

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**J567/03**

**MATHEMATICS B**

**Paper 3 (Higher Tier)**

**THURSDAY 28 FEBRUARY 2013:**

**Afternoon**

**DURATION: 1 hour 45 minutes  
plus your additional time allowance  
MODIFIED ENLARGED 24pt**

<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)**

**WARNING**

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

**READ INSTRUCTIONS OVERLEAF**

This paper has been pre modified for carrier language

## **INSTRUCTIONS TO CANDIDATES**

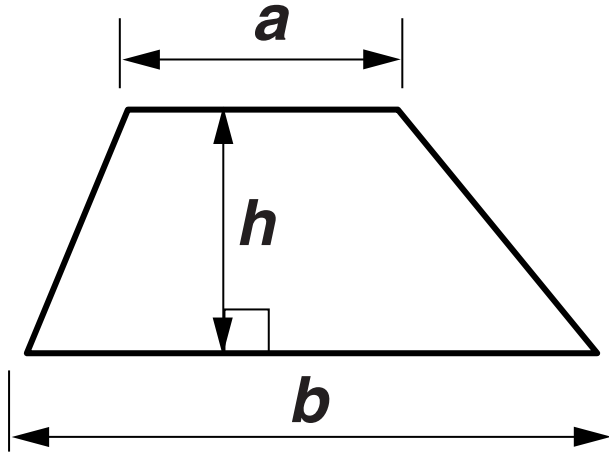
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you 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 100.**

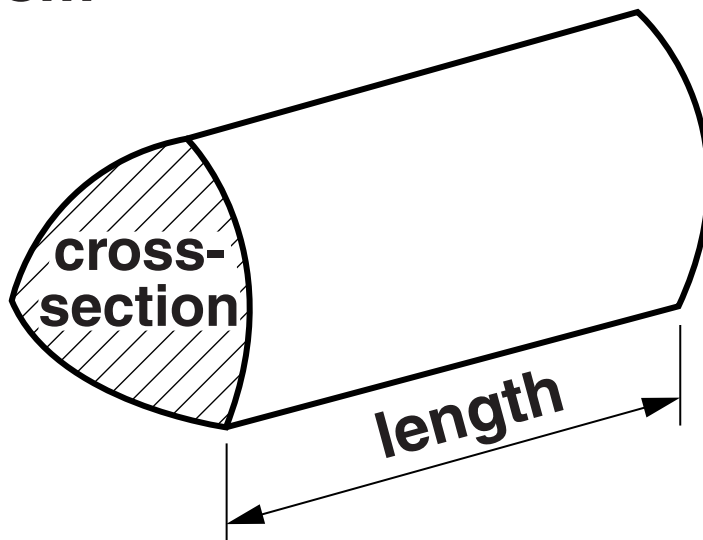
# FORMULAE SHEET: HIGHER TIER

## Trapezium



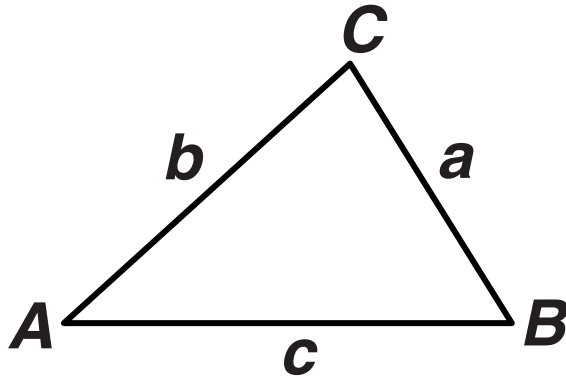
$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$

## Prism



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

In any triangle  $ABC$

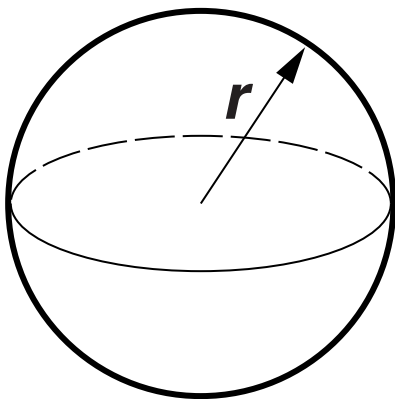


Sine rule  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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

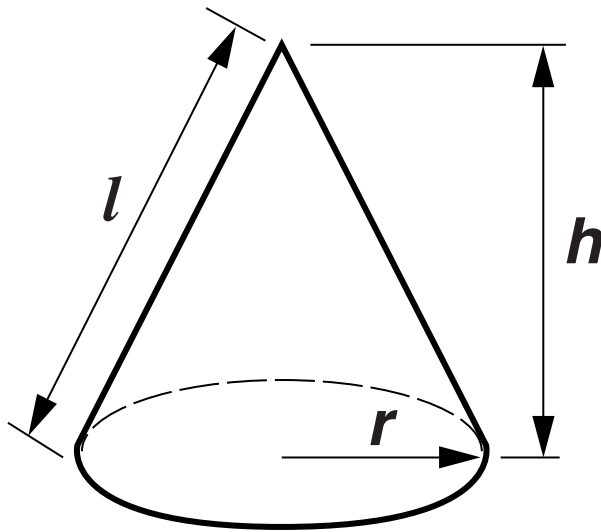
Sphere



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

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

## Cone



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

$$\text{Curved surface area of cone} = \pi r l$$

## The Quadratic Equation

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

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

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- 1 One day 300 people visit a museum.  
The ratio of adults to children is 2 : 3.**

