

Index Number	Class	Name
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CHIJ ST JOSEPH'S CONVENT
Semestral Assessment 2

Mathematics	4017/01
Paper 1	13 th October 2006
Secondary Two Express	1 hour

INSTRUCTIONS FOR CANDIDATES

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If working is needed for any question it must be shown in the space below that question

Omission of essential working or units may result in loss of marks.

Working in pencil will not be marked.

Answer all questions.

Write your answers in the spaces provided on the question paper.

If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degree should be given to one decimal place.

FOR EXAMINER'S USE	
Q1 – 7	15
Q8 – 13 (Algebra)	17
Q14 – 17	18
Total	50

This document consists of 12 printed pages (including this page).

Setter: Ms Evonne Koh

1. Evaluate

(a) $1\frac{5}{8} \div 6$

(b) $\sqrt{0.0009}$

Ans: (a) _____ [1]

(b) _____ [1]

2. Express

(a) 56% as a fraction in its lowest terms,

(b) $\frac{5}{9}$ as a decimal, giving your answer as a recurring decimal.

Ans: (a) _____ [1]

(b) _____ [1]

3. (a) Write down the next two terms in the sequence 2, 5, 8, 11, 14,
- (b) Write down, an expression, in terms of n , for the n th term of the sequence in (a)

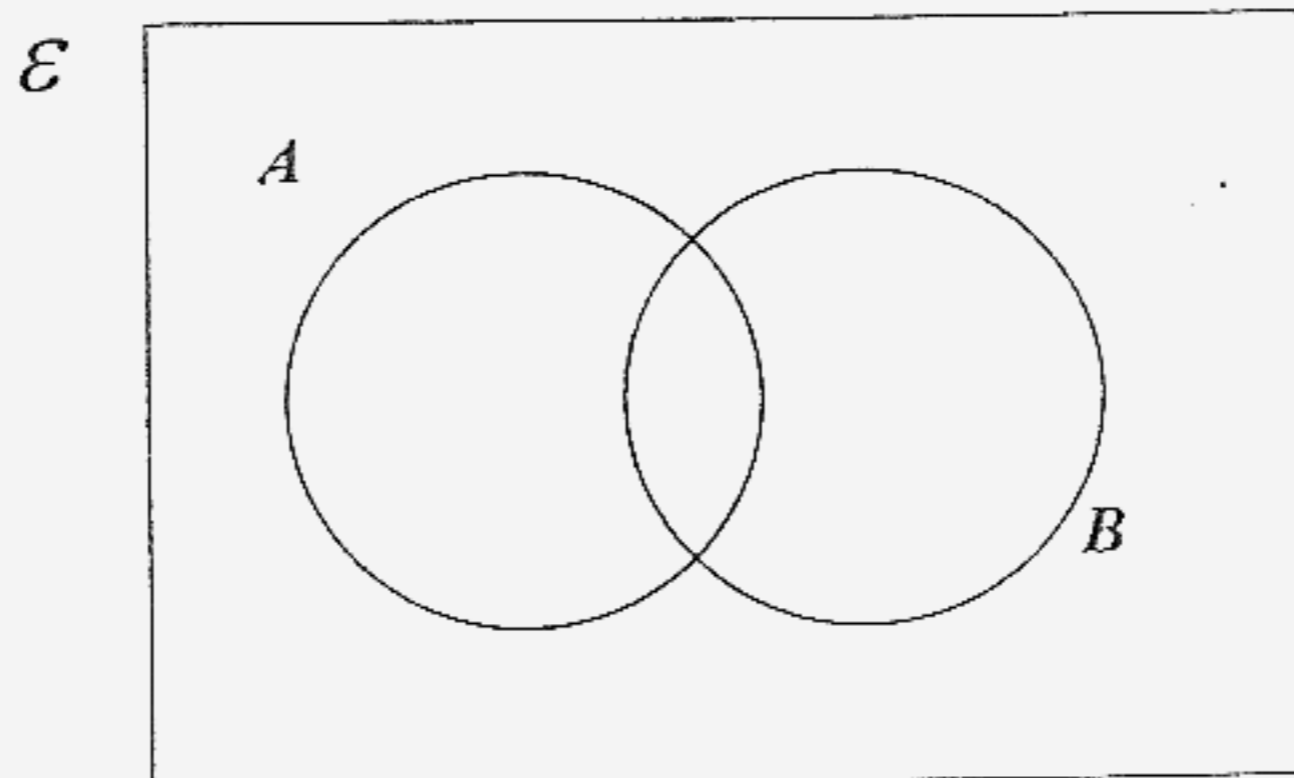
Ans: (a) _____ [1]

(b) _____ [1]

4. The temperatures at midnight over a week in India were -1°C , 3.5°C , -2.5°C , 0°C , 1.5°C , 4°C , 7°C
- Find the difference between the highest and lowest temperature.

Ans: _____ $^{\circ}\text{C}$ [1]

5. Given that \mathcal{E} is the universal set and $A \cap B \neq \phi$, shade the set $A' \cap B$ in the venn diagram below. [2]



6. An overnight train took 9 hours 35 minutes to cover a distance of 805 km. It arrives at its destination at 05 20 the next day. Find
- the time at which the train started its journey,
 - the average speed of the train, giving your answer in kilometres per hour.

Ans: (a) _____ [1]

(b) _____ km/h [2]

7. On a map, a length of 4 cm represents an actual distance of 3 km.
- Write down the scale of the map in the form of $1 : n$.
 - A plot of land covers an area of 18 square kilometers. Find, in square centimeters, the area representing the plot of land on the map.

Ans: (a) _____ [1]

(b) _____ cm^2 [2]

8. Solve $3m^2 - 2m - 5 = 0$.

Ans: $m =$ _____ [2]

9. If $x + y = 39$ and $xy = -7$, find the value of $2(x - y)$.

Ans: _____ [2]

10. Factorize completely,

(a) $a^4 - 81$,

(b) $2px + 4py - 8qx - 16qy$.

Ans (a): _____ [2]

(b): _____ [3]

11. Express, as a single fraction, in its simplest form

$$\frac{3}{x-3} + \frac{5x}{3-x}$$

Ans: _____ [2]

12. It is given that $q = \frac{1+2p}{2p}$

- (a) If $p = -2$, calculate the value of q , giving your answer as a fraction in its lowest term.
(b) Express p in terms of q .

Ans: (a) $q =$ _____ [1]

(b) $p =$ _____ [2]

13. Solve the following simultaneous equations

$$5x - 3y = 3,$$

$$2x + 7y = -7.$$

Ans: $x = \underline{\hspace{2cm}}$, $y = \underline{\hspace{2cm}}$ [3]

14. Of the 42 students in a class, 27 like to play Maples Story and 19 like to play WarCraft.

It is given that

\mathcal{E} = students in the class ,

M = students who like to play Maple Story ,

W = students who like to play WarCraft .

(i) Let $n(M \cap W) = x$, draw a Venn diagram to illustrate this information. [2]

(ii) Hence, find the value of x .

(iii) Find the largest possible value of x .

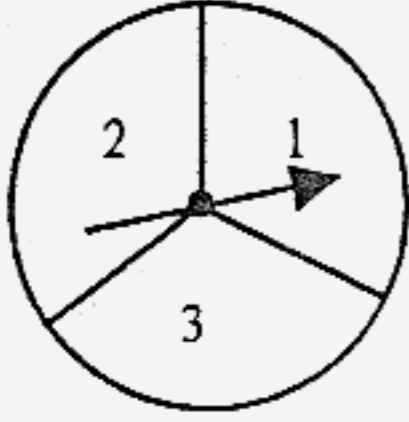
Ans: (ii) $x =$ _____ [2]

(iii) $x =$ _____ [1]

15. The table below shows the sum of the scores of spinning a circular card spinner twice.

Complete the table below.

[2]



	Score 1	Score 2	Score 3
Score 1	2	3	4
Score 2	3		5
Score 3	4	5	

From the above table, find the probability that the sum of the resulting scores is

- (a) 2,
- (b) odd,
- (c) at least 4.

Ans: (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

16. Audrey has $3x$ books. Bernice has 4 less books than Audrey. Candice has half as many books as Bernice.

- (a) Write down an expression, in terms of x , for the number of books that Candice has.
- (b) The total number of books is 129. Find the number of books that Bernice has.

