

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

A502/02

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

MONDAY 9 JUNE 2014: 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:

None

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.

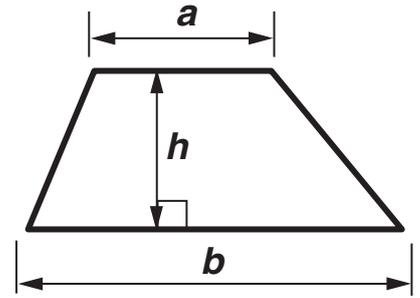
Your quality of written communication is assessed in questions marked with an asterisk (*).

The total number of marks for this paper is 60.

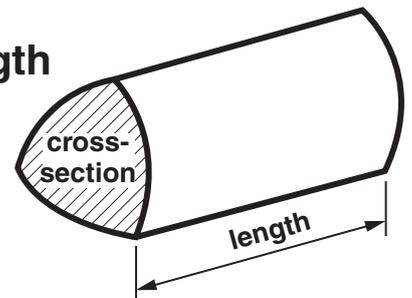
Any blank pages are indicated.

FORMULAE SHEET: HIGHER TIER

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



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

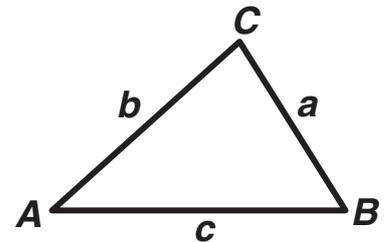


In any triangle *ABC*

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

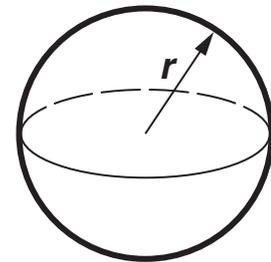
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



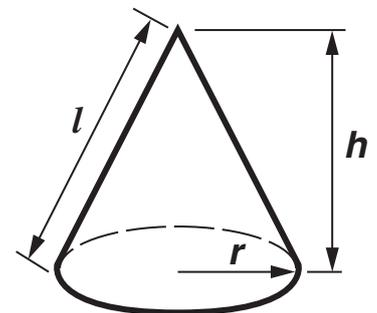
Volume of sphere = $\frac{4}{3} \pi r^3$

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

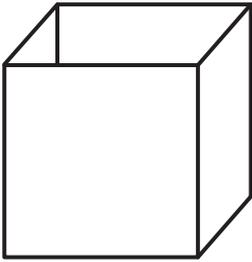
$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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

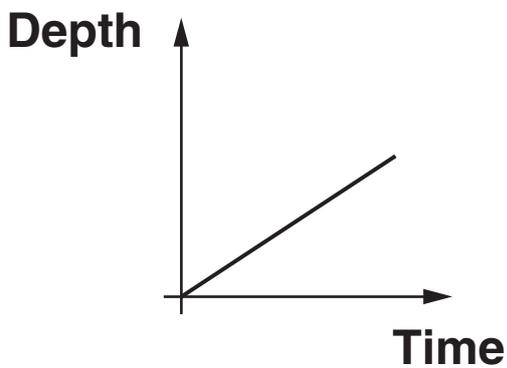
smallest

[4]

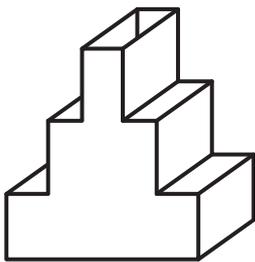
2 This empty container is filled with water at a constant rate.



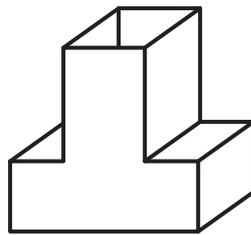
The graph of depth of water against time looks like this.



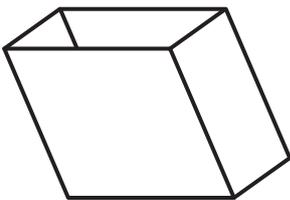
Four more empty containers are shown below. Each of these containers is filled with water at a constant rate.