**(a) Work out the number of adults and  
the number of children.**

**(a) Adults \_\_\_\_\_ Children \_\_\_\_\_ [2]**

**(b) The following two-way table  
summarises some information  
about the visitors to the museum.**

**(i) Complete the table.**

	<b>Adults</b>	<b>Children</b>	<b>Total</b>
<b>Male</b>			<b>132</b>
<b>Female</b>		<b>100</b>	
<b>Total</b>			<b>300</b>

**[1]**



**(ii) One of the adults is chosen at random.**

**Find the probability that the adult is a male.**

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

**(iii) Find the ratio of male to female visitors.**

**Write the ratio in its simplest form.**

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

**2 FRESH CLEAN and CLEANUP are two home cleaning companies.**

**(a) FRESH CLEAN charges £3.50 for each room they clean and an extra £15 call out charge.**

**Write down a formula for the total charge, £ $F$ , for cleaning a house with  $n$  rooms.**

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

**(b) CLEANUP uses the formula below to work out the total charge to clean a house.**

$$C = 25h + 10$$

**$C$  is the total charge in £ for a clean taking  $h$  hours.**

**Pete's house has 8 rooms and will take  $1\frac{1}{2}$  hours to clean.**

**Which of the two cleaning companies, FRESH CLEAN or CLEANUP, will be cheaper and by how much?**

**(b) \_\_\_\_\_ by £ \_\_\_\_\_ [3]**

**3 (a) Multiply out.**

$$a(3 + a)$$

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

**(b) Factorise.**

$$4b - 12$$

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

**(c) Rearrange this formula to make  $p$  the subject.**

$$T = 4p + 5$$

**(c)  $p =$  \_\_\_\_\_ [2]**

**(d) Solve this inequality.**

$$3x - 6 < x + 4$$

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

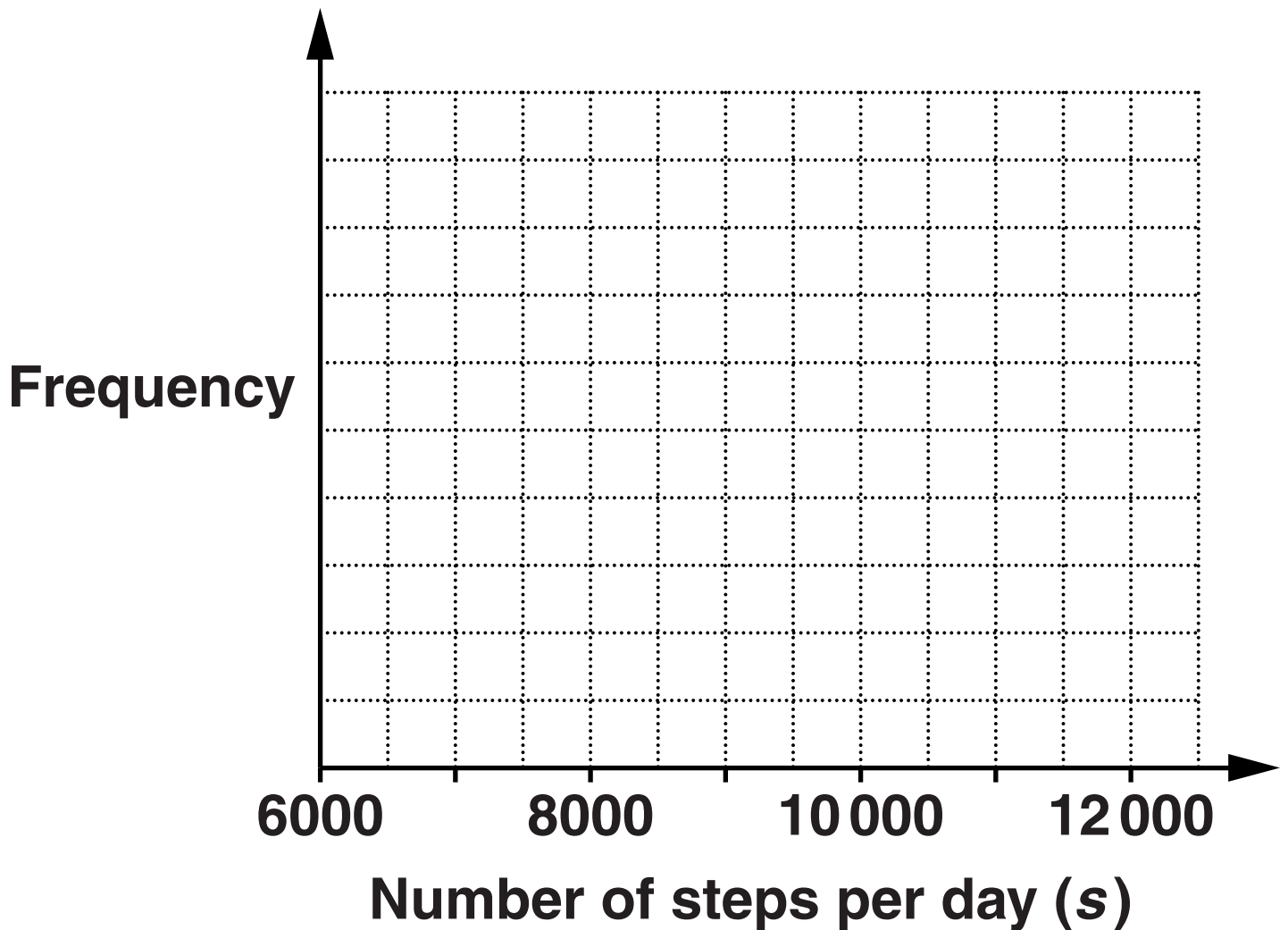
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- 4 Sofia uses a pedometer to record the number of steps she takes each day for one month.  
Her results are summarised in the table below.**

