

2.1 Objectives
Paper I

1. Given the circumference of a circle, finds the arc length of a semicircle of the same radius.
2. Identifies between which two closest whole numbers lies the square root of a number which is not a square of a whole number.
3. Factorises the given difference of two squares.
4. States a requirement for a given quadrilateral in which two opposite sides are marked as equal, to be a parallelogram.
5. Finds a task in man days given the number of men and number of days required for the task.
6. Writes with elements a set given in set generation form.
7. Given the value of one angle of a pair of angles in the same sector of a circle, writes the value of the other angle.
8. Given the coordinates of a point on a straight line drawn on a Cartesian plane and passing through the origin, writes the gradient of that line.
9. Factorises the given trinomial quadratic expression.
10. Of three triangles given with information, selects and names the pair of congruent triangles.
11. Solves an inequality of the form $ax + b < c$; $a, b, c \in \mathbb{Z}^+$ and writes the positive whole number solutions.
12. Simplifies by division two given algebraic fractions which contain algebraic terms in the denominator and the numerator.
13. Finds the radius of the base of a cylinder made from a rectangular paper of given length and width.
14. Solves a problem that includes subtraction and multiplication of fractions.
15. Writes the relationship between two given lines in a given geometrical diagram containing a diameter and a chord of a circle.
16. Indicates by a sketch the locus of a point which subtends a right angle on one side of a given straight line.
17. Finds the value of angle x , given that one angle of a right-angled triangle is x and given a diagram which contains an isosceles triangle with interior angle x within the right-angled triangle.

18. (i) Finds the volume of a prism given its cross sectional area and length.
(ii) Calculates the length of the side of a cube whose volume is equal to the volume of the prism.
19. Given the angle subtended on a circle by an arc, calculates the angle subtended by that arc at the centre and the value of an angle contained in the triangle formed by joining the two ends of the arc and the centre.
20. Given the property value and the rates percentage of a house, calculates the annual rates charged for the house.
21. Names two types of quadrilaterals in which the diagonals bisect perpendicularly.
22. Given the probability of the germination of seeds in two seed samples, finds the probability of both the seeds germinating when a seed from each sample is taken and planted.
23. Finds the value of $a + b$ without solving a pair of simultaneous equations given in the form $ma + nb = c$ where m, n, c are positive integers.
24. Given the quantity of water (in litres) flowing through a tube within a given period (in minutes), calculate the rate of flow of water in litres per second.
25. (i) Using the data given, calculates the central angle of a named sector of a pie chart.
(ii) Given the quantity represented by one sector, calculates the quantity represented by another sector.

Paper I - Part B

1. Given the amount invested to buy shares and the market price of a share,
 - (i) finds the number of shares that can be bought.
 - (ii) calculates the annual income given the annual dividend paid for a share.
 - (iii) finds by how much the income received if the amount invested to buy shares was invested in a fixed deposit under a given annual interest rate is greater than the income from dividends.
 - (iv) finds the dividend paid for a share in the second year given that the income from dividends in the second year was increased by a given percentage.
2. Given a diagram of a semi circle and a triangle contained in a rectangle and the length and breadth of the rectangle,
 - (i) finds the perimeter of the semi circle.
 - (ii) finds the area of the semi circle.
 - (iii) writes the ratio between the areas of the semi circle and the triangle and indicates it in the simplest form.
 - (iv) draws with measurements how a rectangular portion with an area equal to that of the triangle can be attached a new.

3. Given the pension gratuity of a person, the fraction of it he deposited in a bank and the amount allocated for charity,
- (i) finds the amount deposited in the bank.
 - (ii) calculates the interest he draws for two years given the compound interest rate
 - (iii) finds the amount remaining after depositing in the bank and using for charity
 - (iv) calculates the amount received by the wife given how the rest is divided between the wife and the daughter.
4. (a) Using the information given by a Venn diagram of two intersecting sets,
- (i) finds the number of elements belonging to the intersection set.
 - (ii) describes the shaded area in words.
 - (iii) writes by set notation a named portion of the Venn diagram.
- (b) Given a box containing two types of items of equal size and different colours and that one item is taken out of the box followed by taking another without replacing the first,
- (i) marks the sample space of the outcomes in the given grid given.
 - (ii) Using it, finds the probability of getting two items of the same colour.
 - (iii) Finds the probability of taking items of distinct colours with the first being of a given colour.
5. Given an incomplete histogram with unequal class intervals of the mass of a group of students ,
- (i) finds the number of students whose mass is less than a given mass.
 - (ii) writes to which class interval a given number of students belong.
 - (iii) represents in the histogram when the number of students belonging to a class interval is given.
 - (iv) finds the total number of students from whom the data were collected.
 - (v) creates the frequency polygon using the histogram.

Paper II
Part A

1. (a) Given the loan amount, annual interest rate and the equal number of instalments and informed that the interest is calculated on the reducing balance,
- (i) finds the instalment of the loan payable monthly.
 - (ii) calculates the interest for a month unit.
 - (iii) finds the interest payable for a given number of month units.
- (b) Calculates the time taken to repay the loan given the loan amount, annual simple interest rate and the total amount repayable to settle the loan.
2. (i) Within the given range, draws the graph of a function of the form $y = a - (x + b)^2$ where a and b are integers.
- (ii) Finds the roots of a given quadratic equation using the graph.
 - (iii) Finds a pair of suitable values for a and b when the roots of the equation $a - (x + b)^2 = 0$ are given.