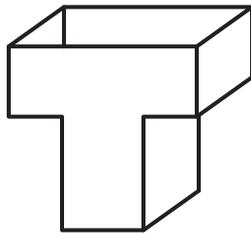
A



B



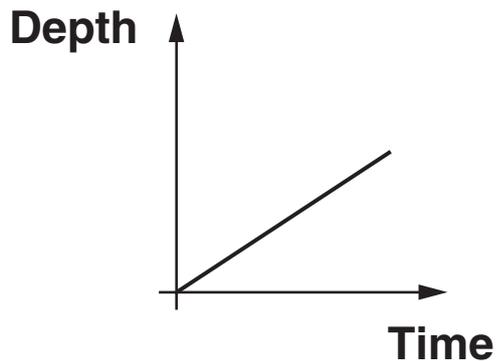
C



D

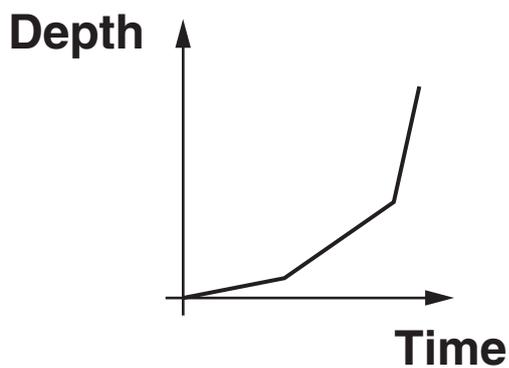
Choose which of these containers matches each of the graphs.

(a)



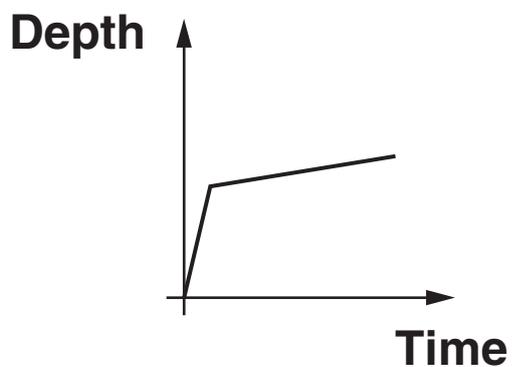
(a) Container _____ [1]

(b)



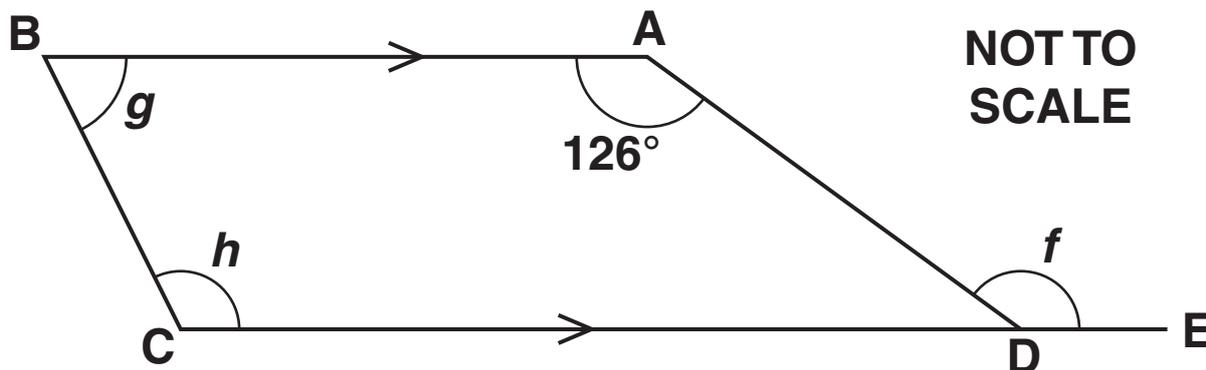
(b) Container _____ [1]

(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.

$f =$ _____ $^\circ$ because _____
 _____ [2]

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

Work out the size of angle h .

