Paper Reference(s)

5525/06

Edexcel GCSE
Mathematics A – 1387
Paper 6 (Calculator)
Higher Tier
Monday 11 June 2007 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and
millimetres, protractor, compasses,
pen, HB pencil, eraser, calculator.
Tracing paper may be used.

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 25 questions in this question paper. The total mark for this paper is 100.
There are 24 pages in this question paper. Any blank pages are indicated.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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Turn over
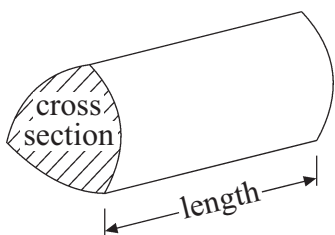
edexcel
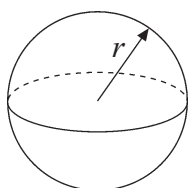advancing learning, changing lives

Formulae: Higher Tier

**You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.**

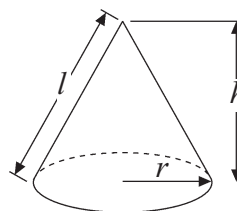**Volume of a prism** = area of cross section × length

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 $= \pi rl$

In any triangle ABC

Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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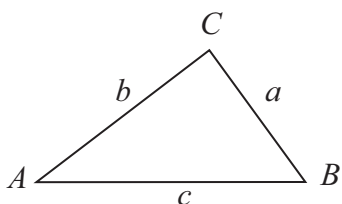
The Quadratic Equation

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 TWENTY FIVE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. A shop sells CDs and DVDs.
   In one week the number of CDs sold and the number of DVDs sold were in the ratio 3:5
   The total number of CDs and DVDs sold in the week was 728

   Work out the number of CDs sold.

   .... $Q1$

   (Total 2 marks)

2. Here are the first 4 terms of an arithmetic sequence.

   2   5   8   11

   Find an expression, in terms of n, for the nth term of the sequence.

   .... $Q2$

   (Total 2 marks)

3. The equation

$$x^3 - x = 30$$

has a solution between 3 and 4
Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

$x = $ ....

(Total 4 marks)

4. Seejal says

"If a and b are prime numbers greater than 2, then $a \times b$ is always an odd number."

Is Seejal correct? ....

Give reasons for your answer.

....

....

....
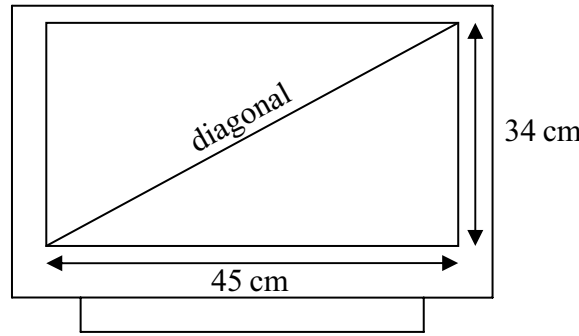
(Total 2 marks)

5.

Diagram **NOT** accurately drawn

34 cm

45 cm

A rectangular television screen has a width of 45 cm and a height of 34 cm.

Work out the length of the diagonal of the screen.
Give your answer correct to the nearest centimetre.

.... cm

Q5

(Total 4 marks)

6. James invested £2000 for three years in an Internet Savings Account.
He is paid 5.5% per annum **compound** interest.

Work out the **total interest** earned after three years.

