

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**A502/02**

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

**WEDNESDAY 6 NOVEMBER 2013: Morning**

**DURATION: 1 hour  
plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Geometrical instruments  
Tracing paper (optional)**

<p><b>WARNING</b> <b>No calculator can be used for this paper</b></p>
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**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

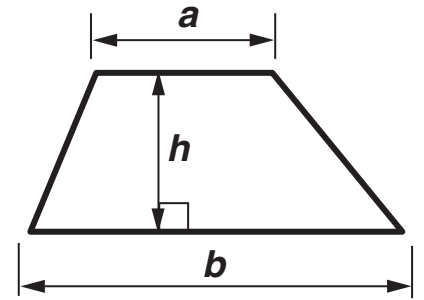
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you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

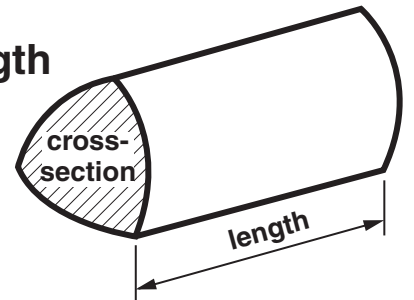
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **Your quality of written communication is assessed in questions marked with an asterisk (\*).**
- **The total number of marks for this paper is 60.**

# FORMULAE SHEET: HIGHER TIER

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



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

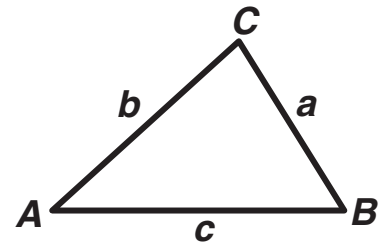


In any triangle *ABC*

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

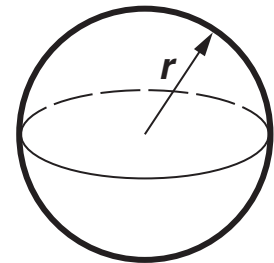
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



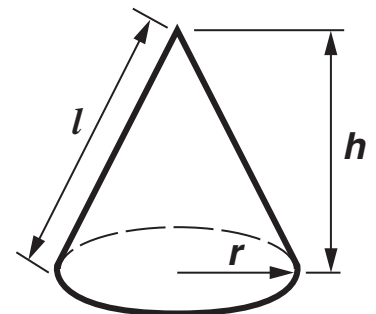
Volume of sphere =  $\frac{4}{3} \pi r^3$

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

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

**Answer ALL the questions.**

- 1 Sukrit and Anna are playing a game called ‘Make 100’.  
Sukrit says a 2-digit number.  
Anna says the number that has to be added to this to  
make 100.**

