Centre No.						Paper Reference							Surname	Initials
Candidate No.						4	4	0	0	/	4	H	Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Tuesday 10 November 2009 – 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.
Without sufficient working, correct answers may be awarded no marks.
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 22 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.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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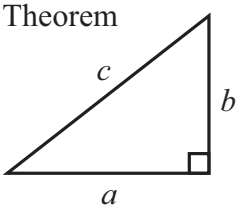
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

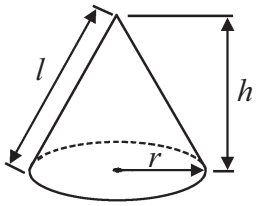
Pythagoras' Theorem



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

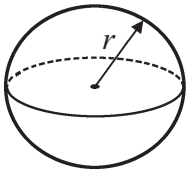
Volume of cone = $\frac{1}{3}\pi r^2 h$

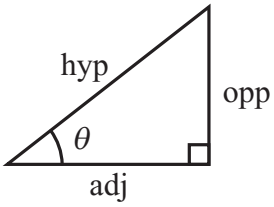
Curved surface area of cone = $\pi r l$



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

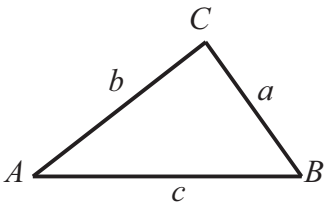
or

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

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

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

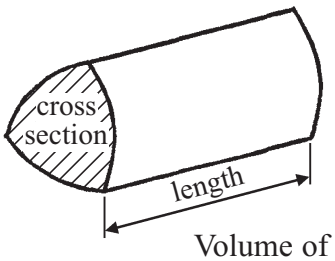
In any triangle ABC



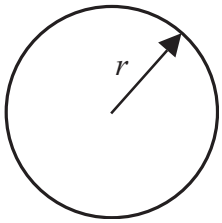
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



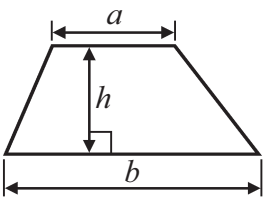
Volume of prism = area of cross section × length

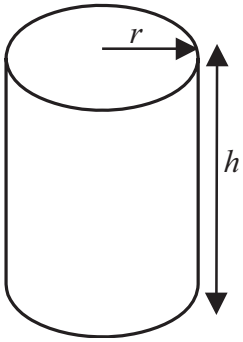


Circumference of circle = $2\pi r$

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

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

Answer ALL TWENTY TWO questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Use your calculator to work out the value of $\dfrac{11.7+18.4^2}{0.3}$

Write down all the figures on your calculator display.

.....

Q1

(Total 2 marks)

2. (a) Factorise $n^2 - 4n$

.....

(2)

(b) Solve $8 - 5x = 2$

$x =$ .....

(3)

Q2

(Total 5 marks)

3.

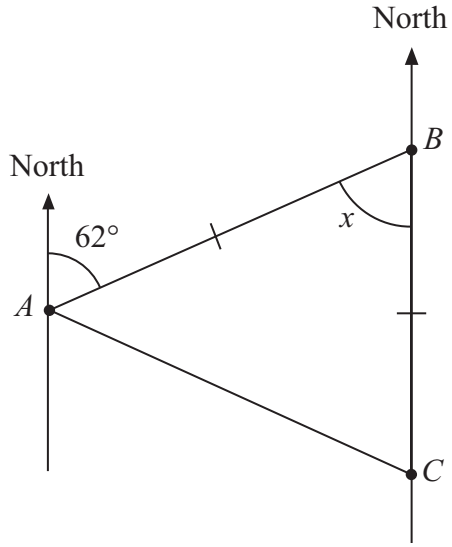


Diagram **NOT** accurately drawn

The bearing of B from A is 062°.
C is due south of B.
$AB = CB$.

(a) (i) Find the size of angle x.

