

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 18pt

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)

WARNING

No calculator can be used for this paper.

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

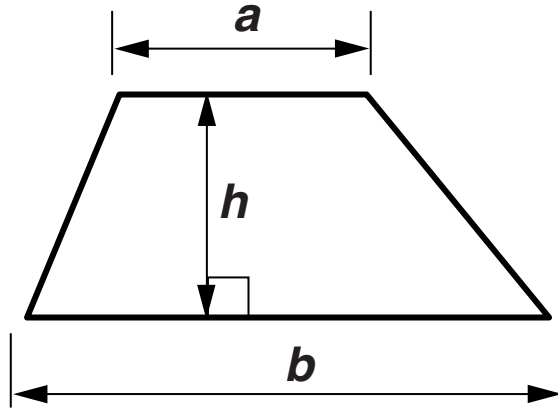
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you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

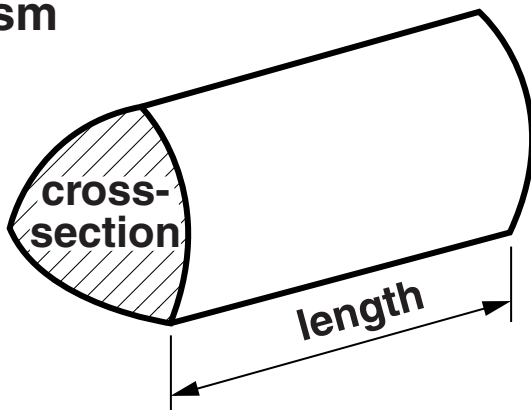
FORMULAE SHEET: HIGHER TIER

Trapezium



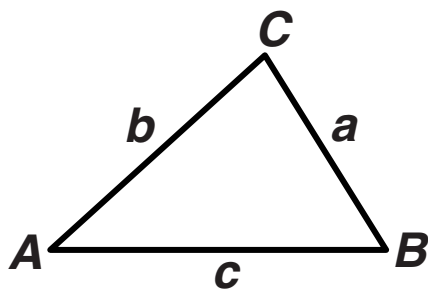
$$\text{Area of trapezium} = \frac{1}{2}(a + b)h$$

Prism



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

In any triangle ABC

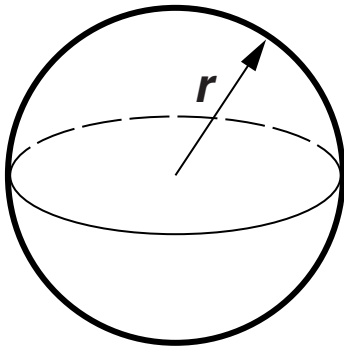


$$\text{Sine rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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

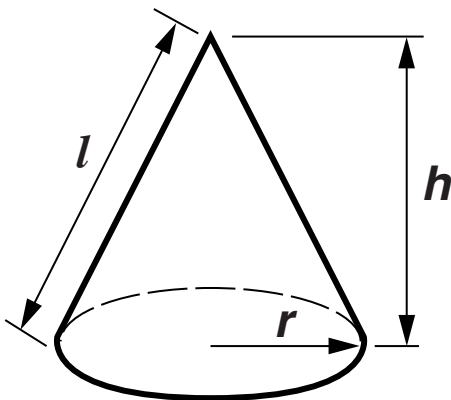
Sphere



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

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

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.

	Adults	Children	Total
Male			132
Female		100	
Total			300

[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.