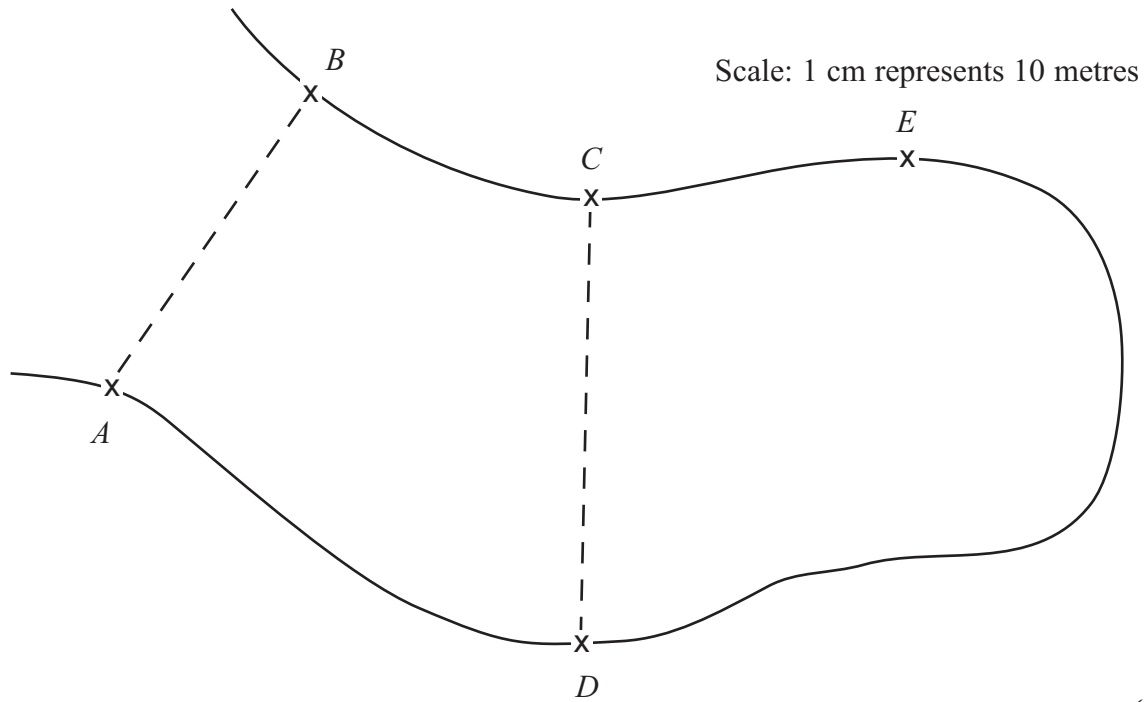£ ....

Q6

(Total 3 marks)

7. The map shows part of a lake.

In a competition for radio controlled boats, a competitor has to steer a boat so that
  its path between *AB* and *CD* is a straight line
  this path is always the same distance from *A* as from *B*

(a) On the map, draw the path the boat should take.

Scale: 1 cm represents 10 metres

B

E

C

A

D

(2)

There is a practice region for competitors.
The practice region is that part of the lake that is less than 30 metres from point *E*.
The scale of the map is 1 cm represents 10 metres.

(b) Shade this practice region on the map.

(2)   **Q7**

(Total 4 marks)

8. The table gives some information about the time taken by a group of 100 students to complete an IQ test.

Time (*t* seconds)	Frequency	
$60 < t \leqslant 70$	12	
$70 < t \leqslant 80$	22	
$80 < t \leqslant 90$	23	
$90 < t \leqslant 100$	24	
$100 < t \leqslant 110$	19	

Calculate an estimate for the mean time taken by the students.

.... seconds

(Total 4 marks)

9. A plane flies 1400 kilometres in 2 hours 20 minutes.
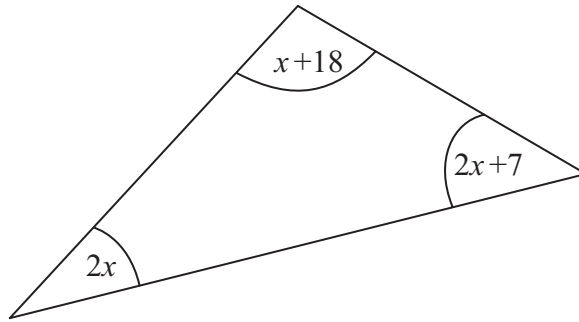
Calculate the average speed, in km/h, of the plane.

.... km/h

(Total 3 marks)

10.

Diagram **NOT** accurately drawn

The sizes of the angles, in degrees, of the triangle are

$2x + 7$
$2x$
$x + 18$

(a) Use this information to write down an equation in terms of x.

....

(2)

(b) Use your answer to part (a) to work out the value of x.

$x =$ ....