<b>Steps per day (<math>s</math>)</b>	<b>Frequency</b>
<b><math>6000 \leq s &lt; 7000</math></b>	<b>3</b>
<b><math>7000 \leq s &lt; 8000</math></b>	<b>4</b>
<b><math>8000 \leq s &lt; 9000</math></b>	<b>6</b>
<b><math>9000 \leq s &lt; 10\,000</math></b>	<b>8</b>
<b><math>10\,000 \leq s &lt; 11\,000</math></b>	<b>7</b>
<b><math>11\,000 \leq s &lt; 12\,000</math></b>	<b>2</b>



**(a) On the following grid, draw a frequency polygon to display this information.**



**[3]**

**(b) Write down the modal class of the number of steps per day.**

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

- (c) Sofia reads that taking at least 10 000 steps per day is an important part of a healthy lifestyle.**

**For what percentage of the month did she meet this target?**

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

- (d) One day Sofia goes for a walk in the hills.**

**The length of the walk is 7 km, correct to the nearest kilometre.**

**What is the longest possible length of Sofia's walk?**

**(d)\_\_\_\_\_ km [1]**

**5 Kate thinks of a number.  
She multiplies it by 3 and then adds 3.**

**Leo thinks of the same number as Kate.  
He subtracts 5 and then multiplies the  
result by 6.**

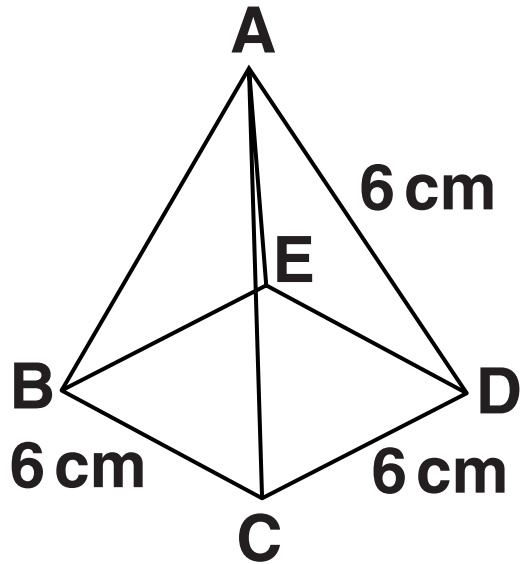
**Kate and Leo both end up with the  
same number.**

**Find the numbers that they start and  
end with.**

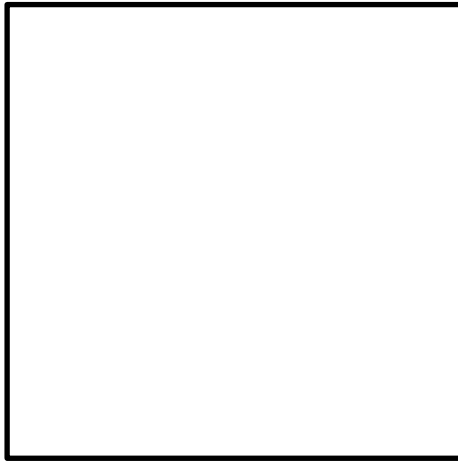
**Start \_\_\_\_\_**

**End \_\_\_\_\_ [4]**

- 6** **ABCDE**, shown below, is a square-based pyramid.  
The length of each edge is 6 cm.