(c) _____° [3]

4 You are given that $411 \times 32 = 13152$.

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

(a) 4110×320

(a) _____ [1]

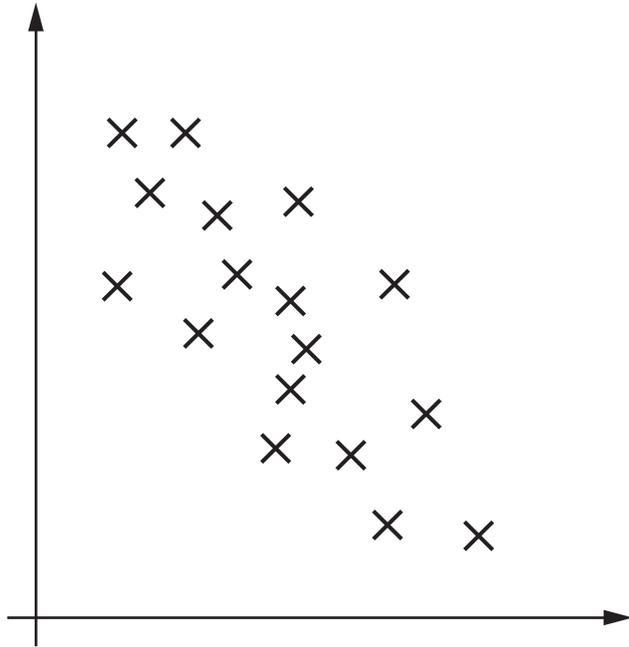
(b) 4.11×320

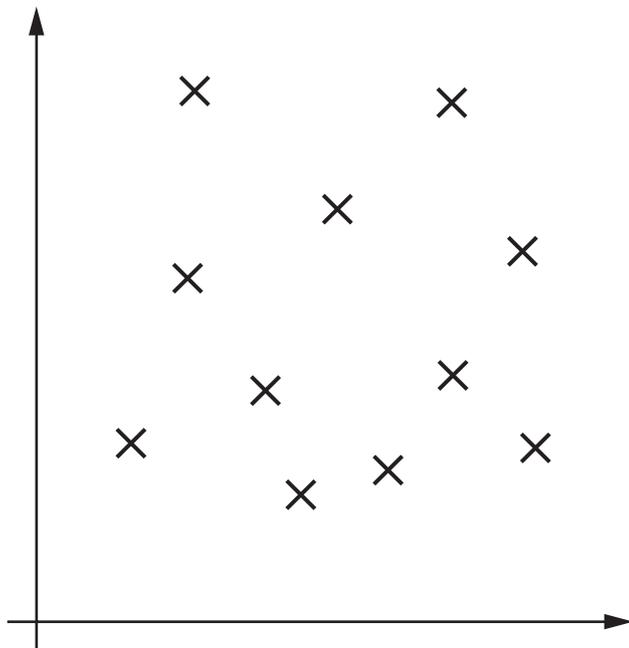
(b) _____ [1]

(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 the table below.

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 the scatter graph on the opposite page.

