THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

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Thursday 19 January 2012 – Afternoon

GCSE MATHEMATICS A

A502/02 Unit B (Higher Tier)

A516880112

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.

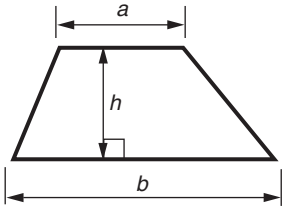
WARNING

No calculator can be used for this paper

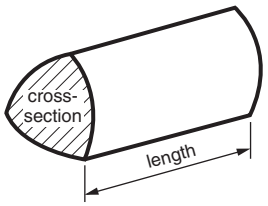
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

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



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

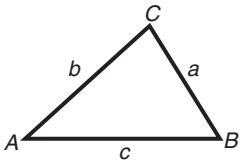


In any triangle *ABC*

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

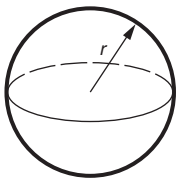
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



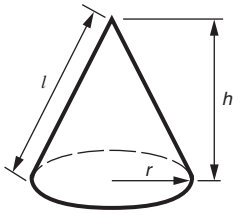
Volume of sphere $= \frac{4}{3}\pi r^3$

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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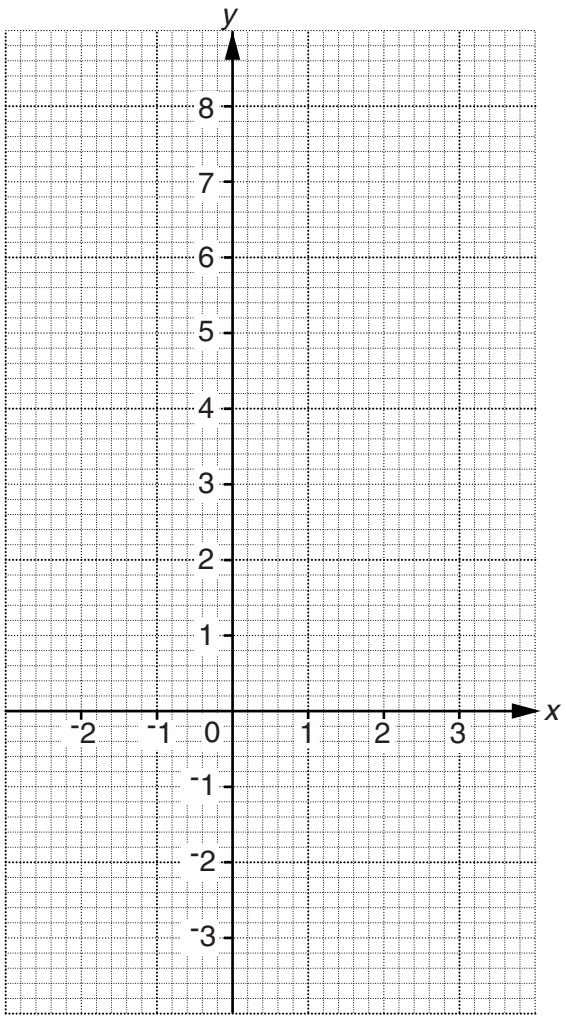
1 **(a)** On the grid, draw the graph of $y = 4 - 2x$ for x from $^-2$ to 3.



[3]

(b) On the same grid, draw the graph of $y = 3$ and use it to solve these simultaneous equations.