**(a) In the space below, construct a full-size net of the pyramid. The base is drawn for you.**



**[2]**

**(b) Use measurements from your diagram to calculate the total surface area of the pyramid.**

**(b)\_\_\_\_\_ cm<sup>2</sup> [4]**

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- 7 (a) The price of a printer is £64.50 excluding VAT.**

**Calculate the price of the printer including VAT at 20%.**

**(a) £ \_\_\_\_\_ [3]**



**(b) The price of a season ticket is increased by 10% in January 2012 and then by another 10% in January 2013.**

**Calculate the overall percentage increase in the price of the season ticket.**

**(b)\_\_\_\_\_ % [3]**

- 8 (a) Find the size of the exterior angle of a regular 12-sided polygon.**

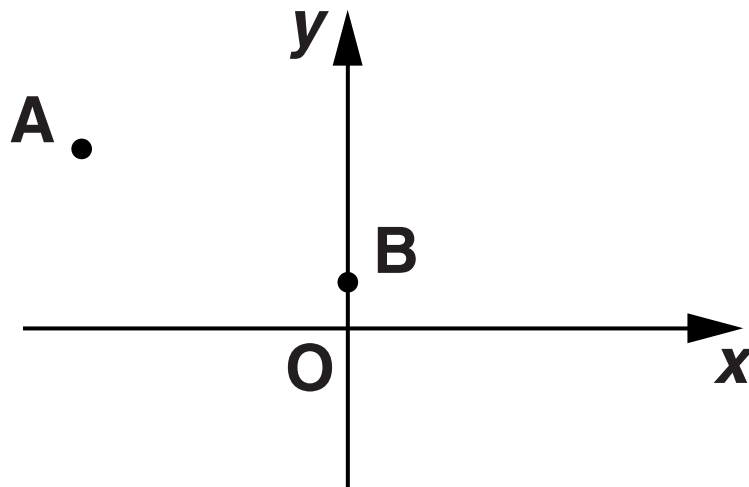
**(a)\_\_\_\_\_° [2]**

- (b) Hence find the size of the interior angle of a regular 12-sided polygon.**

**(b)\_\_\_\_\_° [1]**

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- 9 In the sketch below, A is the point  $(-10, 8)$  and B is the point  $(0, 3)$ .



- (a) Find the coordinates of the midpoint of the line AB.

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

**(b) Find the equation of the line AB.**

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

**10 (a) Work out.**

$$2\frac{2}{5} \div 2\frac{1}{4}$$

**Give your answer as a mixed number in its simplest form.**

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

**(b) Write down the reciprocal of 5.**

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

**(c) Write as a single power of 5.**

$$5^6 \div 5^{-3}$$

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

**11 The box plots opposite represent data for the salaries of the employees working in two companies.**

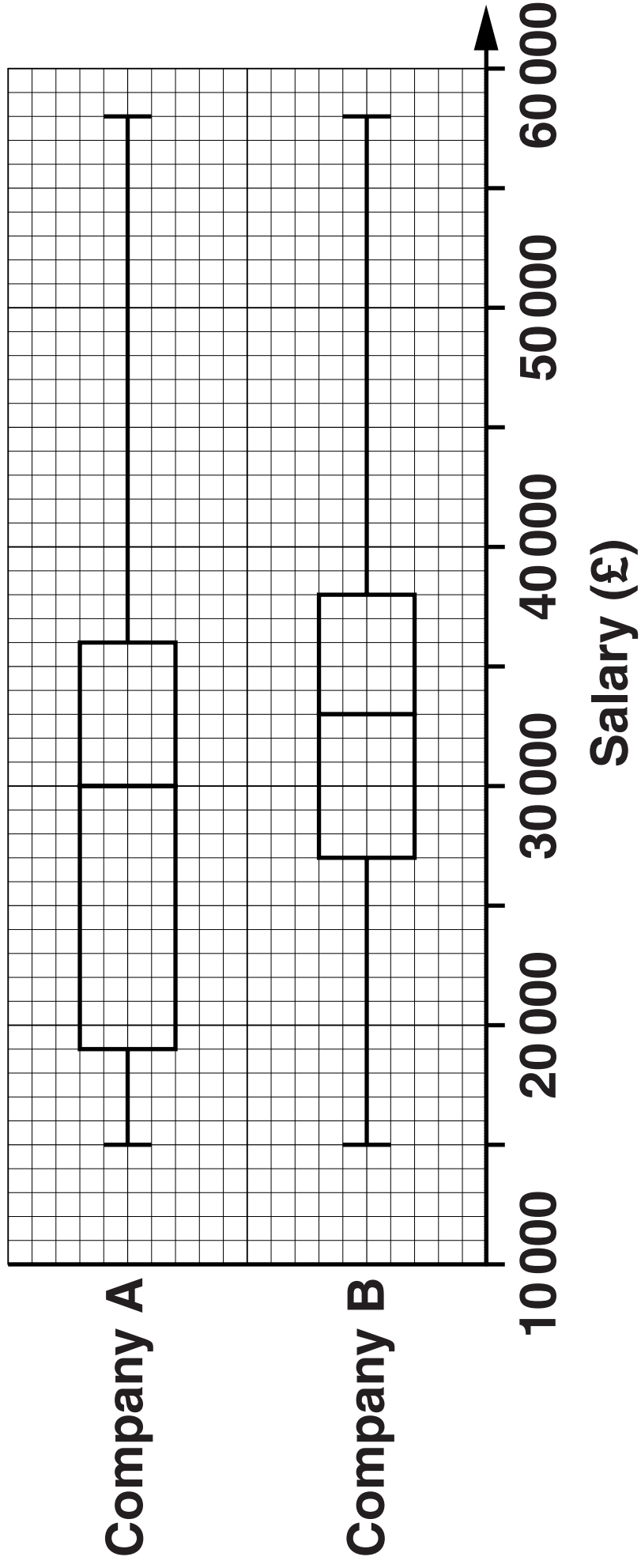
**(a) Find the median for company A.**

**(a) £\_\_\_\_\_ [1]**

**(b) Find the interquartile range for company B.**

**(b) £\_\_\_\_\_ [2]**





**(c) Make two different comparisons between the salaries in the two companies.**

**1** \_\_\_\_\_  
\_\_\_\_\_

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

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**12 State which calculation, in each of the following pairs, has an incorrect answer. Explain how you can tell without giving the correct answer.**

