

Wednesday 6 November 2013 – Morning

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour



Candidate forename		Candidate surname	
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Centre number							Candidate number				
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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.

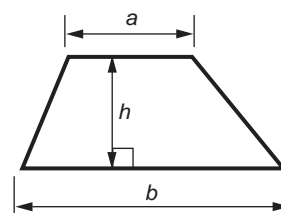
INFORMATION FOR CANDIDATES

- 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.

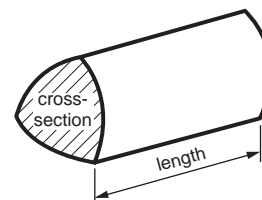


Formulae Sheet: Higher Tier

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



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

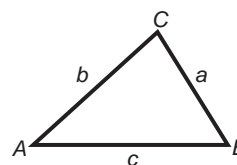


In any triangle ABC

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

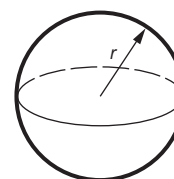
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



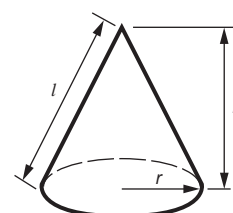
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

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3

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?

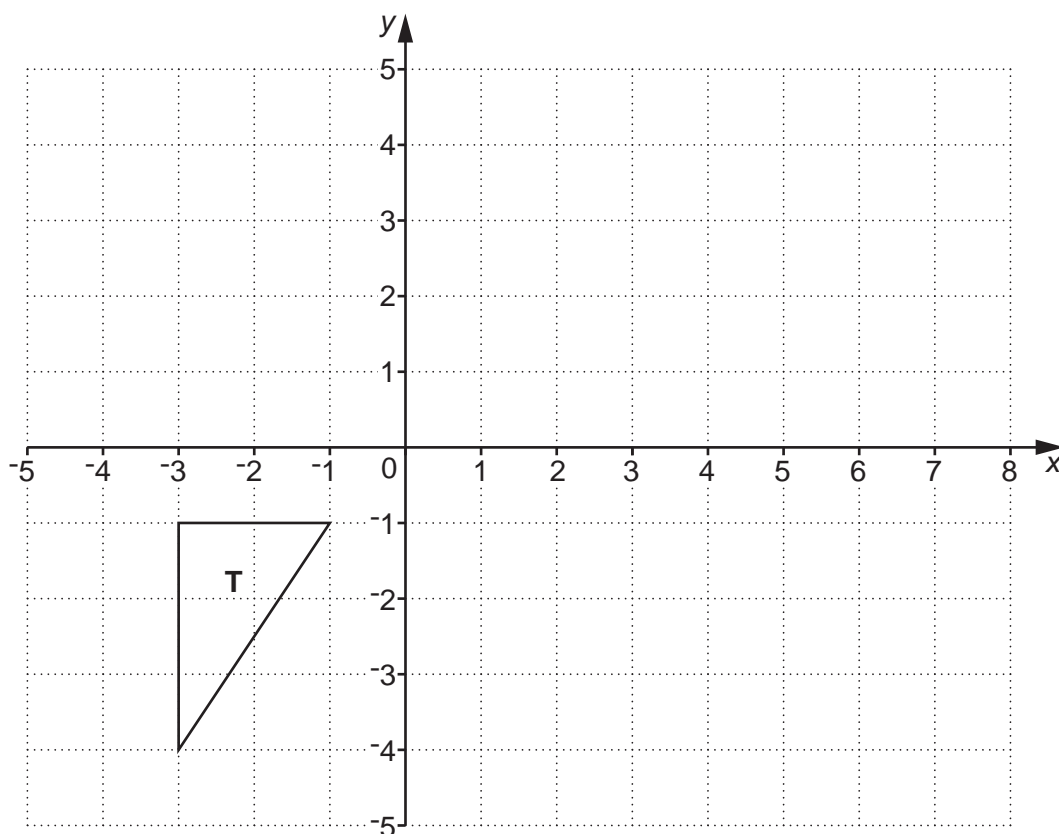
(b) _____ [1]

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

What are their two numbers?

(c) _____ and _____ [1]

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.