$y = 4 - 2x$
$y = 3$

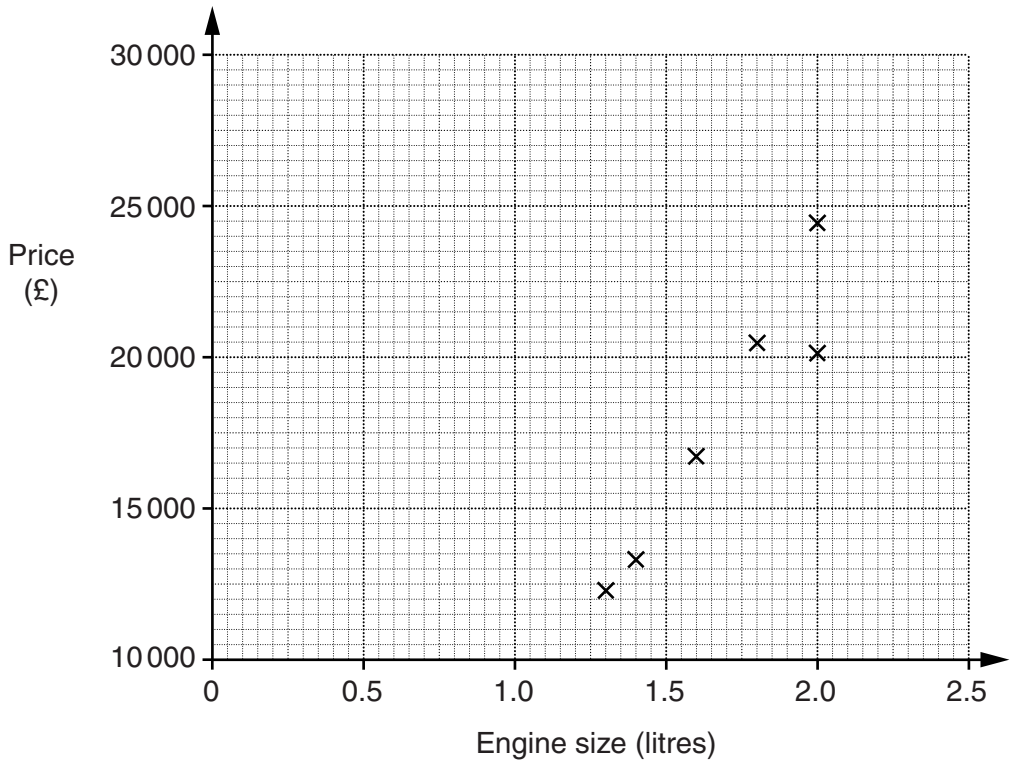
(b) $x =$ _____

$y =$ _____ **[3]**

2 A website gives the price and engine size for different models of one manufacturer's cars.

Engine size (litres)	Price (£)
1.3	12 360
1.4	13 345
1.6	16 695
1.8	20 495
2	20 095
2	24 295
2	29 945
2.2	27 345
2.5	25 745

(a) Complete the scatter graph below.
The first six points have been plotted for you.



[2]

(b) Draw a line of best fit on your scatter graph. **[1]**

(c) Describe the correlation between price and engine size.

(c) _____ **[1]**

(d) This manufacturer is planning to produce a car with a 1.7 litre engine.

What might you expect its price to be?

(d) £ _____ **[1]**

(e) One of the cars is a sports model that is more expensive than other cars with the same engine size.

Put a ring round the point that represents the sports model. **[1]**

3 **(a)** A football stadium has 10 car parks and 2 coach parks.
Each car park has space for m cars.
Each coach park has space for d coaches.

Write an expression for the total number of cars and coaches that can park at the stadium.

(a) _____ **[2]**

(b) One Saturday afternoon, there are t coaches at a theme park.
There are $2t$ people in each coach.