**For example, if Sukrit says 60, Anna says 40  
as  $60 + 40 = 100$ .**

- (a) Complete these two games.**

**Sukrit says 36, Anna says \_\_\_\_\_**

**Sukrit says 81, Anna says \_\_\_\_\_**

**[1]**

- (b) They play the game 12 times.**

**What should be the total of ALL their numbers?**

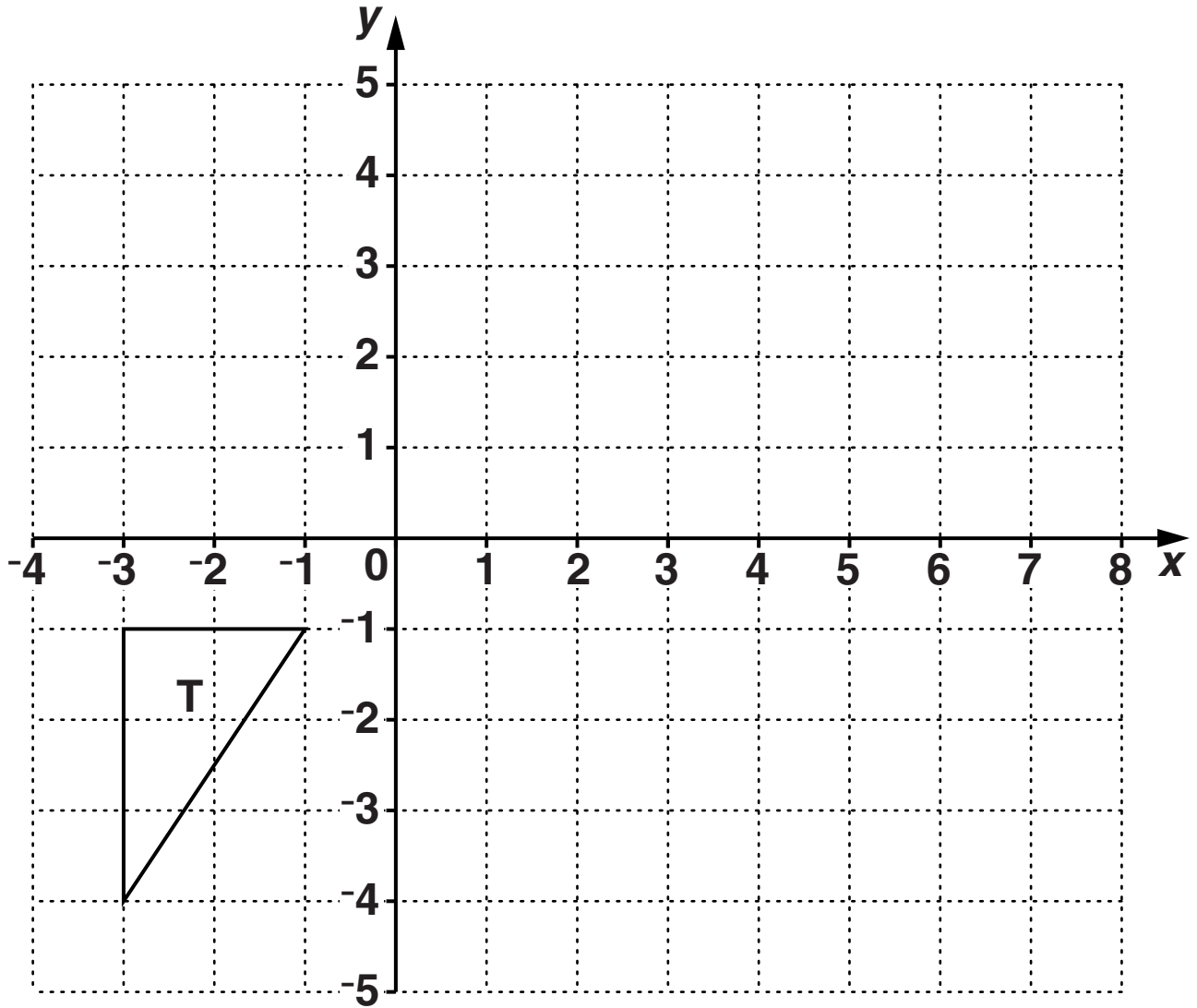
**(b) \_\_\_\_\_ [1]**

**(c) In another game of 'Make 100', their two numbers have a DIFFERENCE of 50.**

**What are their two numbers?**

**(c) \_\_\_\_\_ and \_\_\_\_\_ [1]**

2 The diagram below shows triangle T on a grid.



(a) Reflect triangle T in the line  $y = -1$ .  
Label the image A. [2]

(b) Rotate triangle T  $180^\circ$  about the point  $(0, 0)$ .  
Label the image B. [2]

**(c) Triangle T is transformed by four translations given by the following vectors.**

$$\begin{pmatrix} 15 \\ -6 \end{pmatrix} \text{ then } \begin{pmatrix} 22 \\ 9 \end{pmatrix} \text{ then } \begin{pmatrix} -15 \\ 6 \end{pmatrix} \text{ then } \begin{pmatrix} -17 \\ -9 \end{pmatrix}$$