Ans: (a) _____ [1]

(b) _____ [3]

17. The line $x + ky = 18$ has a gradient of $-\frac{1}{6}$.

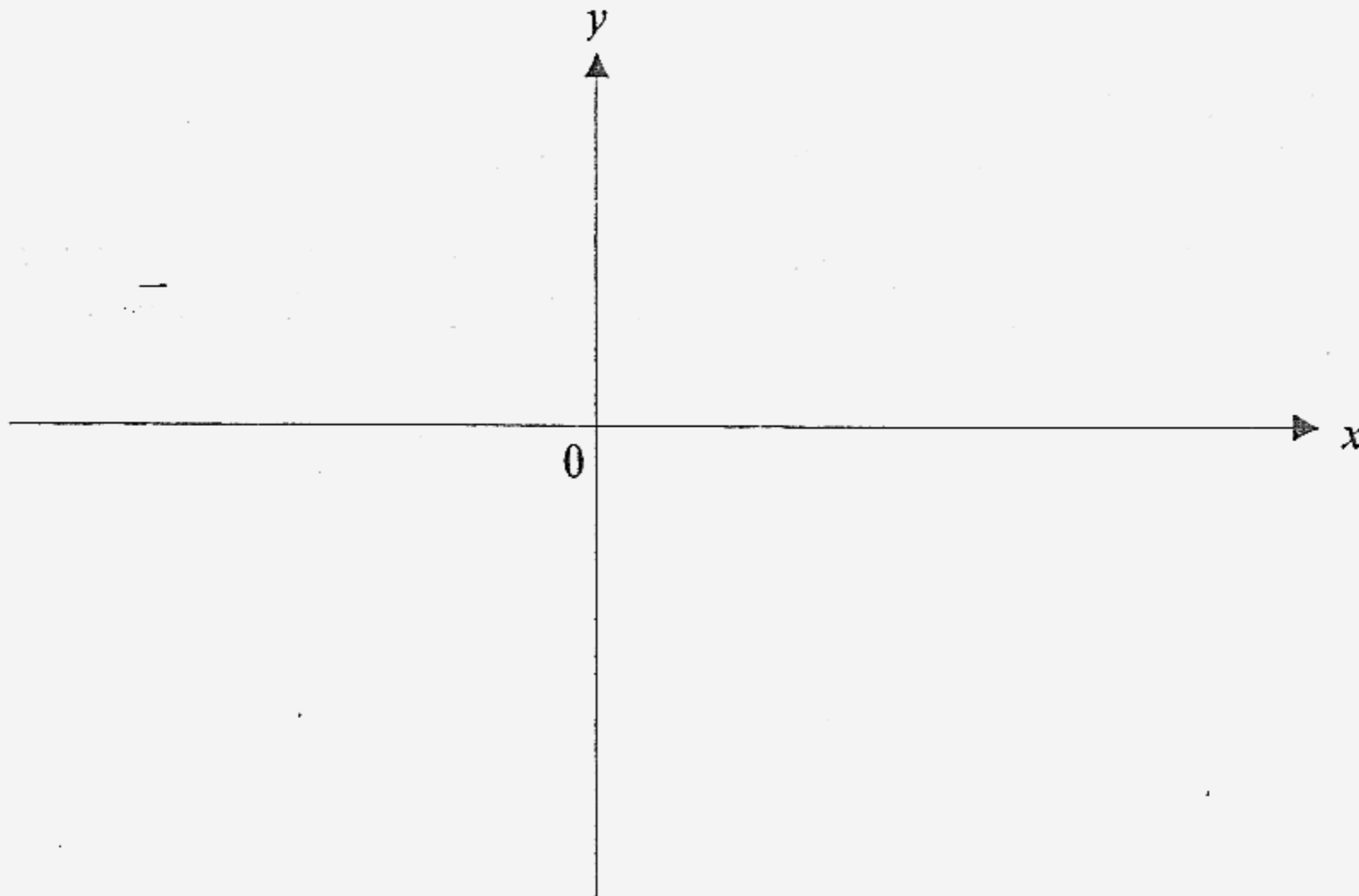
- (a) Find the value of k .
- (b) What is the y -intercept of this line?
- (c) Find the value of x when $y = 0$.

Ans:(a) $k =$ _____ [1]

(b) _____ [1]

(c) $x =$ _____ [1]

- (d) Sketch the graph of the line on the axes provided, labeling the graph and both x - and y -intercepts clearly. [1]



THE END

Index Number	Class	Name
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CHIJ ST JOSEPH'S CONVENT
Semestral Assessment 2

Mathematics	4017/02
Paper 2	13 th October 2006
Secondary Two Express	1 hour 30 minutes

INSTRUCTIONS FOR CANDIDATES

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Write in dark blue or black pen.

You may use soft pencil for any diagrams, graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

The use of calculators is allowed in this paper.

Show all your working on the same page as the rest of the answer,

Omission of essential working or units may result in loss of marks.

Working in pencil will not be marked.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer **either** question 9 or 10.

Write your answers in the spaces provided on the question paper.

If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degree should be given to one decimal place.

For π , use either your calculator value or 3.142, unless the question requires the answer in terms of π .

FOR EXAMINER'S USE	
Section A (Q2 – Q3)	9
Section A (All)	42
Section B	8
TOTAL	50

This document consists of 14 printed pages (including this page).

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Section A (42 marks)**Answer all questions in this section.**

1. If the interior angle of a regular polygon is x° , the exterior angle is $\left(\frac{x-60}{4}\right)^\circ$. Find

(a) the value of x , and

(b) the number of sides in the polygon.

Ans:(a) $x =$ _____ [2]

(b) _____ sides [2]

2. Vincent was travelling from Town A to Town B on his van at a speed of x km/h. On his return trip he increased his speed by 10 km/h.
- (a) If the distance between the two towns is 400 km, form an algebraic expression for the time taken when travelling from Town A to B .
- (b) Form an algebraic expression for the time taken for his return journey.
- (c) Vincent found that he had reduced his travelling time by 2 hours on his return trip. Form an equation in terms of x and show that it reduces to $x^2 + 10x - 2000 = 0$.
- (d) Hence, solve the equation.

Ans: (a) _____ km/h [1]

(b) _____ h [1]

(c) Shown in space provided [3]

(d) $x =$ _____ [3]

3. If each pupil in a class sends a Christmas card to every classmate, the total number of cards sent by all pupils will be 870. Find the number of pupils in the class.

Ans: _____ pupils [3]

4. It takes 12 men to make 9 cupboards in 4 days. How long will it take 4 men to make 24 cupboards?

Ans: _____ days [2]

5. The following are the heights (cm) obtained by a class of 30 during a health check.

155	156	157	160	162
165	155	158	162	162
151	169	170	166	161
153	168	163	164	158
160	171	170	165	159
156	157	161	163	167

(a) Some of the heights are represented in a stem-and-leaf diagram below.

Complete the stem-and-leaf diagram for this data.

[2]

15		1 3
16		0
17		0

(b) What percentage of the students are taller than 158 cm?

(Leave your answer in fraction.)

(c) What is the mean height in cm? (Correct your answer to 3 significant figures.)

(d) What is the mode of this data?

(e) What is the median of this data? (Correct your answer to 1 decimal place.)

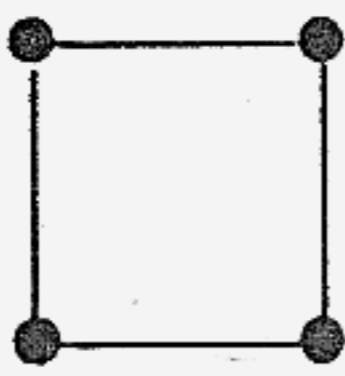
Ans: (b) _____ % [2]

(c) _____ cm [2]

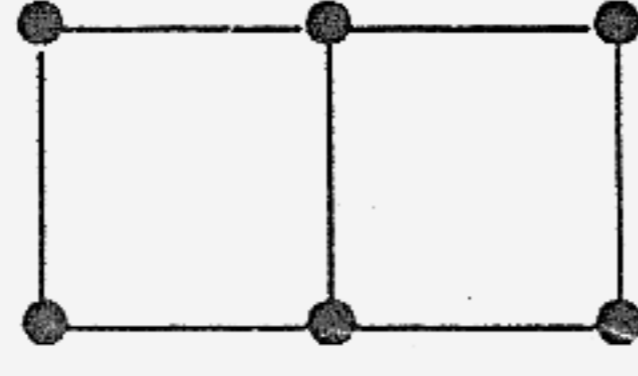
(d) _____ cm [1]

(e) _____ cm [1]

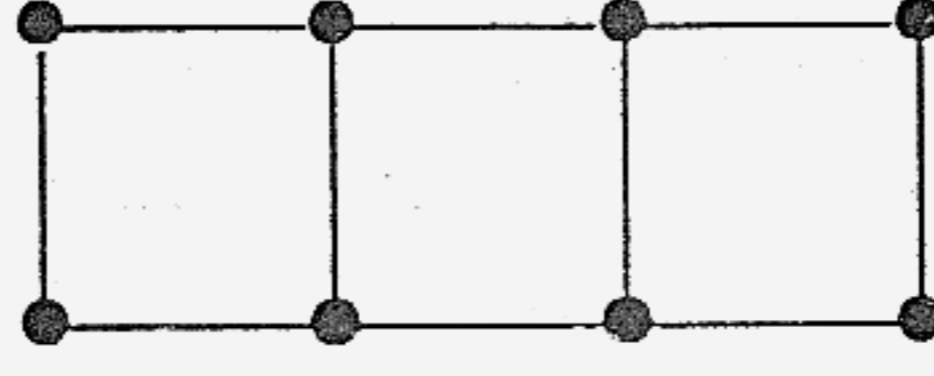
6. Sticks are arranged to form squares as shown below.