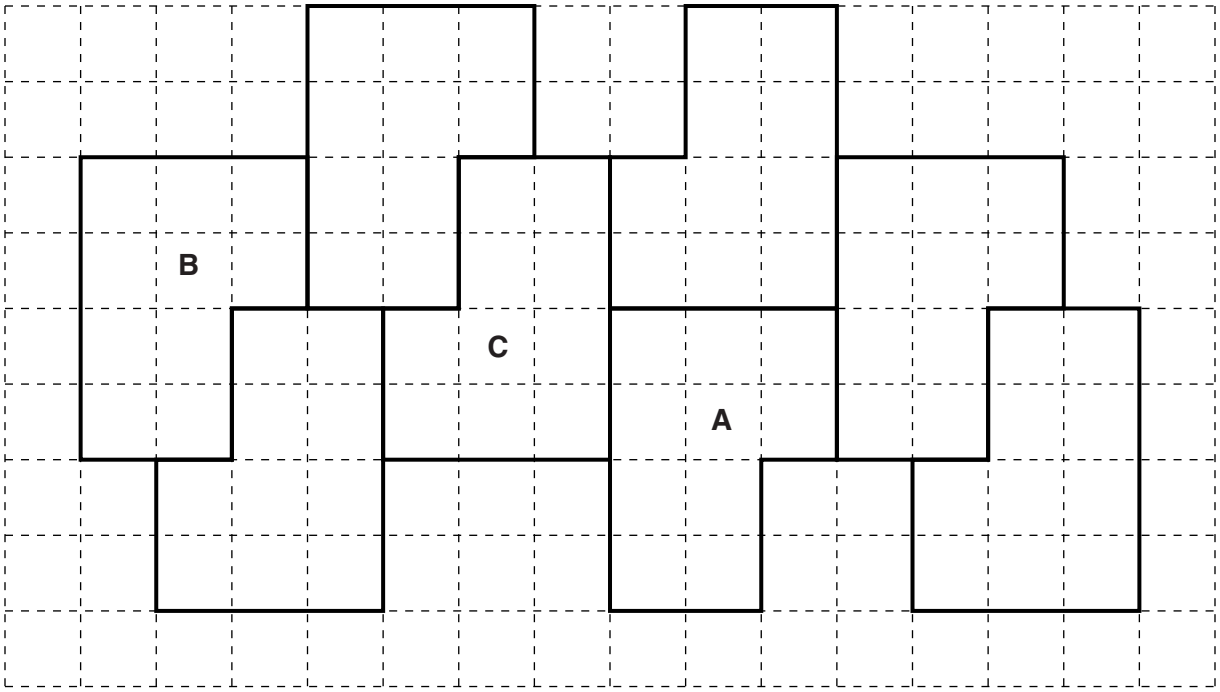
(i) Write an expression for the total number of people in the coaches.

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

(ii) Find the total number of people in the coaches if $t = 20$.

(ii) _____ **[1]**

4 Part of a wallpaper design is shown below.



(a) Describe fully the single transformation that maps shape **A** onto shape **B**.

_____

_____ **[3]**

(b) Shape **C** is a rotation of shape **B**.

(i) Through what angle has the shape been rotated?

(b)(i) _____ ° **[1]**

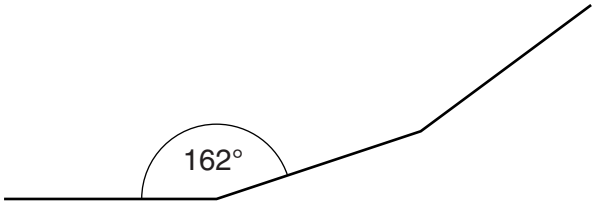
(ii) Mark the centre of rotation with a cross (X). **[1]**

(c) Describe a single transformation that would **decrease** the **area** of shape **A**.

_____

_____ **[2]**

5 This diagram shows part of a regular polygon.



Not to scale

How many sides does this polygon have?

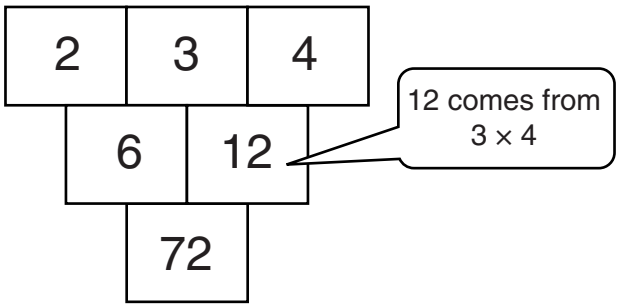
_____ **[3]**

6 Mark has a voucher that gives him 22% off the prices at *Cordula's Hardware Store*.

Estimate how much he will pay for an electric drill that normally costs £87.99.

