

Monday 9 June 2014 – Morning**GCSE MATHEMATICS A****A502/02** Unit B (Higher Tier)

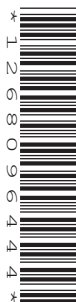
Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour

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.

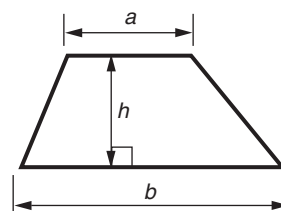
INFORMATION FOR CANDIDATES

- 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.

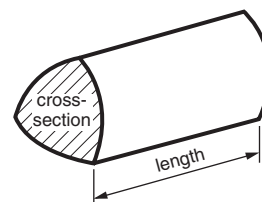
WARNING**No calculator can be
used for this paper**

Formulae Sheet: Higher Tier

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



Volume of prism $= (\text{area of cross-section}) \times \text{length}$

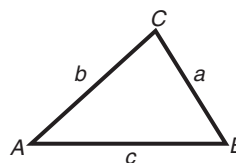


In any triangle ABC

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

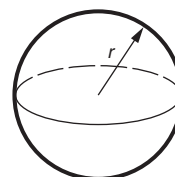
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



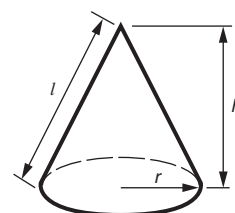
Volume of sphere $= \frac{4}{3} \pi r^3$

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

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

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

- 1** Julie asked three of her friends to estimate how much of the time it rained during their holidays. Their holidays were all the same length of time.

Eliot 40% of the time

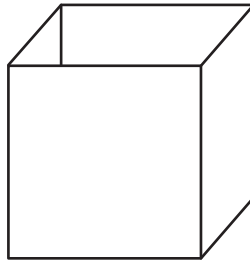
Harpreet $\frac{5}{12}$ of the time

Megan $\frac{3}{8}$ of the time

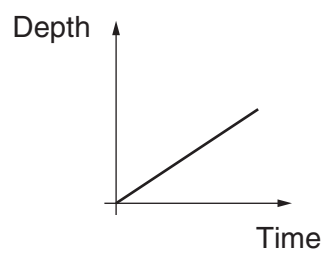
Put these estimates in order, starting with the smallest.
You must show your method clearly.

..... [4]
smallest

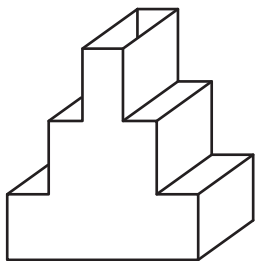
- 2 This empty container is filled with water at a constant rate.



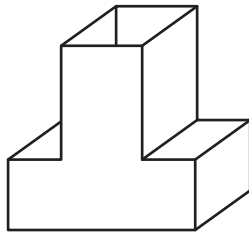
The graph of depth of water against time looks like this.



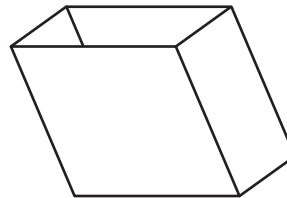
Four more empty containers are shown below.
Each of these containers is filled with water at a constant rate.



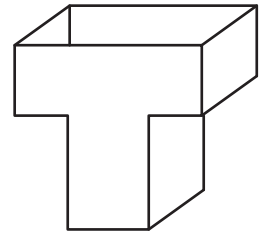
A



B



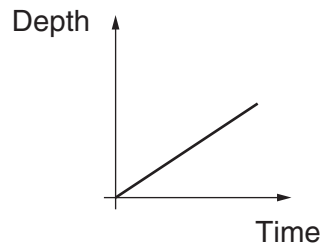
C



D

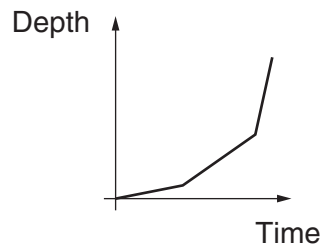
Choose which of these containers matches each of the graphs.

