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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**A502/02**

**MATHEMATICS A**

**Unit B (Higher Tier)**

**THURSDAY 19 JANUARY 2012: Afternoon**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Geometrical instruments**

**Tracing paper (optional)**

<p><b><u>WARNING</u></b> <b>No calculator can be used for this paper.</b></p>
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**This paper has been pre modified for carrier language**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

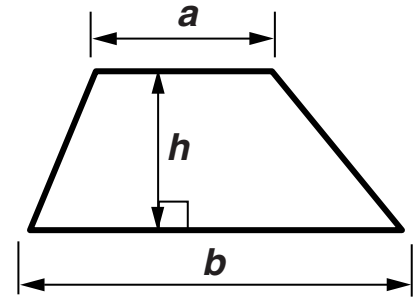
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you 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**

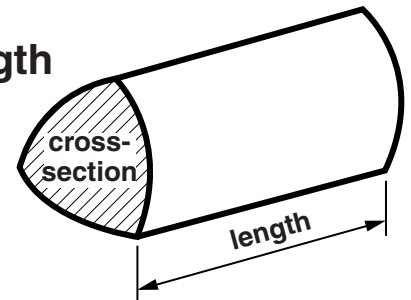
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **Your Quality of Written Communication is assessed in questions marked with an asterisk (\*).**
- **The total number of marks for this paper is 60.**

# FORMULAE SHEET: HIGHER TIER

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



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

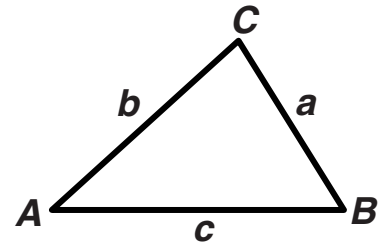


In any triangle  $ABC$

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

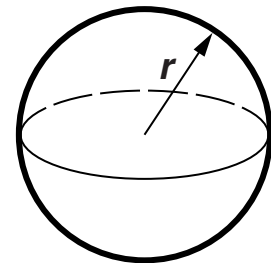
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



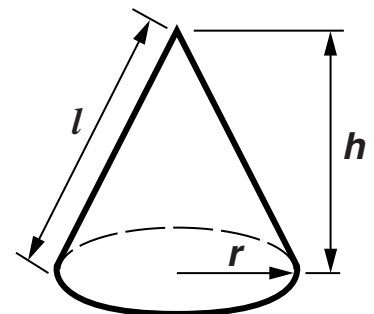
Volume of sphere =  $\frac{4}{3} \pi r^3$

Surface area of sphere =  $4\pi r^2$



Volume of cone =  $\frac{1}{3} \pi r^2 h$

Curved surface area of cone =  $\pi rl$

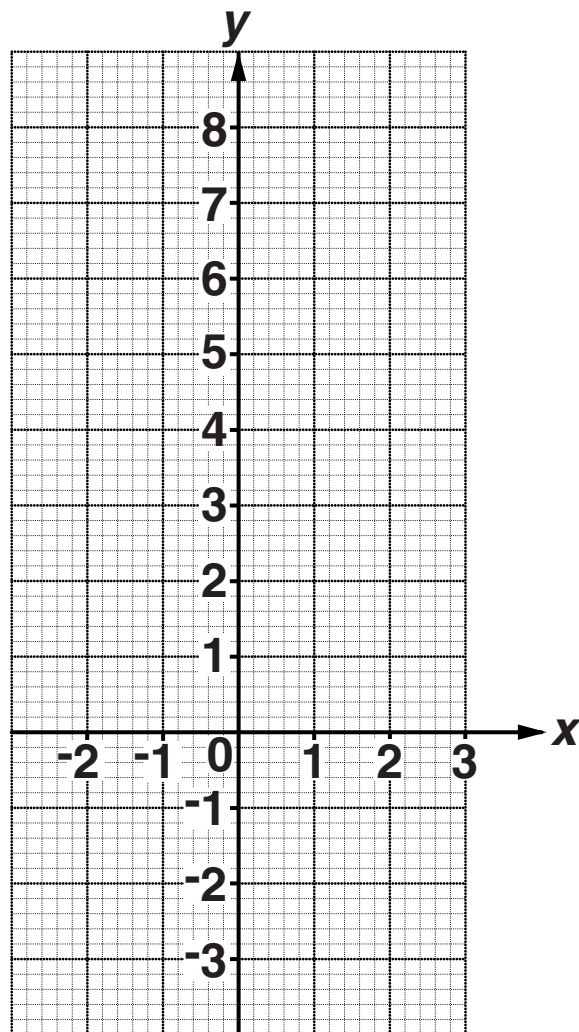


The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$ , where  $a \neq 0$ , are given by

