Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/3H

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Friday 4 November 2005 – Morning

Time: 2 hours

Examiner's use only

Team Leader's use only

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Total	

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 and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 24 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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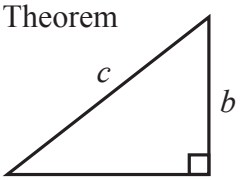
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

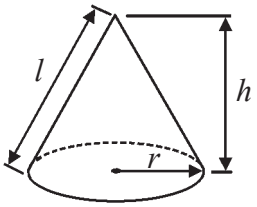
Pythagoras' Theorem



$a^2 + b^2 = c^2$

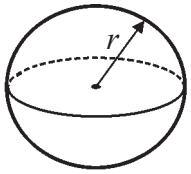
Volume of cone = $\frac{1}{3}\pi r^2 h$

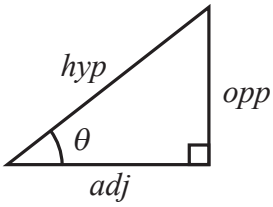
Curved surface area of cone = $\pi r l$



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

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





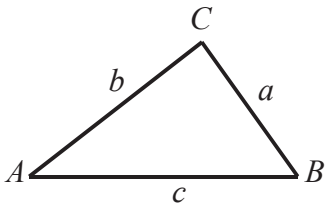
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

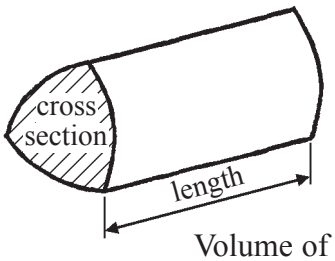
In any triangle ABC



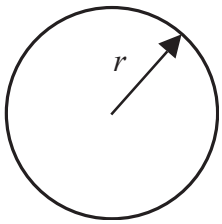
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



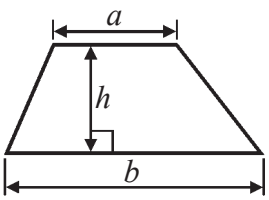
Volume of prism = area of cross section × length

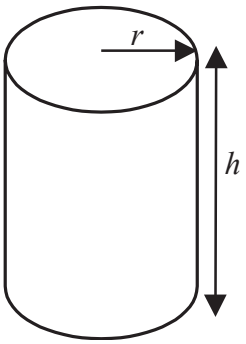


Circumference of circle = $2\pi r$

Area of circle = πr^2

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





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

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

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

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. (a) Use your calculator to work out the value of

$$2.6 - \frac{9.8}{2.7 + 1.2}$$

Write down all the figures on your calculator display.

.....

(2)

(b) Give your answer to part (a) correct to 2 significant figures.