**(a)    A     $300 \times 4000 = 12\ 000$**

**B     $0.003 \times 0.04 = 0.00012$**

**Calculation \_\_\_\_\_ has an  
incorrect answer because \_\_\_\_\_**

\_\_\_\_\_ **[1]**

**(b)    C     $6497 \times 1.08 = 7016.76$**

**D     $5684 \div 0.96 = 5456.64$**

**Calculation \_\_\_\_\_ has an  
incorrect answer because \_\_\_\_\_**

\_\_\_\_\_ **[1]**

**(c)**

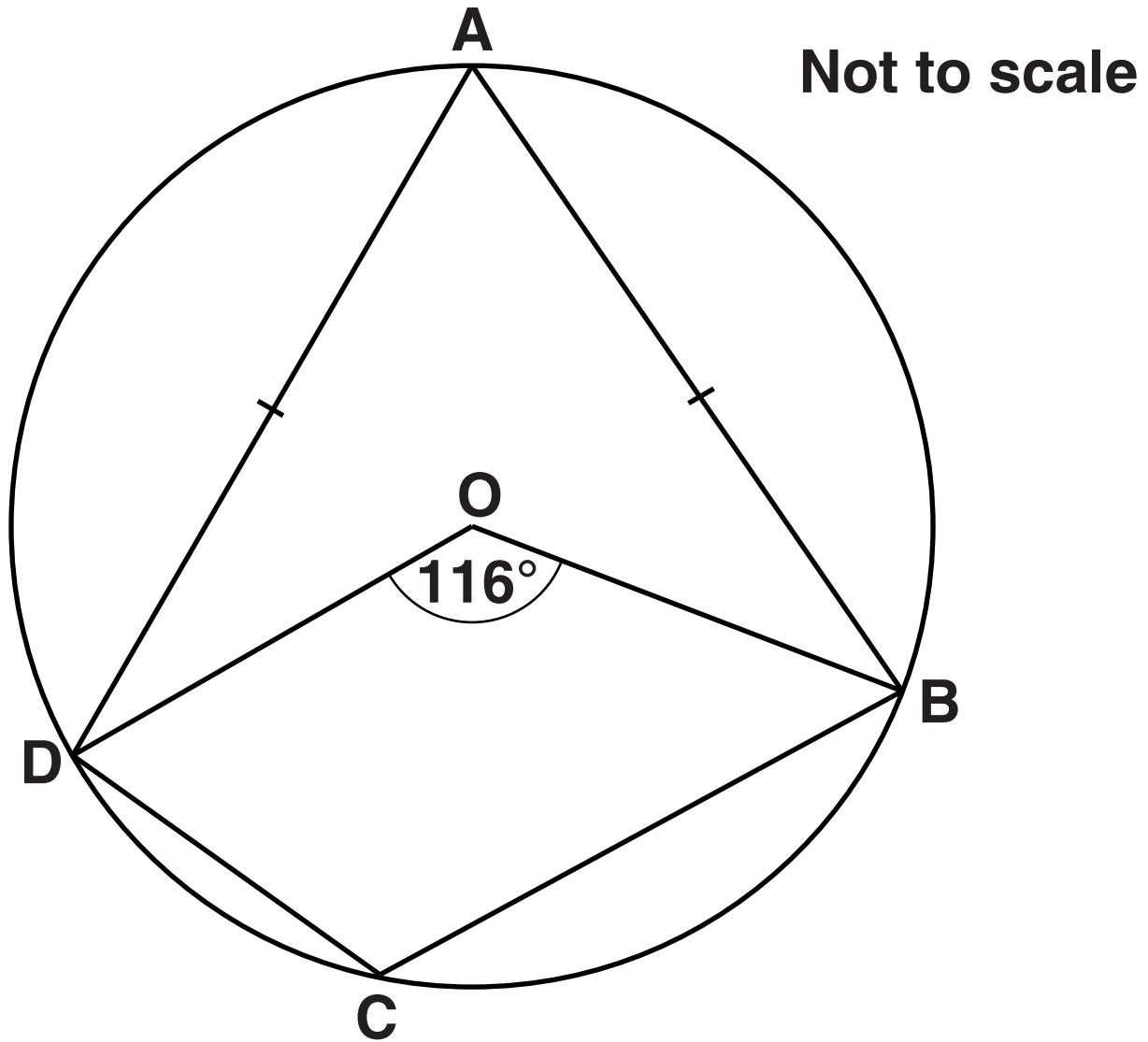
<b>E</b> $5.8 \times 10^{-3} \times 1.2 \times 10^{-2} = 6.96 \times 10^{-5}$
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<b>F</b> $4.6 \times 10^8 \div 3.7 \times 10^2 = 1.24 \times 10^4$
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**Calculation \_\_\_\_\_ has an  
incorrect answer because \_\_\_\_\_**

\_\_\_\_\_  
\_\_\_\_\_ **[1]**

- 13** In the diagram below, A, B, C and D are points on the circle centre O.  
AB = AD and angle BOD =  $116^\circ$ .