.....°

(ii) Give a reason for your answer.

.....

(2)

(b) Work out the bearing of C from A.

.....°

(2) **Q3**

(Total 4 marks)

4. A bag contains some beads.
The colour of each bead is red or green or blue.
Binita is going to take a bead at random from the bag.
The probability that she will take a red bead is 0.4
The probability that she will take a green bead is 0.5

(a) Work out the probability that she will take a blue bead.

.....
(2)

(b) There are 80 beads in the bag.
Work out the number of red beads in the bag.

.....
(2) **Q4**

(Total 4 marks)

5. (a) Cheng invested 3500 dollars.
At the end of one year, interest of 161 dollars was added to his account.

Express 161 as a percentage of 3500

..... %
(2)

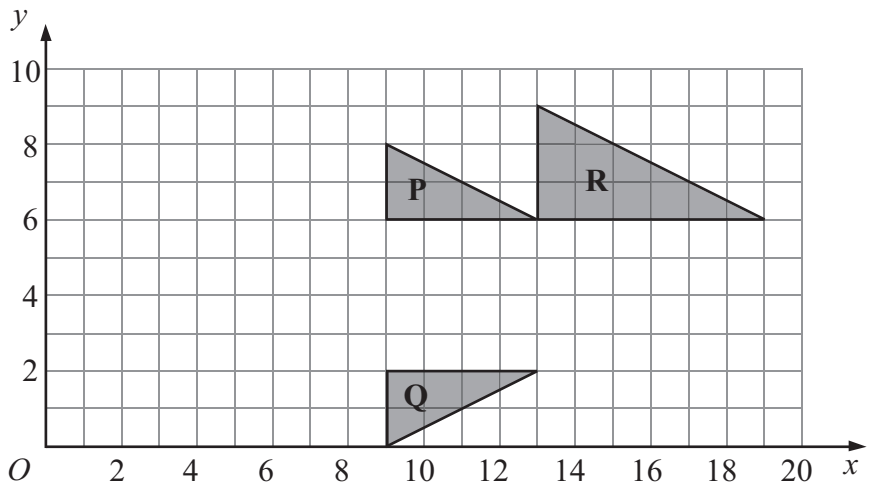
(b) Lian invested an amount of money at an interest rate of 5.2% per year.
After one year, she received interest of 338 dollars.

Work out the amount of money Lian invested.

..... dollars
(3) **Q5**

(Total 5 marks)

6.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

.....

(3) **Q6**

(Total 5 marks)

7. Carlos mixes cement, lime and sand in the ratios 1 : 2 : 9 by weight.

Work out the weight of cement, the weight of lime and the weight of sand in 60 kg of the mixture.

cement ..... kg

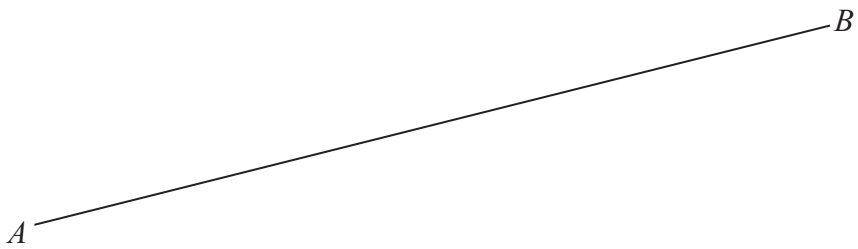
lime ..... kg

sand ..... kg

Q7

(Total 3 marks)