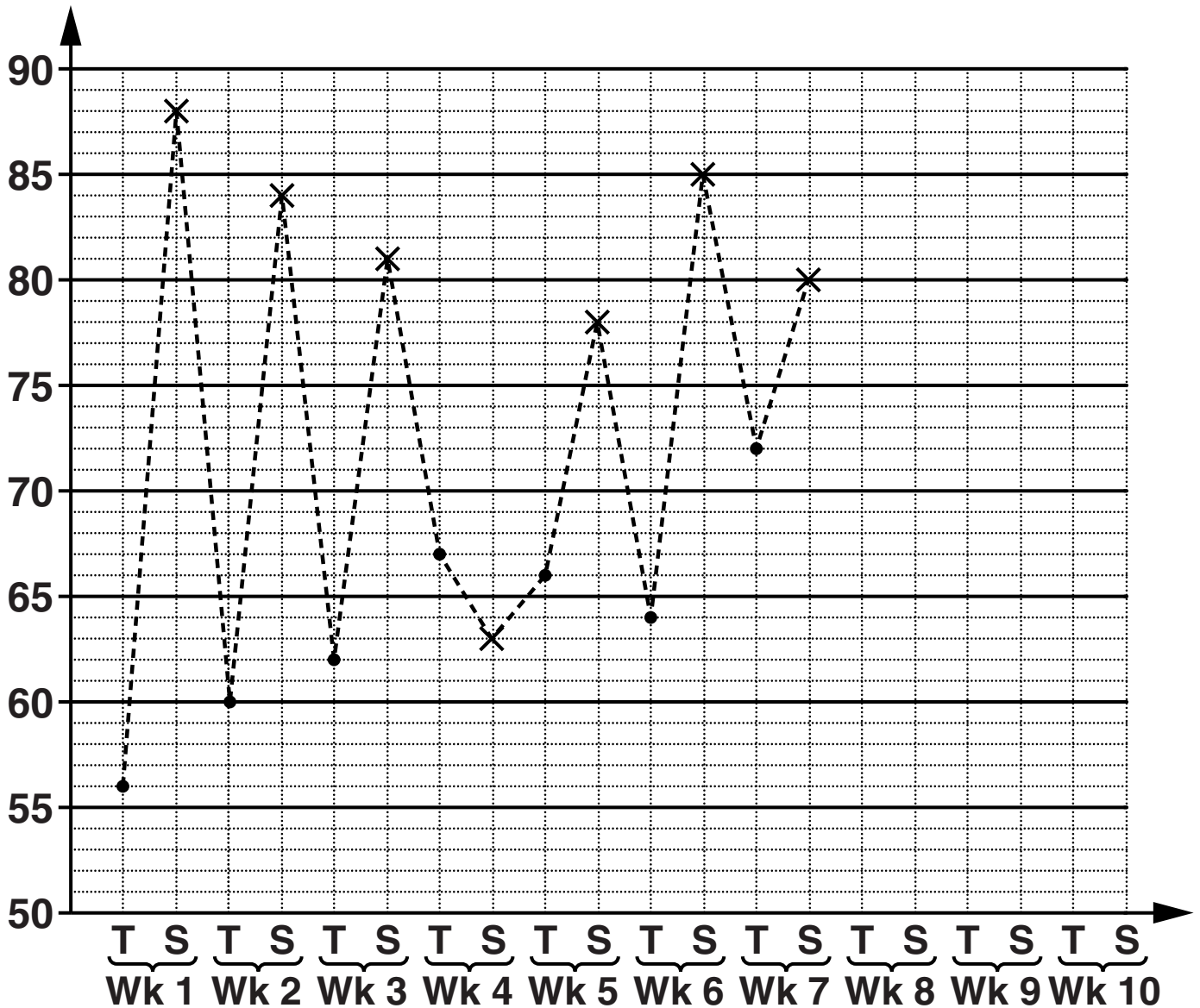
**Draw the image of triangle T after these four translations.**

**Label the image C. [3]**

**3 Robin sells ice creams at a market on Thursdays and Saturdays.  
He records how many ice creams he sells on each of these days for 10 weeks.  
His results are shown in the following table.**

<b>Week (Wk)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Thursday (T)</b>	56	60	62	67	66	64	72	74	77	78
<b>Saturday (S)</b>	88	84	81	63	78	85	80	84	86	83