3. (a) Given the cube of a binomial expression in the form of a sum
- (i) writes the cube of another binomial expression.
 - (ii) obtains the cube of a number.
- (b)
- (i) Factorises a trinomial quadratic algebraic expression with a given common factor.
 - (ii) Subtracts two algebraic fractions with related denominators containing algebraic expressions.
4. (a) Given the base and height of a triangle as algebraic expressions,
- (i) writes an algebraic expression for the area of the triangle.
 - (ii) shows that it satisfies a quadratic equation given in terms of x when a numerical value is given for the area of that triangle.
 - (iii) shows that the roots of that equation are given expressions.
 - (iv) finds the length of a named side of the triangle.
- (b) Finds the matrix AB when two matrices A and B are given.
5. Given the diagram of a post erected on a flat, horizontal ground and the way two wires are tied to two points on the ground from the top of the post so that the post and the wires lie on the same plane,
- (i) includes the given information in the diagram.
 - (ii) when the length of the two wires and the angle between a wire and the ground are given, calculates the angle between the remaining wire and the post using the trigonometric tables.
6. Given a cumulative frequency distribution relating to the time wasted by a person who visits a site for a certain task daily during a month,
- (i) writes the class interval that includes the maximum number of days .
 - (ii) writes the maximum possible time wasted at that site.
 - (iii) calculates the mean time wasted at the site using a suitable assumed mean.
 - (iv) gives reasons as to why the time that may be expected to be wasted at the site within a certain period is greater than the given number of hours.

Part B

7. (a) (i) Given an algebraic expression for the n^{th} term of an arithmetical progression, writes the first three terms of that progression and from it finds the first term and the common difference.
- (ii) Finds which term a given value is.
 - (iii) Finds the sum of the given initial number of terms in the progression.
- (b)
- (i) Shows that the terms of a given event are in a geometric progression.
 - (ii) Finds the value of a given term using given information.
 - (iii) When the last term is given, shows that the number of terms in the progression is equal to a given number.

8. (a) Writes a named theorem.
 (b) Proves a given rider when the following are given for a named parallelogram.
- The point of intersection of the line drawn through a vertex parallel to a diagonal, and a produced side.
 - The point of intersection of the line joining the intersection point described in above to a vertex of the parallelogram, and a side of the parallelogram.
 - The intersection point of the diagonals.
9. (i) Constructs a triangle when the lengths of two sides and an angle are given.
 (ii) Extends a side of it and marks a point on it at a given distance.
 (iii) Constructs the circle touching the point marked and a side of the triangle and names its centre.
 (iii) Measures and writes the radius of that circle.
 (iv) Writes the relationship between the two given sides and presents reasons for it.
10. (a) Given that a right circular cone of known base radius and height is immersed in water, in a cylindrical tank of known height which is half filled, writes the base radius of the tank in terms of the base radius of the cone.
 (b) Using the logarithms table, finds the value of an expression of the type $\frac{a^2\sqrt{b}}{c}$ to the first decimal place.
11. Given a circle of known radius and a diagram of that circle with a cyclic quadrilateral in it,
- (i) when the length of a side of that cyclic quadrilateral is given, calculates the perpendicular distance to that side from the centre.
 - (ii) when the angle subtended by an arc at the centre is given, finds the value of the angle which is subtended on the remaining part of the circle.
 - (iii) finds the angle of the quadrilateral given that two angles are equal.
 - (iv) writes the relationship between the two tangents drawn to the circle from the terminal points of a chord and the theorem on which it is based.
12. (a) Given an incomplete Venn diagram of three intersecting sets to give information about the number of students sitting an examinations with three subjects and the number of students passing one, two or three subjects from it,
- (i) includes given information in the Venn diagram.
 - (ii) finds the number of students who passed in only one named subject.
 - (iii) finds the number of students who passed in at least one of two subjects.
- (b) Given the probability of the germinating of two types of seeds
- (i) draws a tree diagram to indicate the events of germination or non-germination when two seeds randomly selected from each type are planted.
- Using the tree diagram
- (ii) finds the probability of the germination of both seeds.
 - (iii) finds the probability of the non-germination of both seeds.

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Mathematics Question Paper - 2

2.2 Paper
Mathematics I
Part A

Time: 2 hours

Answer all the questions in this paper itself.

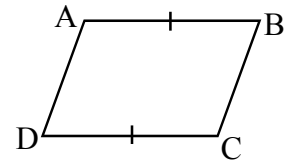
1. The circumference of a circle is 44 cm. What is the length of the arc of a semicircle of the same radius in centimetres?
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2. Between which two closest whole numbers does the value of $\sqrt{18}$ lie?
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3. Complete by writing the factors in the blanks.

$$x^2 - y^2 = (\dots\dots\dots)(\dots\dots\dots)$$

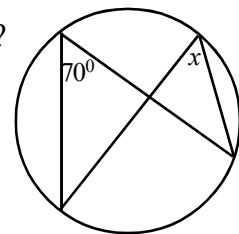
4. In the quadrilateral ABCD, $AB = DC$. State a requirement for it to be a parallelogram.