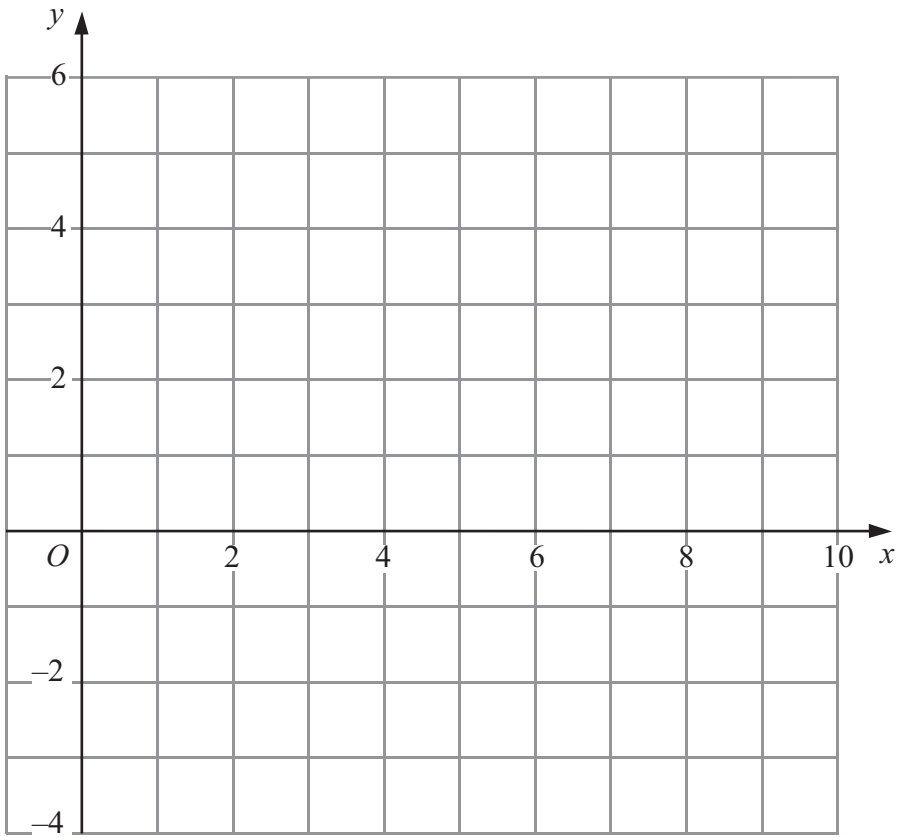
8. Use ruler and compasses to construct the perpendicular bisector of the line AB.
You must show all construction lines.



Q8

(Total 2 marks)

9. (a) On the grid, draw the graph of $2x - 3y = 6$ from $x = 0$ to $x = 9$



(2)

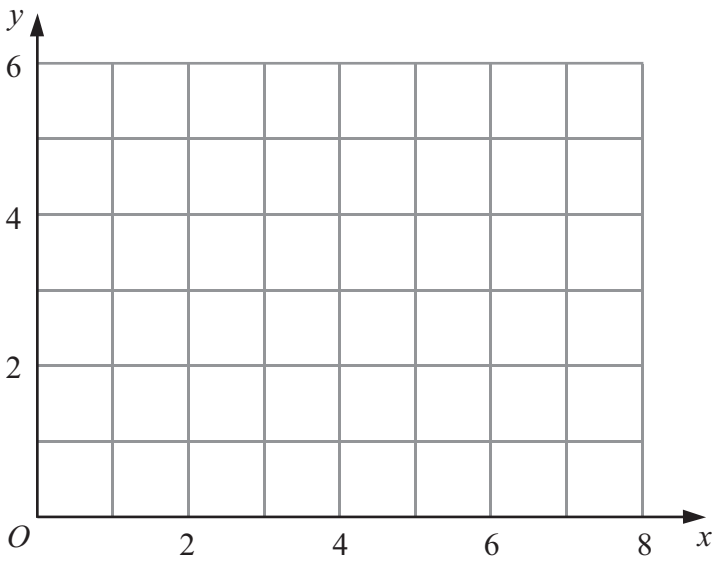
(b) On the grid, show by shading the region which satisfies the inequalities

$3 \leqslant x \leqslant 6$

and

$2 \leqslant y \leqslant 4$

Label your region **R**.