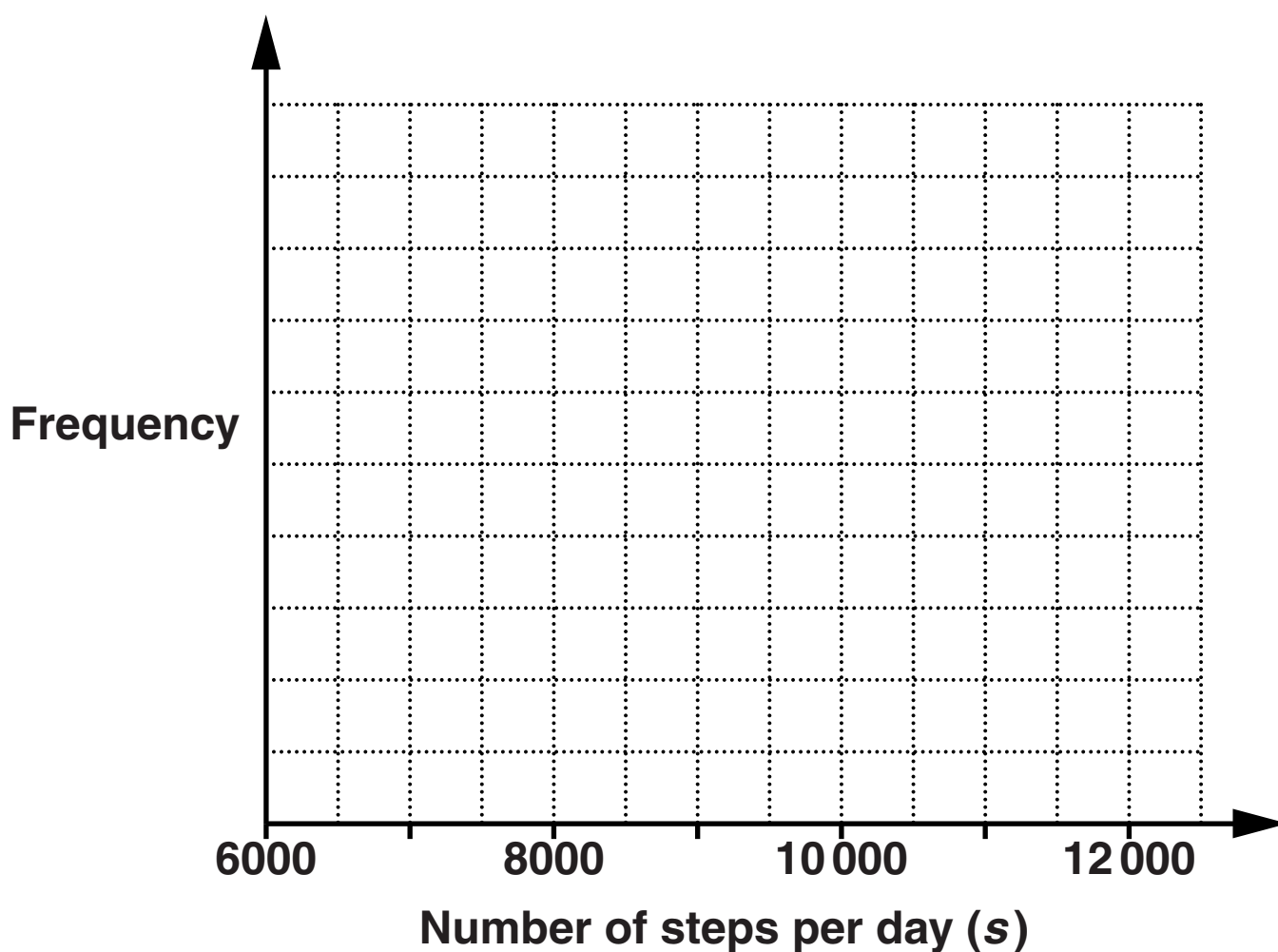
$$3x - 6 < x + 4$$

(d) _____ [3]

- 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.

Steps per day (s)	Frequency
$6000 \leq s < 7000$	3
$7000 \leq s < 8000$	4
$8000 \leq s < 9000$	6
$9000 \leq s < 10\,000$	8
$10\,000 \leq s < 11\,000$	7
$11\,000 \leq s < 12\,000$	2

- (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.