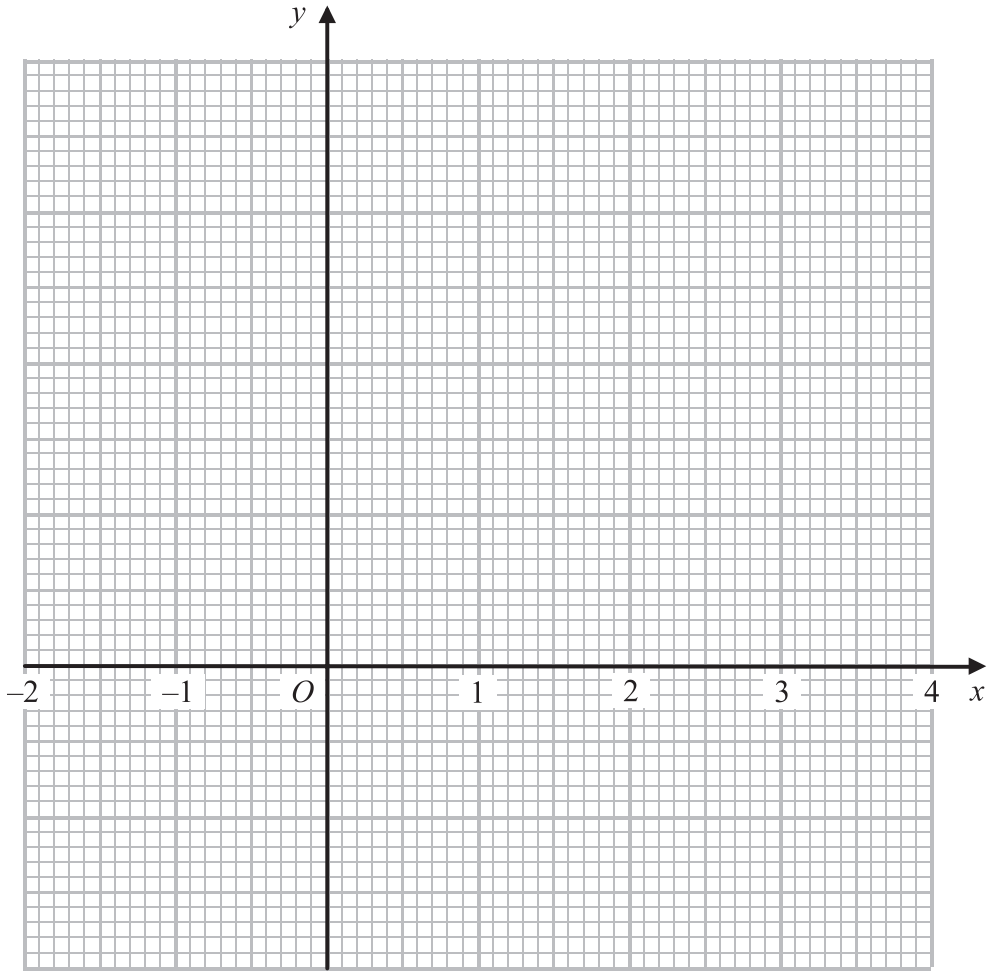
.....

(1) **Q1**

(Total 3 marks)

Leave blank

2. On the grid, draw the graph of $y = 3x + 5$ from $x = -2$ to $x = 4$



Q2

(Total 3 marks)

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3. The lengths of two of the sides of a kite are 7.6 cm and 4.3 cm.
The length of the shorter diagonal of the kite is 5.2 cm.

In the space below, use ruler and compasses to **construct** an accurate, full-size drawing of the kite.
You must show all construction lines.

Q3

(Total 4 marks)

Leave blank

4. The table shows information about the number of bananas the students in class 1B ate in one week.

Number of bananas	Frequency
0	1
1	6
2	5
3	2
4	7
5	4

(a) Find the mean number of bananas.

.....

(3)

There are 575 students in the school.
The numbers of bananas eaten by students in class 1B are typical of the numbers eaten by students in the whole school.

(b) Work out an estimate for the number of students in the whole school who will eat exactly one banana next week.

.....

(3) **Q4**

(Total 6 marks)

Leave blank

5.

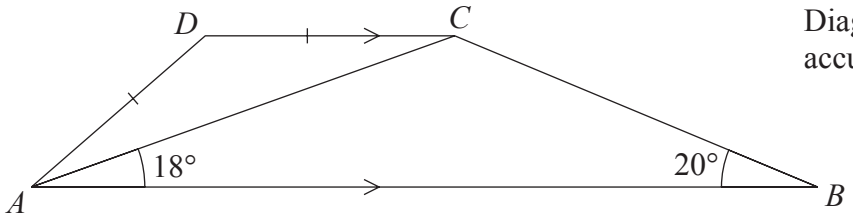


Diagram **NOT** accurately drawn

ABCD is a trapezium.
AB is parallel to *DC*.
Angle *BAC* = 18°.
Angle *ABC* = 20°.
AD = *DC*.

Calculate the size of angle *ADC*.
Give a reason for each step in your working.

.....°

Q5

(Total 5 marks)

Leave blank

6. $$f = \frac{uv}{u+v}$$

Work out the value of f when $u = 5.7$ and $v = -7.6$

$f =$ .....

Q6

(Total 3 marks)

7. The amount of petrol a car uses is directly proportional to the distance it travels.
A car uses 3 litres of petrol when it travels 50 km.

(a) Work out the amount of petrol the car uses when it travels 125 km.

..... litres

(2)

(b) Work out the distance the car travels when it uses 5.7 litres of petrol.