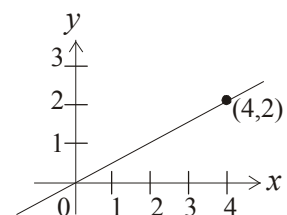
5. Four people can complete a certain work in three days. How many man days are spent for that work?
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6. $A = \{x \mid 1 < x < 10, x \text{ is an odd number}\}$. Write the set A with elements.
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7. What is the value of x according to the information given in the diagram?



8. Find the gradient of the straight line shown on the coordinate plane.



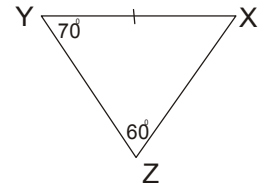
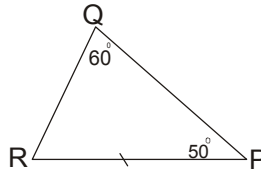
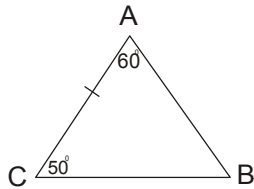
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Mathematics Question Paper - 2

9. Factorise $x^2 - x - 20$.

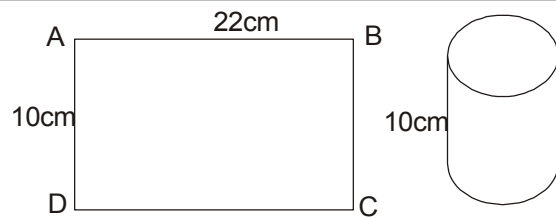
10. Of the following triangles, select and write a pair of congruent triangles.



11. Write the positive whole number solutions of the inequality $2x + 1 < 6$.

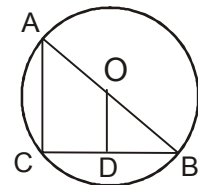
12. Simplify $\frac{4x^2y^2}{3z} \div \frac{2xy}{9z}$

13. A cylinder is made from the rectangular paper as shown in the diagram. Find the radius of the base of the cylinder. (Take $\pi = \frac{22}{7}$)

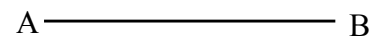


14. Of the coconuts plucked from the garden, $\frac{1}{3}$ was reserved for domestic use and $\frac{1}{2}$ of the rest was sold. What fraction is the amount sold of the total number of nuts?

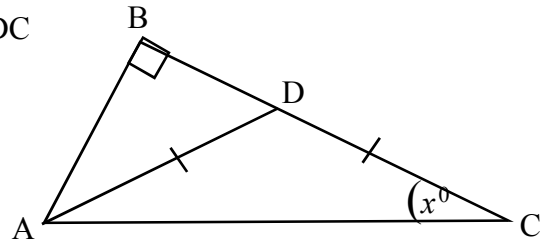
15. AB is a diameter of a circle of centre O. CB is a chord. The perpendicular drawn from O to CB is OD. Write a relationship between AC and OD.



16. AB is a straight line segment 6 cm long. If C lies on one side of AB so that $\hat{ACB} = 90^\circ$, sketch the locus of C.

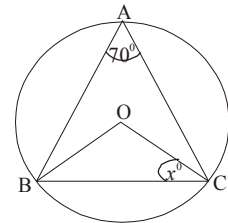


17. Of the triangle ABC, \hat{B} is a right angle. $AD = DC$ and $\hat{BAD} = 40^\circ$. Find the value of x .



18. (i) Find the volume of a prism of cross sectional area 10 cm^2 and length 12.5 cm .
 (ii) Find the length of a side of a cube with the same volume.

19. The centre of the circle given in the diagram is O. Find the value of x according to the information given.



20. An urban council charges annual rates of 8%. What is the rates that should be paid per year for a house of assessed value Rs. 60 000 ?

21. Name two types of quadrilaterals in which the diagonals intersect perpendicularly.

22. For two seed samples A and B, the probability of germination is 0.8 and 0.9. Find the probability of germination of both seeds if one seed of each sample is planted.

23. $2a + b = 4$
 $a + 2b = 2,$

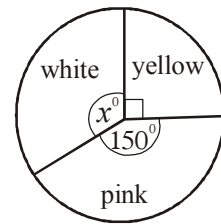
Find the value of $a + b$ without solving this pair of simultaneous equations.

24. 300 litres of water flows through a tube in 5 minutes. What is the rate of flow of water through the tube in litres per second?

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25. The figure shows a pie chart drawn to show the amount of white, yellow and pink flowers in a basket.

(i) What is the angle at the centre of the sector representing white flowers?

(ii) If there were 18 yellow flowers in the basket, how many white flowers were there?



Part B

Answer the questions in this paper itself.

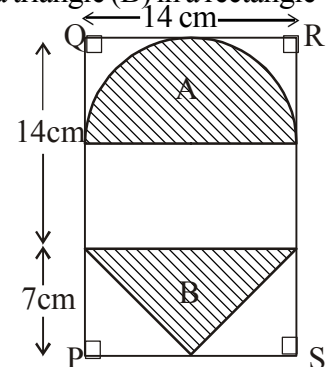
1. Saman invests Rs. 80 000 to buy shares in a certain company. The market price of a share is Rs.40.
 - (i) How many shares can Saman buy?

 - (ii) If the annual dividend paid for a share is Rs. 4, find the annual income.