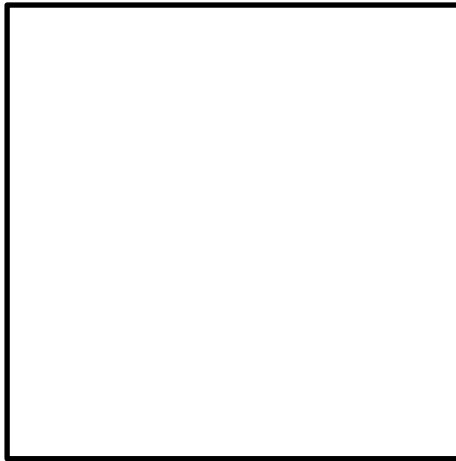
Find the numbers that they start and end with.

Start _____

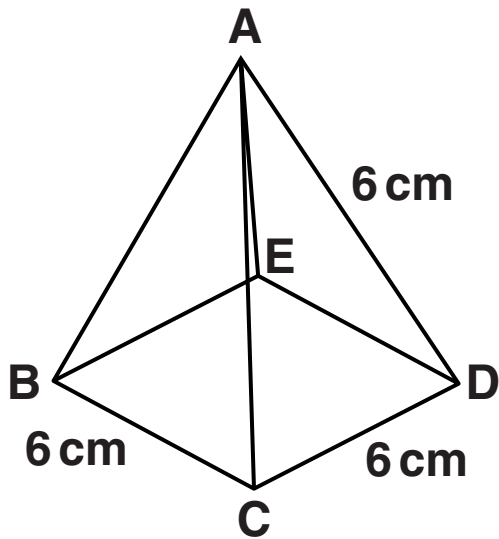
End _____ **[4]**

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- 6 ABCDE, shown opposite, 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^2 [4]

- 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]

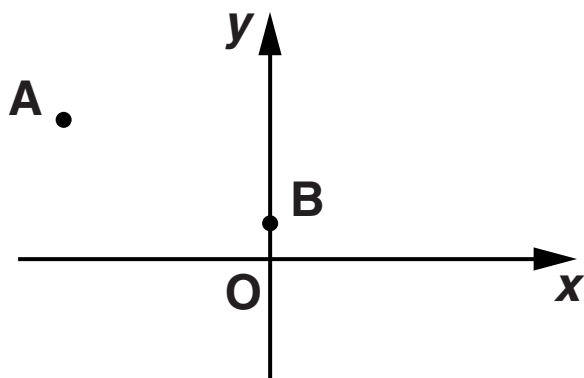
- 8 (a) Find the size of the exterior angle of a regular 12-sided polygon.**

(a) _____° [2]

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

(b) _____° [1]

- 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.

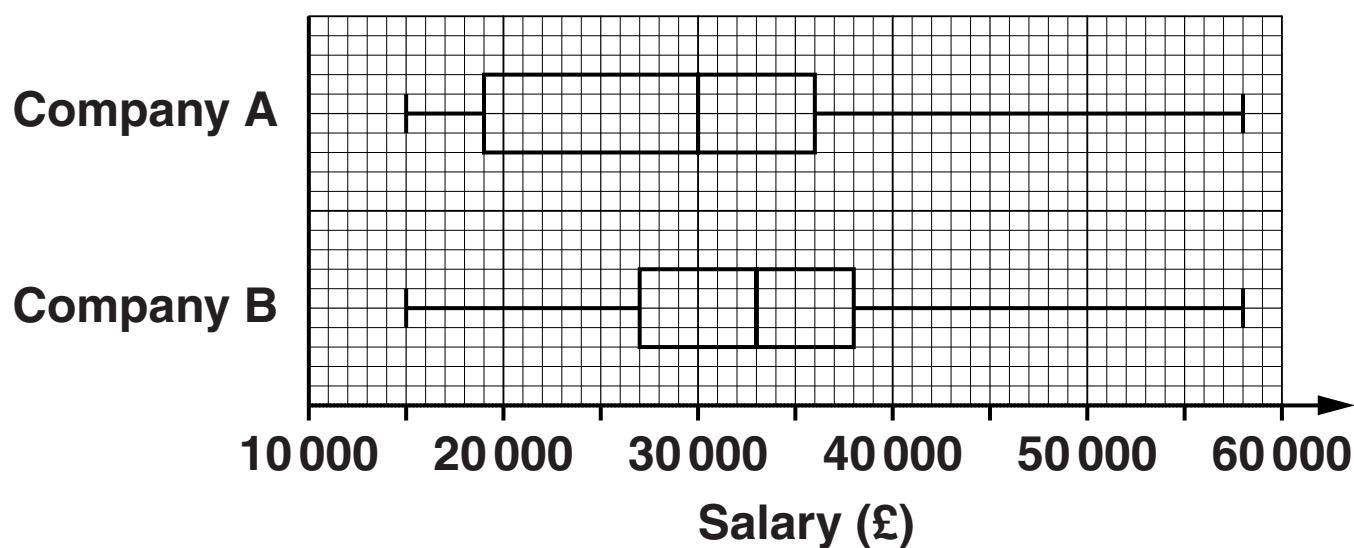
(b) _____ [1]