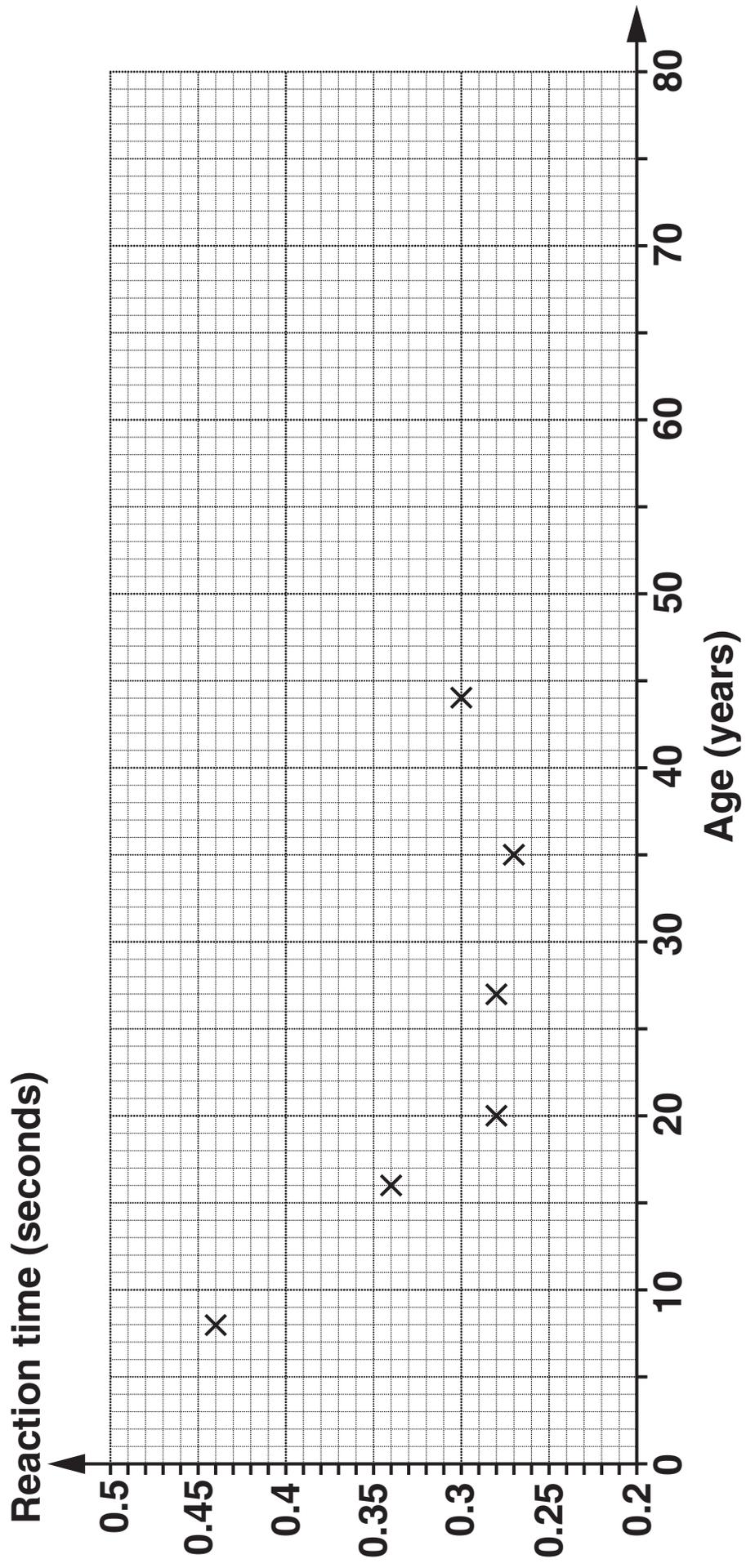
- (i) Complete the scatter graph. The first six results have been plotted for you. [2]

- (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.

