OCR

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Wednesday 5 November 2014 – 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

A502/02

3055741314

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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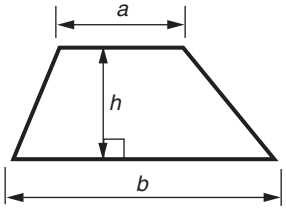
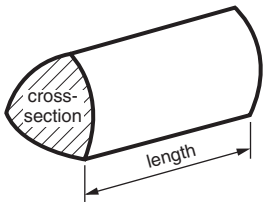
Formulae Sheet: Higher Tier

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



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

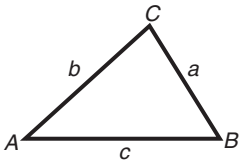


In any triangle *ABC*

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

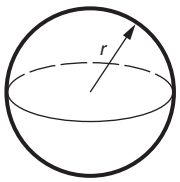
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



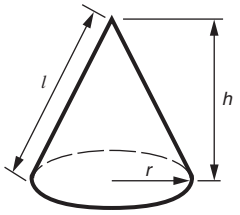
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

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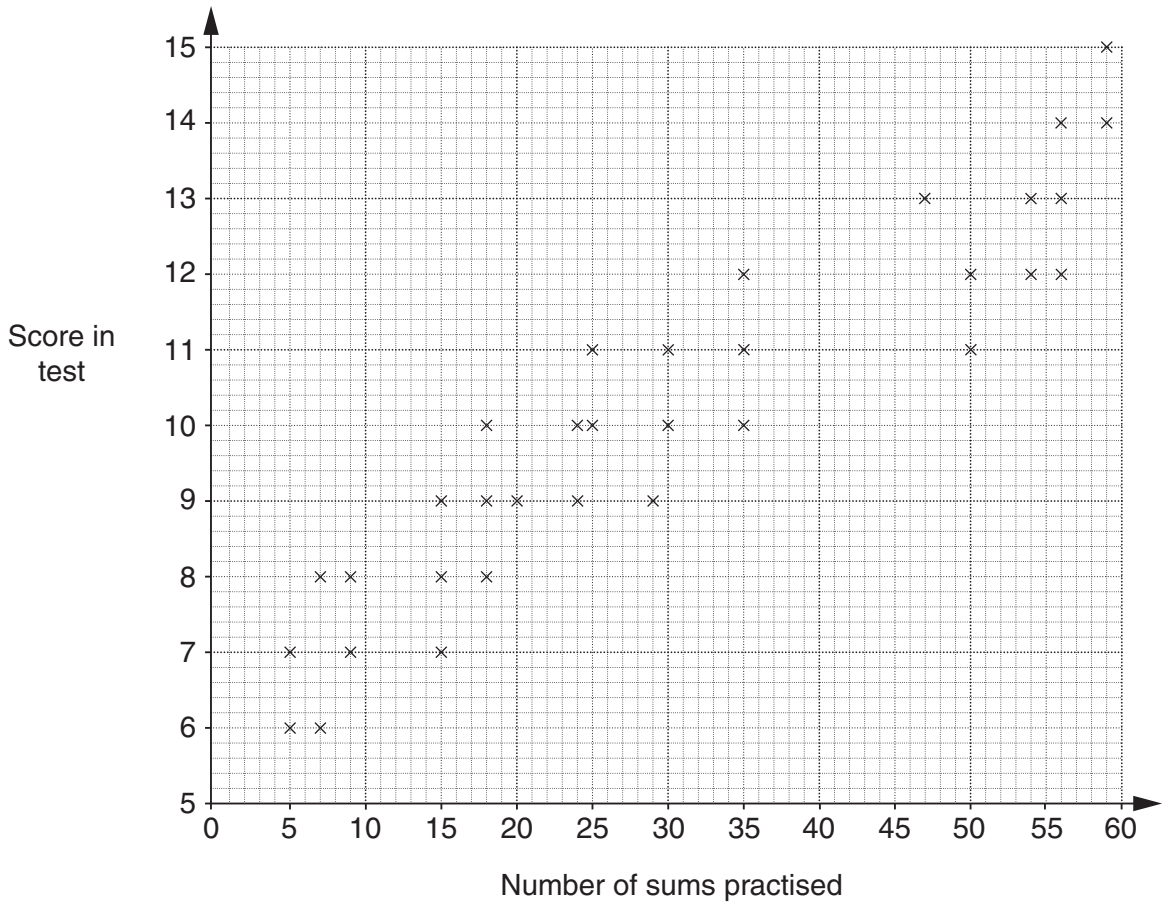
Answer **all** the questions.