(c) Write as a single power of 5.

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

(c) _____ [1]

11 The box plots below 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]**

- 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)

$$\text{E} \quad 5.8 \times 10^{-3} \times 1.2 \times 10^{-2} = 6.96 \times 10^{-5}$$

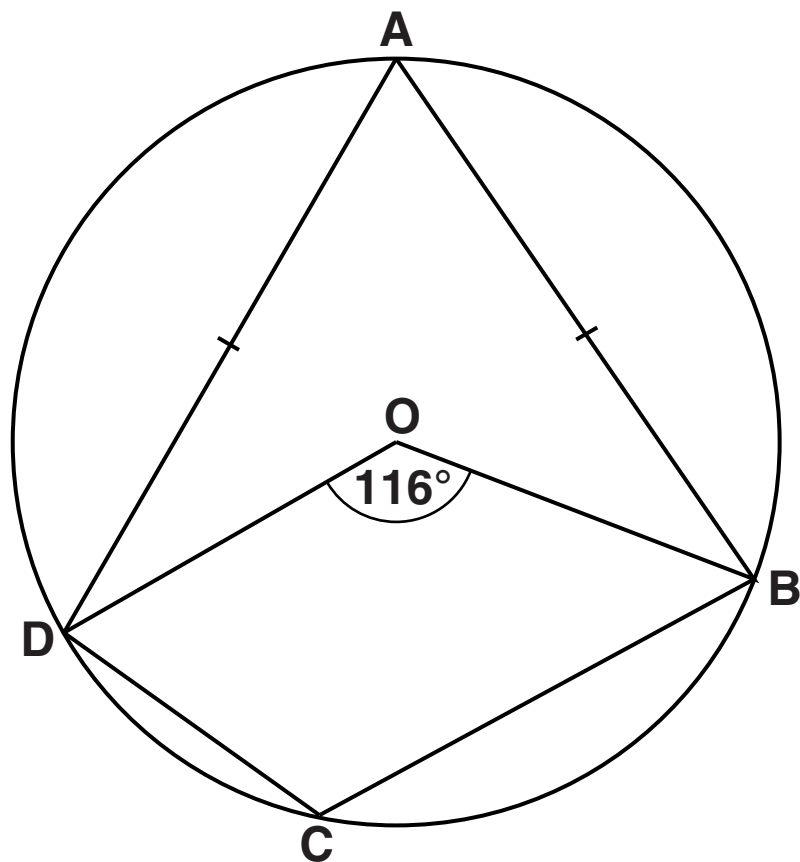
$$\text{F} \quad 4.6 \times 10^8 \div 3.7 \times 10^2 = 1.24 \times 10^4$$

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° .



Not to scale

Calculate

(a) angle BAD,

(a) _____ $^\circ$ [1]

(b) angle BCD,

(b) _____ $^\circ$ [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.

