OCR
RECOGNISING ACHIEVEMENT

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Thursday 28 February 2013 – Afternoon

GCSE MATHEMATICS B

J567/03 Paper 3 (Higher Tier)

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour 45 minutes

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 **100**.
- This document consists of **20** pages. Any blank pages are indicated.

WARNING

No calculator can be used for this paper

This paper has been pre modified for carrier language

DC (LEO/SW) 56624/7

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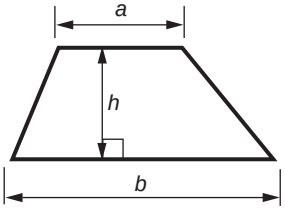
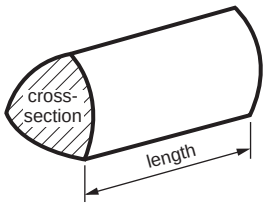
Formulae Sheet: Higher Tier

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



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

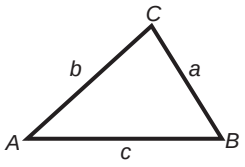


In any triangle *ABC*

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

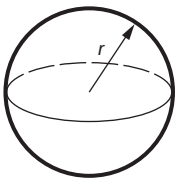
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



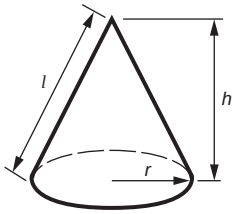
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi r l$



The Quadratic Equation

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

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

PLEASE DO NOT WRITE ON THIS PAGE

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) This 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 this formula 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.

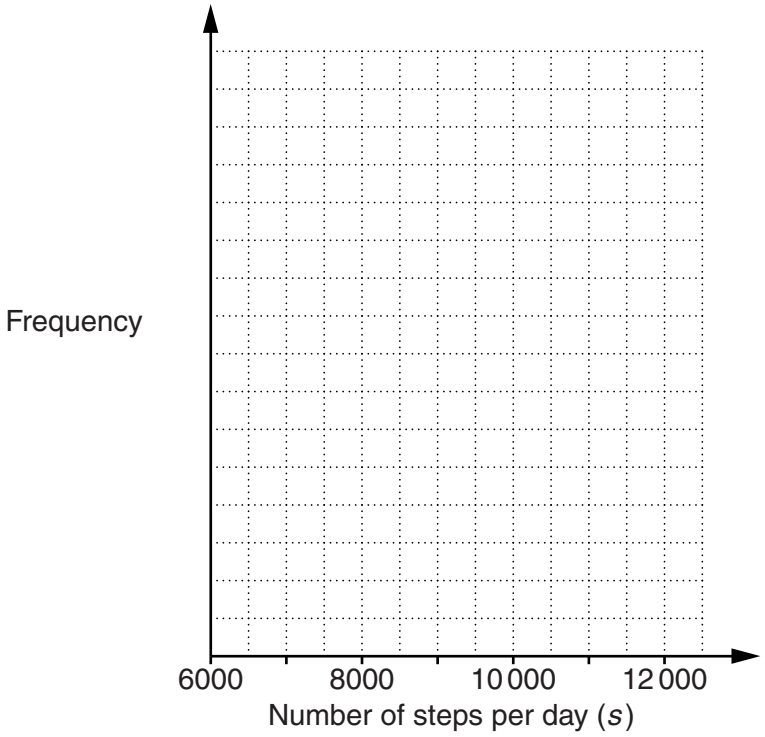
$3x - 6 < x + 4$

(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
$6000 \leqslant s < 7000$	3
$7000 \leqslant s < 8000$	4
$8000 \leqslant s < 9000$	6
$9000 \leqslant s < 10\,000$	8
$10\,000 \leqslant s < 11\,000$	7
$11\,000 \leqslant s < 12\,000$	2

(a) 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.

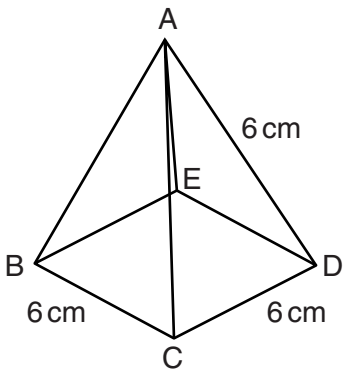
Kate and Leo both end up with the same number.

Find the numbers that they start and end with.