(3) **Q9**

(Total 5 marks)

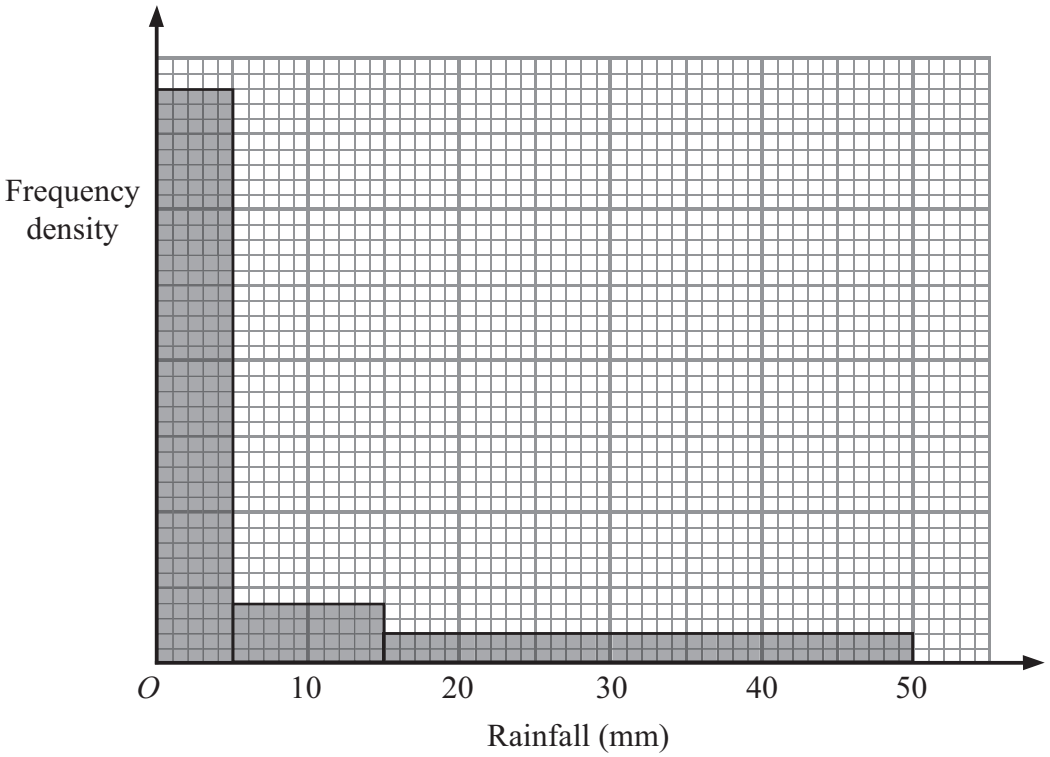
10. (a) The table shows information about the rainfall in Singapore in December one year.

Rainfall (d mm)	Number of days
$0 \leqslant d < 10$	23
$10 \leqslant d < 20$	3
$20 \leqslant d < 30$	2
$30 \leqslant d < 40$	3

Work out an estimate for the total rainfall in December.

..... mm
(3)

(b) The histogram shows information, for the same year, about the rainfall in Singapore in November, which has 30 days.
The rainfall was less than 50 mm every day in November.



Complete the table.

Rainfall (d mm)	Number of days
$0 \leqslant d < 5$	.....
$5 \leqslant d < 15$	.....
$15 \leqslant d < 50$	.....

(3) **Q10**

(Total 6 marks)

11. (a) Find the Highest Common Factor of 64 and 80

.....

(2)

(b) Find the Lowest Common Multiple of 64 and 80

.....

(2) **Q11**

(Total 4 marks)

12. (a) Expand and simplify $(p + 7)(p - 4)$

.....

(2)

(b) Simplify $4x^3y^5 \times 3x^2y$

.....

(2)

(c) Simplify $(27q^6)^{\frac{2}{3}}$

.....

(2) **Q12**

(Total 6 marks)

13.