A square



A row of 2 squares



A row of 3 squares

(a) Complete the table below.

[2]

No. of squares (S)	No. of sticks (M)	No. of dots (D)
1	4	4
2	7	6
3	10	8
4		
5		
s	m	d

- (b) How many sticks are needed to form a row of 21 squares?
- (c) How many dots will you get if you have 34 sticks?
- (d) To form s squares, we need to use m sticks and get d dots. Write down a formula
- connecting m and s , and
 - connecting d and s .

Ans: (b) _____ sticks [1]

(c) _____ dots [2]

(d) (i) _____ [1]

(ii) _____ [1]

8. Answer the whole of this question on a piece of graph paper

(a) Copy and complete the following table of values for $y = 5 + 4x - x^2$ [2]

x	-2	-1	0	1	2	3	4	5
y	-7		5	8	9		5	0

(b) On a graph paper, using a scale of 2 cm to represent 1 unit on the x -axis and 1 cm to represent 1 unit on the y -axis, draw the graph of $y = 5 + 4x - x^2$ for $-2 \leq x \leq 5$. [3]

(c) Use your graph,

(i) find the greatest value of y , [1](ii) find values of x when $y = 6$, [2](iii) solve the equation $5 + 4x - x^2 = x$. [2]

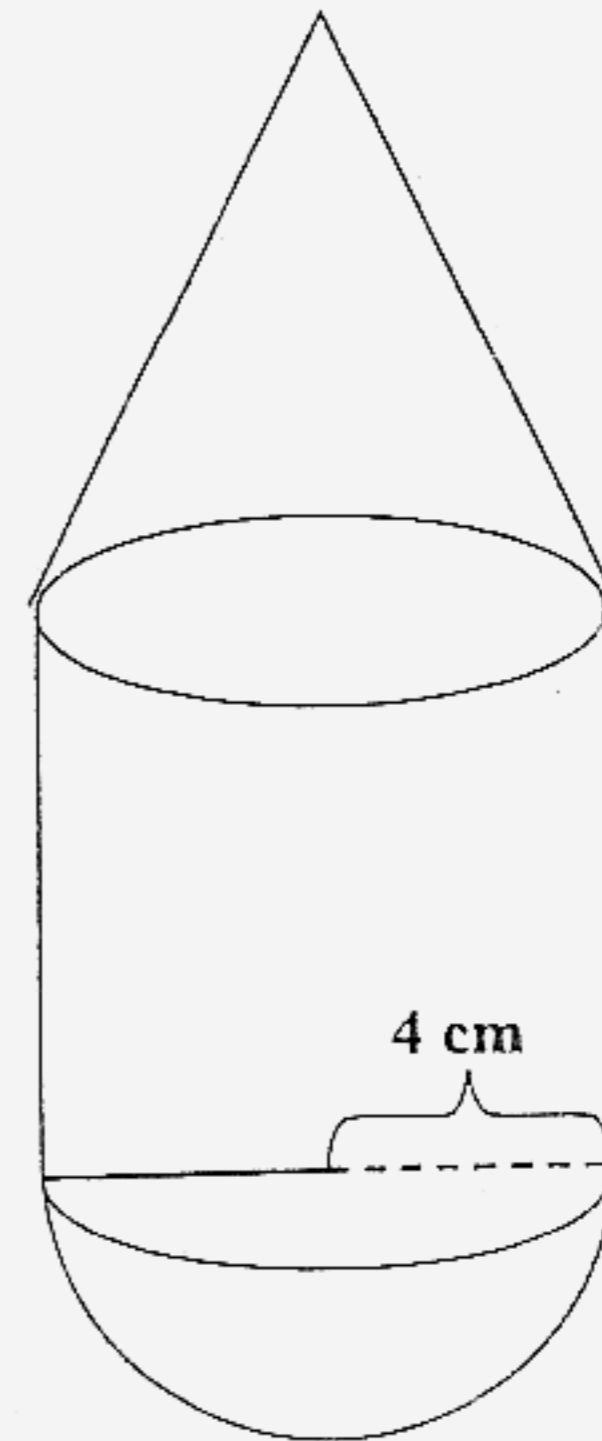
Section B (8 marks)

Answer only ONE question

9.(a) [Volume of sphere = $\frac{4}{3} r^3$; Volume of cone = $\frac{1}{3} r^2 h$; Volume of cylinder = $r^2 h$]

The diagram shows a solid consisting of a cone, a cylinder and a hemisphere. The base radius is 4cm and both the cone and cylinder has a common height measurement. The ratio of the volumes of the cone, the cylinder and the sphere is 6: 27: 4. Find the height of the cone and cylinder

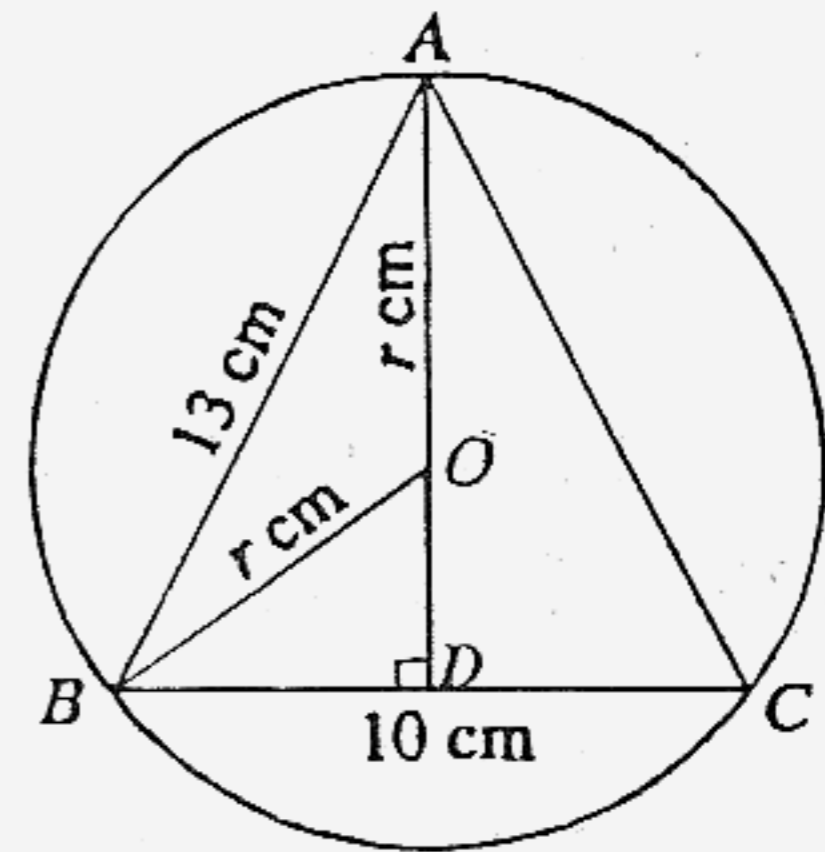
THERE IS SOMETHING WRONG WITH THIS QUESTION. HENCE THE ANSWER IS NOT ACCURATE



Ans: (a) _____ cm [4]

9 (b) An isosceles triangle ABC is inscribed in a circle with centre O .

If $AB = AC = 13$ cm and $BC = 10$ cm, find the radius, r cm, of the circle.