(a)



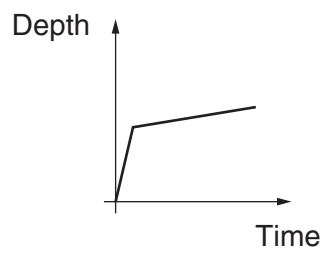
(a) Container..... [1]

(b)



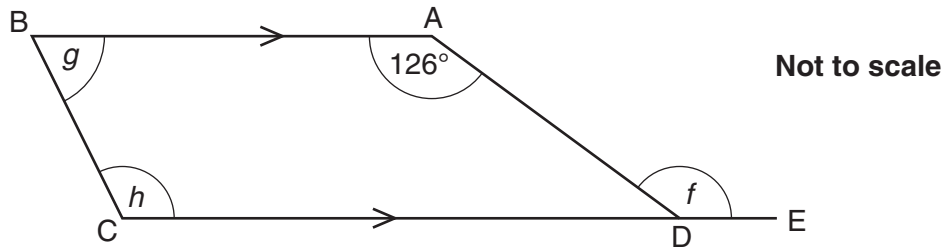
(b) Container..... [1]

(c)



(c) Container..... [1]

- 3 ABCD is a quadrilateral.
BA is parallel to CDE.
Angle h is **not** equal to 126° .



- (a) What is the mathematical name for quadrilateral ABCD?

(a) [1]

- (b) Find the size of angle f .
Give a geometrical reason for your answer.

$f = \dots\dots\dots^\circ$ because.....
..... [2]

- (c) Angle h is 4 times the size of angle g .

Work out the size of angle h .

(c) $^\circ$ [3]

- 4 You are given that $411 \times 32 = 13\,152$.

Use this information to work out the answer to each of the following.

(a) 4110×320

(a) [1]

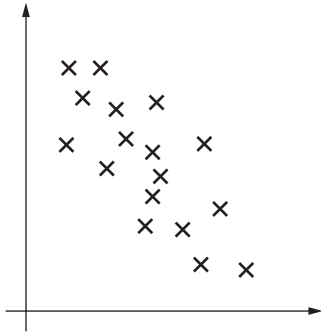
(b) 4.11×320

(b) [1]

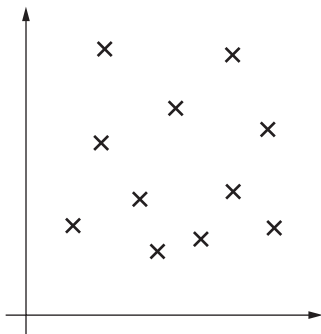
(c) $13.152 \div 32$

(c) [2]

- 5 (a) Describe the correlation shown in each of these scatter graphs.
If appropriate, also describe the strength of the correlation.



.....
.....



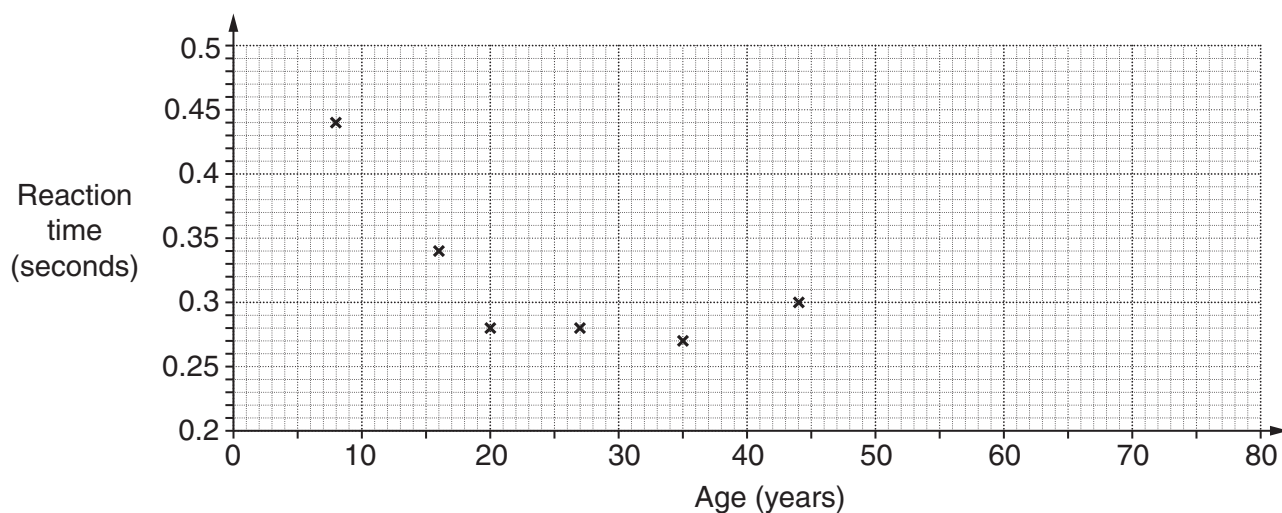
.....
.....