## Calculate

**(a) angle BAD,**

**(a)** \_\_\_\_\_° **[1]**

**(b) angle BCD,**

**(b)** \_\_\_\_\_° **[1]**

**(c) angle ABO.**

**(c)** \_\_\_\_\_° **[2]**

**14 (a) Solve algebraically these simultaneous equations.**

$$6x + 2y = 5$$

$$4x - 5y = 16$$

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

**$y =$  \_\_\_\_\_ **[4]****



**(b) Factorise and solve.**

$$6x^2 + 11x - 10 = 0$$

**(b)  $x =$  \_\_\_\_\_ and  $x =$  \_\_\_\_\_ [3]**

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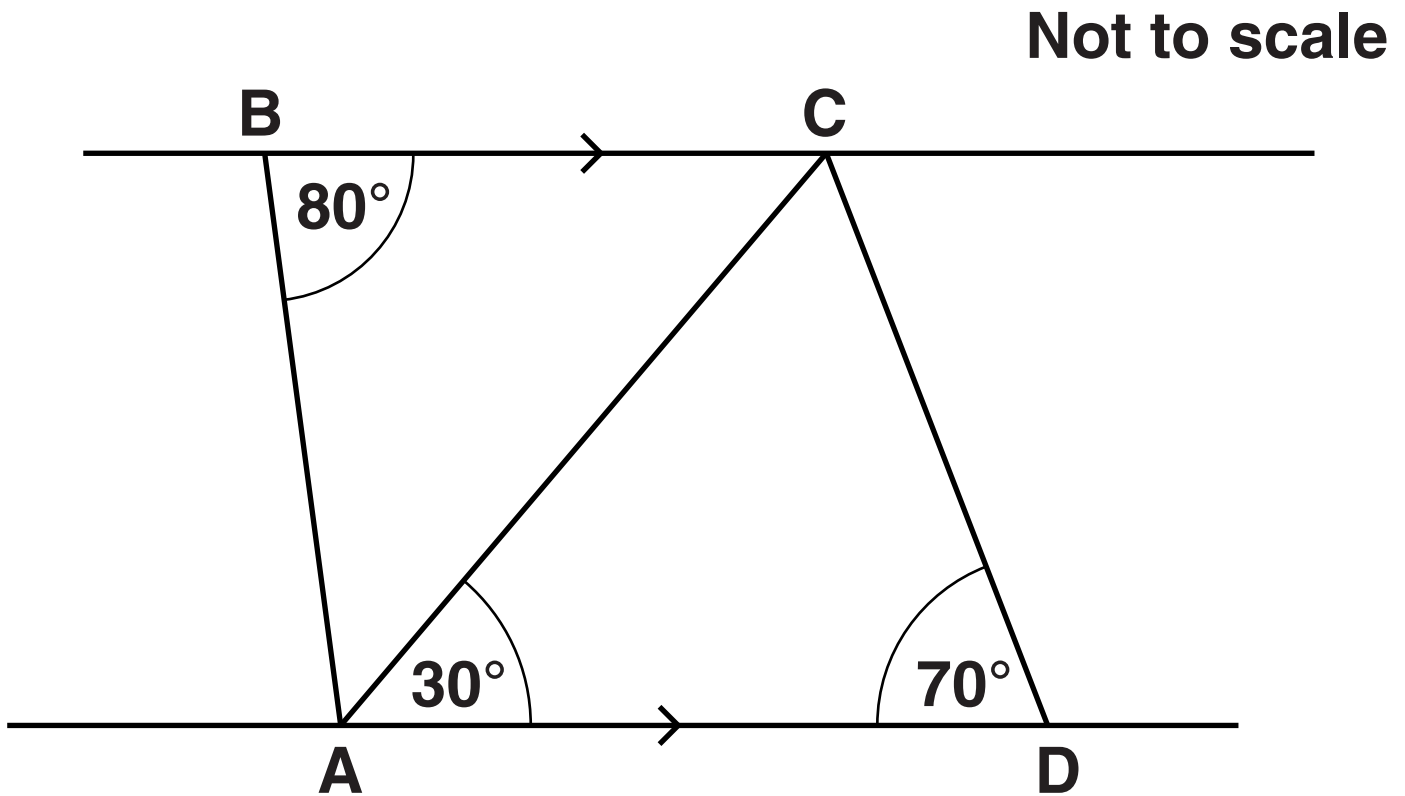
**15 (a) A photo is 12 cm wide by 10 cm high.  
An enlargement of the photo is  
15 cm wide.**