(2)

Q10

(Total 4 marks)

11. (a) Complete the table of values for $y = x^3 + 3x$

x	-2	-1	0	1	2
y	-14		0		

(2)

(b) On the grid, draw the graph of $y = x^3 + 3x$

(2)
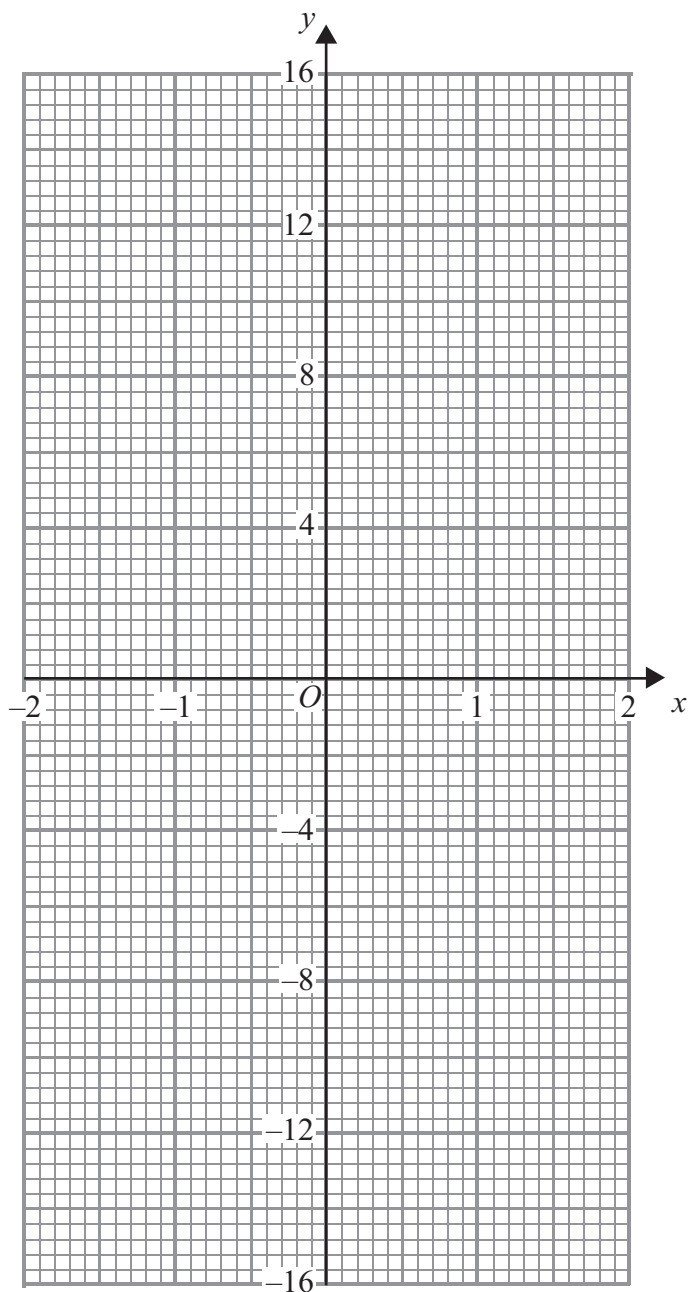
(Total 4 marks)

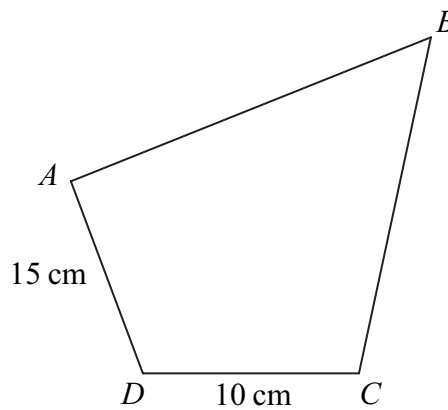**12.** The diagram shows two quadrilaterals that are mathematically **similar**.
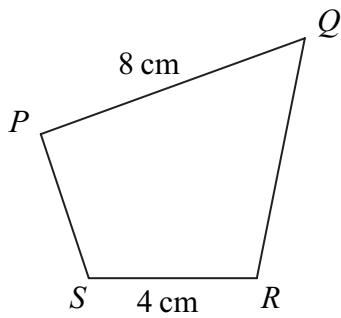

Diagram **NOT** accurately drawn

In quadrilateral *PQRS*, *PQ* = 8 cm, *SR* = 4 cm.
In quadrilateral *ABCD*, *AD* = 15 cm, *DC* = 10 cm.
Angle *PSR* = angle *ADC*.
Angle *SPQ* = angle *DAB*.