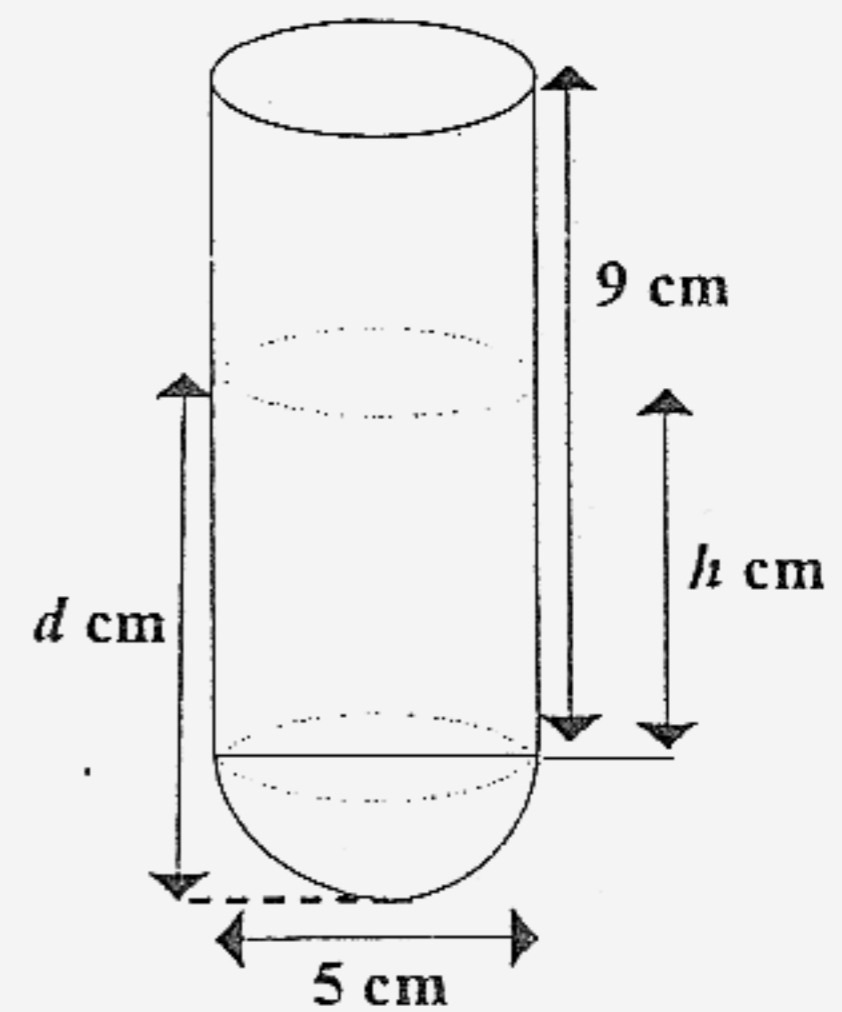
Ans: _____ cm [4]

10. [Volume of sphere = $\frac{4}{3} r^3$; Surface area of sphere = $4 r^2$; Volume of cylinder = $r^2 h$]

A boiling tube consists of a hemisphere of radius 2.5 cm attached to a cylinder of the same radius and height 9 cm. The boiling tube is filled with water to a depth of d cm as shown in the diagram below.

- (a) Given that the volume of water in the boiling tube is 130 cm^3 , calculate
- the height, h cm, of the water in the cylinder, and
 - the value of d .
- (b) Calculate the exterior surface area of the boiling tube.
- (c) If the height of the cylinder is increased by 10%, calculate the percentage increase in its exterior surface area.

(Take $\pi = 3.142$)



Note: Write your answers on the next page and you may use the space provided for your working.

Ans: (a) (i) _____ cm [3]

(ii) _____ cm [1]

(b) _____ cm² [1]

(c) _____ cm² [3]

T H E E N D

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FOR EXAMINER'S USE
50

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Setter: Ms Evonne Koh

1. Evaluate

(a) $1\frac{5}{8} \div 6$

(b) $\sqrt{0.0009}$

Answer:

(a) $\frac{13}{8} \times \frac{1}{6} = \frac{13}{48}$

(b) $\sqrt{0.0009} = \sqrt{0.03 \times 0.03}$
 $= 0.03$

Ans: (a) _____ $\frac{13}{48}$ _____ [1]

(b) _____ 0.03 _____ [1]

2. Express

(a) 56% as a fraction in its lowest terms,

(b) $\frac{5}{9}$ as a decimal, giving your answer as a recurring decimal.

(a) $56\% = \frac{56}{100}$
 $= \frac{14}{25}$

A1

(b) $9 \overline{)5.0000}$

$= 0.\dot{5}$

A1

Ans: (a) _____ $\frac{14}{25}$ _____ [1]

(b) _____ $0.\dot{5}$ _____ [1]

3. (a) Write down the next two terms in the sequence 2, 5, 8, 11, 14,
- (b) Write down, an expression, in terms of n , for the n th term of the sequence in (a)

Ans: (a) 17, 20 [1]

(b) $3n - 1$ [1]

4. The temperatures at midnight over a week in India were -1°C , 3.5°C , -2.5°C , 0°C , 1.5°C , 4°C , 7°C

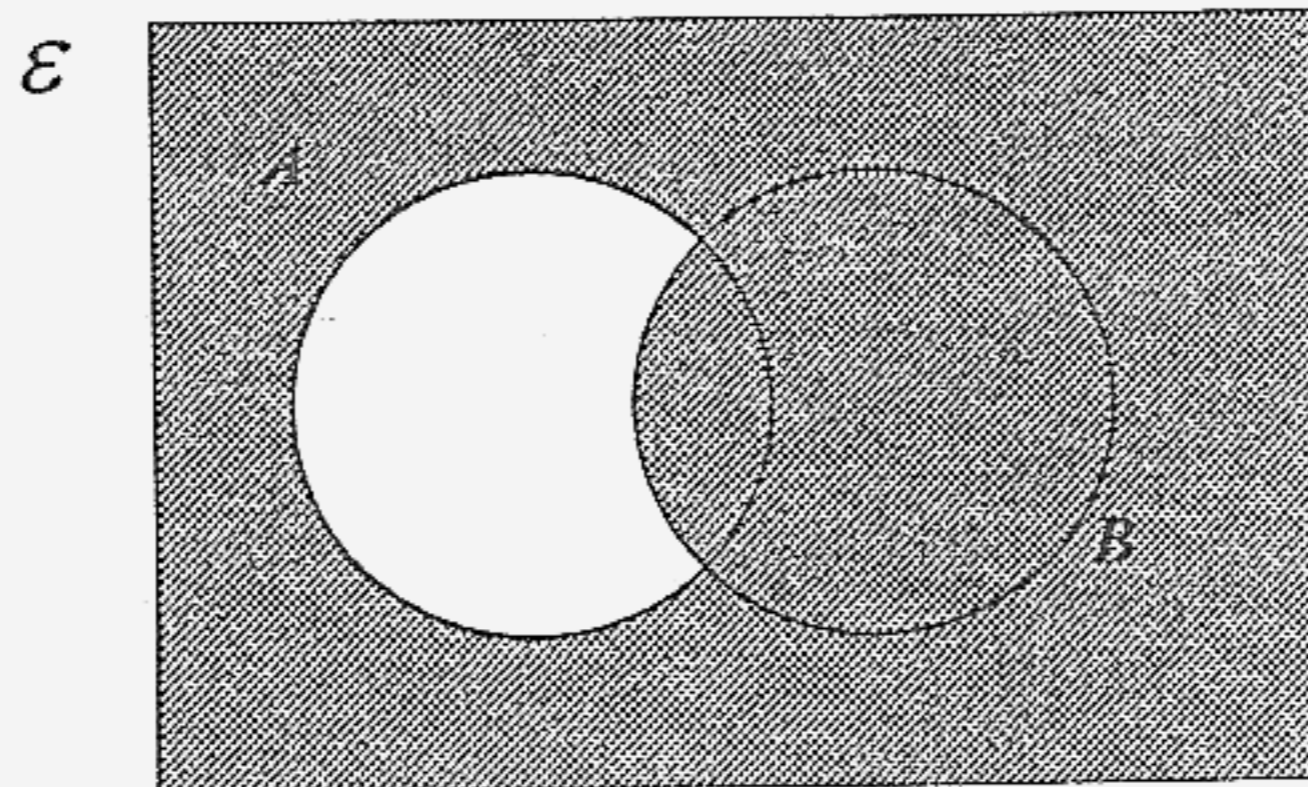
Find the difference between the highest and lowest temperature.

Answer:

$$\begin{aligned} \text{Difference} &= 7^{\circ}\text{C} - (-2.5^{\circ}\text{C}) \\ &= 9.5^{\circ}\text{C} \end{aligned}$$

Ans: 9.5 $^{\circ}\text{C}$ [1]

5. Given that ε is the universal set and $A \cap B \neq \phi$, shade the set $A' \cap B$ in the venn diagram below. [2]



6. An overnight train took 9 hours 35 minutes to cover a distance of 805 km. It arrives at its destination at 05 20 the next day. Find
- (a) the time at which the train started its journey,
- (b) the average speed of the train, giving your answer in kilometres per hour.

Answer:

(a) 0520 h = 2920 h

(b) $S = \frac{D}{T}$

$= 805 \div 9 \frac{35}{60}$

$= 805 \times \frac{60}{575}$

$= 84 \text{ km/h}$

M1

A1

$$\begin{array}{r} 28\ 80 \\ \cancel{29\ 20} \\ - 09\ 35 \\ \hline 19\ 45 \end{array}$$

Ans: (a) 19 45 [1]

(b) 84 km/h [2]

7. On a map, a length of 4 cm represents an actual distance of 3 km.
- (a) Write down the scale of the map in the form of 1 : n.
- (b) A plot of land covers an area of 18 square kilometers. Find, in square centimeters, the area representing the plot of land on the map.