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

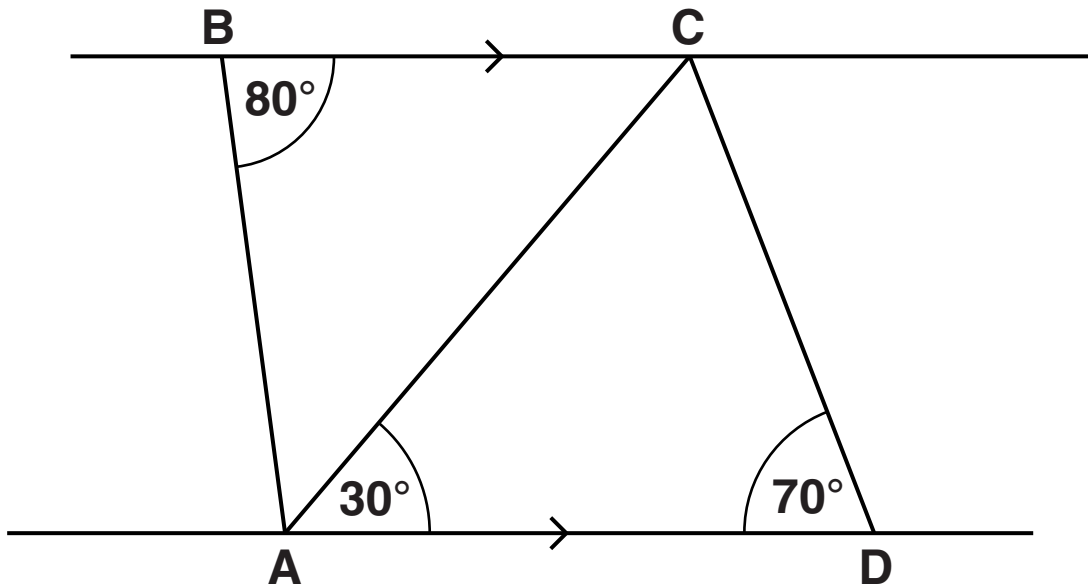
(b) $x =$ _____ and $x =$ _____ [3]

- 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 $ADC = 70^\circ$.



Not to scale

Show that triangles ABC and DCA are similar.

[3]

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

Calculate.

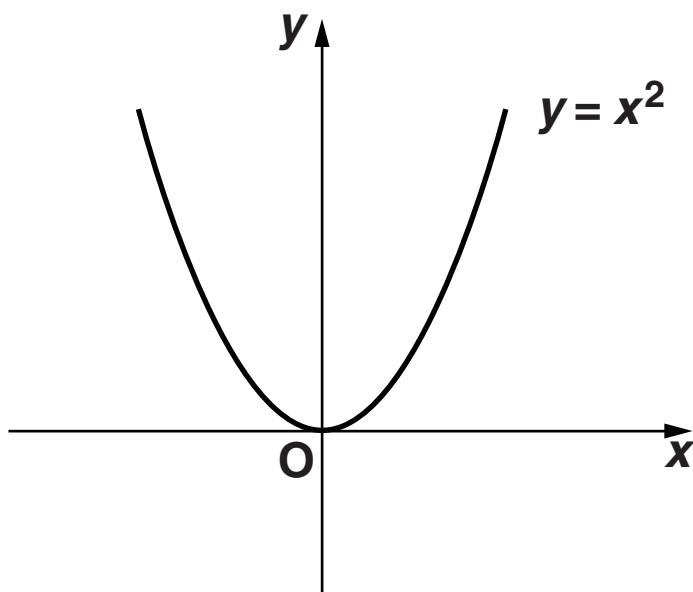
(a) $\mathbf{p} + \mathbf{q}$

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

(b) $3\mathbf{p} - \mathbf{q}$

(b) $\begin{pmatrix} \\ \end{pmatrix}$ **[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 $y = x^2 - 3$.