(a) Calculate the length of *AB*.

.... cm

(2)

(b) Calculate the length of *PS*.

.... cm

(2)

Q12

(Total 4 marks)

13. In 2003 the population of Great Britain was 6.0×10^7

In 2003 the population of India was 9.9×10^8

(a) Work out the difference between the population of India and the population of Great Britain in 2003.
Give your answer in standard form.

....
(2)

In 1933 the population of Great Britain was 4.5×10^7

(b) Calculate the percentage increase in the population of Great Britain from 1933 to 2003.
Give your answer correct to one decimal place.

.... %
(3)

(Total 5 marks)

14. Martin is organising a summer fair.
He needs bread buns and burgers for the barbecue.

Bread buns are sold in packs. Each pack contains 40 bread buns.
Burgers are sold in packs. Each pack contains 24 burgers.
Martin buys exactly the same number of bread buns as burgers.

What is the least number of each pack that Martin buys?

.... packs of bread buns

.... packs of burgers

(Total 3 marks)

15.

A

12 cm

32°

B C
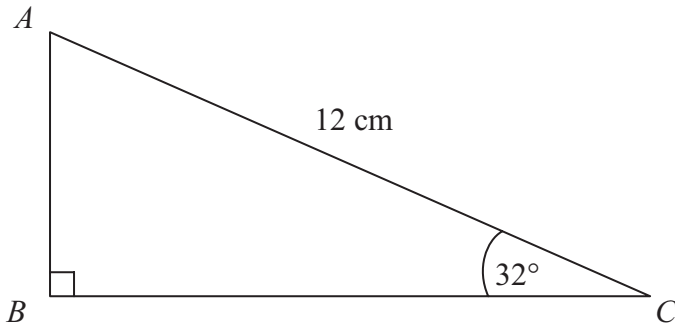
Diagram **NOT**
accurately drawn

$AC = 12$ cm.
Angle $ABC = 90°$.
Angle $ACB = 32°$.

Calculate the length of AB.
Give your answer correct to 3 significant figures.

.... cm

(Total 3 marks)

M 2 5 7 6 7 A 0 1 3 2 4

16. The mean of eight numbers is 41
The mean of two of the numbers is 29

What is the mean of the other six numbers?

....

(Total 3 marks)

17. (a) Expand and simplify $(x + 3)(x - 4)$

....

(2)

(b) Expand and simplify $(2x + 5)(3x - 4)$

....

(2)

(c) Factorise $x^2 + 7x + 10$

....

(2)

(d) Simplify fully $3p^5q \times 4p^3q^2$

....

(2)

(e) $p = 3t + 4(q - t)$

Find the value of q when $p = 6$ and $t = 5$

$q = $ ....

(3)

(Total 11 marks)

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖
M 2 5 7 6 7 A 0 1 5 2 4

18. In a spring, the tension (T newtons) is directly proportional to its extension (x cm).

When the tension is 150 newtons, the extension is 6 cm.

(a) Find a formula for T in terms of x.

$T = $ ....
(3)

(b) Calculate the tension, in newtons, when the extension is 15 cm.

.... newtons
(1)

(c) Calculate the extension, in cm, when the tension is 600 newtons.

.... cm
(1)

Q18

(Total 5 marks)

16

19. There are three age groups in a competition.
The table shows the number of competitors in each age group.

16-18 years	19-24 years	25+ years
120	250	200

John wants to do a survey of the competitors.
He uses a stratified sample of exactly 50 competitors according to each age group.

Work out the number of competitors in each age group that should be in his stratified sample of 50.

16-18 years: ....

19-24 years: ....

25+ years: ....