[3]

- (b) A student measures the reaction time for each of ten people of different ages. The results are given in this table.

Age (years)	8	16	20	27	35	44	56	65	70	79
Reaction time (seconds)	0.44	0.34	0.28	0.28	0.27	0.30	0.28	0.34	0.38	0.40

The results are plotted on a scatter graph.



- (i) Complete the scatter graph.
The first six results have been plotted for you.

[2]

- (ii) Why is it not sensible to draw a line of best fit?

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

- (iii) Describe the relationship between age and reaction time shown by your graph.

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

- 6 (a) Solve this inequality.

$$3y - 11 > 25$$

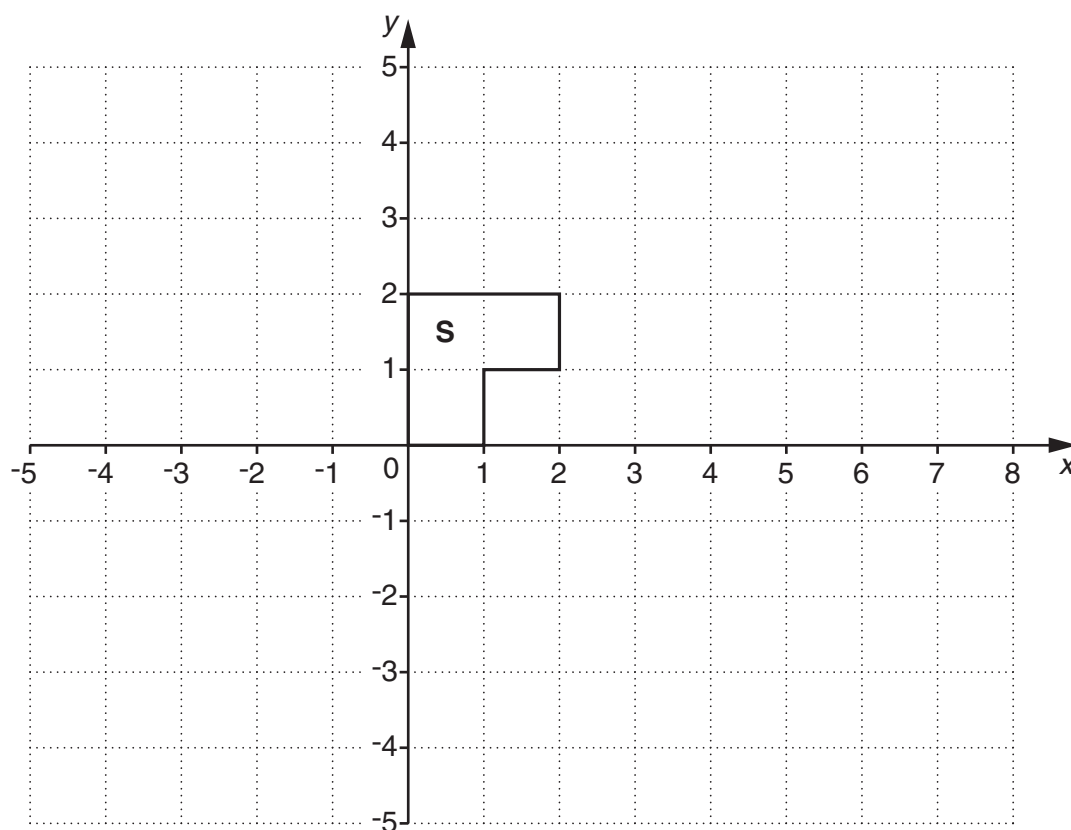
(a) [2]

- (b) Find **all** the **integer** values of w that satisfy this inequality.

$$9 < 3w < 20$$

(b) [2]

- 7 Shape **S** is shown on the grid.