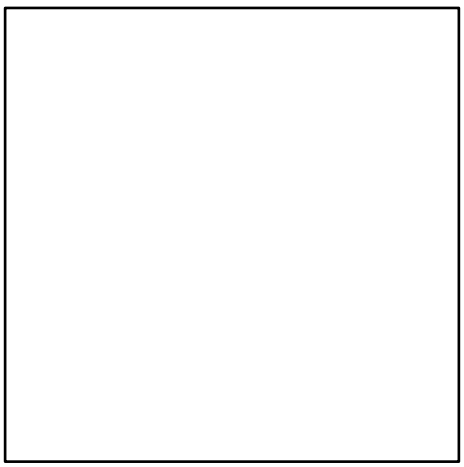
Start _____

End _____ **[4]**

6 ABCDE is a square-based pyramid.
The length of each edge is 6 cm.



(a) 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]**

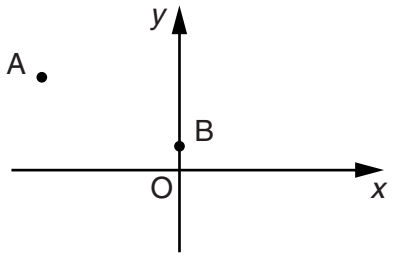
8 **(a)** Find the size of the exterior angle of a regular 12-sided polygon.

(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.

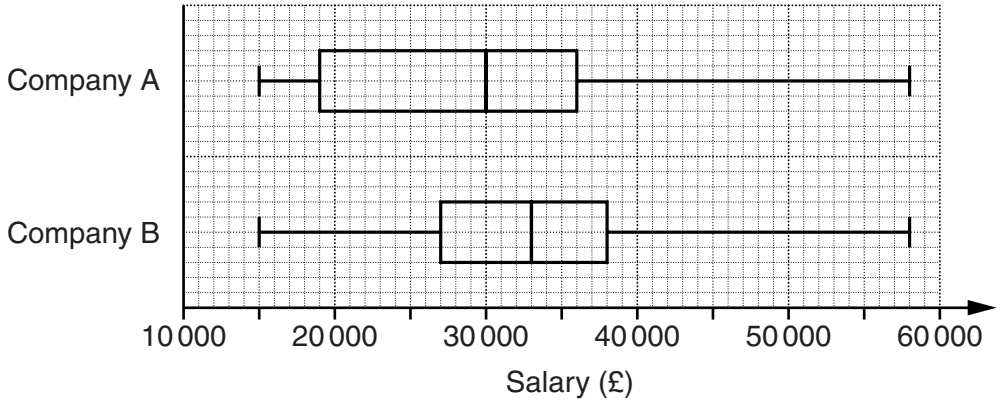
(b) _____ **[1]**

(c) Write as a single power of 5.

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

(c) _____ **[1]**

11 These box plots 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]**

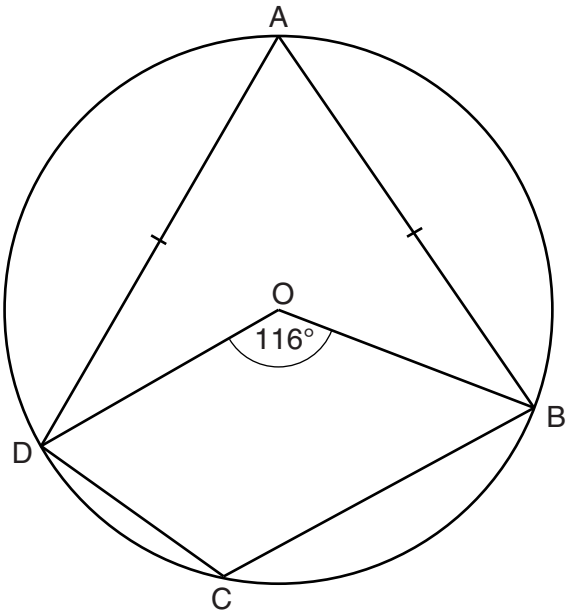
(c)

E	$5.8 \times 10^{-3} \times 1.2 \times 10^{-2} = 6.96 \times 10^{-5}$
F	$4.6 \times 10^{8} \div 3.7 \times 10^{2} = 1.24 \times 10^{4}$

Calculation _____ has an incorrect answer

because _____ **[1]**

13 In the diagram, 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) _____ ° **[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.

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

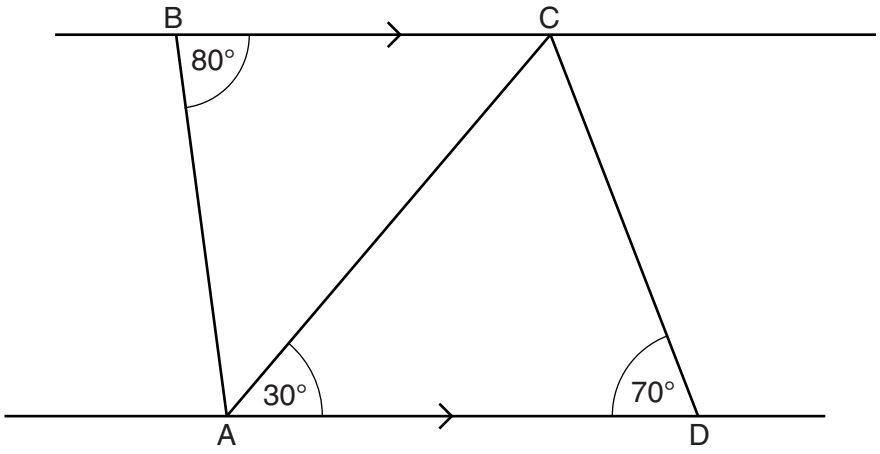
(b) $x =$ _____ and $x =$ _____ **[3]**

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, AD is parallel to BC.
Angle ABC = 80°, angle CAD = 30° and angle ADC = 70°.