Answer:

(a)

4 cm	repr	3 km
4 cm	repr	300 000 cm
1 cm	repr	75 000 cm

A1

(b)

4 cm	repr	3 km
1 cm	repr	$\frac{3}{4}$ km
1 cm ²	repr	$\frac{9}{16}$ km ²
$\frac{16}{9}$ cm ²	repr	1 km ²
$\frac{16}{9} \times 18 = 32$ cm ²	repr	18 km ²

M1

A1

Ans: (a) 1 : 75 000 [1]

(b) 32 cm² [2]

8. Solve $3m^2 - 2m - 5 = 0$.

Answer:

$$3m^2 - 2m - 5 = 0$$

$$(3m - 5)(m + 1) = 0 \quad \text{M1}$$

$$\therefore m = \frac{5}{3} \quad \text{or } m = -1$$

$$= 1\frac{2}{3} \quad \text{A1}$$

Ans: $m = 1\frac{2}{3}$ or $m = -1$ [2]

9. If $x + y = 39$ and $xy = -7$, find the value of $2(x - y)$.

$$2(x - y)$$

$$= 2(x^2 - 2xy + y^2)$$

$$= 2[(x + y) - 2xy]$$

$$= 2[39 - 2(-7)] \quad \text{M1}$$

$$= 2[39 + 14]$$

$$= 106 \quad \text{A1}$$

Ans: 106 [2]

10. Factorize completely,

(a) $a^4 - 81$,

(b) $2px + 4py - 8qx - 16qy$.

ANSWER:

(a) $a^4 - 81 = (a^2)^2 - (9)^2$

$= (a^2 + 9)(a^2 - 9)$

$= (a^2 + 9)(a + 3)(a - 3)$

M1

A1

(b) $2px + 4py - 8qx - 16qy$

$= 2(px + 2py - 4qx - 8qy)$

$= 2[p(x + 2y) - 4q(x + 2y)]$

$= 2(x + 2y)(p - 4q)$

M1

M1

A1

Ans (a): _____ [2]

(b): _____ $2(x + 2y)(p - 4q)$ _____ [3]

11. Express, as a single fraction, in its simplest form

$$\frac{3}{x-3} + \frac{5x}{3-x}$$

ANSWER:

$$\frac{3}{x-3} + \frac{5x}{3-x}$$

$$= \frac{3}{x-3} - \frac{5x}{x-3}$$

$$= \frac{3-5x}{x-3}$$

M1

A1

Ans: _____ $\frac{3-5x}{x-3}$ _____ [2]

12. It is given that $q = \frac{1+2p}{2p}$

(a) If $p = -2$, calculate the value of q , giving your answer as a fraction in its lowest term.

(b) Express p in terms of q .

ANSWER:

(a) $q = \frac{1+2(-2)}{2(-2)}$ ————— M1

$$= \frac{1-4}{-4}$$

$$= \frac{3}{4}$$
 ————— A1

(b) $q = \frac{1+2p}{2p}$

$$2pq = 1+2p$$
 ————— M1

$$2pq - 2p = 1$$

$$2p(q-1) = 1$$

$$p = \frac{1}{2(q-1)}$$
 ————— A1

Ans: (a) $q = \frac{3}{4}$ [1]

(b) $p = \frac{1}{2(q-1)}$ [2]

13. Solve the following simultaneous equations

$$5x - 3y = 3, \quad \text{----- (1)}$$

$$2x + 7y = -7.$$

$$(1) \times 2: \quad 10x - 6y = 6 \quad \text{----- (3)}$$

$$(2) \times 2: \quad 10x + 35y = -35 \quad \text{----- (4)}$$

M1

$$(1) - (2): \quad -41y = 41 \quad \text{----- M1}$$

$$y = -1$$

$$\text{Sub } y = -1 \text{ into (1):} \quad 5x - 3(-1) = 3$$

$$5x + 3 = 3$$

$$x = 0$$

A1

$$\text{Ans: } x = \underline{0}, y = \underline{-1} \quad [3]$$

14. Of the 42 students in a class, 27 like to play Maples Story and 19 like to play WarCraft.

It is given that

\mathcal{E} = students in the class ,

M = students who like to play Maple Story ,

W = students who like to play WarCraft .

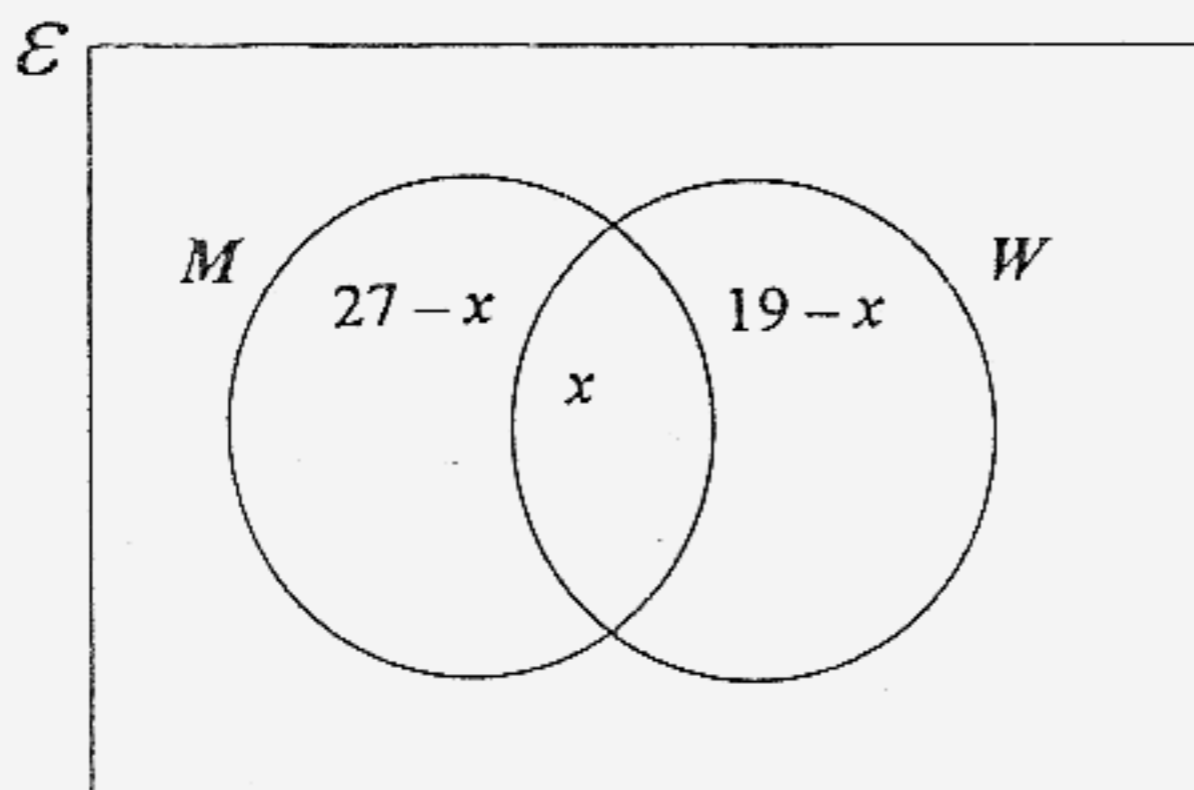
(i) Let $n(M \cap W) = x$, draw a Venn diagram to illustrate this information. [2]

(ii) Hence, find the value of x .

(iii) Find the largest possible value of x .

Answer:

(i)



(ii) $27 - x + x + 19 - x = 42$ —————

M1

— $x = 42 - 46$

$x = 4$ —————

A1

(iii) No working required

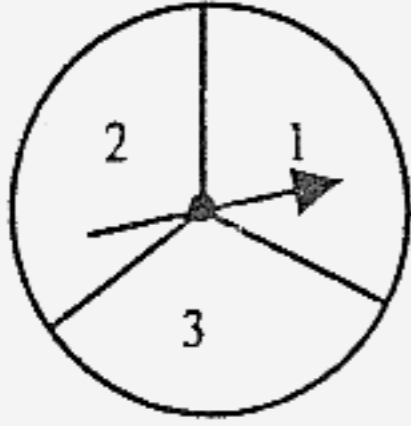
Ans: (ii) $x =$ 4 [2]

(iii) $x =$ 19 [1]

15. The table below shows the sum of the scores of spinning a circular card spinner twice.

Complete the table below.

[2]



	Score 1	Score 2	Score 3
Score 1	2	3	4
Score 2	3	<u>4</u>	5
Score 3	4	5	<u>6</u>

From the above table, find the probability that the sum of the resulting scores is

- (a) 2,
- (b) odd,
- (c) at least 4.