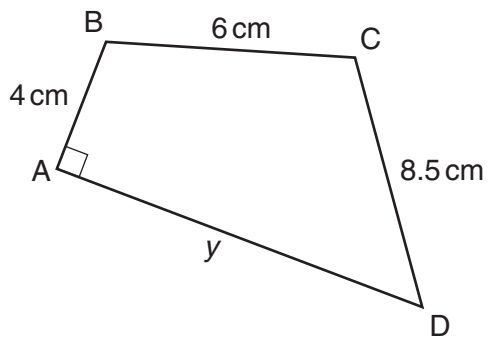
- (a) Rotate shape **S** through 90° clockwise about (2, 0).
Label your image **R**.

[3]

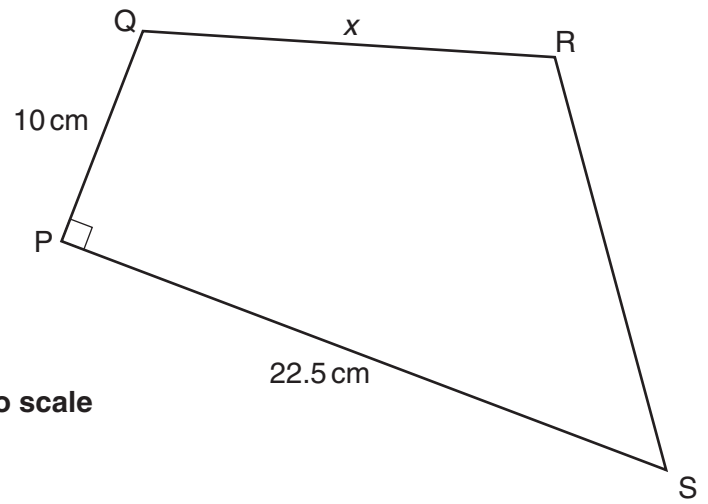
- (b) Enlarge shape **S** with scale factor -2 and centre (0, 0).
Label your image **E**.

[2]

8* ABCD and PQRS are mathematically similar.



Not to scale



Calculate lengths x and y .

[5]

9 A line, L , has equation $y = 4x - 5$.

(a) Write down the gradient of line L .

(a) [1]

(b) What are the coordinates of the point where line L crosses the y -axis?

(b) (.....,) [1]

(c) Write down the equation of the line **parallel** to line L that passes through $(0, 0)$.

(c) [2]

(d) Explain how you can tell that the line $y = -\frac{1}{5}x - 5$ is not perpendicular to line L .

.....
 [1]

10 Solve, algebraically, these simultaneous equations.

$$\begin{aligned} x + 3y &= 14 \\ 2x + y &= 3 \end{aligned}$$

$x =$

$y =$ [3]

- 11 (a) Write $\frac{5}{9}$ as a recurring decimal.

(a) [1]

