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Wednesday 6 November 2013 – Morning

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

A516820313

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour

A502/02

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

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**.
- This document consists of **16** pages. Any blank pages are indicated.

WARNING

No calculator can be used for this paper

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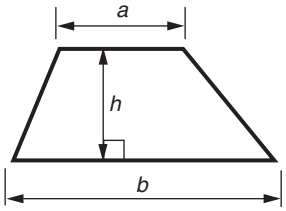
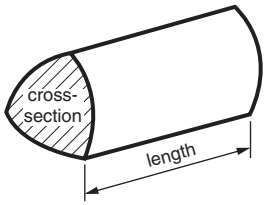
Formulae Sheet: Higher Tier

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



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

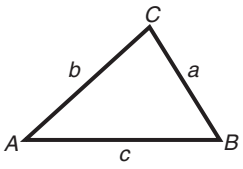


In any triangle *ABC*

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

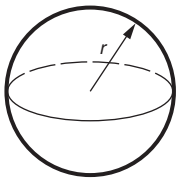
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



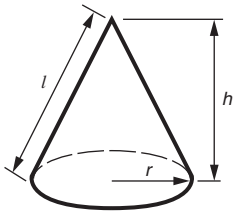
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



The Quadratic Equation

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

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

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Answer **all** the questions.

1 Sukrit and Anna are playing a game called 'Make 100'.
Sukrit says a 2-digit number.
Anna says the number that has to be added to this to make 100.

For example, if Sukrit says 60, Anna says 40 as 60 + 40 = 100.

(a) Complete these two games.

Sukrit says 36, Anna says _____

Sukrit says 81, Anna says _____

[1]

(b) They play the game 12 times.

What should be the total of **all** their numbers?

(b) _____ **[1]**

(c) In another game of 'Make 100', their two numbers have a **difference** of 50.

What are their two numbers?

(c) _____ and _____ **[1]**

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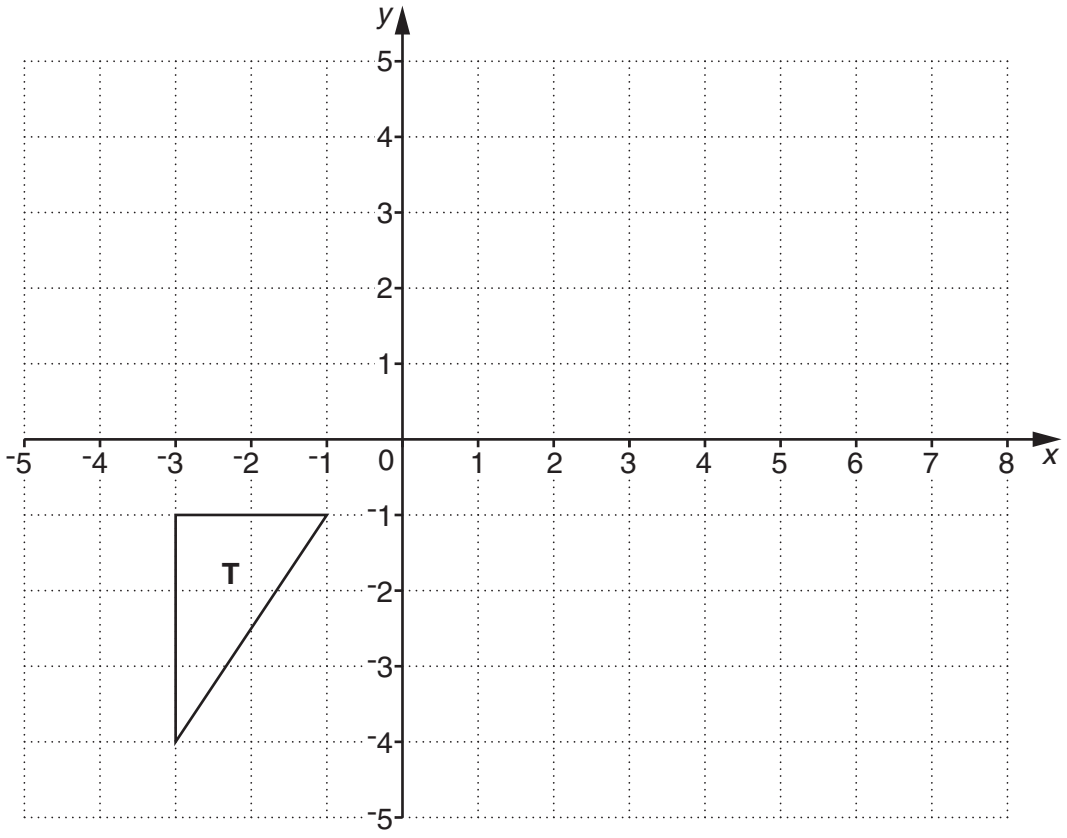
2 The grid shows triangle **T**.