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

- 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.**

$$y = 4 - 2x$$

$$y = 3$$

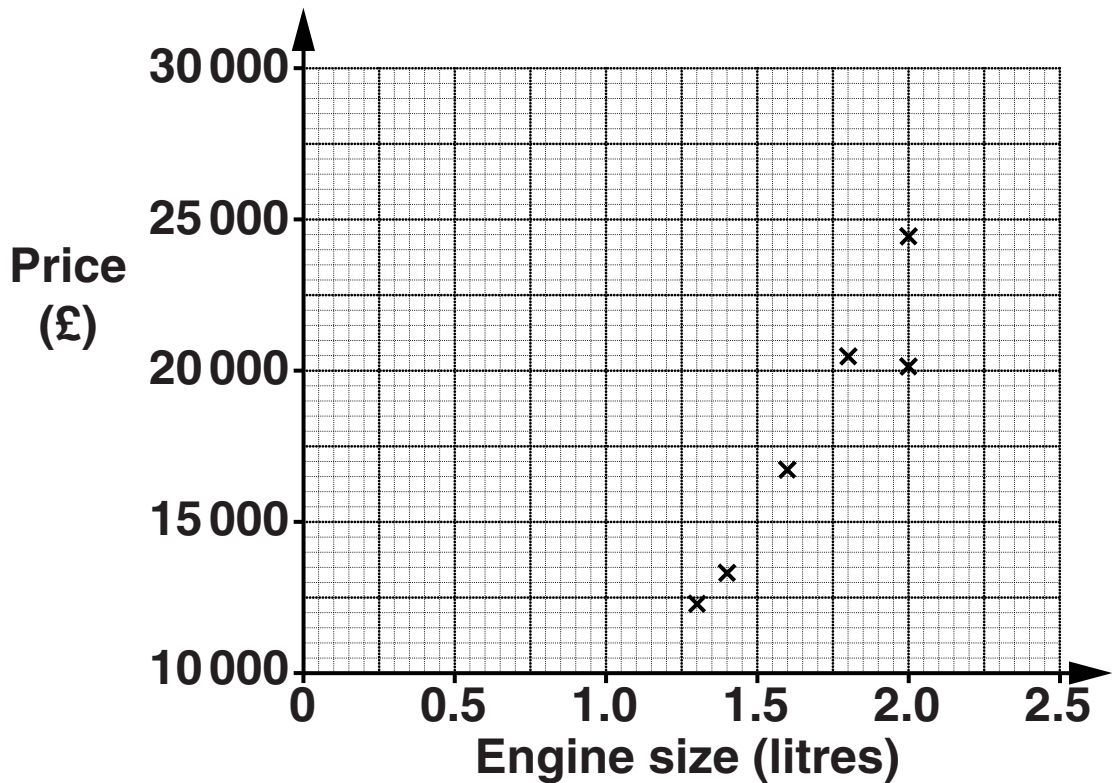
**(b)  $x =$  \_\_\_\_\_**

**$y =$  \_\_\_\_\_ **[3]****

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

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

- (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.**

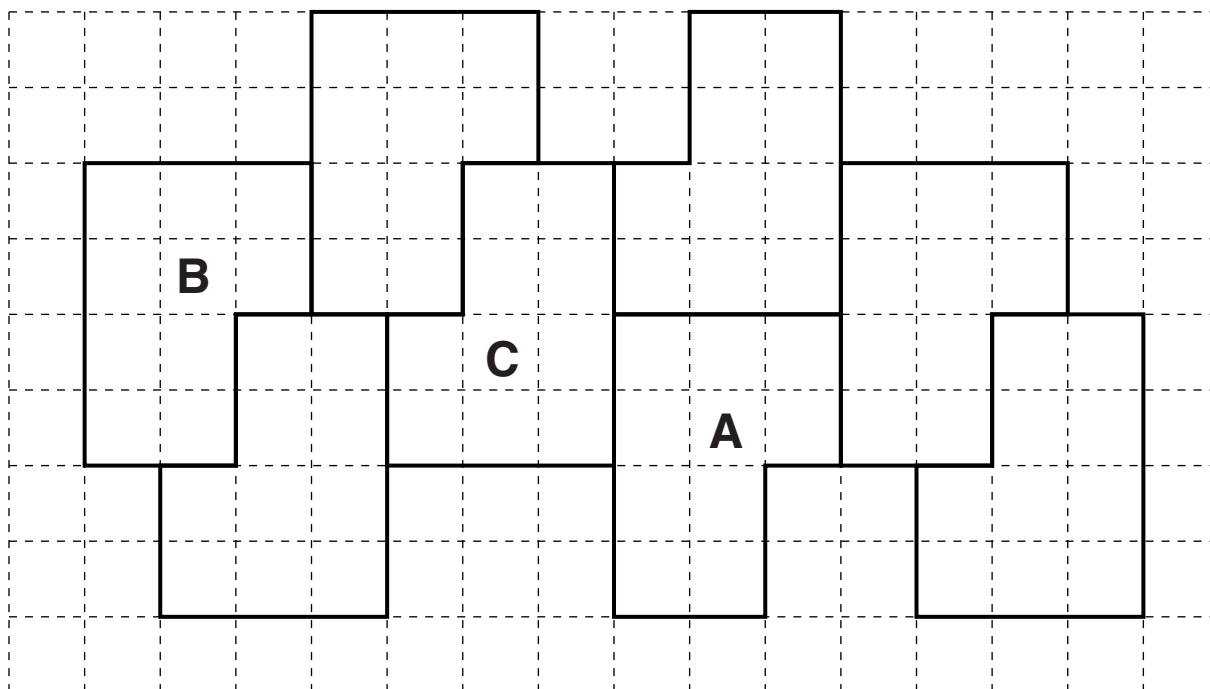
- (i) Write an expression for the total number of people in the coaches.**