**Calculate the height of the  
enlargement.**

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

**(b) In the diagram below, AD is parallel to BC.**

**Angle  $ABC = 80^\circ$ , angle  $CAD = 30^\circ$   
and angle  $ADC = 70^\circ$ .**



**Show that triangles  $ABC$  and  $DCA$  are similar.**

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**[3]**

**16 Vector  $p = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$  and vector  $q = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$ .**

**Calculate.**

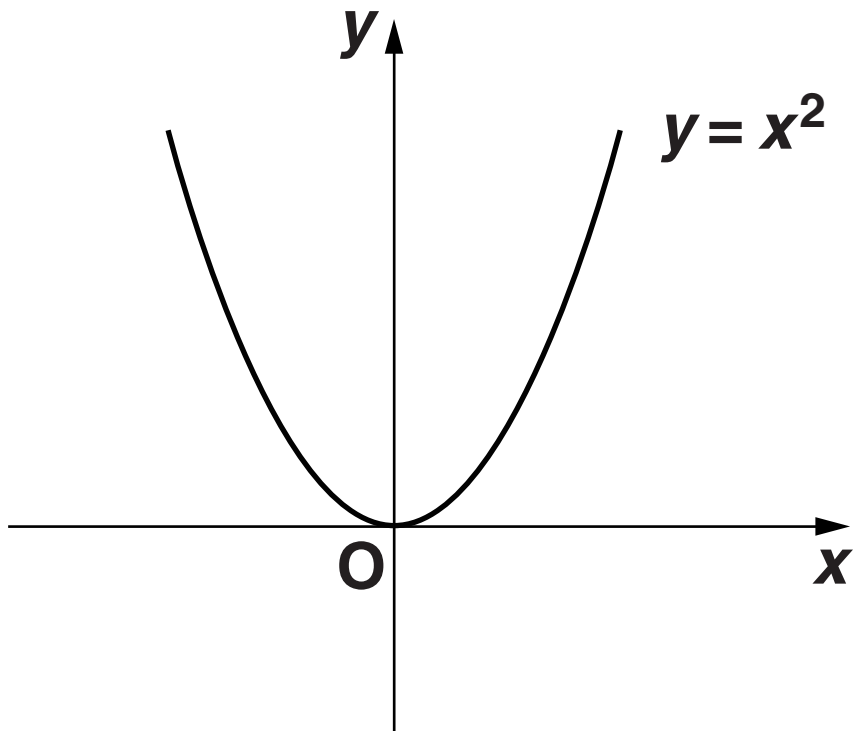
**(a)  $p + q$**

**(a)  $\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [1]**

**(b)  $3p - q$**

**(b)  $\begin{pmatrix} \phantom{0} \\ \phantom{0} \end{pmatrix}$  [2]**

- 17 The following sketch shows the graph of  $y = x^2$ .**



- (a) On the same axes, sketch the graph of  $y = 2x^2$ . [1]**
- (b) Describe the transformation that maps the graph of  $y = x^2$  onto  $y = x^2 - 3$ .**

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**[2]**

**18 Simplify.**

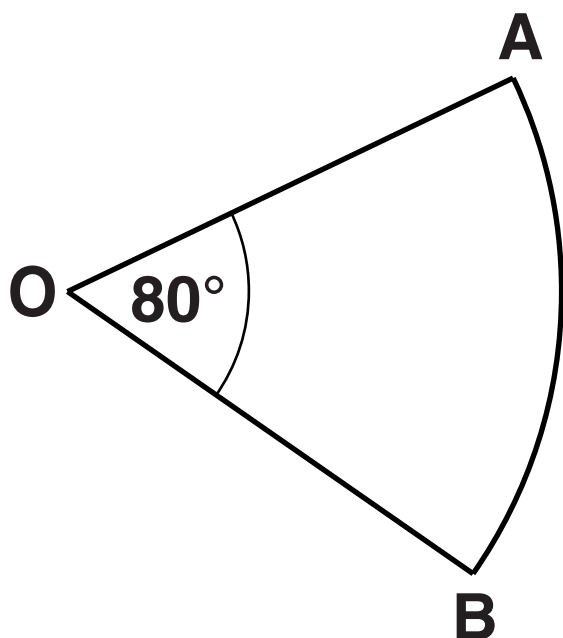
$$\frac{6 + \sqrt{2}}{\sqrt{2}}$$

**Give your answer in the form  $a\sqrt{2} + b$ .**

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



- 19 **OAB is a sector of a circle.  
Angle AOB =  $80^\circ$ . This is shown on the  
following diagram.**