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

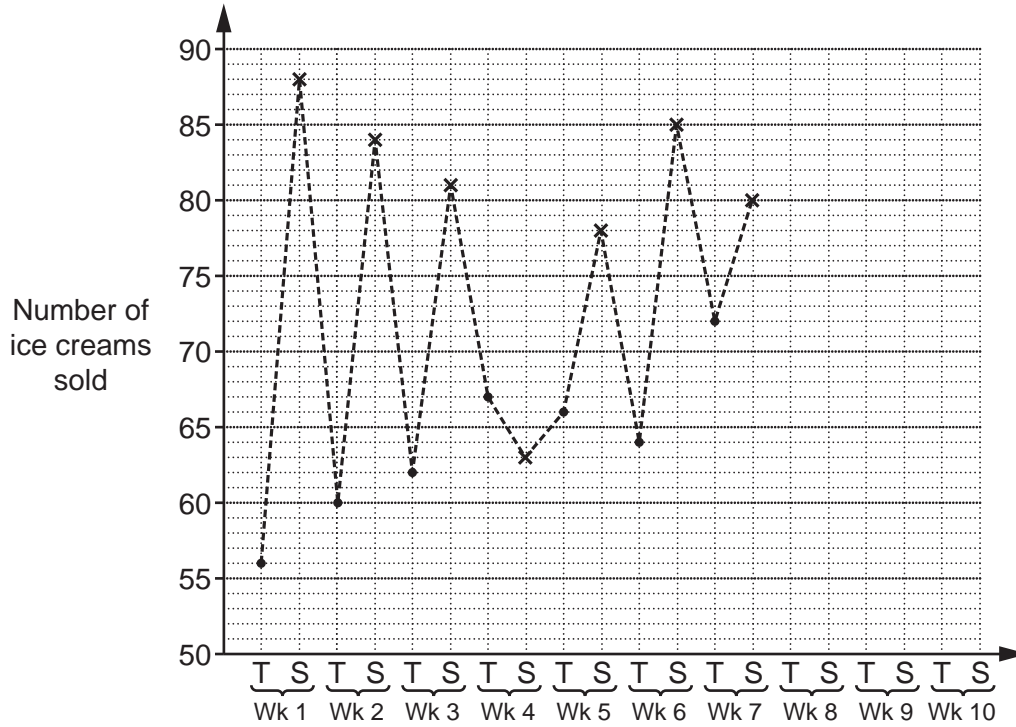
Draw the image of triangle **T** after these four translations.
Label the image **C**.

[3]

5

- 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]

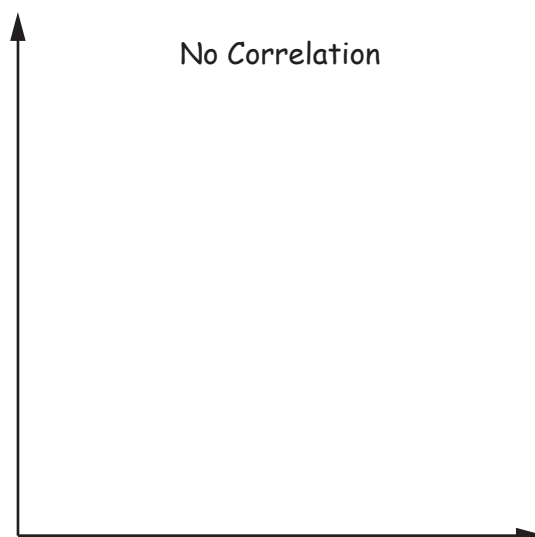
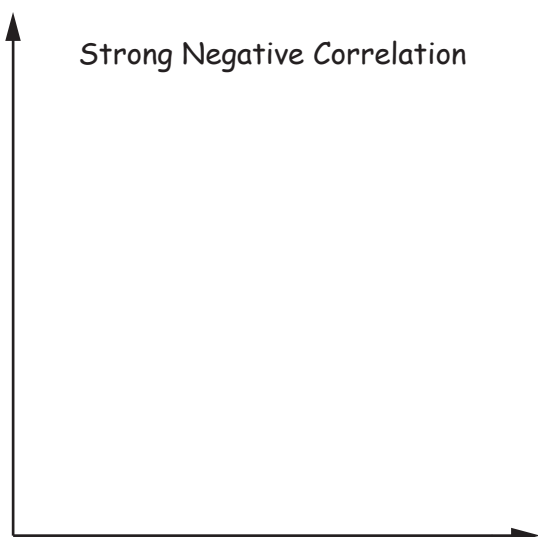
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- 4 Decide whether each of the following is an equation, a formula, an identity or an expression. For each one, put a tick (✓) in the correct column.