**(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]

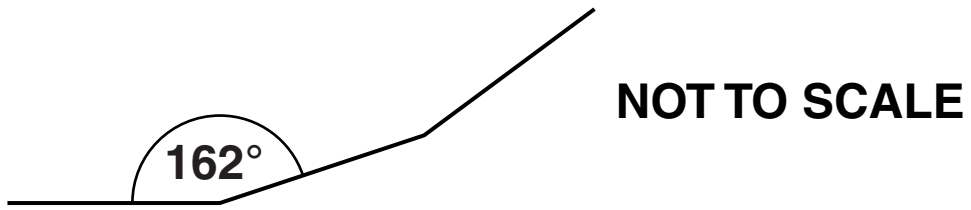
**(c) Describe a single transformation that would DECREASE the AREA of shape A.**

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**[2]**

5 This diagram shows part of a regular polygon.



How many sides does this polygon have?

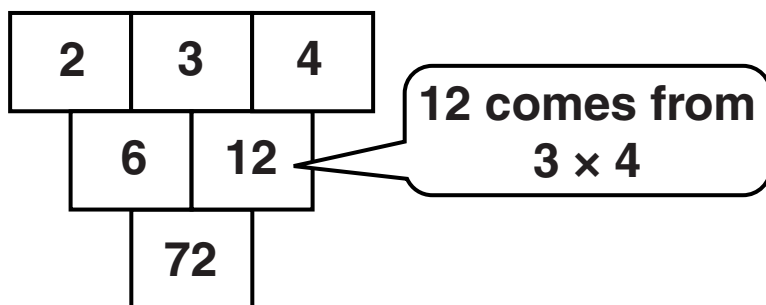
\_\_\_\_\_ [3]

**6 Mark has a voucher that gives him 22% off the prices at CORDULA'S HARDWARE STORE.**

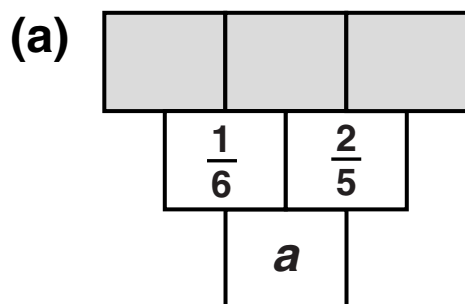
**ESTIMATE how much he will pay for an electric drill that normally costs £87.99.**

£ \_\_\_\_\_ [3]

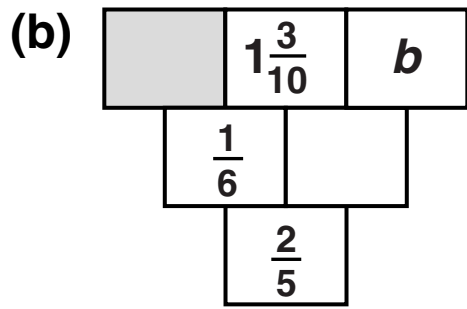
- 7 In these diagrams, the number in a box is worked out by multiplying together the two numbers immediately above it.  
For example:



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



(a) \_\_\_\_\_ [2]