 - (iii) If the amount used to buy shares was deposited for one year in a fixed deposit at an annual interest rate of 12%, by how much would the income be greater than that from shares?

 - (iv) If the dividend income in the second year was greater by 50% than the income in part (ii) above, find the annual dividend paid for a share in the second year.

2. The diagram shows a wall hanger consisting of a semicircle (A) and a triangle (B) in a rectangle PQRS. PQ = 21 cm and QR = 14 cm. (Take $\pi = \frac{22}{7}$)



- (i) What is the perimeter of the semicircle A?

- (ii) Find the area of the semicircle A.

- (iii) Write the ratio of the areas of parts A and B and indicate it in the simplest form.

- (iv) It is required to add a rectangular band which is equal in area to part B to the wall hanger. Draw with measurements in the diagram how this band can be added with PS as a margin.

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Mathematics Question Paper - 2

3. Sujeewa's pension gratuity is Rs. 600 000. He deposited $\frac{2}{3}$ of it in a bank and gave Rs. 20 000 to charity.
- (i) What is the amount Sujeewa deposited in the bank?

 - (ii) If the bank pays compound interest of 8%, what is the interest he receives in total for the two years?

 - (iii) What is the amount left after depositing in the bank and giving to charity?

 - (iv) Having deposited in the bank and given to charity, he gave $\frac{1}{3}$ of the remaining amount to his daughter and the rest to his wife. What is the amount of money received by the wife?

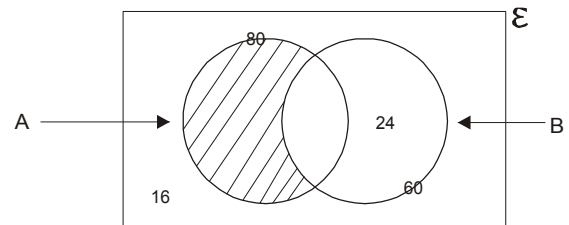
4.(a) The Venn diagram shows some information about a group of students who sat for an examination.

ϵ = {Children sitting the examination }

A = {Girls sitting the examination }

B = {Children passing the examination }

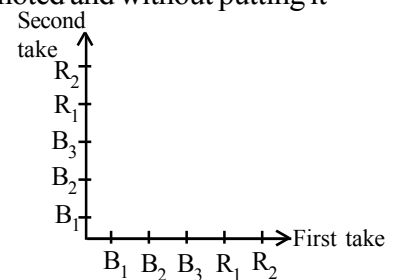
Answer the following using the Venn diagram.



- (i) How many girls passed the examination?

 - (ii) Describe those who are represented by the shaded area.

 - (iii) Represent the shaded area by set notation.
- (b) There are five handkerchiefs in a box. Of them, three are blue and two are red. One handkerchief is taken from the box randomly, its colour is noted and without putting it back, another one is taken.
- (i) In the grid, mark the sample space showing the possible outcomes.
(B and R represent blue and red respectively).

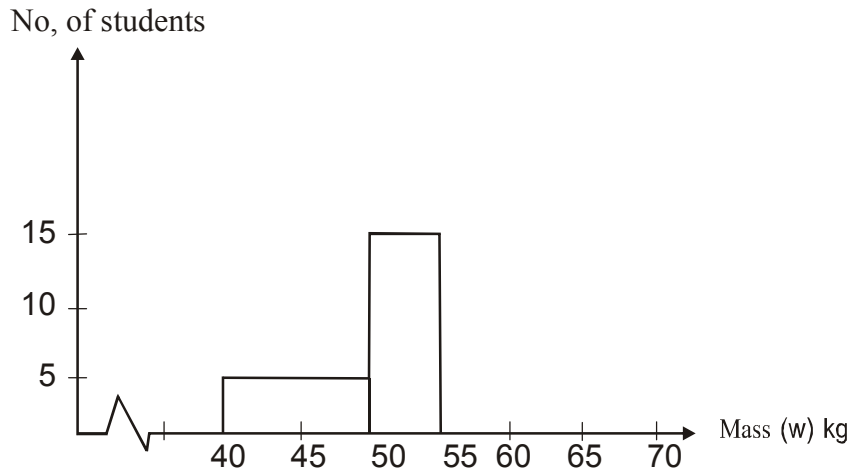


Using it,

- (ii) find the probability of getting handkerchiefs of the same colour on both occasions.

- (iii) find the probability of getting a blue one in the first take and a red one in the second take.

5. Given below is an incomplete histogram depicting the information collected on the masses of a group of students.



Using this histogram answer the following questions.

Class intervals are given as $40 \leq w < 50$, $50 \leq w < 55$ etc.

- (i) How many students are less than 50 kg in mass?
- (ii) State in which class interval there are 15 students.
- (iii) If there are 30 students in the class interval 55 - 70, indicate it in the above histogram.
- (iv) What is the total number of students from whom the data were collected?
- (v) Draw the frequency polygon on the histogram.

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Mathematics Question Paper - 2

Mathematics II

Three hours

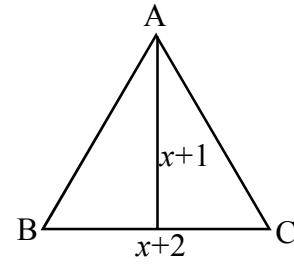
- Answer 10 questions selecting five questions from part A and five questions from part B
- Every question is worth 10 marks.
- The volume of a right circular cylinder of base radius r and height h is $\pi r^2 h$.
- The volume of a right circular cone of base radius r and height h is $\frac{1}{3}\pi r^2 h$.