(a) Reflect triangle **T** in the line $y = -1$.
Label the image **A**. **[2]**

(b) Rotate triangle **T** 180° about the point (0, 0).
Label the image **B**. **[2]**

(c) Triangle **T** is transformed by four translations given by the following vectors.

$$\begin{pmatrix} 15 \\ -6 \end{pmatrix} \text{ then } \begin{pmatrix} 22 \\ 9 \end{pmatrix} \text{ then } \begin{pmatrix} -15 \\ 6 \end{pmatrix} \text{ then } \begin{pmatrix} -17 \\ -9 \end{pmatrix}$$

Draw the image of triangle **T** after these four translations.
Label the image **C**. **[3]**

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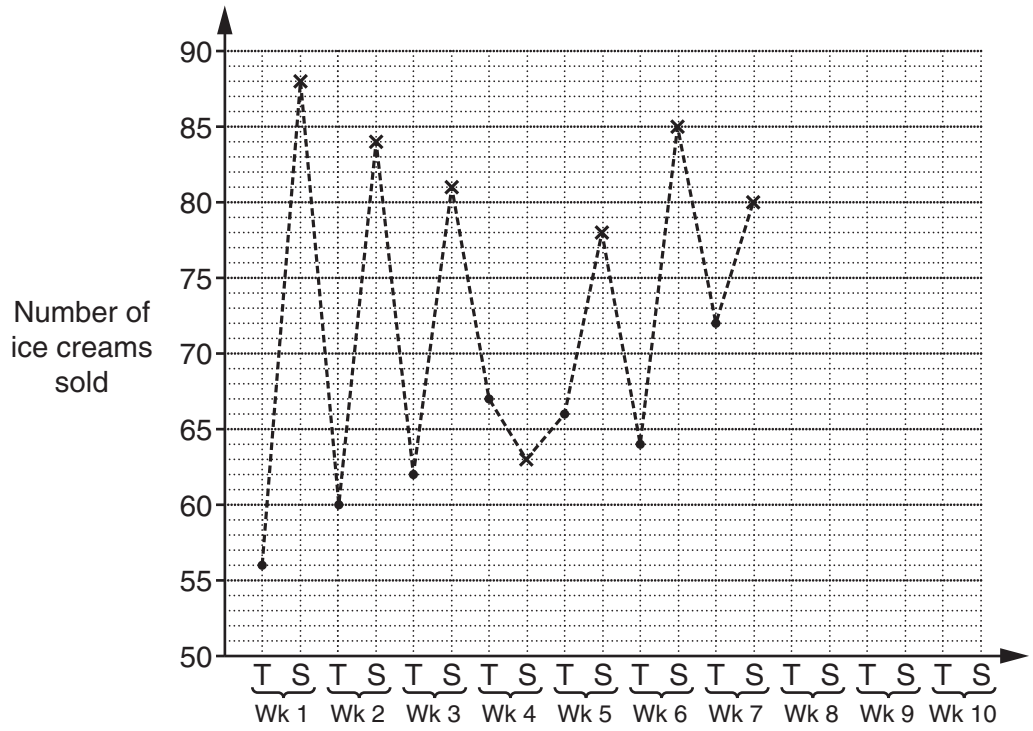
3 Robin sells ice creams at a market on Thursdays and Saturdays.
He records how many ice creams he sells on each of these days for 10 weeks.

Week (Wk)	1	2	3	4	5	6	7	8	9	10
Thursday (T)	56	60	62	67	66	64	72	74	77	78
Saturday (S)	88	84	81	63	78	85	80	84	86	83



(a) Complete the time series graph.
The first 7 weeks have been done for you. **[2]**

(b) Look at the time series graph.