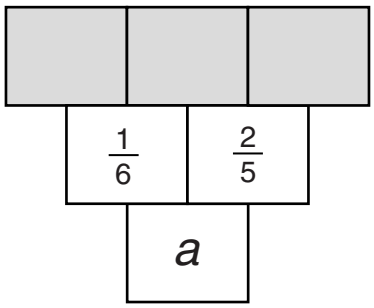
£_____ **[3]**

7 In these diagrams, the number in a box is worked out by multiplying together the two numbers immediately above it.
For example:



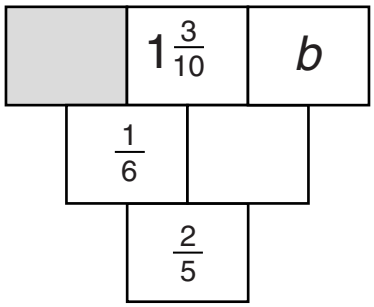
Calculate the missing numbers, represented by the letters *a* and *b*, in these diagrams.
Give any fractions in their simplest form.

(a)



(a) _____ **[2]**

(b)

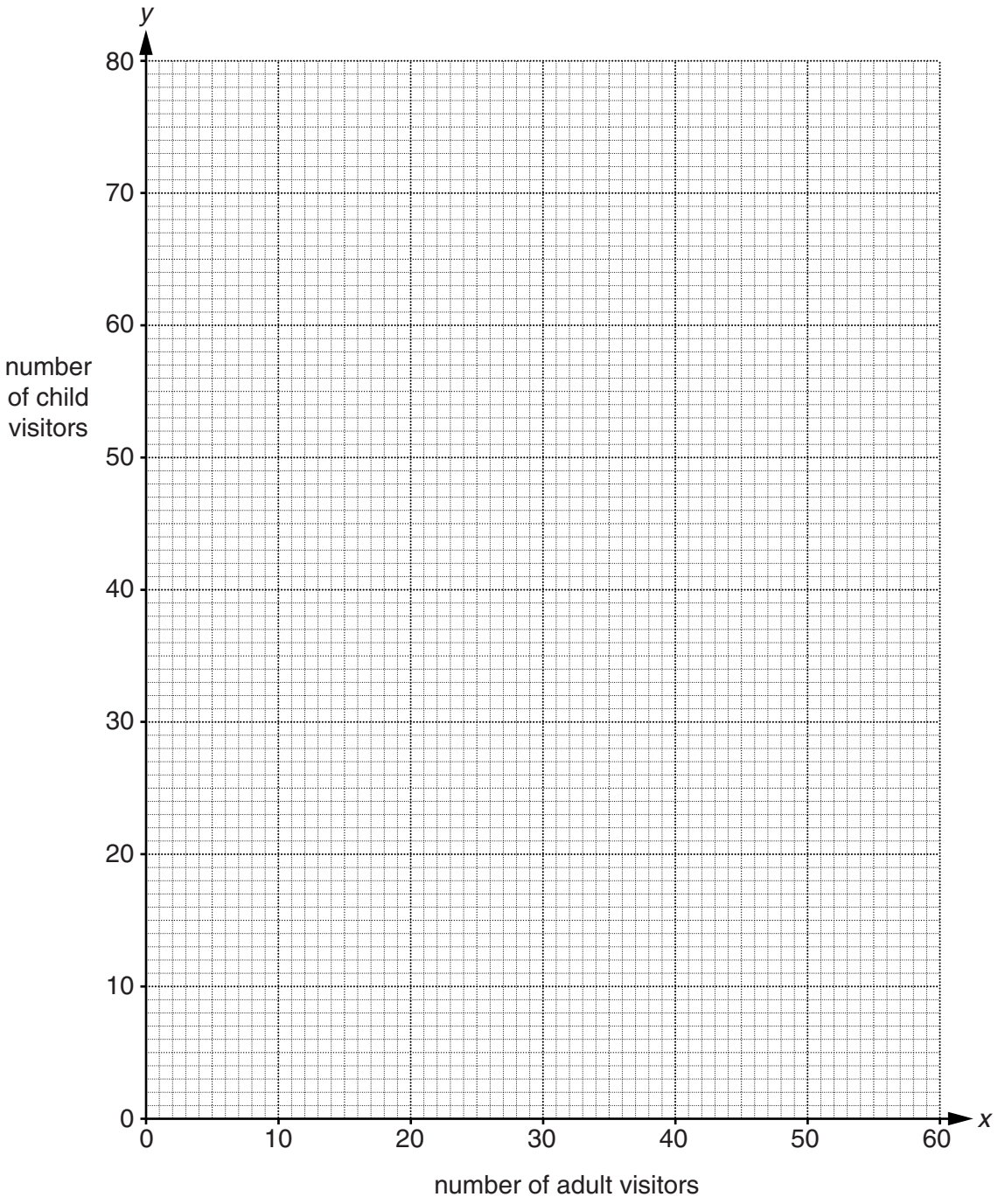


(b) _____ **[4]**

8 The entry fee to a stately home is £6 for an adult and £5 for a child.
Kushala was working at the till and noticed that she had taken more than £300 in entry fees one morning.