Part A

Answer five questions only

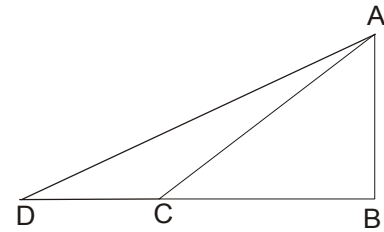
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1. (a) A loan of Rs. 30 000 is taken from a financial institution at an annual interest rate of 12% where the interest is calculated on the reducing balance. It was agreed that the loan amount and the interest will be paid in 15 months in equal instalments.
- (i) What is the monthly instalment of the loan payable?
 - (ii) What monthly interest is paid for the above part of the loan amount?
 - (iii) Find the total interest payable for the loan.
- (b) After what period of time does a person who takes a loan of Rs. 25 000 at a simple interest rate of 11% settle the loan by paying Rs. 33 250?
2. (i) Draw the graph of the function $y = 2 - (x + 1)^2$ within the range $-4 \leq x \leq 2$ and using the graph find the roots of the equation $-x^2 - 2x + 1 = 0$.
- (ii) If the roots of the equation $a + (x + b)^2 = 0$ are 2 and 4, find a pair of values matching a and b .
3. (a) $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
- Using this result,
- (i) expand $(a - 1)^3$.
 - (ii) find the value of 105^3 .
- (b) (i) Factorise $6a^2x^2 - a^2x - a^2$.
- (ii) Simplify $\frac{2}{(a-5)^2} - \frac{3}{(5-a)}$.

4. (a) The base BC of a triangle ABC is $(x + 2)$ units and the height is $(x + 1)$ units.



- (i) Write an expression containing x for the area of the triangle ABC.
 - (ii) If the area of the triangle ABC is 2 square units, show that x satisfies the quadratic equation $x^2 + 3x - 2 = 0$.
 - (iii) Solve the equation $x^2 + 3x - 2 = 0$ and show that its roots are $x = \frac{\pm\sqrt{17} - 3}{2}$.
 - (iv) Using it, find the length of the side BC of the triangle (Assume $\sqrt{17} = 4.12$)
- (b) $A = \begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ 3 & 0 \end{pmatrix}$. Find the matrix AB.

5. AB is a post erected on a flat ground. Two wires 15 m and 20 m long are drawn from the top of the post A and fixed to two points C and D on the flat ground. (The post and the wires are on the same plane). $\hat{A}DB = 30^\circ 30'$.



- (i) Copy the diagram given and mark the relevant data in it.
- (ii) Find the value of $\hat{B}AC$ using trigonometric ratios.

6. Susil goes to a certain bank everyday for the banking affairs of his business. He is used to noting down the time he spends in the bank till his turn comes everyday. A table which indicates the time and the number of days he has noted for a period of 30 days in a month is given here.

Time spent(minutes)	No. of days
0 - 6	1
6 - 12	3
12 - 18	3
18 - 24	4
24 - 30	10
30 - 36	6
36 - 42	2
42 - 48	1

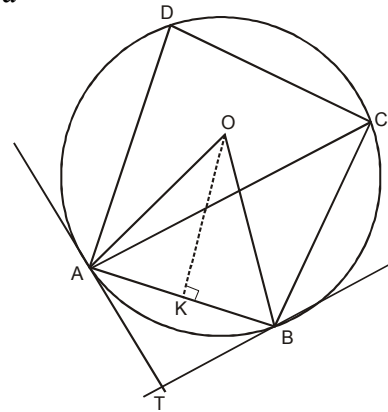
- (i) What is the class interval that shows the maximum number of days in relation to the time he has wasted in the bank?
- (ii) What could be the maximum time in minutes wasted by Susil in the bank?
- (iii) Using a suitable assumed mean, calculate the mean time he has wasted in the bank.
- (iv) Find the time he can be expected to waste in the bank during 60 days and show that it is more than 24 hours. Give reasons for your answer.