Make two comments about Robin's data.

(1) _____

_____

(2) _____

_____ **[2]**

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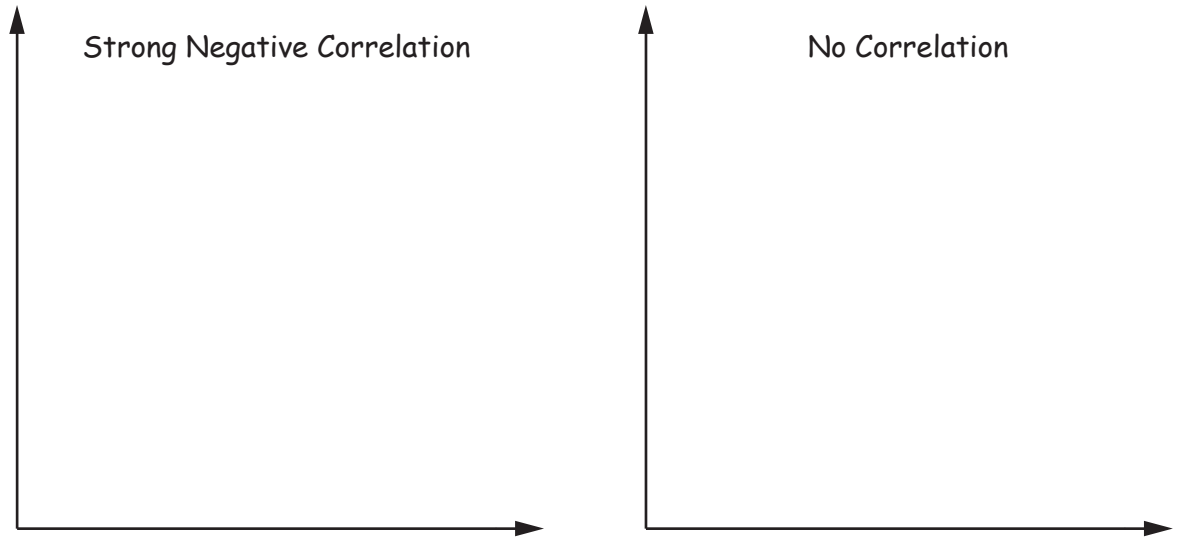
4 Decide whether each of the following is an equation, a formula, an identity or an expression. For each one, put a tick (✓) in the correct column.

	Equation	Identity	Formula	Expression
$V = \frac{1}{3}\pi r^2 h$				
$3n + 5 + 5n - 7 \equiv 8n - 2$				
$6n - 4 = 2n$				
πr^2				
$7t^2 - t + 11$				

[4]

5 Draw at least 10 crosses (✗) on each grid to produce scatter graphs that show the following.



[3]

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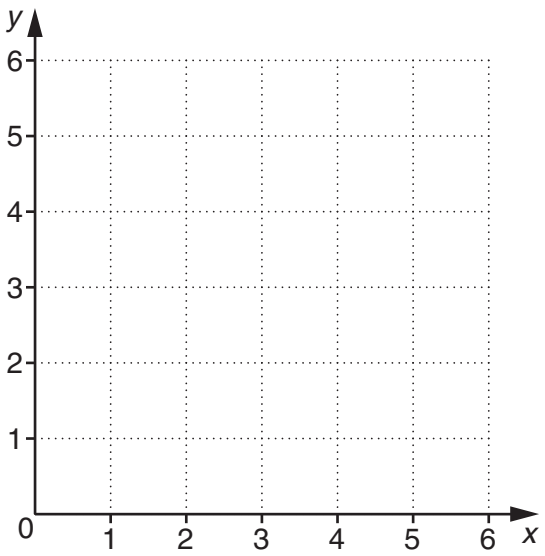
6 **(a)** Complete the table for $2x + 3y = 12$.

x	0	4.5	
y			0

[2]

(b) Draw the graph of $2x + 3y = 12$ for $0 \leqslant x \leqslant 6$.



[2]

(c) Use your graph to find the gradient of the line $2x + 3y = 12$.

(c) _____ **[2]**

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7 A nail is made from a volume of 5.8 cm^3 of iron.
The density of iron is 7.9 g/cm^3.