(Total 3 marks)

Q19

20. Solve the equation

$$\frac{x}{2x-3} + \frac{4}{x+1} = 1$$

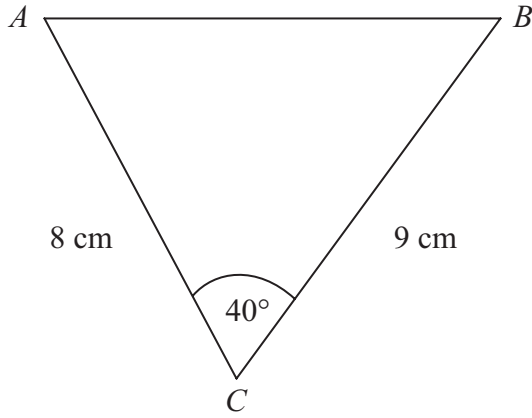$x = $ ....

(Total 5 marks)

Q20

21.

Diagram **NOT** accurately drawn

ABC is a triangle.
AC = 8 cm.
BC = 9 cm.
Angle *ACB* = 40°.

Calculate the length of *AB*.
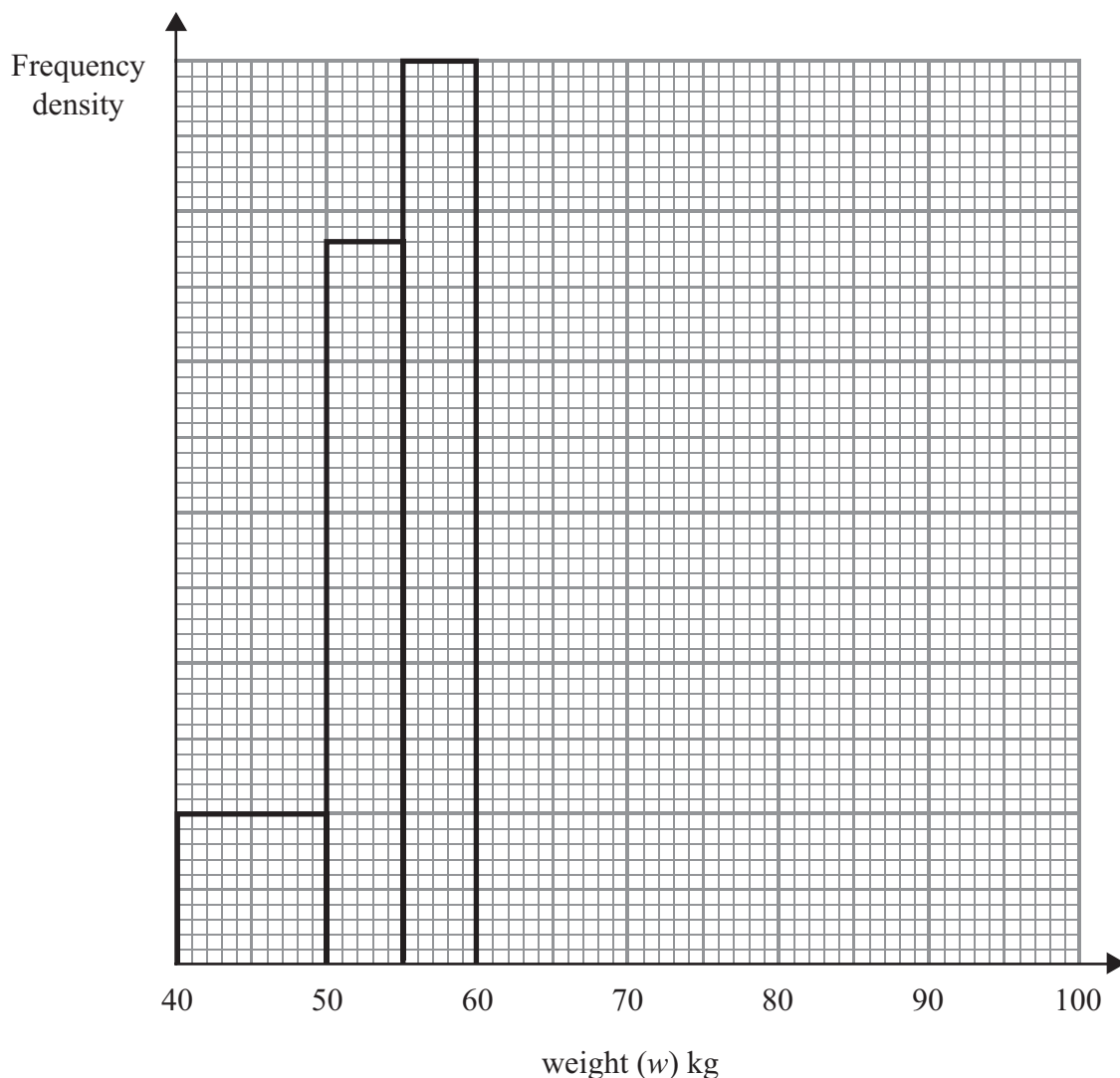Give your answer correct to 3 significant figures.