1 Pia uses a computer to help her revise.
Each time, Pia practises a number of sums and then takes a test, scored out of 15.
For each test, Pia records the number of sums practised and the score on the test.
She draws this scatter graph.



One day, Pia practised 42 sums but did not have time to take the test.
She decides to use a line of best fit to estimate her likely score in the test.

(a) On the grid, draw a line of best fit. **[1]**

(b) Use your line of best fit to estimate a score for Pia.

(b) .....**[1]**

(c) What type of correlation is shown?

(c) .....**[1]**

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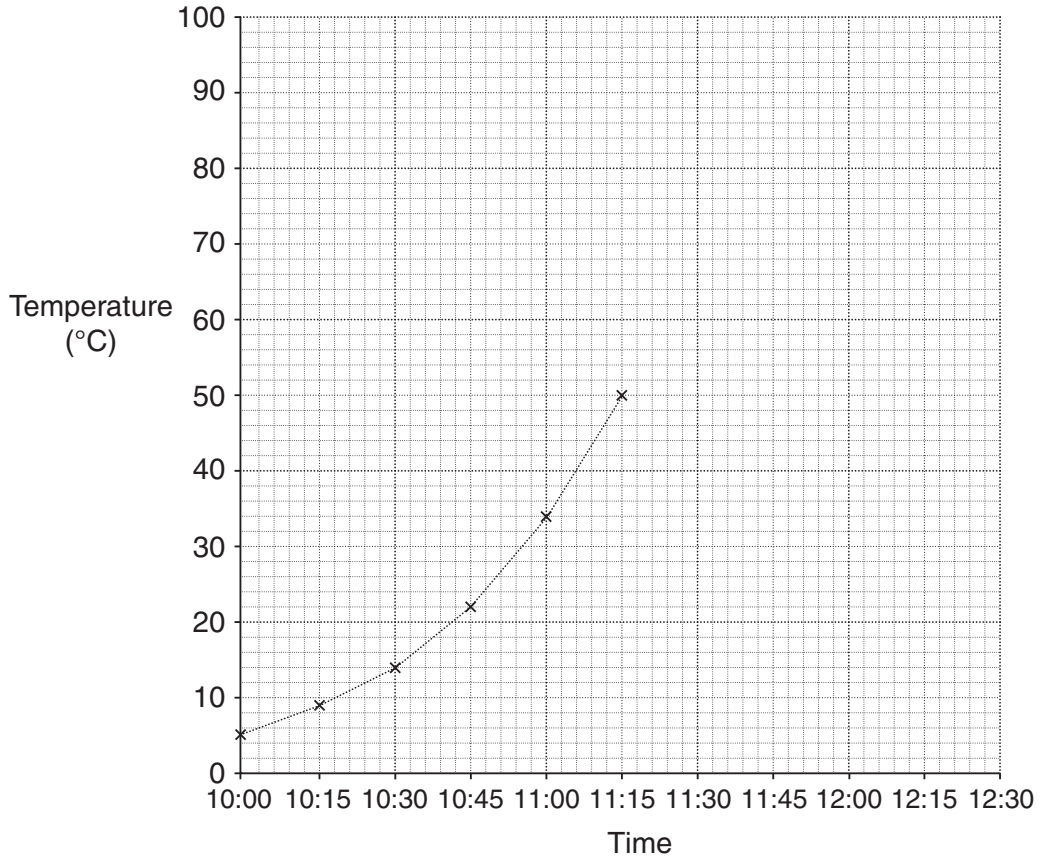
2 Maxine is cooking a chicken.
She uses a meat thermometer to check when her chicken is cooked.
She puts the chicken in the oven at 10:00.
This table shows the temperature in the chicken every 15 minutes.