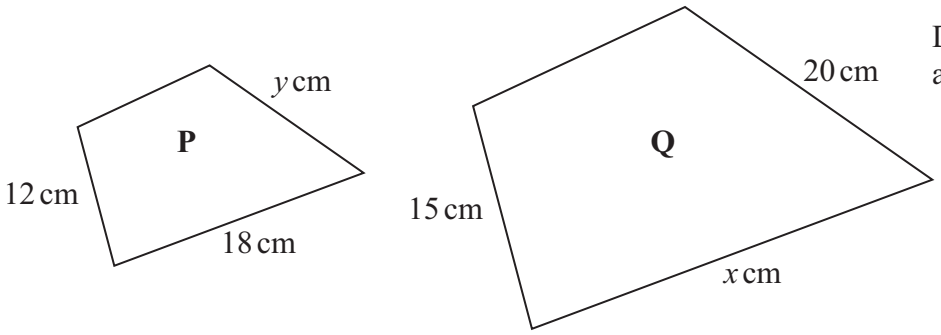


Diagram **NOT** accurately drawn

Quadrilateral **P** is mathematically similar to quadrilateral **Q**.

(a) Calculate the value of x.

x = ...

(2)

(b) Calculate the value of y.

y = ...

(2)

Q13

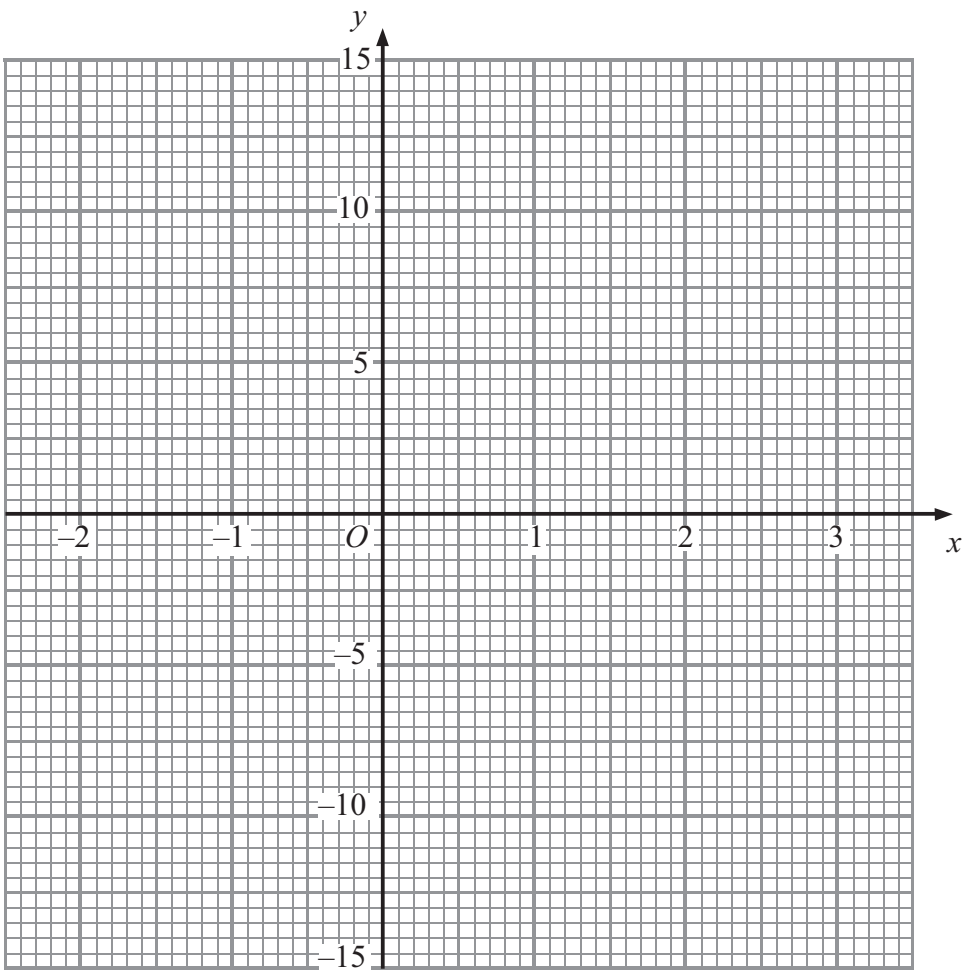
(Total 4 marks)

14. (a) Complete the table of values for $y = x^3 - 3x^2 + 12$

x	–2	–1	0	1	2	3
y		8				

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 12$



(2) **Q14**

(Total 4 marks)

15.