..... km

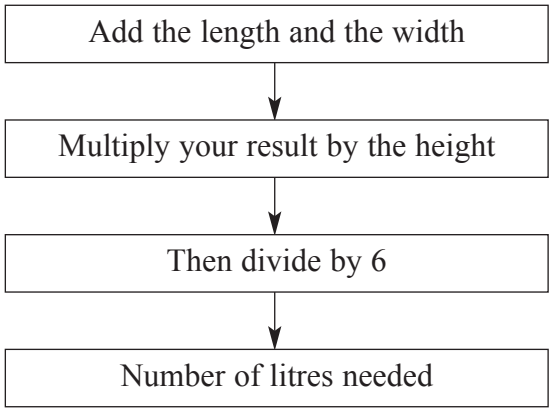
(2)

Q7

(Total 4 marks)

Leave blank

8. This rule can be used to work out the number of litres of paint needed to cover the walls of a room, using the length, width and height, in metres, of the room.



A room has length L metres, width W metres and height H metres.
N litres of paint are needed to cover the walls of the room.

(a) Find a formula for N in terms of L, W and H.

.....

(3)

The perimeter of the room is P metres.

(b) Find a formula for N in terms of P and H.

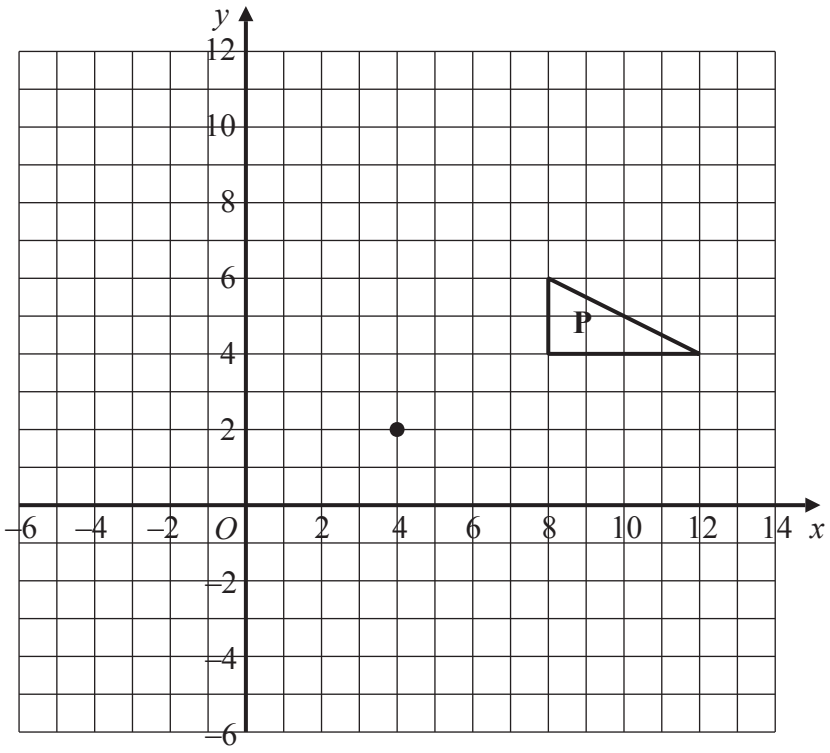
.....

(2) **Q8**

(Total 5 marks)

Leave blank

9. (a)