Time	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30
Temperature (°C)	5	9	14	22	34	50	65	77	87	92	80

(a) Complete this time series graph to show Maxine's data.
The first six points have been plotted for you.



[2]

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(b) Maxine turns the oven off when the temperature in the chicken first reaches 83°C.
Use your graph to estimate the following.

(i) The time that Maxine turned the oven off.

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

(ii) The number of **minutes** that the chicken took to first reach 83°C.

(ii) ..... minutes **[1]**

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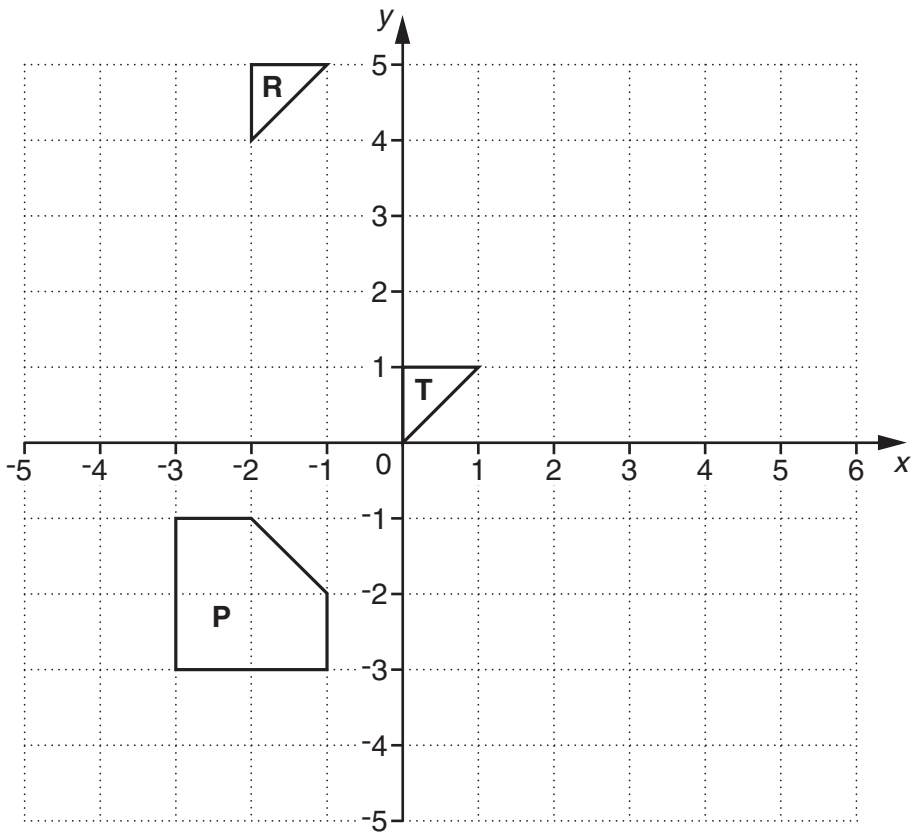
3 Shapes **P**, **R** and **T** are drawn on this grid.



(a) Describe fully the **single** transformation that maps triangle **T** onto triangle **R**.

.....

..... **[3]**

(b) Reflect shape **P** in the line $x = 1$.
Label your image **B**. **[2]**

(c) Enlarge triangle **T** with scale factor 3, centre (0, 0).
Label your image **C**. **[3]**

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4 In 2009, the world record for the 100 m was 9.572 seconds.
In 1968, it was 10.03 seconds.

What is the difference between these two times?

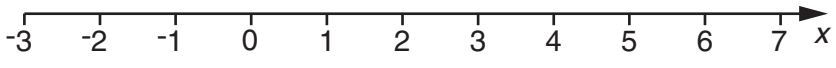
..... seconds **[2]**

5 **(a)** Solve this inequality.