Ans: (a) $\frac{1}{9}$ [1]

(b) $\frac{4}{9}$ [1]

(c) $\frac{2}{3}$ [1]

16. Audrey has $3x$ books. Bernice has 4 less books than Audrey. Candice has half as many books as Bernice.

(a) Write down an expression, in terms of x , for the number of books that Candice has.

(b) The total number of books is 129. Find the number of books that Bernice has.

Answer:

(a) Audrey: $3x$

Bernice: $3x - 4$

Candice: $\frac{1}{2}(3x - 4)$

(b) $3x + 3x - 4 = \frac{3x - 4}{2} = 129$

$$\frac{15}{2}x = 135$$

$$x = 18$$

$$\begin{aligned} \text{Bernice: } 3x - 4 &= 3(18) - 4 \\ &= 50 \end{aligned}$$

Ans: (a) $\frac{1}{2}(3x - 4)$ [1]

(b) 50 [3]

17. The line $x + ky = 18$ has a gradient of $-\frac{1}{6}$.

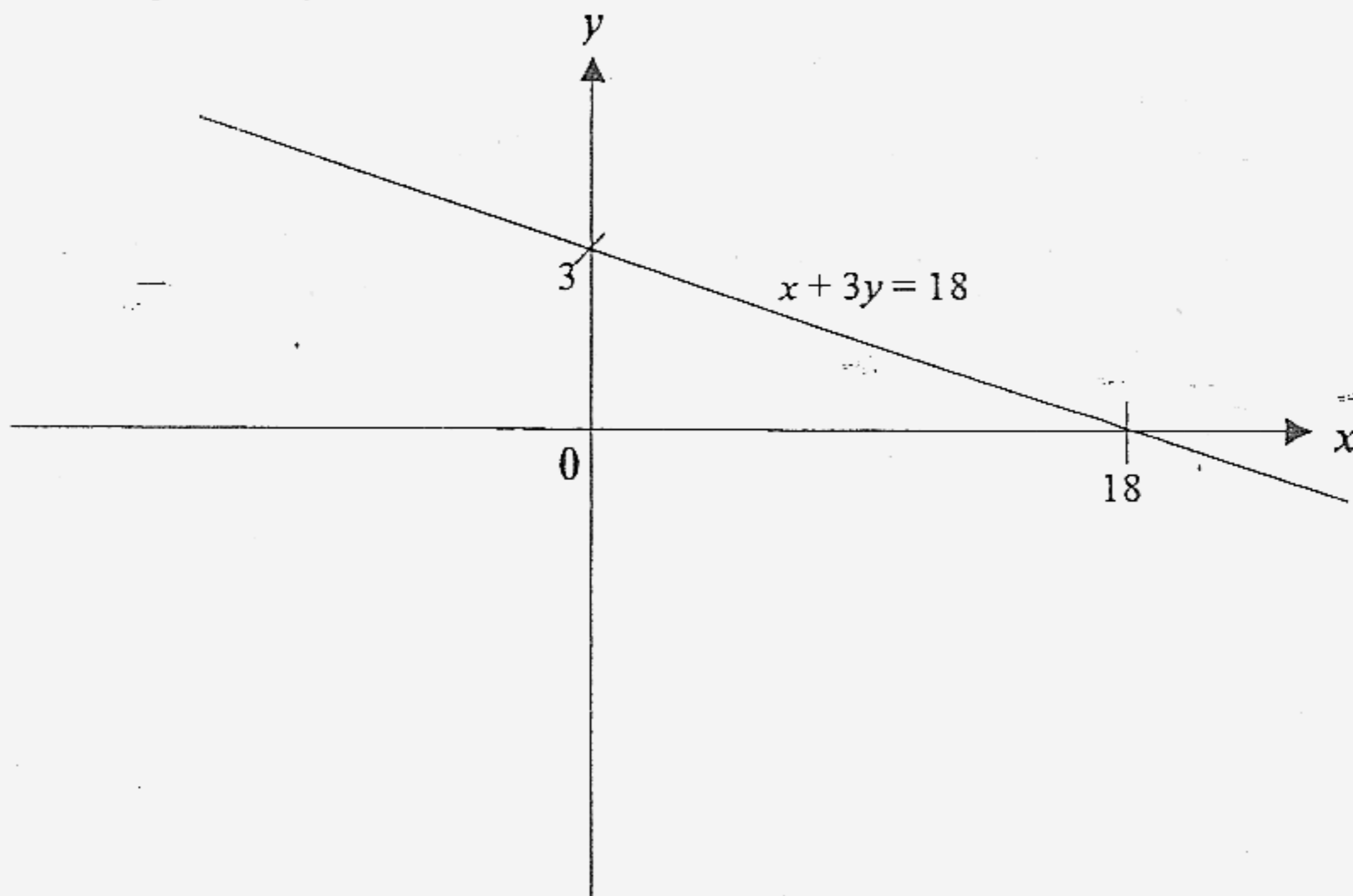
- (a) Find the value of k .
 (b) What is the y -intercept of this line?
 (c) Find the value of x when $y = 0$.

Ans:(a) $k = \underline{\quad 6 \quad}$ [1]

(b) $\underline{\quad 3 \quad}$ [1]

(c) $x = \underline{\quad 18 \quad}$ [1]

- (d) Sketch the graph of the line on the axes provided, labeling the graph and both x - and y -intercepts clearly. [1]



THE END

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Mathematics	4017/02
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Do not use staples, paper clips, highlighters, glue or correction fluid.

The use of calculators is allowed in this paper.

Show all your working on the same page as the rest of the answer,

Omission of essential working or units may result in loss of marks.

Working in pencil will not be marked.

Section A

Answer all questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer either question 9 or 10.

Write your answers in the spaces provided on the question paper.

If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degree should be given to one decimal place.

(Take $\pi = 3.142$ when necessary)

FOR EXAMINER'S USE	
Section A	42
Section B	8
TOTAL	50

This document consists of 14 printed pages (including this page).

Setter: Ms Evonne Koh

Section A (42 marks)

Answer all questions in this section.

1. If the interior angle of a regular polygon is x° , the exterior angle is $\left(\frac{x-60}{4}\right)^\circ$. Find

- (a) the value of x , and
 (b) the number of sides in the polygon.

ANSWER:

(a) $\frac{x-60}{4} + x = 180^\circ$ [Sum of adjacent angles on a straight line] ————— **M1**

$$\frac{x-60}{4} + \frac{4x}{4} = \frac{720}{4}$$

$$x - 60^\circ + 4x = 720^\circ$$

$$5x = 780^\circ$$

$$x = 156^\circ$$
 ————— **A1**

(b) Let n be the number of sides of the polygon

$$\frac{x-60}{4} = \frac{360}{n}$$
 ————— **M1**

$$\frac{156-60}{4} = \frac{360}{n}$$

$$\frac{360}{n} = 24$$

$$n = \frac{360}{24}$$

$$= 15$$
 ————— **A1**

Ans:(a) $x =$ 156 [2]

(b) 15 sides [2]

2. Vincent was travelling from Town A to Town B on his van at a speed of x km/h. On his return trip he increased his speed by 10 km/h.
- (a) If the distance between the two towns is 400 km, form an algebraic expression for the time taken when travelling from Town A to B .
- (b) Form an algebraic expression for the time taken for his return journey.
- (c) Vincent found that he had reduced his travelling time by 2 hours on his return trip. Form an equation in terms of x and show that it reduces to $x^2 + 10x - 2000 = 0$.
- (d) Hence, solve the equation.

ANSWER:

(c) $\frac{400}{x} - \frac{400}{x+10} = 2$

M1

$$\frac{400(x+10)}{x(x+10)} - \frac{400x}{x(x+10)} = 2$$

M1

$$400x + 4000 - 400x = 2x^2 + 20x$$

$$2x^2 + 20x - 4000 = 0$$

$$x^2 + 10x - 2000 = 0 \text{ (shown)}$$

A1

(d) $x^2 + 10x - 2000 = 0$

$$(x - 40)(x + 50) = 0$$

M1

$$x = 40 \quad \text{or} \quad x = -50 \text{ (N.A.)}$$

A1

A1 (to show rejection)

Ans: (a) $\frac{400}{x}$ km/h [1]

(b) $\frac{400}{x+10}$ h [1]

(c) Shown in space provided [3]

(d) $x = 40$ [3]

3. If each pupil in a class sends a Christmas card to every classmate, the total number of cards sent by all pupils will be 870. Find the number of pupils in the class.