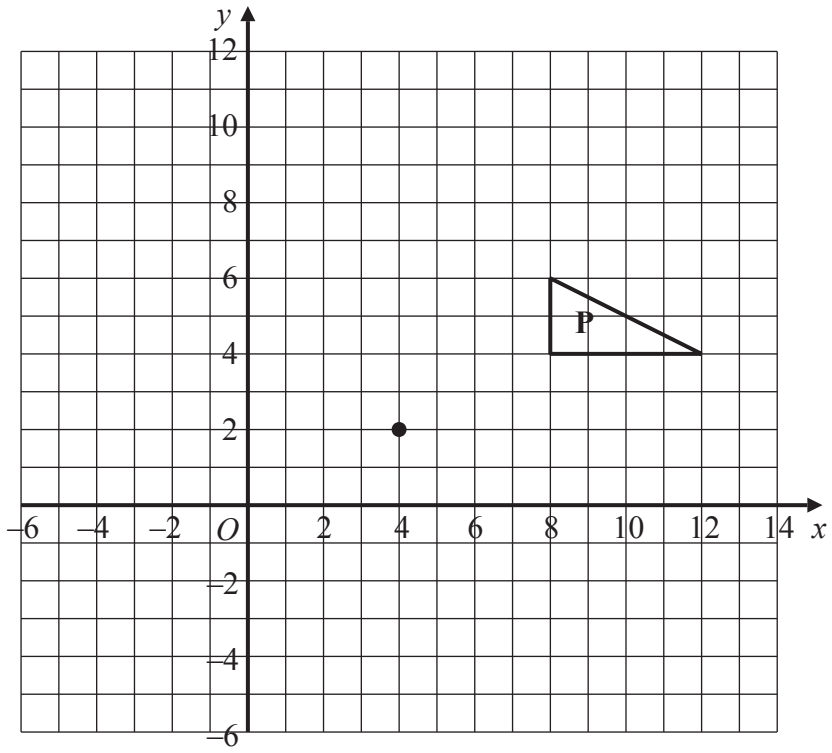


On the grid, rotate triangle **P** 90° anti-clockwise about the point (4, 2).

(2)

Leave blank

(b)



On the grid, enlarge triangle **P** with scale factor $\frac{1}{2}$ and centre (4, 2).

(2) **Q9**

(Total 4 marks)

Leave blank

10. Pat drops a ball onto a wooden floor.
The ball bounces to a height which is 26% less than the height from which it is dropped.

(a) Pat drops the ball from a height of 85 cm.
Calculate the height to which it first bounces.

..... cm
(3)

(b) Pat drops the ball from a different height.
It first bounces to a height of 48.1 cm.
Calculate the height from which he dropped it.

..... cm
(3)

Q10

(Total 6 marks)

11. Solve $\frac{5x+4}{3} = 2$

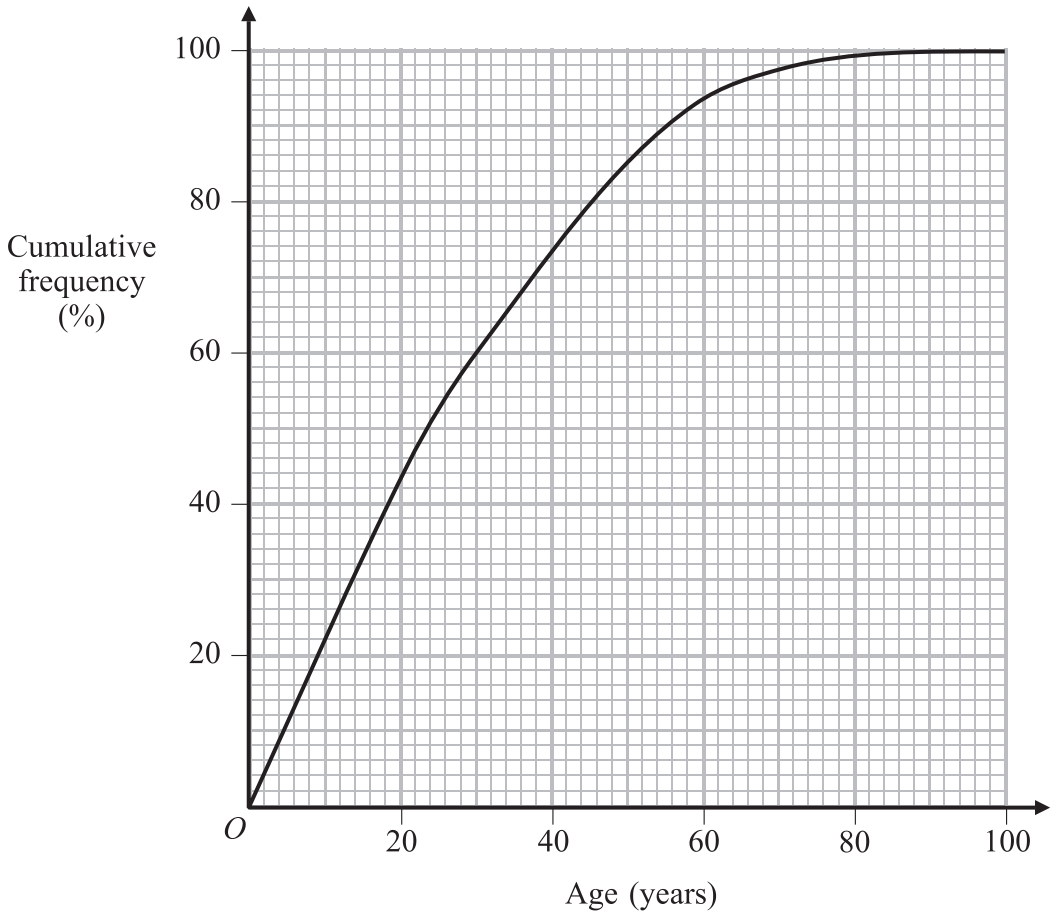
$x =$ .....