Part B

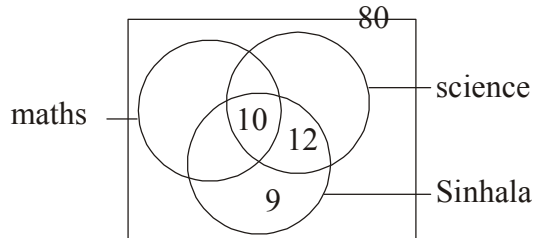
7. (a) The n^{th} term of an arithmetic progression is given by $T_n = 7n - 1$
- (i) Write the first three terms of this progression and hence write down the first term and the common difference.
 - (ii) Find which term of this progression is 83.
 - (iii) Find the sum of the first 12 terms of this progression.
- (b) In a fireworks display, a sparkler which is lit shoots sparkles as follows.
- during the first minute - 512 sparkles;
 during the second minute - 256 sparkles;
 during the third minute - 128 sparkles
- (i) Show that the sparkler emits sparkles according to a geometric progression.
 - (ii) How many sparkles are shot during the seventh minute?
 - (iii) If the sparkler dies out after emitting 2 sparkles, show that it was alight for 9 minutes.
8. (a) Write the mid point theorem.
 ABCD is a parallelogram. The line drawn through B parallel to AC meets DC produced at E. The lines AE and BC intersect at P while the lines AC and BD intersect at Q. Show that $PQ = \frac{1}{4} DE$.
9. Using only a ruler with a mm/cm scale and a compass,
- (i) construct a triangle ABC so that $\hat{A} = 120^\circ$, $AB = 6.6$ cm and $BC = 6.5$ cm.
 - (ii) Produce the side CB to point X so that $BX = 5$ cm.
 - (iii) Construct a circle so that it touches CX at X and the side AB, and name its centre O.
 - (iv) Measure and write the radius of that circle.
 - (v) What is the relationship between OB and AC? Give reasons for it.
10. (a) Exactly half of a cylindrical tank of which the radius of the bottom is a and the height is $4r$ is filled with water. A solid cone of base radius r and height $2r$ was carefully dipped in the water in the tank without any spillage. Then if the total volume of the water in the tank and the cone is $\frac{26\pi r^3}{3}$, find the base radius of the tank in terms of r :
- (b) Find the value using the logarithms tables. $\frac{(1.475)^2 \times \sqrt{18.62}}{0.372}$
 Give the answer to the first decimal place.

11. The diagram shows a cyclic quadrilateral ABCD inscribed in a circle of centre O and radius 17 cm.

- (i) If the length of the chord AB is 16 cm, find the perpendicular distance from O to the chord AB.
- (ii) Find \hat{ACB} if $\hat{AOB} = 58^\circ$.
- (iii) Find \hat{BAD} if $\hat{AOB} = \hat{ACD}$.
- (iv) If the lines touching the circle at points A and B meet at T, write the relationship between AT and TB and state the theorem on which it is based.



12. (a) Eighty children appeared for a mock examination in mathematics, science and Sinhala. 36 passed in maths; 48 passed in science; 11 failed in all subjects; 24 passed maths and science; 6 passed maths and Sinhala only. An incomplete Venn diagram presenting these information is given below.



- (i) Copy the Venn diagram in your answer script and include the above information.
 - (ii) How many students have passed only in science?
 - (iii) How many have passed either maths or science?
- (b) There are two types of chillies, dwarf chilli and long chilli. The probability of the germination of dwarf chilli seeds is $\frac{3}{5}$ whereas that of long chilli seeds is $\frac{4}{5}$.

(i) Two seeds, one from each type, are randomly taken and sown. Draw a tree diagram that includes the events of germination or non germination of those seeds.

Using the tree diagram find the probability of

- (ii) the germination of both seeds.
- (iii) non-germination of both seeds.

2.3 Answers and the Marking Scheme
Mathematics I - Part A

01.	22 cm	.....	02
02.	4, 5	.....	02
03.	$x^2 - y^2 = (x + y)(x - y)$	.....	02
04.	AB//DC or AB = BC	.....	02
05.	man days 12	.....	02
06.	{ 3, 5, 7, 9 }	.....	02
07.	$x = 70^0$ or 70^0	.....	02
08.	$\frac{1}{2}$	.....	02
09.	$x^2 - 5x + 4x - 20$ $(x - 5)(x + 4)$	.....	02
10.	Triangles PQR and XYZ	.....	02
11.	$x < 2\frac{1}{2}$	.....	01
	Value of x: 1, 2	.....	01 ②
12.	$\frac{4x^2y^2}{3z} \times \frac{9z}{2xy}$	.....	01
	6xy	01 ②
13.	$2\pi r = 22$ $2 \times \frac{22}{7} \times r = 22$ r = 3.5cm	02 ②
14.	Part remaining = $\frac{2}{3}$	01
	Part sold $\frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$	01 ②

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Mathematics Question Paper - 2

15. $AC \parallel OD$ or $AC = 2 OD$ ②

16.  ②

17. $\hat{A}DB = 50^\circ$
 $x = 25^\circ$ ②

18. (i) Volume of the prism = 125 cm^2 01
 (ii) side of the cube = 5 cm 01 ②

19. $\hat{B}OC = 140^\circ$ 01
 $x = 20^\circ$ 01

20. $60000 \times \frac{8}{1000}$ 01

Rs. 4800 01 ②

21. (i) Square 01
 (ii) Rhombus 01 ②

22. Probability of both seeds germinating = 0.8×0.9 01
 $= 0.72$ 01 ②

23. $3a + 3b = 6$ 01
 $a + b = 2$ 01 ②

24. $300(5 \times 60)$ 01
 1 litre per second 01 ②

25. $x = 120^\circ$ 01
 24 white flowers 01 ②

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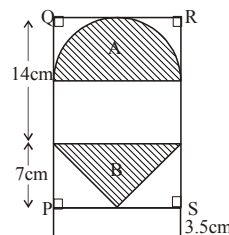
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Mathematics Question Paper - 2

.Mathematics - I Part -B

Question No.	Answer	Marks	Other
01.	(i) Number of shares = $\frac{80\ 000}{40} = 2\ 000$.	2 ②	
	(ii) Annual income = $2\ 000 \times 4$ ----- = Rs. 8 000 -----	1 1 ②	
	(iii) Income from the bank = $80\ 000 \times \frac{12}{100}$ --- = Rs. 9 600 --	1 1	
	Rs. (9 600 - 8 000) = Rs. 1600 -----	1 ③	
(iv)	$\frac{4}{100} \times 150$ -----	2	
	= Rs.6.00	1 ③ ⑩	