ANSWER:

Let the number of pupils be x .

$$(x-1)x = 870$$

M1

$$x^2 - x - 870 = 0$$

$$(x-30)(x+29) = 0$$

M1

$$x = 30 \quad \text{or} \quad x = -29 \text{ (rej)}$$

A1

Ans: 30 pupils [3]

4. It takes 12 men to make 9 cupboards in 4 days. How long will it take 4 men to make 24 cupboards?

ANSWER:

<u>MEN</u>	<u>CUPBOARDS</u>	<u>DAYS</u>
------------	------------------	-------------

12 M	----- 9 C	----- 4 D
------	-----------	-----------

4 M	----- 9 C	----- 12 D
-----	-----------	------------

M1

4 M	----- 3 C	----- 4 D
-----	-----------	-----------

4 M	----- 24 C	----- 32 D
-----	------------	------------

a1

Ans: 32 days [2]

5. The following are the heights (cm) obtained by a class of 30 during a health check.

155	156	157	160	162
165	155	158	162	162
151	169	170	166	161
153	168	163	164	158
160	171	170	165	159
156	157	161	163	167

(a) Some of the heights are represented in a stem-and-leaf diagram below.

Complete the stem-and-leaf diagram for this data. [2]

15		1 3 <u>3 5 5 6 7 7 8 8 9</u>
16		0 <u>0 1 1 2 2 2 3 3 4 5 5 6 7 8 9</u>
17		0 <u>0 1</u>

- (b) What percentage of the students are taller than 158 cm? (Leave your answer in fraction.)
- (c) What is the mean height in cm? (Correct your answer to 3 significant figures.)
- (d) What is the mode of this data?
- (e) What is the median of this data? (Correct your answer to 1 decimal place.)

ANSWER:

$$\begin{aligned} \text{Mean Ht} &= \frac{\text{total height}}{\text{no. of students}} \\ &= \frac{4688}{30} \\ &= 156 \text{ cm} \end{aligned}$$

A1

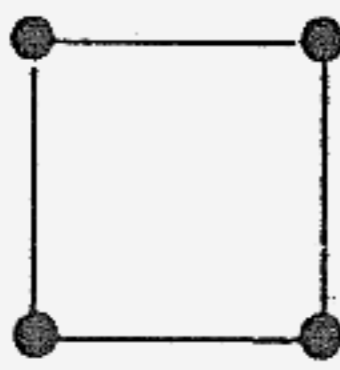
Ans: (b) $76\frac{2}{3}$ % [2]

(c) 161 cm [2]

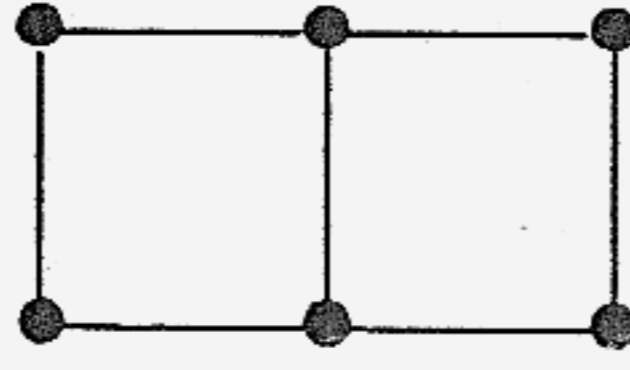
(d) 162 cm [1]

(e) _____ 162 _____ cm [1]

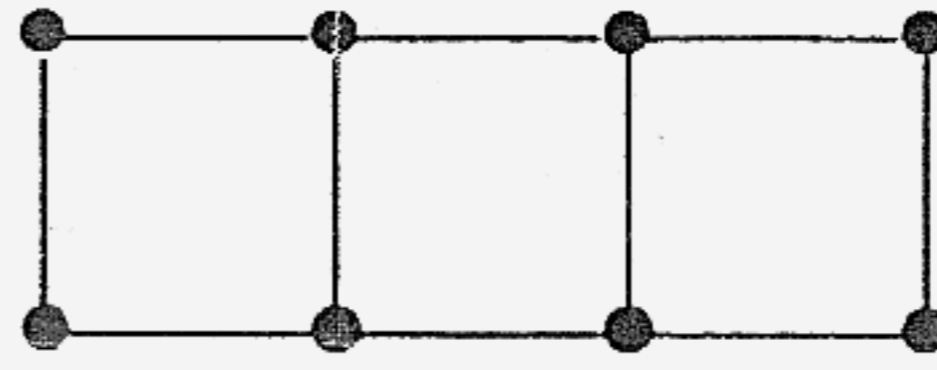
6. Sticks are arranged to form squares as shown below.



A square



A row of 2 squares



A row of 3 squares

(a) Complete the table below.

[2]

No. of squares (S)	No. of sticks (M)	No. of dots (D)
1	4	4
2	7	6
3	10	8
4	<u>13</u>	<u>10</u>
5	<u>16</u>	<u>12</u>
s	m	d

(b) How many sticks are needed to form a row of 21 squares?

(c) How many dots will you get if you have 34 sticks?

(d) To form s squares, we need to use m sticks and get d dots. Write down a formula(i) connecting m and s , and(ii) connecting d and s .**ANSWER:**

Any clear method will get M1

(c)

No. of squares (S)	No. of sticks (M)	No. of dots (D)
5	16	12
6	19	14
7	22	16
8	25	18
9	28	20
10	31	22
11	34	<u>24</u>

A1

Ans: (b) _____ 64 _____ sticks [1]

(c) _____ 24 _____ dots [2]

(d) (i) _____ $m = 3s + 1$ _____ [1](ii) _____ $d = 2s + 2$ _____ [1]

8. Answer the whole of this question on a piece of graph paper

(a) Copy and complete the following table of values for $y = 5 + 4x - x^2$. [2]

x	-2	-1	0	1	2	3	4	5
y	-7		5	8	9		5	0

(b) On a graph paper, using a scale of 2 cm to represent 1 unit on the x -axis and

1 cm to represent 1 unit on the y -axis, draw the graph of $y = 5 + 4x - x^2$

for $-2 \leq x \leq 5$. [3]

(c) Use your graph,

(i) find the greatest value of y , [1]

(ii) find values of x when $y = 6$, [2]

(iii) solve the equation $5 + 4x - x^2 = x$. [2]

Section B (8 marks)

Answer only ONE question

9.(a) [Volume of sphere = $\frac{4}{3} r^3$; Volume of cone = $\frac{1}{3} r^2 h$; Volume of cylinder = $r^2 h$]

The diagram shows a solid consisting of a cone, a cylinder and a hemisphere. The base radius is 4cm and both the cone and cylinder has a common height measurement. The ratio of the volumes of the cone, the cylinder and the sphere is 6: 27: 4. Find the height of the cone and cylinder

THERE IS SOMETHING WRONG WITH THIS QUESTION. HENCE THE ANSWER IS NOT ACCURATE

ANSWER:

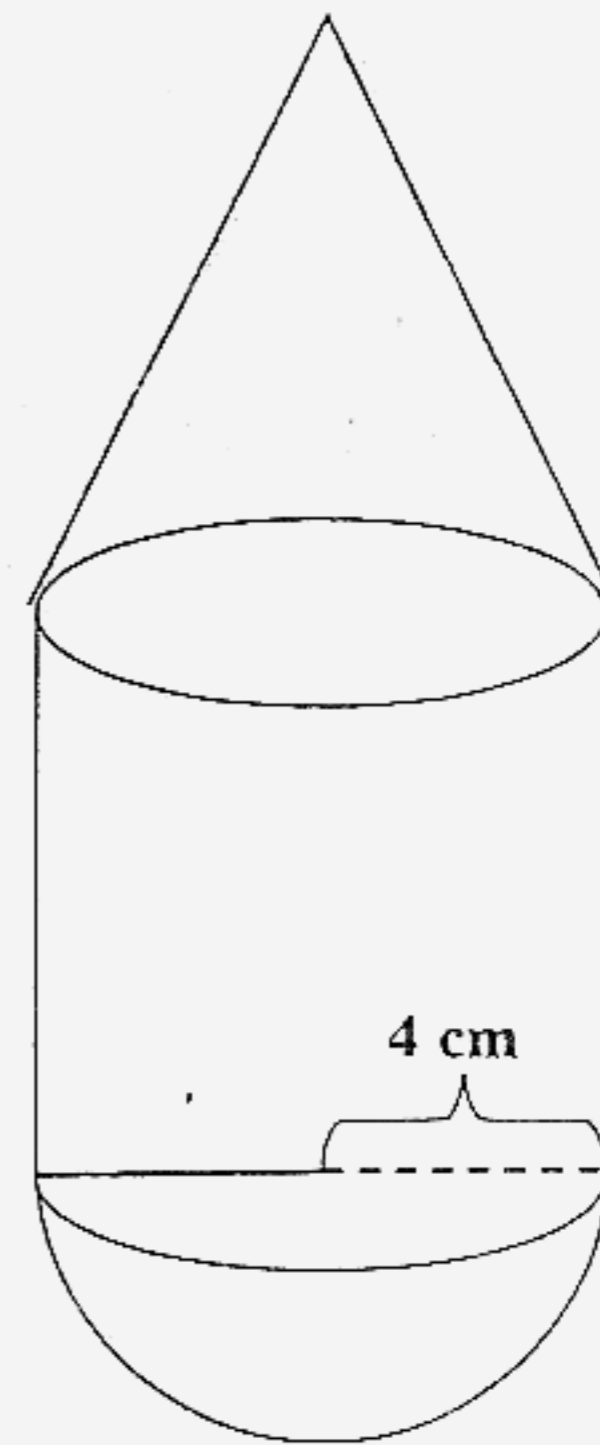
Volume of cone: volume of cylinder: Volume of sphere

$$\frac{1}{3} r^2 h : r^2 h : \frac{4}{3} r^3$$

$$\frac{1}{3} : 1 : \frac{4}{3} r$$

$$1 : 3 : 4r$$

When base radius is 4cm,
1 : 3 : 16



Ans: (a) _____ cm [4]

9 (b) An isosceles triangle ABC is inscribed in a circle with centre O .