Q11

(Total 3 marks)

Leave blank

12. The cumulative frequency graph gives information about the ages of people in India. The cumulative frequency is given as a percentage of all the people in India.



(a) Use the cumulative frequency graph to find an estimate for the percentage of people in India who are

(i) aged less than 20,

.....%

(ii) aged 54 or over.

.....%

(2)

(b) Find an estimate for the interquartile range of the ages of people in India.

..... years

(2)

Q12

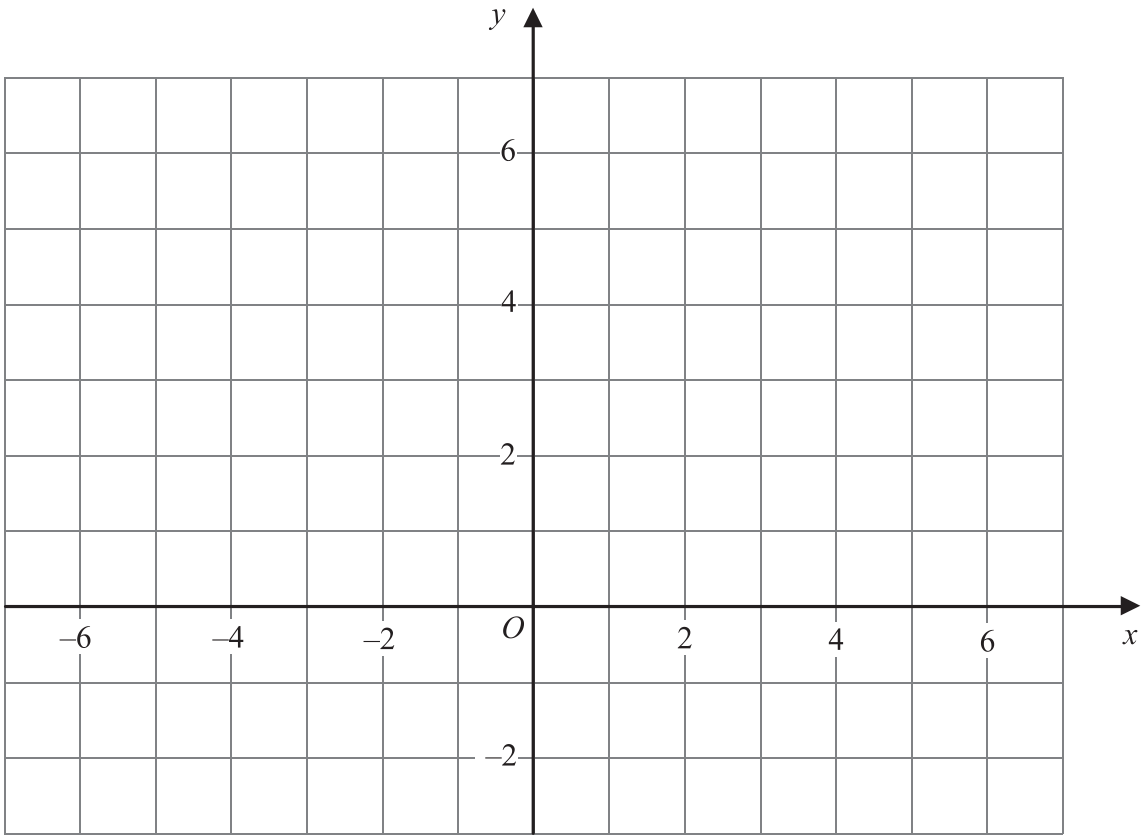
(Total 4 marks)

Leave blank

13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$x \geqslant 1$ $y \geqslant x$ $x + 2y \leqslant 6$

Label your region **R**.