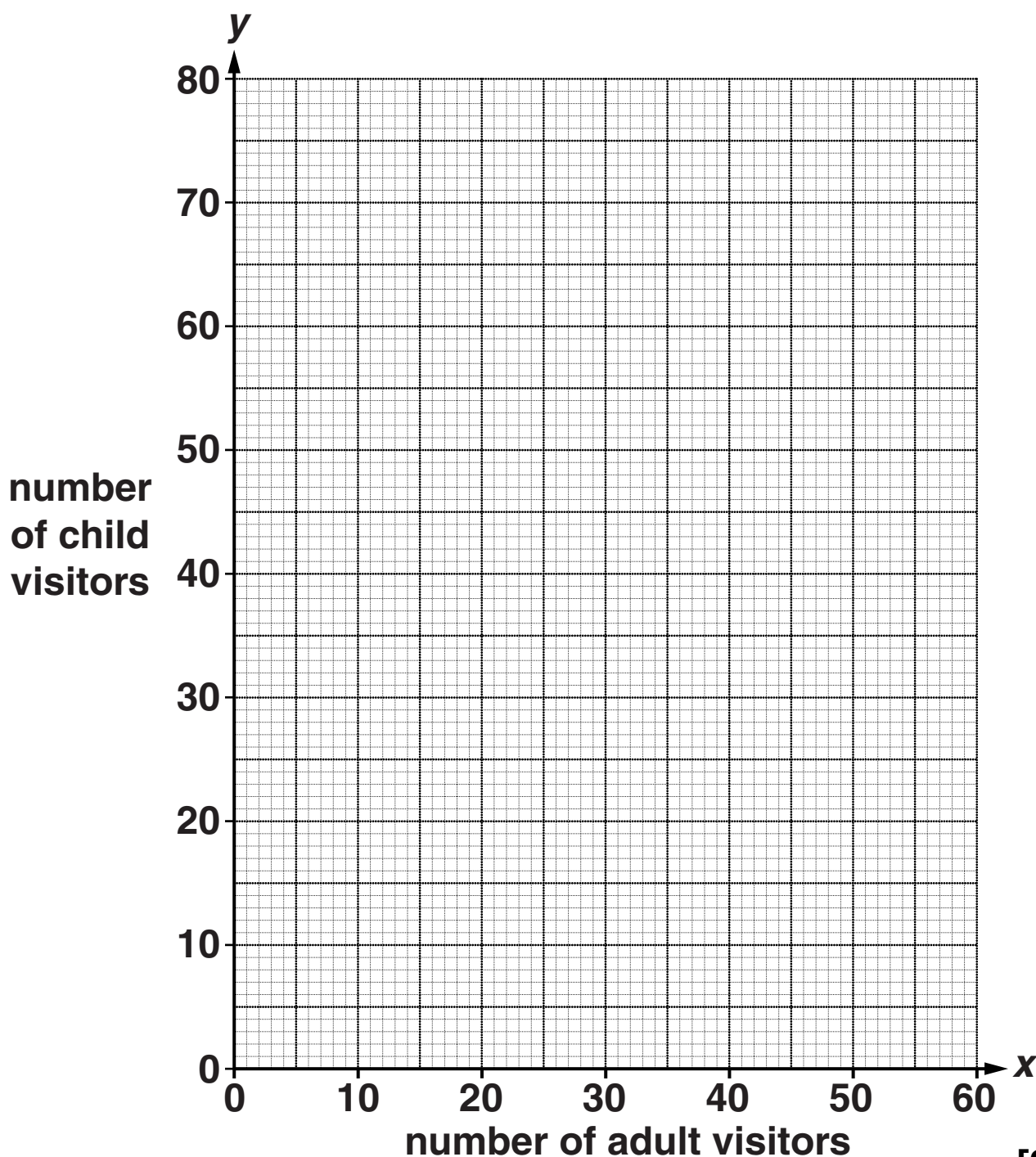
(b) \_\_\_\_\_ [4]

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

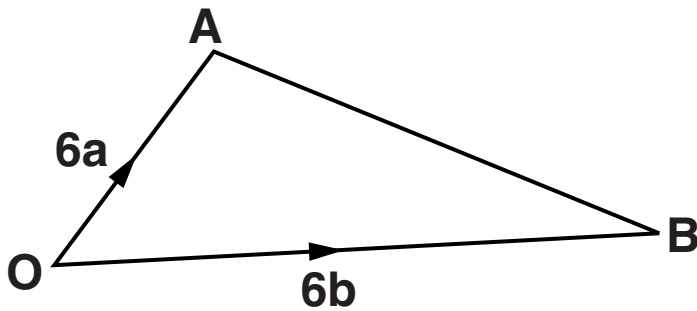
**(a) \_\_\_\_\_ [3]**

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

**(b) \_\_\_\_\_ [1]**

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- 10 In triangle  $OAB$ ,  $\vec{OA} = 6a$  and  $\vec{OB} = 6b$ .  
 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  $\vec{AB}$ .

(a) \_\_\_\_\_ [1]

- (b) Find  $\vec{ON}$ .

(b) \_\_\_\_\_ [2]

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

- (c) (i) Find  $\vec{AM}$ .

(c)(i) \_\_\_\_\_ [1]

















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

(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.

				24
				3
				9
				13
-2	13	24	14	

Use algebra to find the values represented by  and .

□ = \_\_\_\_\_

⬡ = \_\_\_\_\_ [5]

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