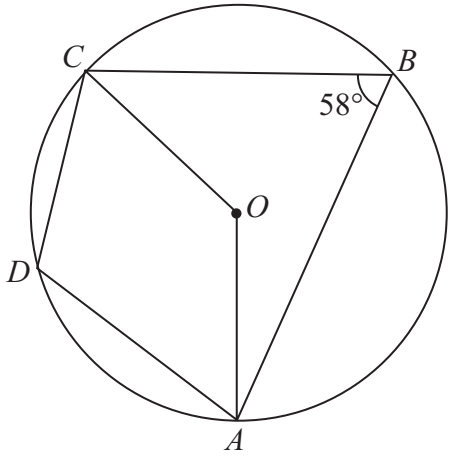


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
Angle *ABC* = 58°.

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

.....°

(ii) Give a reason for your answer.

.....

.....

(2)

(b) (i) Calculate the size of angle *ADC*.

.....°

(ii) Give a reason for your answer.

.....

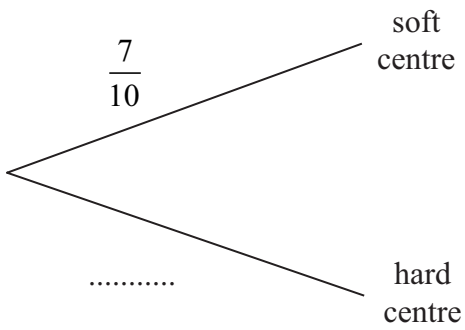
.....

(2) **Q15**

(Total 4 marks)

16. There are 10 chocolates in a box.
7 of the chocolates have soft centres and 3 of the chocolates have hard centres.
Kyla takes at random a chocolate from the box and eats it.
She then takes at random another chocolate from the box and eats it.

(a) Complete the probability tree diagram.



(2)

(b) Calculate the probability that at least one of the chocolates Kyla eats has a hard centre.

.....

(3)

Q16

(Total 5 marks)

17.

$$T = \frac{n(1+e)}{(1-e)}$$

(a) Work out the value of T when $n = 8.6$ and $e = 0.2$

$T =$ .....

(2)

(b) Make e the subject of the formula $T = \frac{n(1+e)}{(1-e)}$

$e =$ .....

(5) **Q17**

(Total 7 marks)

18.

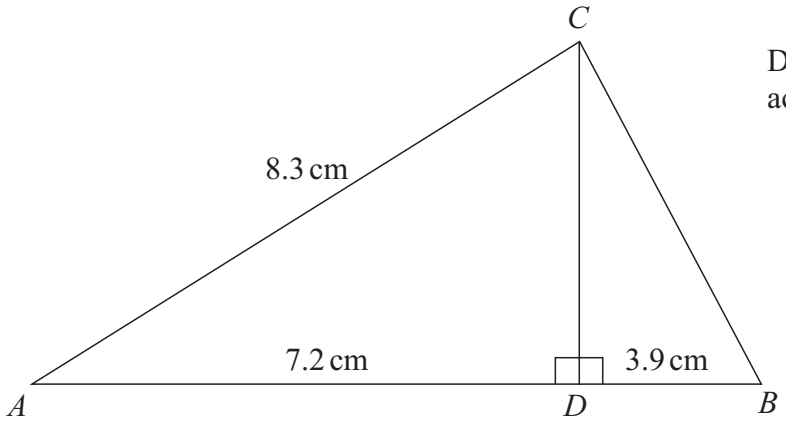


Diagram **NOT** accurately drawn

ABC is a triangle.
D is a point on *AB*.
CD is perpendicular to *AB*.
AD = 7.2 cm, *DB* = 3.9 cm, *AC* = 8.3 cm.