Q13

(Total 4 marks)

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14.

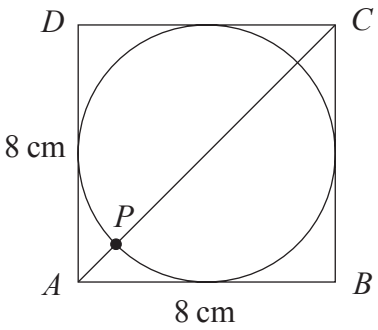


Diagram **NOT** accurately drawn

The diagram shows a circle of radius 4 cm inside a square $ABCD$ of side 8 cm.
P is a point of intersection of the circle and the diagonal AC of the square.

(a) Show that $AP = 1.66$ cm, correct to 3 significant figures.

(4)

(b) Calculate the length of DP.
Give your answer correct to 3 significant figures.

..... cm

(3) **Q14**

(Total 7 marks)

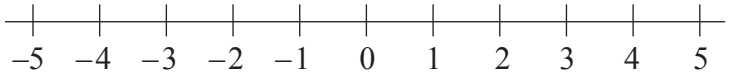
Leave blank

15. (a) Solve the inequality $x^2 \leqslant 4$

.....

(2)

(b) On the number line, represent the solution set of $x^2 \leqslant 4$



(2) **Q15**

(Total 4 marks)

Leave blank

16.

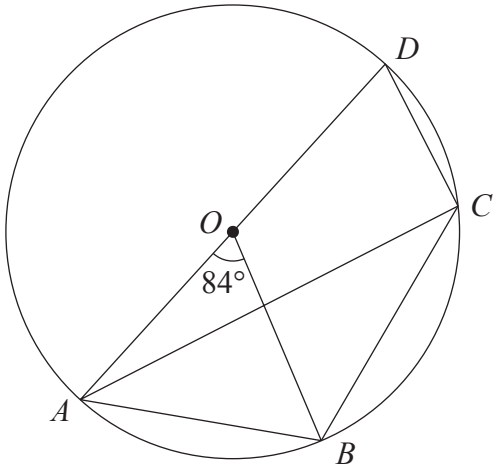


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle with centre *O*.
AOD is a diameter of the circle.
Angle *AOB* = 84°.

(a) (i) Calculate the size of angle *ACB*.

.....°

(ii) Give a reason for your answer.

.....

(2)

(b) Calculate the size of angle *BCD*.

.....°

(2)

Q16

(Total 4 marks)

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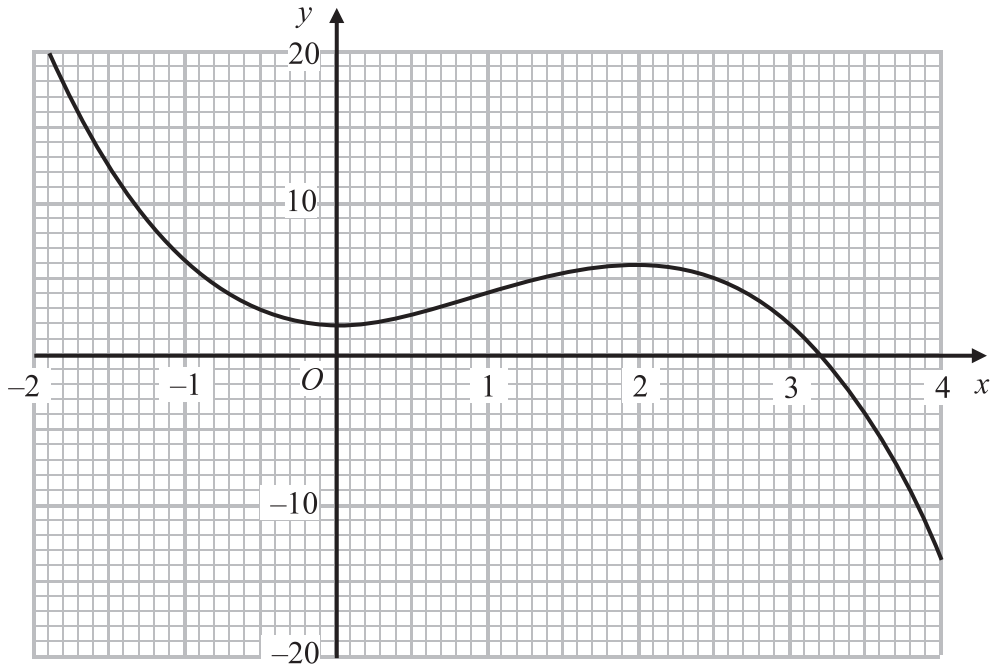
17. The diagram shows part of the graph of $y = f(x)$.