Use this formula to find the mass of the nail.

mass = density × volume

_____ g **[4]**

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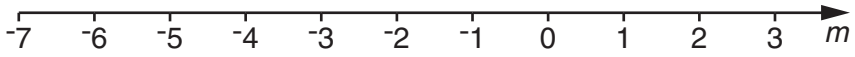
8 **(a)** **(i)** Solve this inequality.

$$2m + 6 > -4$$

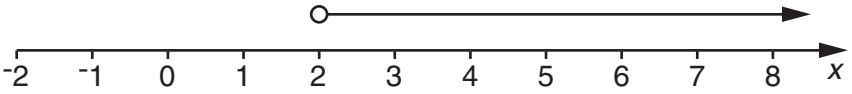
(a)(i) _____ **[2]**

(ii) Represent your answer to part **(a)(i)** on this number line.



[1]

(b) This diagram represents the solution of another inequality.



What is the smallest integer that x can be?

(b) _____ **[1]**

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9 **(a)** The mass of the Earth is approximately 10^{21} tonnes.
There are 1000 kilograms in one tonne.

What is the mass of the Earth in kilograms?
Give your answer using indices.

(a) _____ kg **[2]**

(b) The mass of the planet Mercury is 10^{23} kg.
The mass of the planet Jupiter is 10^{27} kg.

Complete this sentence.

The mass of Jupiter is _____ times the mass of Mercury. **[2]**

(c) Work out.

$$100^{-\frac{1}{2}}$$

(c) _____ **[3]**

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10 Work out.

$$1\frac{2}{3} \div 1\frac{3}{4}$$

_____ **[3]**

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11 Chanre sews edging onto curtains and blinds.
She is paid £C for each pair of curtains and £B for each set of blinds.

On Monday she completes 10 pairs of curtains and 2 sets of blinds.
She is paid £35 for this.

This gives the equation $10C + 2B = 35$.

(a) On Tuesday she completes 5 pairs of curtains and 6 sets of blinds.
She is paid £30 for this.

Write an equation to show this information.

(a) _____ **[1]**

(b) Solve the two simultaneous equations algebraically to find the amount she is paid for each pair of curtains and each set of blinds.

(b) Curtains £ _____

Blinds £ _____ **[3]**

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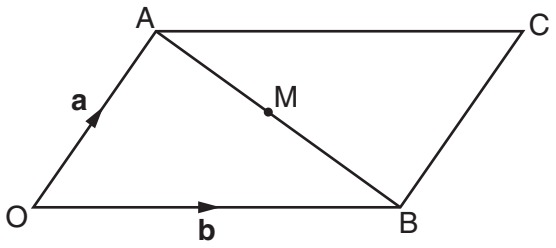
12 OACB is a parallelogram.
$\overrightarrow{OA}$ = **a** and $\overrightarrow{OB}$ = **b**.
M is the midpoint of AB.



Not to scale

(a) Find, in terms of **a** and **b**, these vectors.

(i) $\overrightarrow{OC}$

(a)(i) _____ **[1]**

(ii) $\overrightarrow{AB}$

(ii) _____ **[1]**

(iii) $\overrightarrow{OM}$

(iii) _____ **[2]**

(b) Use your answers to write **two** conclusions about points O, M and C.

(1) _____

_____

(2) _____

_____ **[2]**

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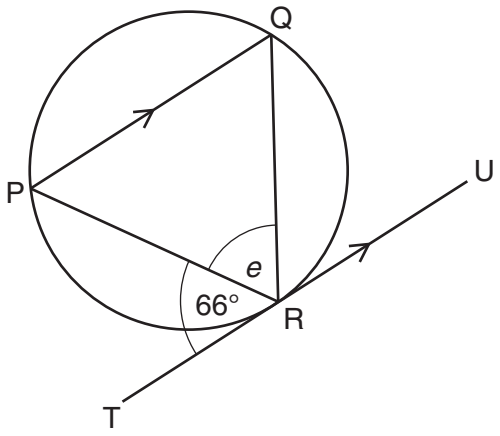
13* Chord PQ is parallel to tangent TRU.



Not to scale

Calculate the size of angle *e*.
Give a geometrical reason for each stage of your working. **[5]**

END OF QUESTION PAPER

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