If $AB = AC = 13$ cm and $BC = 10$ cm, find the radius, r cm, of the circle.

ANSWER:

$$BD = \frac{10}{2} = 5 \text{ cm}$$

$$AD = \sqrt{13^2 - 5^2} = 12 \text{ cm}$$

M1

$$OD = 12 - r$$

$$r^2 = (12 - r)^2 + 5^2$$

M1

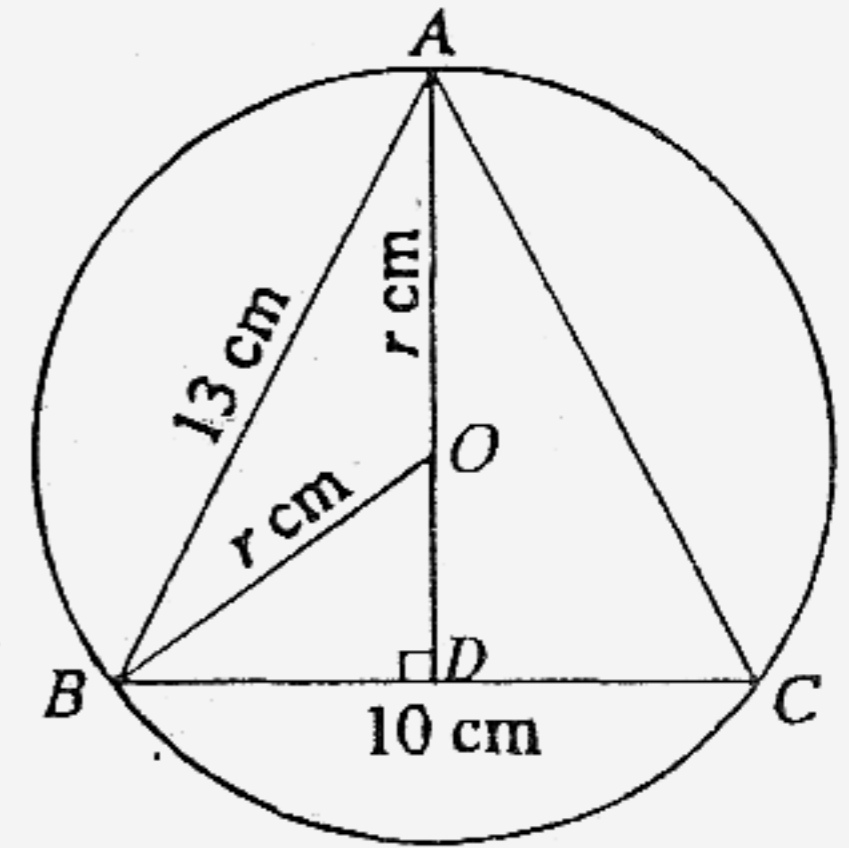
$$= 144 - 24r + r^2 + 25$$

M1

$$24r = 144 + 25$$

$$r \approx 7.04 \text{ (correct to 3 s.f.)}$$

A1



Ans: 7.04 cm [4]

10. [Volume of sphere = $\frac{4}{3} r^3$; Surface area of sphere = $4 r^2$; Volume of cylinder = $\pi r^2 h$]

A boiling tube consists of a hemisphere of radius 2.5 cm attached to a cylinder of the same radius and height 9 cm. The boiling tube is filled with water to a depth of d cm as shown in the diagram below.

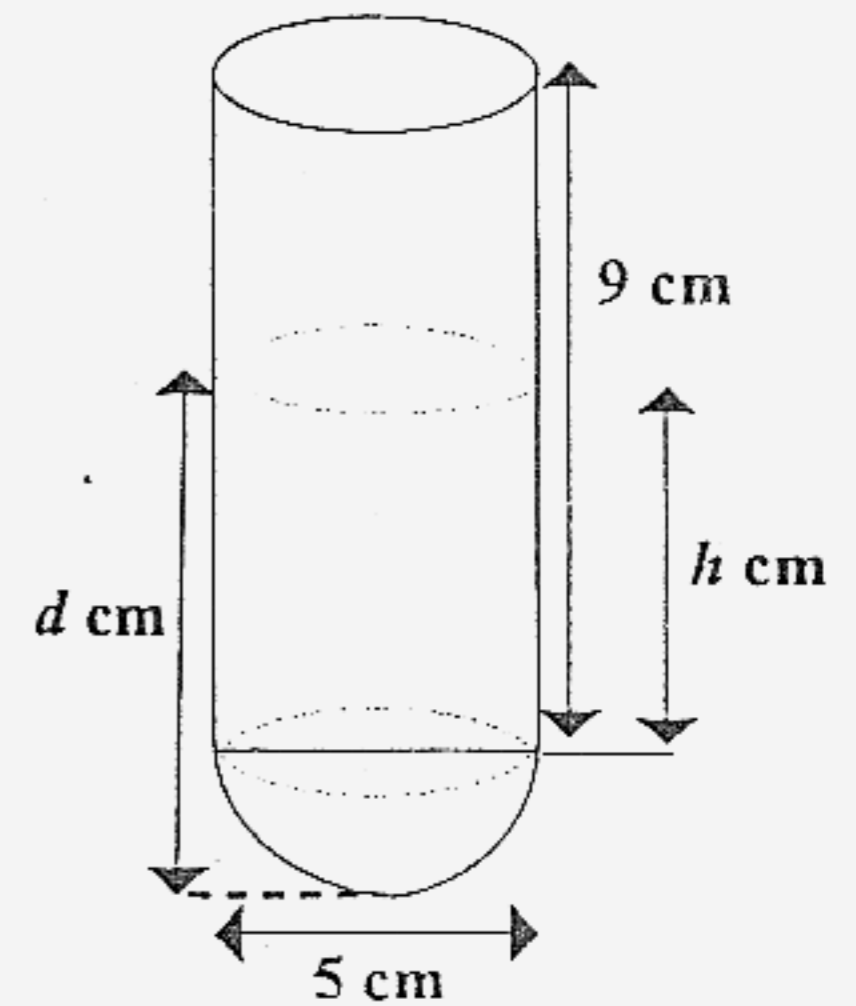
(a) Given that the volume of water in the boiling tube is 130 cm^3 , calculate

- (i) the height, h cm, of the water in the cylinder, and
 (ii) the value of d .

(b) Calculate the exterior surface area of the boiling tube.

(c) If the height of the cylinder is increased by 10%, calculate the percentage increase in its exterior surface area.

(Take $\pi = 3.142$)



ANSWER:

(a) (i) Vol. of hemisphere = $\frac{2}{3} \pi r^3$
 $= \frac{2}{3} (3.142)(2.5)^3$
 ≈ 32.72917 ——— **M1**

Vol. of water in the cylinder = $130 - 32.72917$

$3.142 \times 2.5^2 \times h = 97.27083$ ——— **M1**

$h = \frac{97.27083}{3.142 \times 2.5^2}$
 ≈ 4.95 ——— **A1**

(ii) $d = 2.5 + 4.95$
 $= 7.45$ ——— **A1**

(b) Exterior surface area = $\pi d h + 2 \pi r^2$

$= (3.142)(5)(9) + (2)(3.142)(2.5)^2$

$= 180.665$

$\approx 181 \text{ cm}^2$ ——— **A1**

(c) Diff. in Ht of cylinder after increase = $0.1 \times 9 \text{ cm}$
 = 0.9 cm ————— **M1**

NEW surface area after increase = $0.9 \times 3.142 \times 5$
 = 14.139 ————— **M1**

% increase in surface area = $\frac{14.139}{180.665} \times 100\%$
 $\approx 7.826086957\%$
 $\approx 7.83\%$ ————— **A1**

Ans: (a) (i) _____ cm [3]

(ii) _____ cm [1]

(b) _____ cm² [1]

(c) _____ cm² [3]

T H E E N D