**Number of ice  
creams sold**





**(a) Complete the time series graph.**  
**The first 7 weeks have been done for you. [2]**

**(b) Look at the time series graph.**

**Make two comments about Robin's data.**

**(1)** \_\_\_\_\_

\_\_\_\_\_

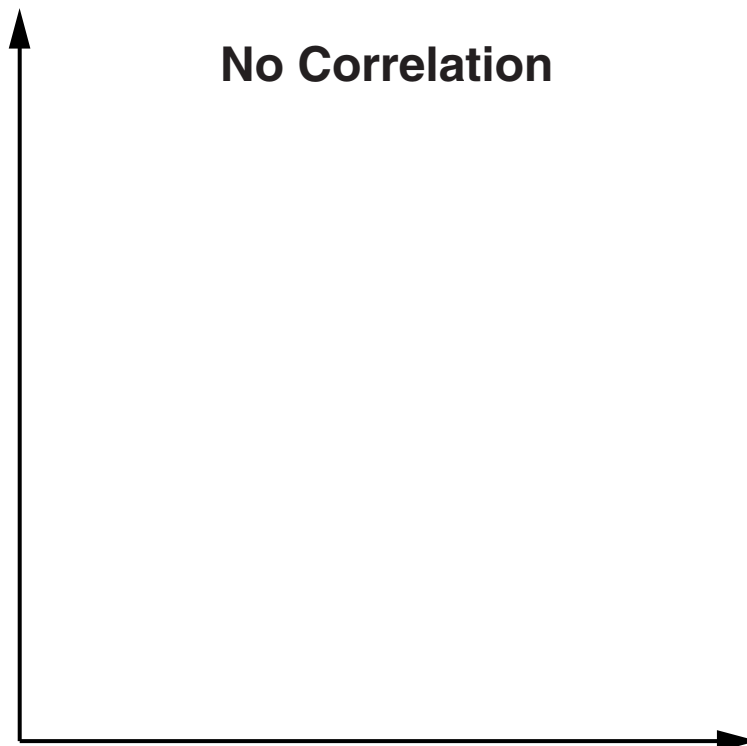
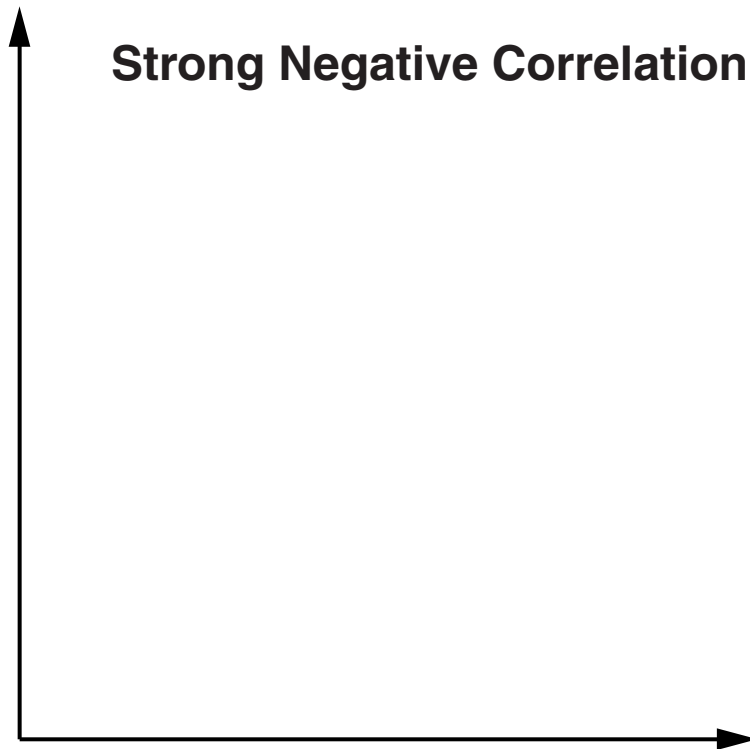
**(2)** \_\_\_\_\_

\_\_\_\_\_ **[2]**

- 4 Decide whether each of the following is an equation, a formula, an identity or an expression. For each one, put a tick (✓) in the correct column. [4]

	Equation	Identity	Formula	Expression
$V = \frac{1}{3}\pi r^2 h$				
$3n + 5 + 5n - 7 \equiv 8n - 2$				
$6n - 4 = 2n$				
$\pi r^2$				
$7t^2 - t + 11$				