Let x be the number of adult visitors and y the number of child visitors.

(a) On the grid, represent the inequality $6x + 5y > 300$.
Shade the area **not** required.



[2]

Kushala also noticed

- the number of child visitors was more than twice the number of adult visitors,
- there were less than 70 child visitors.

(b) (i) Write down two inequalities in x and y to represent this information.

(b)(i) _____

_____ **[2]**

(ii) Represent your inequalities on the grid.
Shade the area **not** required. **[3]**

(c) Kushala's manager thinks they had 30 adult visitors and 50 child visitors that morning.

(i) Explain why the manager must be wrong.

_____

_____ **[1]**

(ii) Write down one possible pair of values for the number of adult visitors (x) and child visitors (y) that fits all the conditions.

(c)(ii) _____ adult visitors

_____ child visitors **[1]**

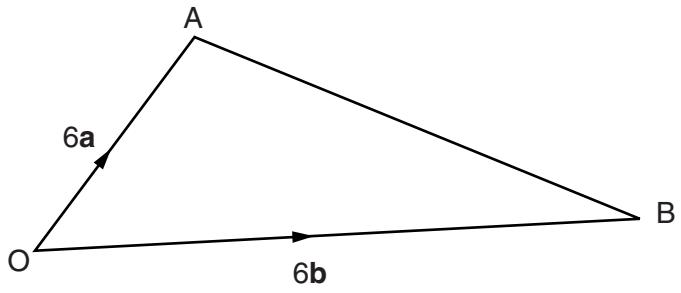
9 **(a)** Express $0.\dot{4}\dot{5}$ as a fraction in its lowest terms.

(a) _____ **[3]**

(b) Hence express $0.0\dot{4}\dot{5}$ as a fraction in its lowest terms.

(b) _____ **[1]**

10 In triangle OAB, $\overrightarrow{OA} = 6\mathbf{a}$ and $\overrightarrow{OB} = 6\mathbf{b}$.
M is the midpoint of OB and N is the midpoint of AB.



In this question give your answers in their simplest form in terms of **a** and **b**.

(a) Find $\overrightarrow{AB}$.

(a) _____ **[1]**

(b) Find $\overrightarrow{ON}$.

(b) _____ **[2]**

G is a point on AM such that $AG = \frac{2}{3}AM$.

(c) (i) Find $\overrightarrow{AM}$.

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

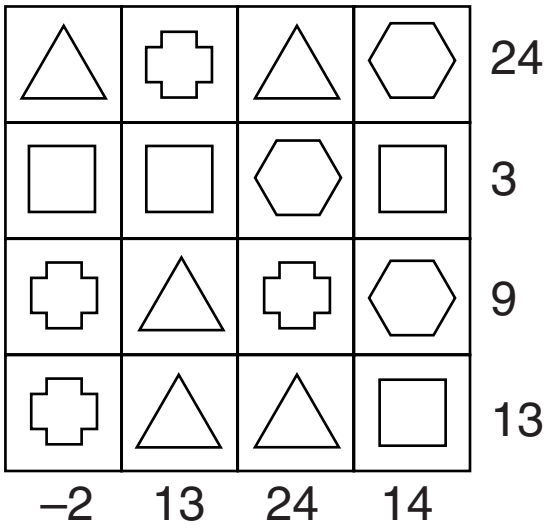
(ii) Find $\overrightarrow{OG}$.

(ii) _____ **[2]**

(d) What do your answers tell you about the points O, G and N?

_____ **[1]**

11* Each symbol in this grid represents a number.
Each number outside the grid is the sum of the numbers in that row or column.



Use algebra to find the values represented by □ and ⬡.

□ = _____

⬡ = _____ **[5]**

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