pmatrix} 3 \\ 7 \end{pmatrix} + p \right] + q$

(b)(i) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

(ii) $-4(q + p)$

(ii) $\begin{pmatrix} \\ \end{pmatrix}$ [2]

END OF QUESTION PAPER

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