_____ [2]

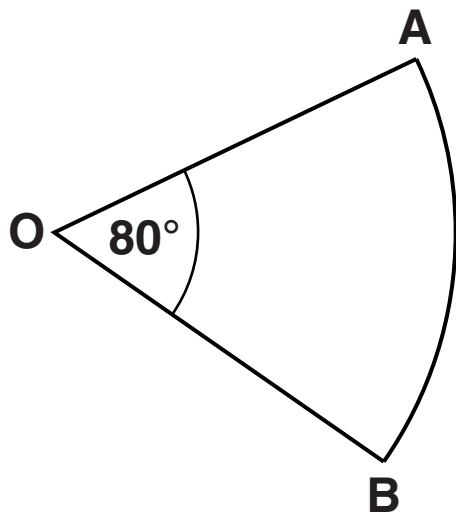
18 Simplify.

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

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

_____ **[3]**

- 19 OAB is a sector of a circle.
Angle AOB = 80° . This is shown on the following diagram.



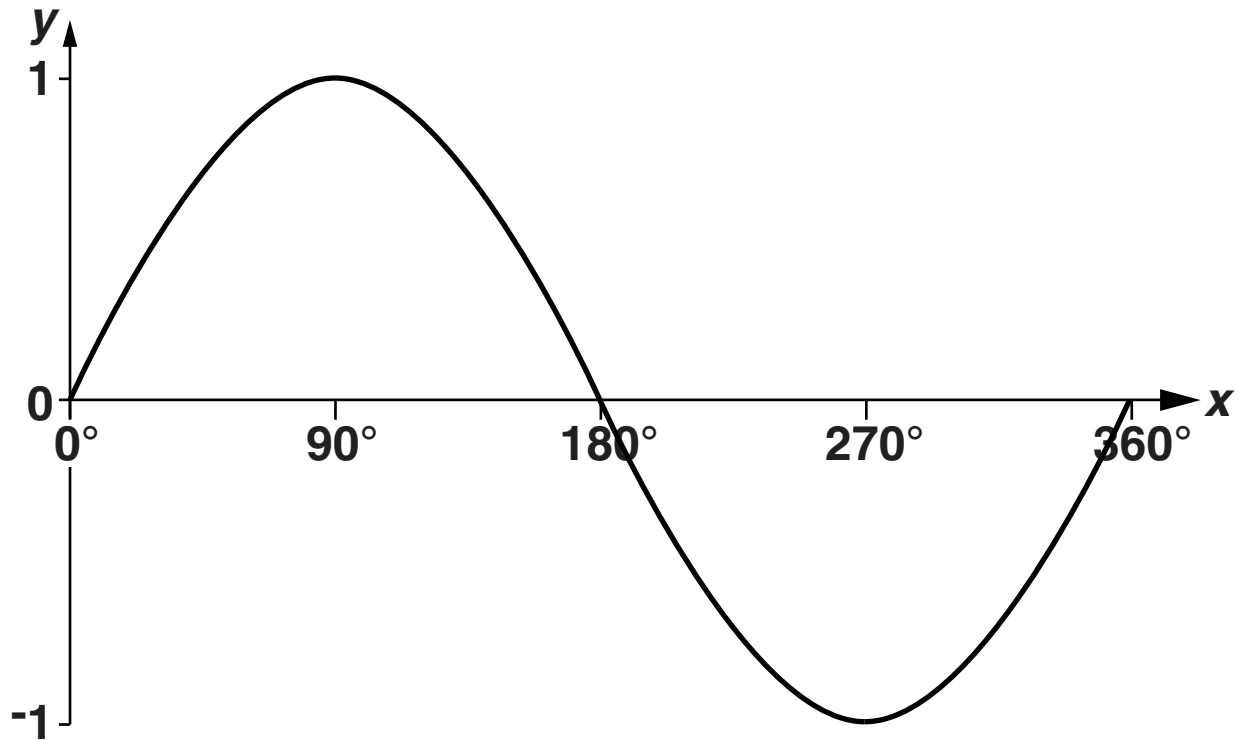
Not to scale

The length of arc AB is 12π cm.

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

_____ [4]

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.

1

2

3

4

5

6

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

[5]

END OF QUESTION PAPER

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