$$3y - 11 > 25$$

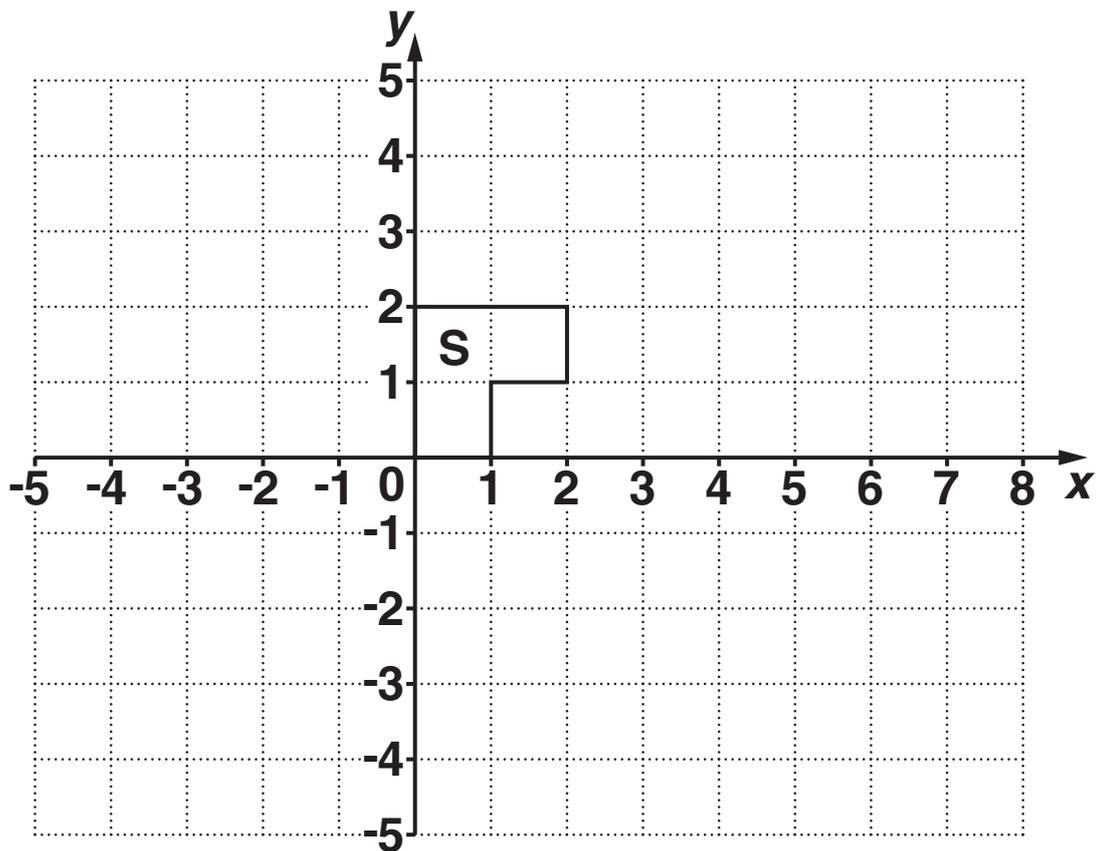
(a) _____ **[2]**

(b) Find ALL the INTEGER values of w that satisfy this inequality.

$$9 < 3w < 20$$

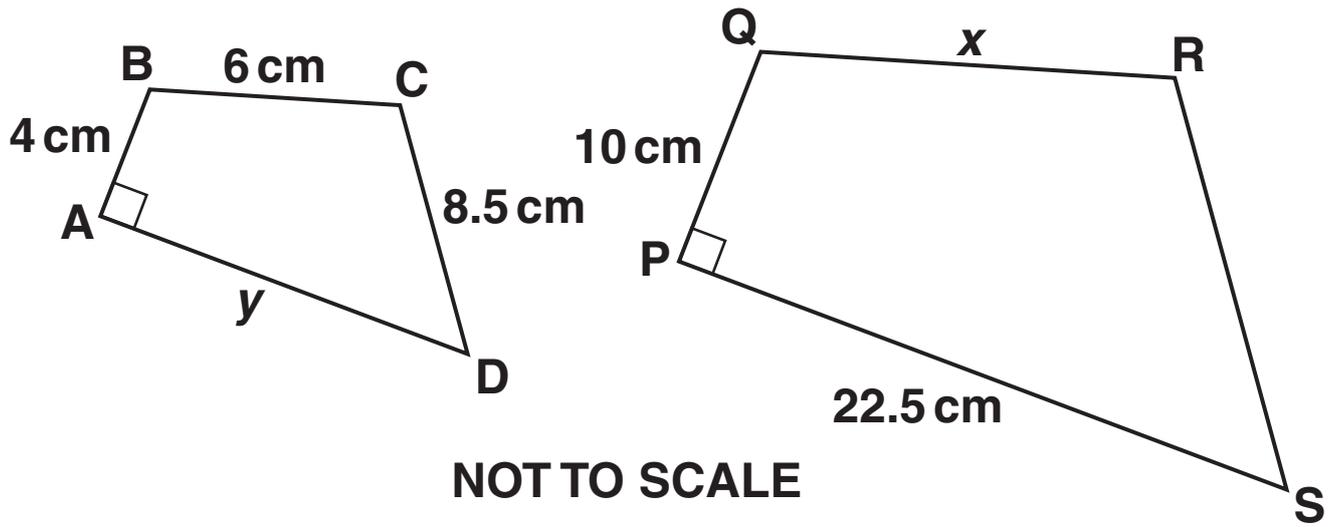
(b) _____ **[2]**

7 Shape S is shown on the grid below.



- (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.