$7x > 3x + 6$

(a) ..... **[2]**

(b) Represent $x \leqslant 2$ on this number line.



[2]

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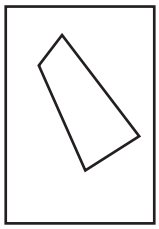
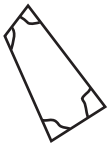
6 **(a)** Maciek draws a quadrilateral on a piece of paper.

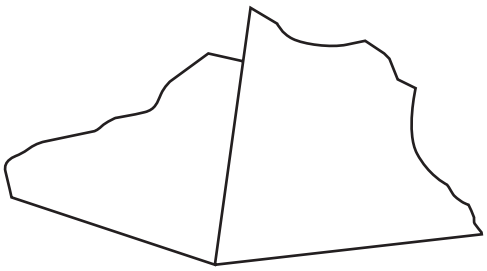


He cuts it out using scissors then tears off the four angles.



He joins the 4 **angles** together at a point with no overlapping.

This is a sketch of the first two angles.



Not to scale

(i) Complete the sketch above. **[1]**

(ii) What angle fact does your sketch demonstrate about the angles in a quadrilateral?

.....

..... **[1]**

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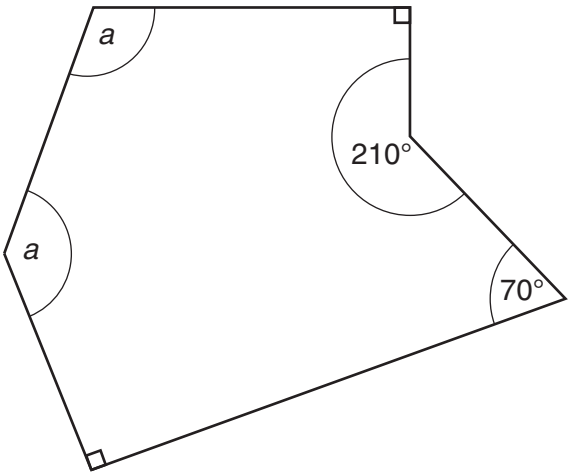
(b) Calculate the size of the two equal angles, each labelled *a*, in this irregular hexagon.



Not to scale

(b) ..... ° **[4]**

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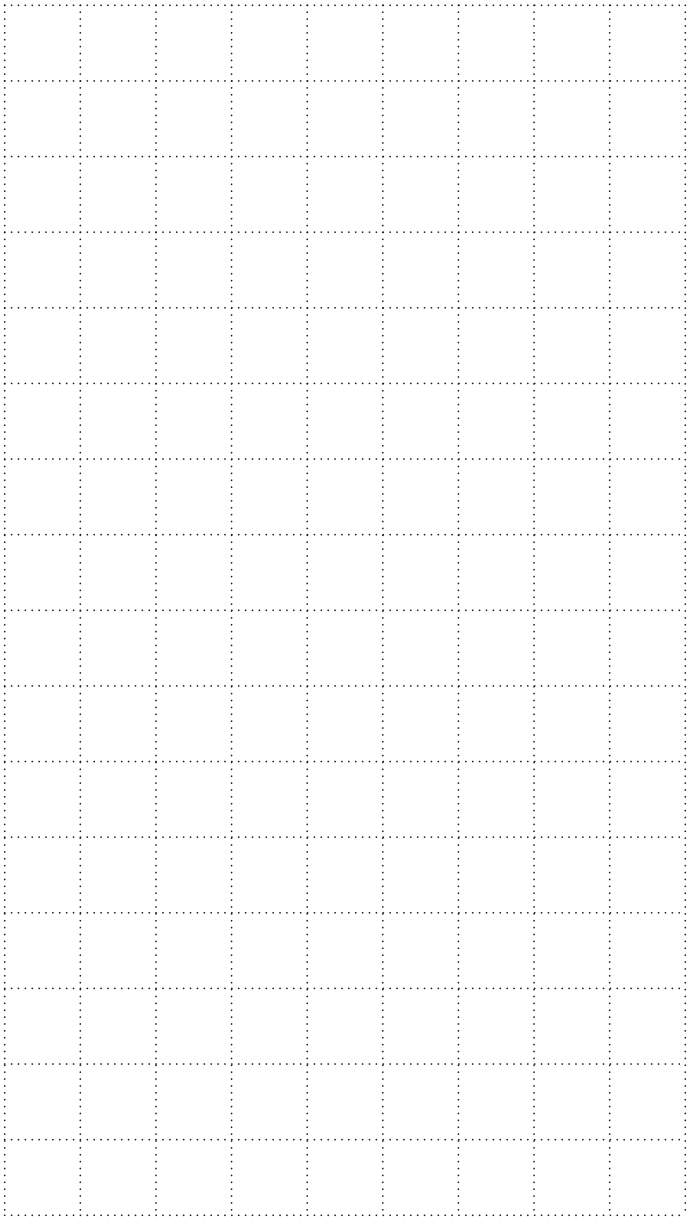
7 **(a)** On the grid below, draw the graph of $y = 8 - 2x$ for $-1 \leqslant x \leqslant 6$.