(a) Find f(3).

.....

(1)

(b) Solve $f(x) = 6$

.....

(2)

(c) Find ff(1).

.....

(2)

Leave blank

(d) Find an estimate for the gradient of the curve at the point where $x = -1$

.....

(3)

The equation $f(x) = k$, where k is a number, has 3 solutions between $x = -2$ and $x = 4$

(e) Complete the inequalities which k must satisfy.

..... $< k <$ .....

(2)

Q17

(Total 10 marks)

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18.

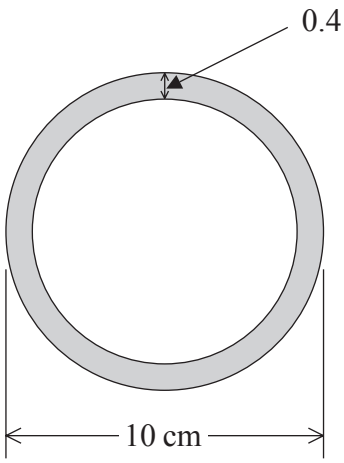

Diagram **NOT** accurately drawn

The outer diameter of a hollow spherical ball is 10 cm.
The ball is made from rubber which is 0.4 cm thick.

Calculate the volume of rubber needed to make the ball.
Give your answer correct to 3 significant figures.

..... cm^3 **Q18**

(Total 4 marks)

Leave blank

19. The probability that Gill will walk to school on Monday is $\frac{3}{5}$.
If Gill walks to school on Monday, the probability that she will walk to school on Tuesday is $\frac{1}{6}$.
If she does **not** walk to school on Monday, the probability that she will walk to school on Tuesday is $\frac{7}{10}$.

(a) Calculate the probability that she walks to school on Monday but not on Tuesday.

.....

(2)

(b) Calculate the probability that she walks to school on **at least** one of the two days.

.....

(3) **Q19**

(Total 5 marks)

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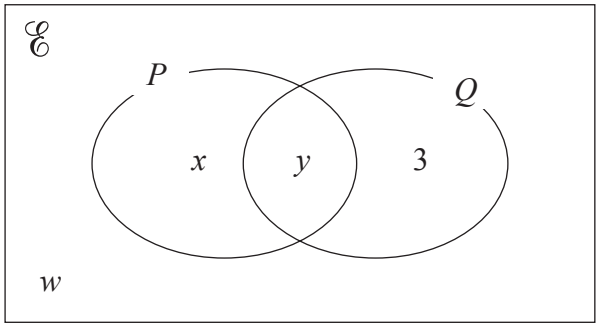
20.



In the Venn diagram, 3, w, x and y represent the **numbers** of elements.
$n(\mathscr{E}) = 24$ $n(P') = 8$ $n((P \cap Q)') = 15$

(a) Find the value of (i) w (ii) x (iii) y

(i) $w =$ .....

(ii) $x =$ .....

(iii) $y =$ .....

(3)

(b) (i) Find $n(P' \cap Q)$.

.....

(ii) Find $n(P' \cup Q')$.

.....

(iii) Find $n(P \cap Q \cap P')$.

.....

(3) **Q20**

(Total 6 marks)

Leave blank

21. Solve the simultaneous equations $y = 3x^2$
$y = 2x + 5$

.....

.....

Q21

(Total 6 marks)

TOTAL FOR PAPER: 100 MARKS

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