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.

$$x + 3y = 14$$

$$2x + y = 3$$

$$x = \underline{\hspace{10em}}$$

$$y = \underline{\hspace{10em}} \text{ [3]}$$

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

(a) _____ [1]

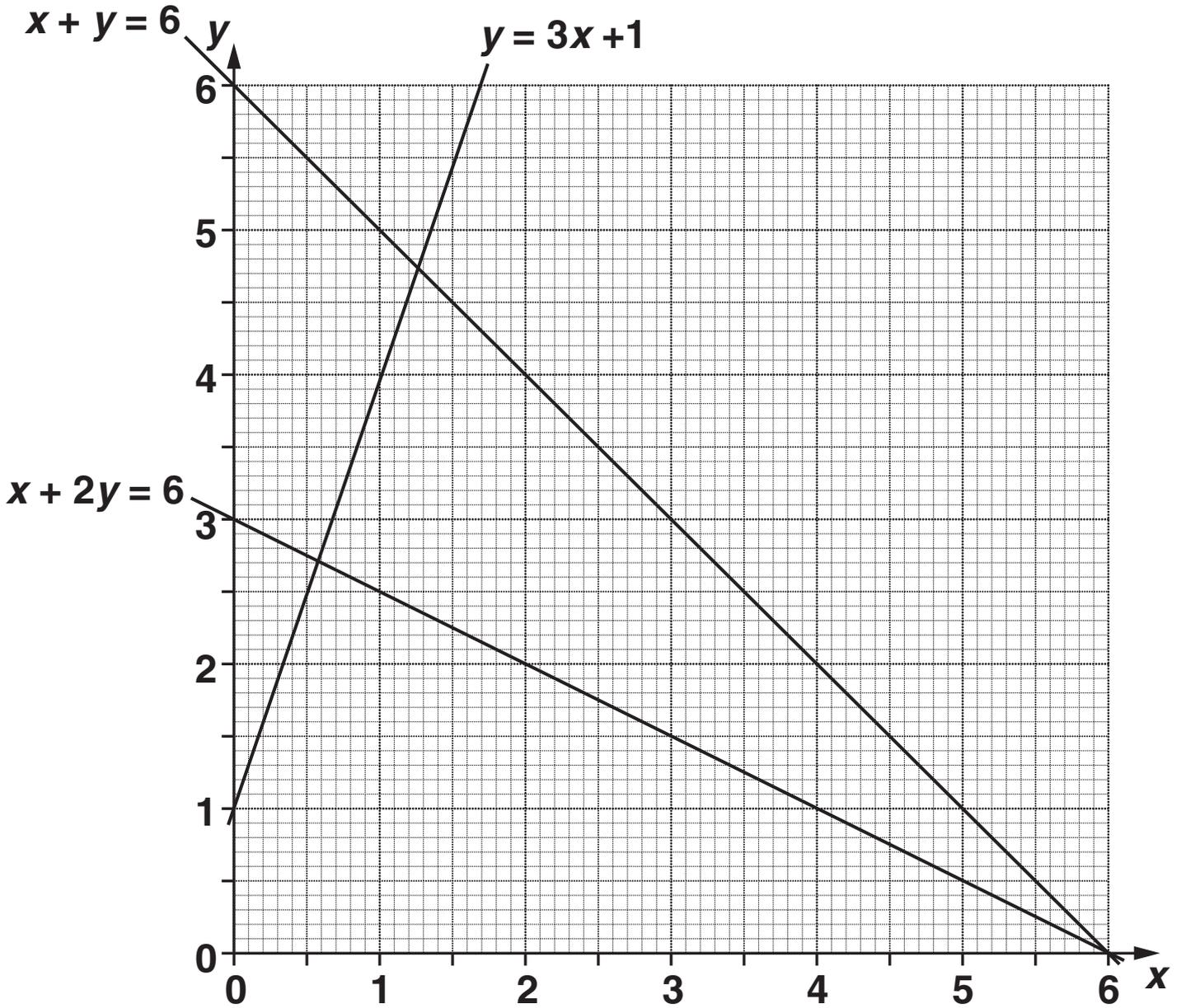
- (b) Marco used his calculator to divide a 2-digit number by a 2-digit number.
His calculator showed this display.

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) $x =$ _____

$y =$ _____ [1]

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

(b) $x =$ _____

$y =$ _____ [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

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