.... cm

(Total 3 marks)

22. The incomplete table and histogram give some information about the weights of people at a keep-fit session.

Frequency density

weight (*w*) kg

(a) Use the information in the histogram to complete the frequency table.

Weight (*w*) kg	Frequency
$40 \leqslant w < 50$	10
$50 \leqslant w < 55$	
$55 \leqslant w < 60$	
$60 \leqslant w < 75$	15
$75 \leqslant w < 95$	8

(2)

(b) Complete the histogram.

(2)

Q22

(Total 4 marks)

23. Kelly runs a distance of 100 metres in a time of 10.52 seconds.

The distance of 100 metres was measured to the nearest metre.
The time of 10.52 seconds was measured to the nearest hundredth of a second.

(a) Write down the upper bound for the distance of 100 metres.

.... metres

(1)

(b) Write down the lower bound for the time of 10.52 seconds.

.... seconds

(1)

(c) Calculate the upper bound for Kelly's average speed.
Write down all the figures on your calculator display.

.... metres per second

(2)

(d) Calculate the lower bound for Kelly's average speed.
Write down all the figures on your calculator display.

.... metres per second

(2)

(Total 6 marks)

Q23

24. Martin has a pencil case which contains 4 blue pens and 3 green pens.

Martin picks a pen at random from the pencil case. He notes its colour, and then replaces it. He does this two more times.

Work out the probability that when Martin takes three pens, exactly two are the same colour.

....
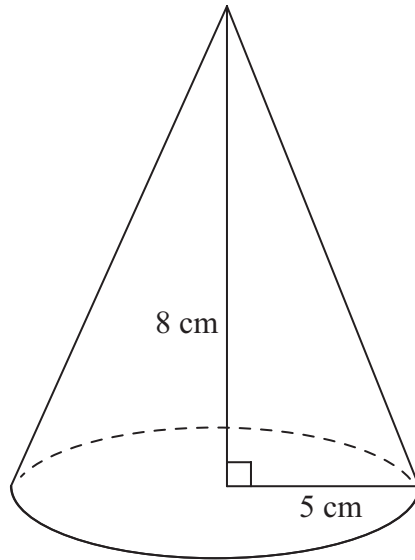
(Total 3 marks)

25.

Diagram **NOT** accurately drawn

8 cm

5 cm

A cone has a base radius of 5 cm and a vertical height of 8 cm.

(a) Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

.... cm^3

(2)

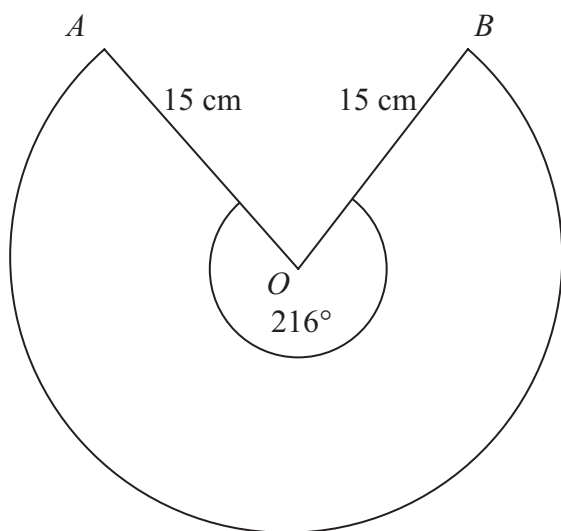Here is the net of a different cone.

A   B

15 cm   15 cm

O
216°

Diagram **NOT**
accurately drawn

The net is a sector of a circle, centre O, and radius 15 cm.
Reflex angle AOB = 216°
The net makes a cone of slant height 15 cm.

(b) Work out the vertical height of the cone.

.... cm

(4)   **Q25**

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

END