- 5 Draw at least 10 crosses ( $\times$ ) on each of the following grids to produce scatter graphs that show the following. [3]

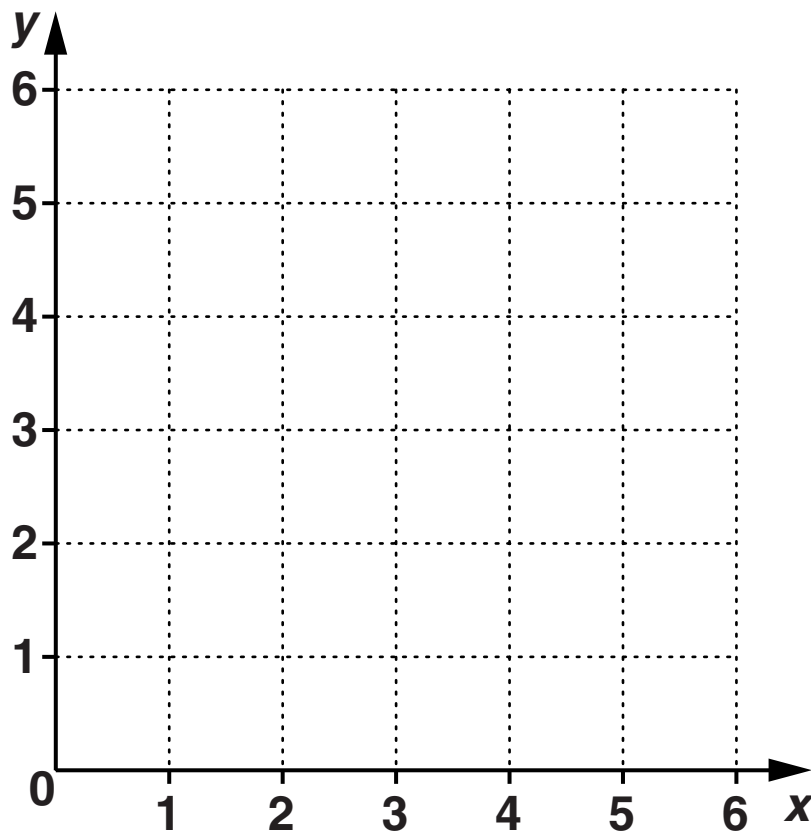


- 6 (a) Complete the following table for  $2x + 3y = 12$  by filling in the three missing numbers. [2]

<b><i>x</i></b>	<b>0</b>	<b>4.5</b>	
<b><i>y</i></b>			<b>0</b>

- (b) On the following grid draw the graph of  $2x + 3y = 12$  for  $0 \leq x \leq 6$ .

[2]



**(c) Use your graph to find the gradient of the line  $2x + 3y = 12$ .**

**(c) \_\_\_\_\_ [2]**

- 7 A nail is made from a volume of  $5.8 \text{ cm}^3$  of iron.  
The density of iron is  $7.9 \text{ g/cm}^3$ .

Use the following formula to find the mass of the nail.

$$\text{mass} = \text{density} \times \text{volume}$$

\_\_\_\_\_ g [4]

8 (a) (i) Solve the following inequality.

$$2m + 6 > -4$$

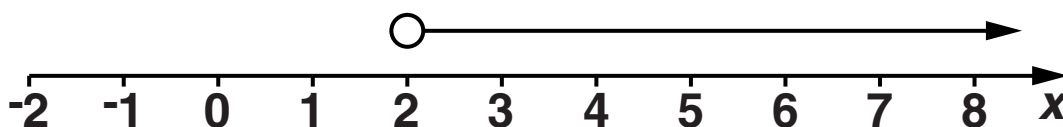
(a)(i) \_\_\_\_\_ [2]

(ii) Represent your answer to part (a)(i) on the following number line.



[1]

(b) The following diagram represents the solution of another inequality.



What is the smallest integer that  $x$  can be?

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

- 9 (a) The mass of the Earth is approximately  $10^{21}$  tonnes.  
There are 1000 kilograms in one tonne.

What is the mass of the Earth in kilograms?  
Give your answer using indices.

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

- (b) The mass of the planet Mercury is  $10^{23}$  kg.  
The mass of the planet Jupiter is  $10^{27}$  kg.