[3]

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(b) Find the gradient of the line $y = 8 - 2x$.

(b) ..... **[2]**

(c) Write down the equation of a line **perpendicular** to the line $y = 8 - 2x$.

(c) ..... **[2]**

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8 **(a)*** On average, human hair grows $1\frac{1}{4}$ cm each month.

Lizzie wants her hair to be at least 18 cm longer than it is now.

How many months is it likely that she will have to wait?

(a) ..... months **[3]**

(b) You are given that t is a positive number.

(i) Write down the reciprocal of t.

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

(ii) What is the value of the following?

t multiplied by the reciprocal of t.

.

(ii) ..... **[1]**

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9 In a car park the only vehicles are motorbikes and cars.
The motorbikes each have 2 wheels and the cars each have 4 wheels.

There are 110 vehicles and 378 wheels altogether in the car park.

Let the number of cars be c and the number of motorbikes be m.

(a) Use the information in the question to complete this equation.

$$c + m = \text{.....}$$

[1]

(b) Write down another equation in c and m and solve it simultaneously with the equation in part **(a)** to find the number of motorbikes and the number of cars in the car park.

(b) Number of cars, $c =$ .....

Number of motorbikes, $m =$ ..... **[4]**

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10 (a) Evaluate.

(i) $\sqrt[3]{27}$

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

(ii) $(\sqrt{7})^2$

(ii) ..... **[1]**

(iii) 4^0

(iii) ..... **[1]**

(b)* Express 6^{-1} as a recurring decimal.

(b) ..... **[3]**

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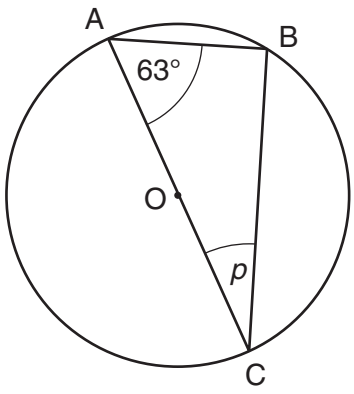
11 A, B and C are points on the circumference of a circle, centre O.
Angle BAC = 63°.
AOC is a diameter of the circle.

Find the size of angle *p*.
Give geometrical reasons for your answer.



Not to scale

p = ... ° because .....

.....

.....

..... **[3]**

TURN OVER FOR QUESTION 12

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12 You are given that $f(x) = 7x - 2$.

(a) Find f(12).

(a) ..... **[1]**

(b) You are also given that $f(x) + g(x) = 4$.

Find $g(x)$.

(b) ..... **[2]**

13 Calculate $\sqrt{10}$ as a percentage of $\sqrt{160}$.

..... % **[4]**

END OF QUESTION PAPER

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