Calculate the size of angle *DBC*.
Give your answer correct to 1 decimal place.

..... °

Q18

(Total 5 marks)

19. A particle moves in a straight line through a fixed point O.
The displacement, s metres, of the particle from O at time t seconds is given by

$$s = t^3 - 5t^2 + 8$$

(a) Find an expression for the velocity, v m/s, of the particle after t seconds.

$v =$ .....

(2)

(b) Find the time at which the acceleration of the particle is $20\,\text{m/s}^2$.

..... seconds

(2)

Q19

(Total 4 marks)

20. P and Q are two sets.
$n(P) = 9$ and $n(Q) = 5$

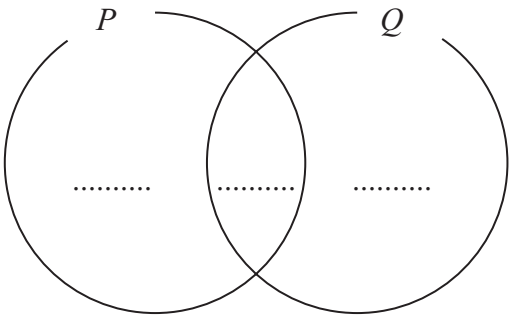
(a) Find the value of $n(P \cup Q)$ when $P \cap Q = \emptyset$

$n(P \cup Q) =$ .....
(1)

(b) Find the value of $n(P \cup Q)$ when $Q \subset P$

$n(P \cup Q) =$ .....
(1)

(c) (i) Complete the Venn Diagram to show **numbers** of elements when $n(P \cap Q) = 3$



(ii) Find the value of $n(P \cup Q)$ when $n(P \cap Q) = 3$

$n(P \cup Q) =$ .....
(3)

Q20

(Total 5 marks)

21.

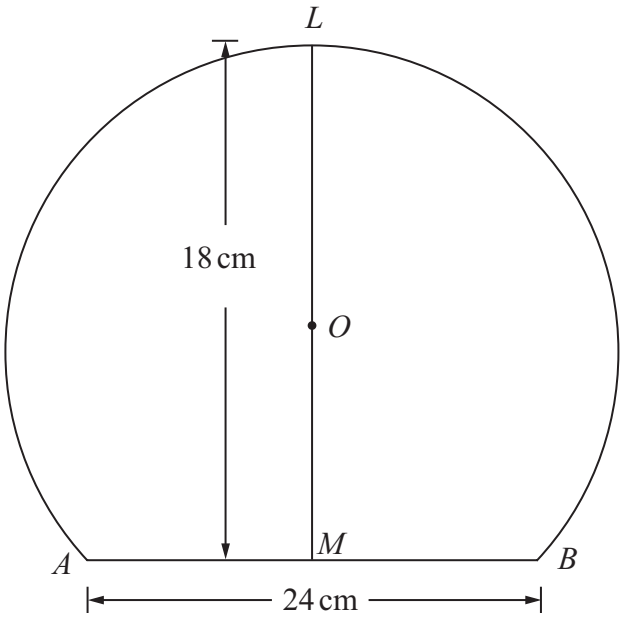


Diagram **NOT** accurately drawn

A, *B* and *L* are points on a circle, centre *O*.
AB is a chord of the circle.
M is the midpoint of *AB*.
LOM is a straight line.
AB = 24 cm.
LM = 18 cm.

Calculate the diameter of the circle.

..... cm

Q21

(Total 4 marks)

22. Solve the simultaneous equations

$$y - 3x = 4$$

$$x^2 + y^2 = 34$$

.....

Q22

(Total 7 marks)

TOTAL FOR PAPER: 100 MARKS

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