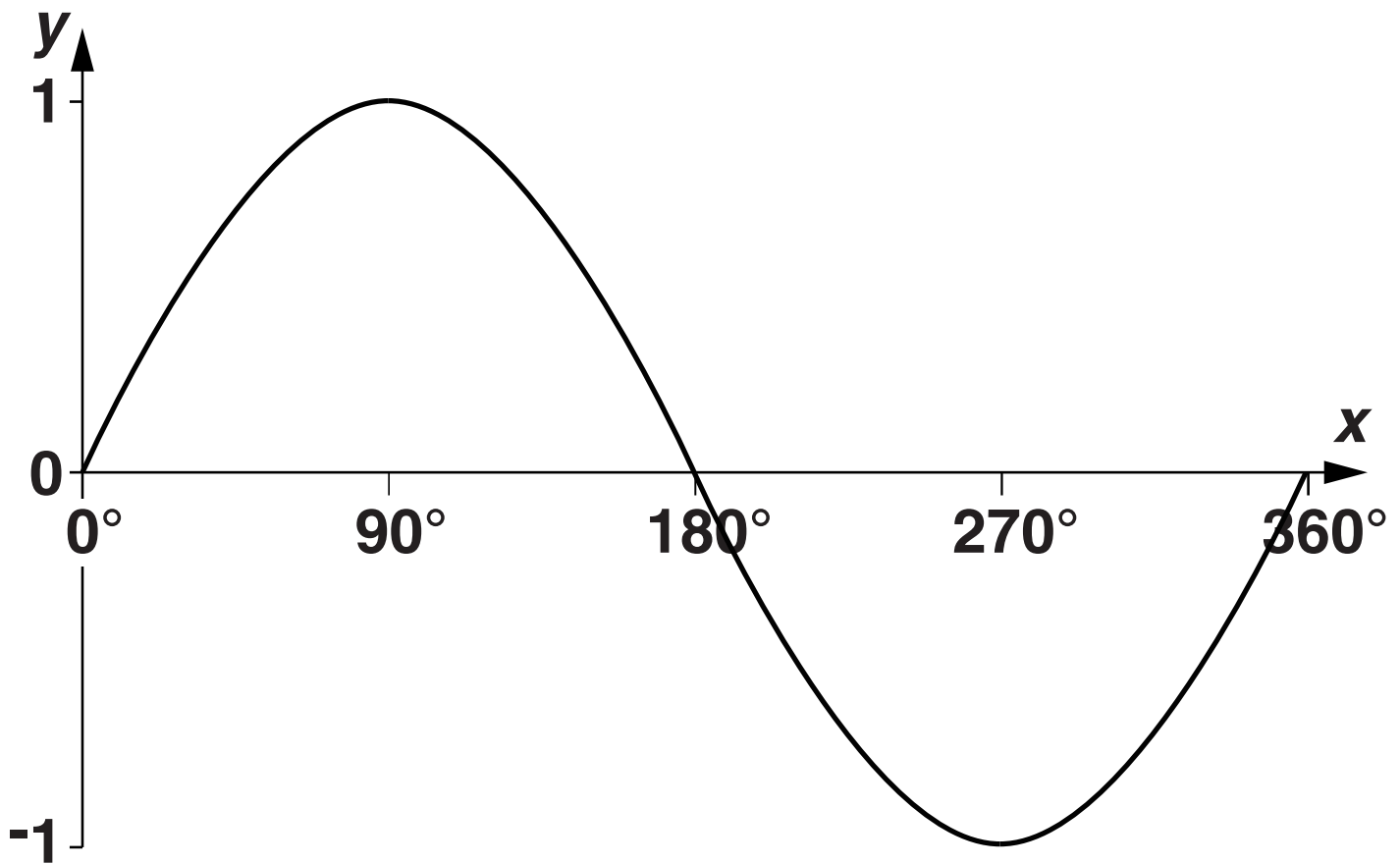


**Not to scale**

**The length of arc AB is  $12\pi$  cm.**

**Find the perimeter of the sector.  
Give your answer in the form  $a + b\pi$ .**

**20** The diagram below shows the graph of  $y = \sin x$  for  $0^\circ \leq x \leq 360^\circ$ .



One solution to the equation  $\sin x = 0.8$  is  $x = 53^\circ$ , correct to the nearest degree.

Find the values of  $x$  which satisfy  $\sin x = -0.8$  in the range  $0^\circ \leq x \leq 360^\circ$ .

$x =$  \_\_\_\_\_ [2]

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**21\* Jamie organises a game to raise money for charity.**

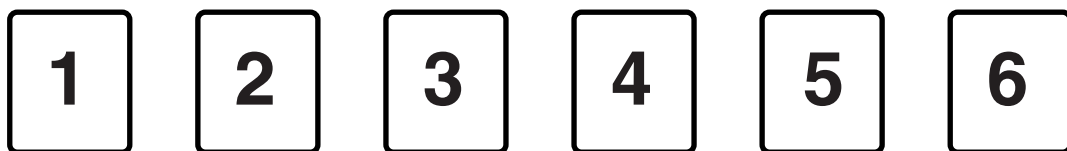
## **Number Generator Game**

**£1 per go**

**Pick 2 cards**

**Win £5 for a number greater than 55**

**He shuffles these six cards and places them face down on a table.**



**Players pick a card at random and place it in the FIRST CARD position on the grid opposite.**

**They then pick a second card at random and place it in the SECOND CARD position on the grid.**

FIRST CARD	SECOND CARD
<input type="text"/>	<input type="text"/>

**Explain why £5 may not be an appropriate prize for this game.**

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**[5]**

**END OF QUESTION PAPER**

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