Question No.	Answer	Marks	Other
02.	(i) Radius = 7 cm	1	
	$\frac{1}{2} \times 2\pi r + 2r$		
	$\frac{1}{2} \times 2 \times \frac{22}{7} \times 7 + 2 \times 7$ ---	1	
	22 + 14 = 36 cm ---	1 ③	
(ii)	Area of part A = $\frac{1}{2} \pi r^2$ ---	1	
	$\frac{1}{2} \times \frac{22}{7} \times 7 \times 7$ --- 77 cm ² ---	1 ②	
(iii)	Area of part B = $\frac{1}{2} \times 14 \times 7 = 49$ cm ²	1	
	Ratio of the areas of part A to part B = 77 : 49 -- 11 : 7 --	1 ③	
(iv)	14 × x = 49 x = 3.5cm ---	1 1	
	For the diagram ---	1 ② ⑩	



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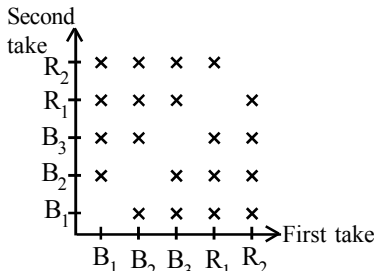
Mathematics Question Paper - 2

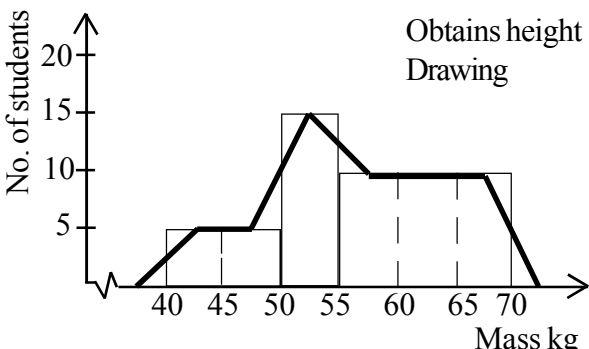
Question No.	Answer	Marks	Other
03.	(i) Amount Sujeewa deposits in the bank = Rs. $600\,000 \times \frac{2}{3}$	1	
	= Rs. 400 000	1	②
	(ii) Interest at the end of the first year = Rs. $400\,000 \times \frac{8}{100}$		
	= Rs. 32 000	1	
	Interest for the two years		
	= Rs. $32\,000 + 432\,000 \times \frac{8}{100}$	2	
	= Rs. 66 560	1	④
	(iii) Amount left = Rs. $600\,000 - 420\,000$ = Rs. 180 000	1	①
	(iv) Part received by wife = $1 - \frac{1}{3} = \frac{2}{3}$	1	
	∴ Amount received by wife = $180\,000 \times \frac{2}{3}$	1	
= Rs. 120 000	1	③	

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Mathematics Question Paper - 2

Question No.		Answer	Marks		Other	
4	(a)	(i) Number of girls passing the examination = $60 - 24 = 36$	2	②		
		(ii) Girls failing the examination	1	①		
		(iii) $A \cap B'$	1	① \triangle		
	(b)	(i)		2	②	
		(ii)	$\frac{6}{20} + \frac{2}{20} = \frac{8}{20} = \frac{2}{5}$	1+1+1	③	
		(iii)	$\frac{6}{20}$	1	① \triangle		⑩



Question No.		Answer	Marks		Other
5	(i)	10	2	②	
	(ii)	$50 \leq w < 55$	1	①	
	(iii)		1		
			1	②	
	(iv)	55	2	②		10+15+30
(v)	Marks at least 4 points correctly End points Completes the polygon	1 1 1	③	⑩	

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Mathematics Question Paper - 2