	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 (X) on each grid to produce scatter graphs that show the following.



[3]

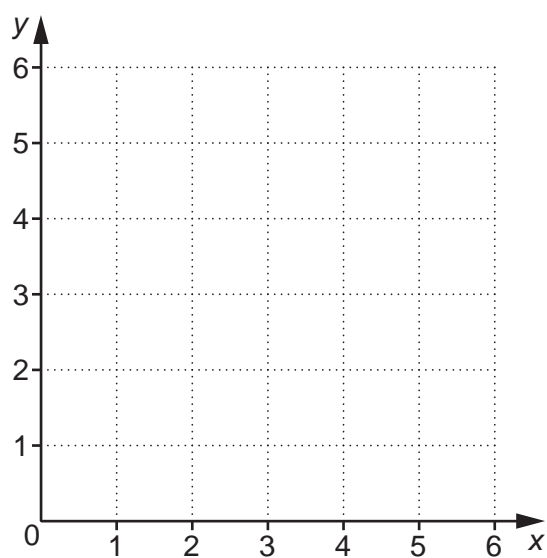
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- 6 (a) Complete the table for $2x + 3y = 12$.

x	0	4.5	
y			0

[2]

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



[2]

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

(c) _____ [2]

8

- 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.

$$\text{mass} = \text{density} \times \text{volume}$$

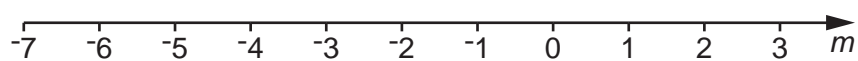
_____ g [4]

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

$$2m + 6 > -4$$

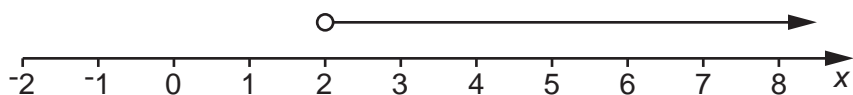
(a)(i) _____ [2]

- (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]

10

- 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]

10 Work out.

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

[3]

12

- 11 Chanre sews edging onto curtains and blinds.
She is paid $\pounds C$ for each pair of curtains and $\pounds B$ for each set of blinds.

On Monday she completes 10 pairs of curtains and 2 sets of blinds.
She is paid $\pounds 35$ 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 $\pounds 30$ for this.

Write an equation to show this information.

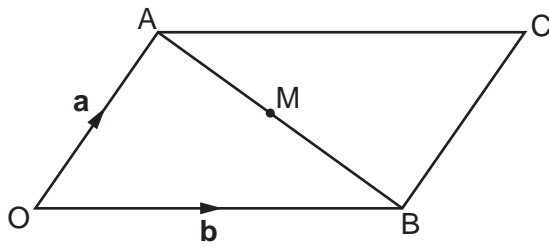
(a) _____ [1]

- (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 \pounds _____

Blinds \pounds _____ [3]

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



Not to scale

- (a) Find, in terms of \mathbf{a} and \mathbf{b} , these vectors.

(i) \vec{OC}

(a)(i) _____ [1]

(ii) \vec{AB}

(ii) _____ [1]

(iii) \vec{OM}

(iii) _____ [2]

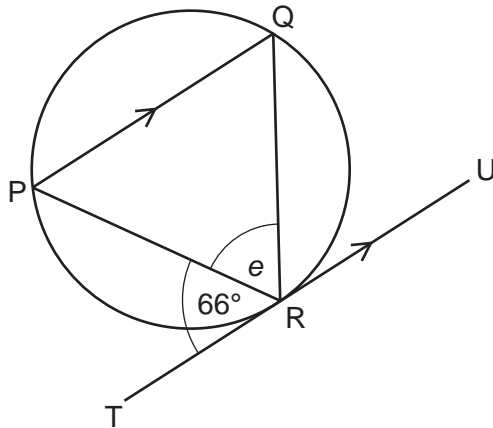
- (b) Use your answers to write **two** conclusions about points O , M and C .

- (1) _____

- (2) _____
 _____ [2]

14

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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