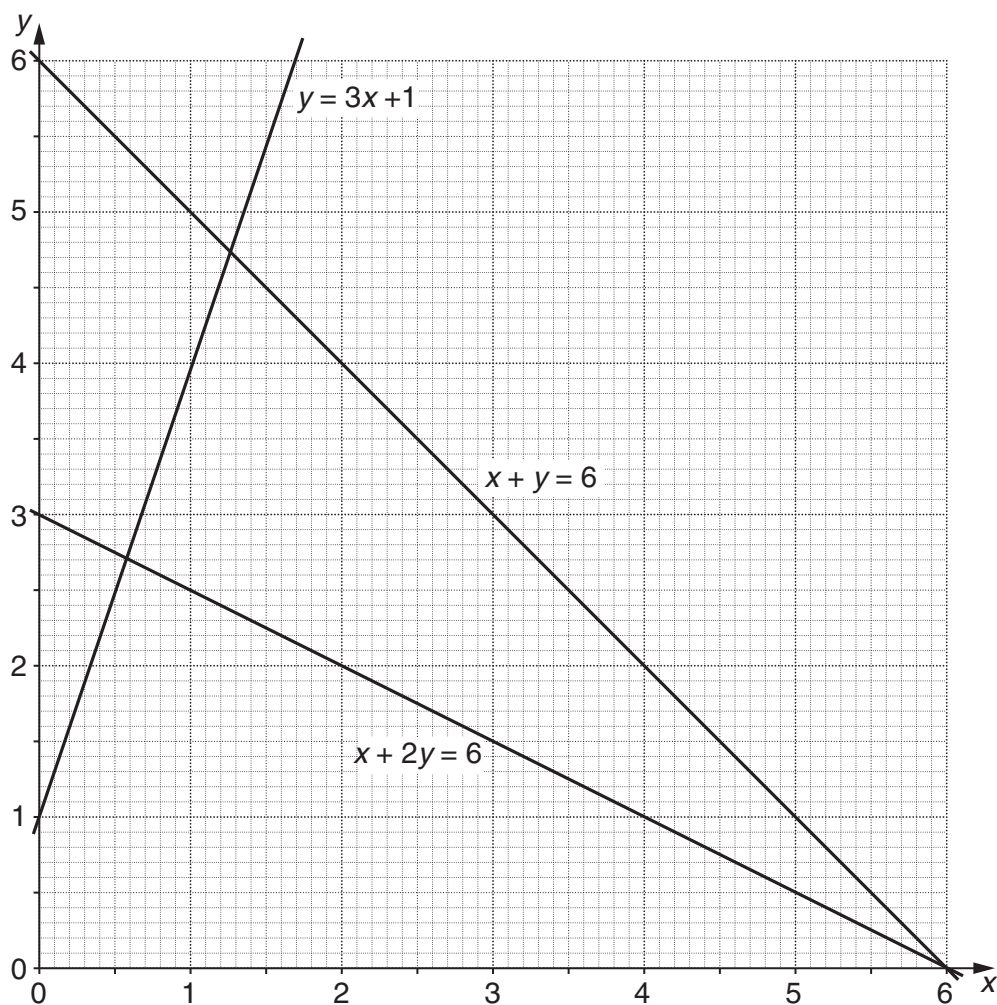
- (b) Marco used his calculator to divide a 2-digit number by a 2-digit number.
His calculator showed this display.

2.030303030

What calculation did Marco do?

(b) [4]

12 The graphs of $x + y = 6$, $y = 3x + 1$ and $x + 2y = 6$ are shown below.



Use the graphs to solve these pairs of simultaneous equations.

(a) $y = 3x + 1$
 $x + 2y = 6$

(a) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [1]

(b) $y = 3x + 1$
 $2x + 2y = 12$

(b) $x = \dots\dots\dots$

$y = \dots\dots\dots$ [2]

TURN OVER FOR QUESTION 13

- 13** B0, B1, B2, ..., B10 are labels given to different sized sheets of paper. The lengths of the sheets are related as follows:

$$\boxed{\text{Length of B10}} \times \sqrt{2} = \boxed{\text{Length of B9}}$$

$$\boxed{\text{Length of B9}} \times \sqrt{2} = \boxed{\text{Length of B8}}$$

and so on from B10, the smallest size, up to B0 the largest size.

- (a)** The length of B7 paper is 125 mm.

- (i)** What is the **exact** length of B6 paper?

(a)(i) mm [1]

- (ii)** What is the length of B5 paper?
Give your answer in its simplest form.

(ii) mm [2]

- (b)** The length of B1 paper is 1000 mm.

Find the length of B2 paper.

Give your answer in the form $k\sqrt{2}$, where k is an integer.

(b) mm [3]

END OF QUESTION PAPER