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.

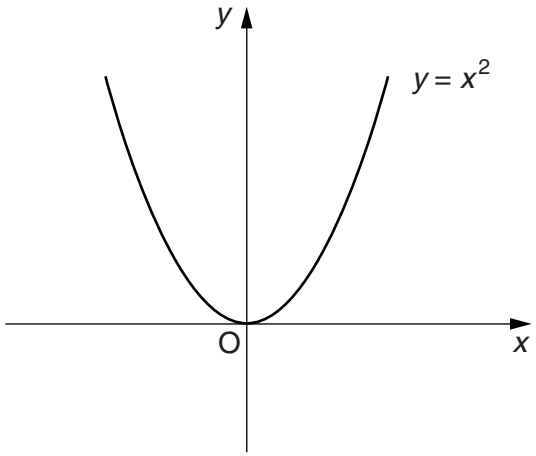
(a) $\mathbf{p} + \mathbf{q}$

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

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

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

17 This 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]**

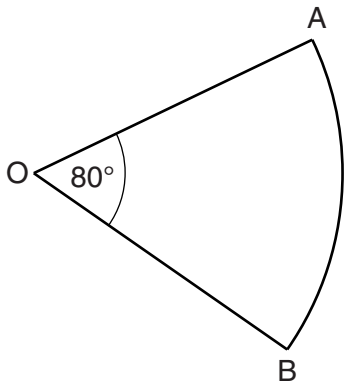
18 Simplify.

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

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

_____ **[3]**

19 OAB is a sector of a circle.
Angle AOB = 80°.



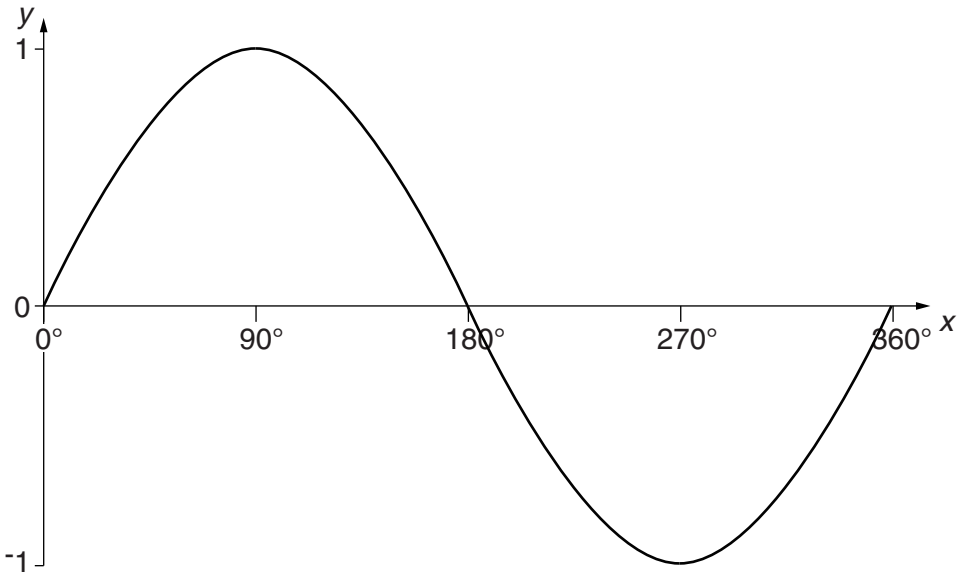
Not to scale

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 shows the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.



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

Find the values of x which satisfy $\sin x = -0.8$ in the range $0° \leqslant x \leqslant 360°$.

$x =$ _____ **[2]**

TURN OVER FOR QUESTION 21

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

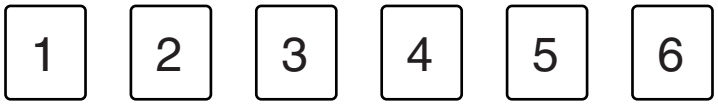
Number Generator Game

£1 per go

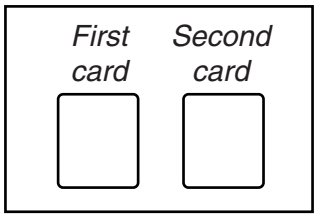
Pick 2 cards

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



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

[5]

END OF QUESTION PAPER