Complete the sentence below.

The mass of Jupiter is \_\_\_\_\_  
times the mass of Mercury. [2]



**(c) Work out  $100^{-\frac{1}{2}}$ .**

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

**10 Work out.**

$$1\frac{2}{3} \div 1\frac{3}{4}$$

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

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**11 Chanre sews edging onto curtains and blinds.  
She is paid £ $C$  for each pair of curtains and £ $B$  for  
each set of blinds.**

**On Monday she completes 10 pairs of curtains and  
2 sets of blinds.**

**She is paid £35 for this.**

**This gives the equation  $10C + 2B = 35$ .**

**(a) On Tuesday she completes 5 pairs of curtains and  
6 sets of blinds.**

**She is paid £30 for this.**

**Write an equation to show this information.**

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

**(b) Solve the two simultaneous equations algebraically to find the amount she is paid for each pair of curtains and each set of blinds.**

**(b) Curtains £ \_\_\_\_\_**

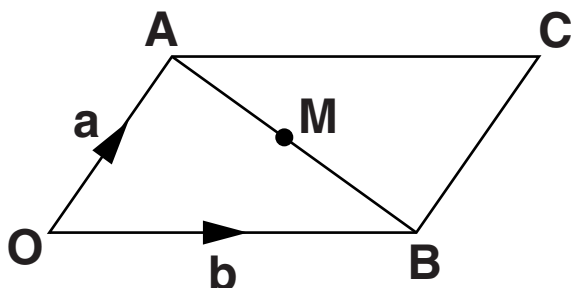
**Blinds £ \_\_\_\_\_ [3]**

12 OACB is a parallelogram.

$\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .

M is the midpoint of AB.

This is shown on the following diagram.



NOT TO SCALE

(a) Find, in terms of  $\mathbf{a}$  and  $\mathbf{b}$ , these vectors.

(i)  $\vec{OC}$

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

(ii)  $\vec{AB}$

(ii) \_\_\_\_\_ [1]

(iii)  $\vec{OM}$

(iii) \_\_\_\_\_ [2]

**(b) Use your answers to write TWO conclusions about points O, M and C.**

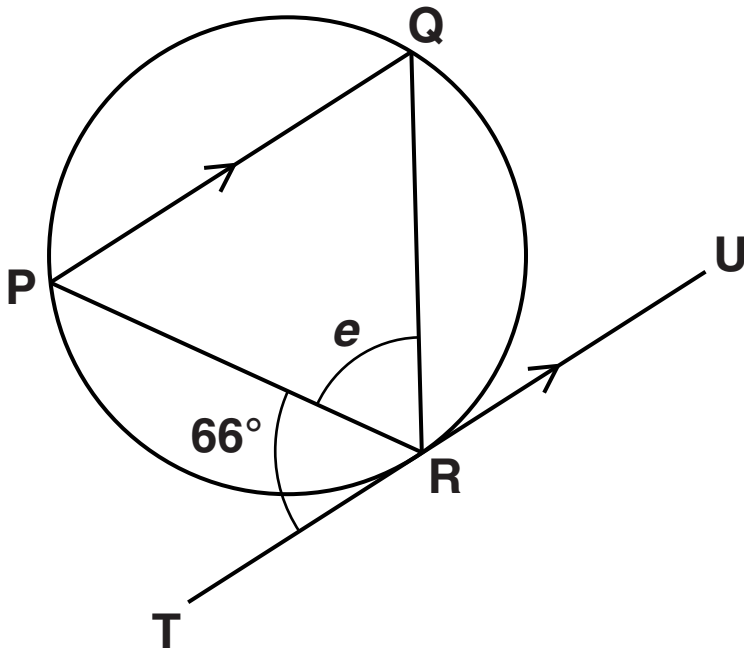
(1) \_\_\_\_\_

\_\_\_\_\_

(2) \_\_\_\_\_

\_\_\_\_\_ [2]

13\* Chord PQ is parallel to tangent TRU.  
This is shown on the following diagram.



NOT TO SCALE

Calculate the size of angle  $e$ .  
Give a geometrical reason for each stage of your working. [5]



**END OF QUESTION PAPER**

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