Mathematics II - Part A

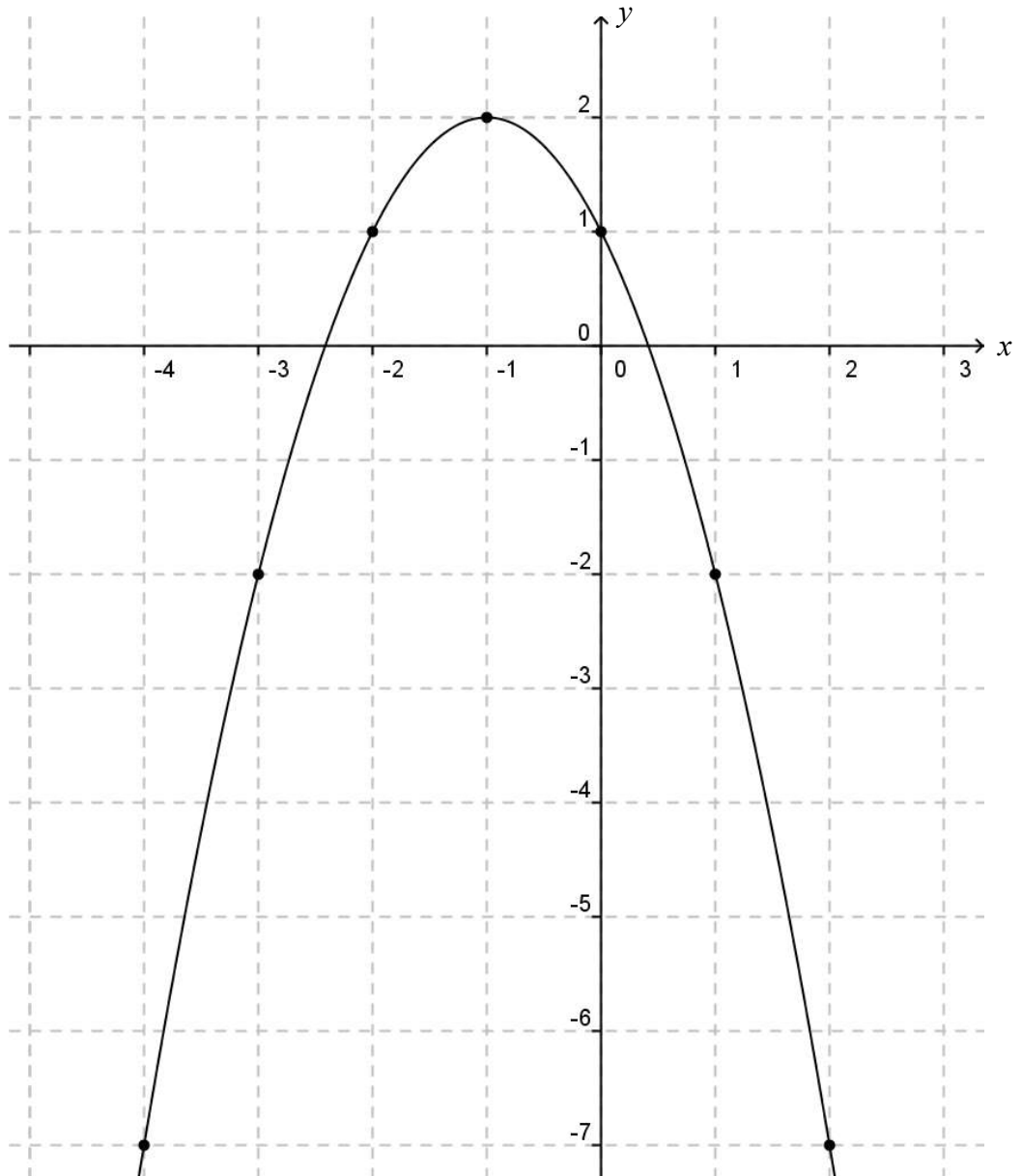
Question No.	Answer	Marks	Other
1	(a) (i) Monthly instalment of the loan amount = $\frac{\text{Rs.}30\,000}{15}$	1	
	= Rs. 2 000	1	②
	(ii) Monthly interest for the above part of the loan amount		
	= $2000 \times \frac{12}{100} \times \frac{1}{12}$		
	= Rs.20	1	①
	(iii) Number of month units = $15 \times \frac{(15+1)}{2}$	1	
	= 120	1	
	∴ Interest paid for the loan = 120×20	1	
	= Rs. 2 400	1	④ 
	(b) Total amount paid = Rs.33 250		
∴ Total interest = Rs. 33 250 - Rs. 25 000			
= Rs. 8 250	1		
Interest for a year = $\text{Rs.}25\,000 \times \frac{11}{100}$			
= Rs.2 750	1		
∴ No. of years = $\frac{8\,250}{2\,750} = 3$	1	③ 	⑩
			Or using the formula $I = \frac{\text{PTR}}{100}$

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Mathematics Question Paper - 2

Question No.		Answer	Marks	Other																
2	(i)	<table border="1" style="display: inline-table; margin-bottom: 10px;"> <tr> <td>x</td><td>-4</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td> </tr> <tr> <td>y</td><td>-7</td><td>-2</td><td>1</td><td>2</td><td>1</td><td>-2</td><td>7</td> </tr> </table> <p align="center"> Calibration of axes Marks at least 6 points correctly Smooth curve $x = 2.4$ or 0.4 </p>	x	-4	-3	-2	-1	0	1	2	y	-7	-2	1	2	1	-2	7	3	
	x	-4	-3	-2	-1	0	1	2												
y	-7	-2	1	2	1	-2	7													
(ii)	$(x - 4)(x - 2) = 0$ $x^2 - 6x + 8 = 0$ $(x - 3)^2 - 1 = 0$ $a = -1, b = -3$	1+1	⑧																	
			1+1	② 10																



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
Mathematics Question Paper - 2

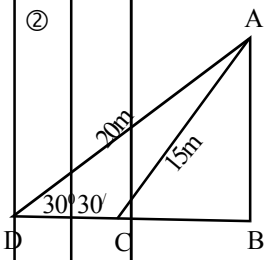
Question No.	Answer	Marks	Other	
3	(a) (i) $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$ substituting $b = -1$ $(a-1)^3 = a^3 - 3a^2 + 3a - 1$	1	①	
	(ii) $(105)^3$ $= (100 + 5)^3$ $= 100^3 + 3 \times 100^2 \times 5 + 3 \times 100 \times 5^2 + 5^3$ $= 1000\ 000 + 150\ 000 + 7500 + 125$ $= 1\ 157\ 625$	1 1 1	③ $\triangle 4$	
	(b) (i) $6a^2x^2 - a^2x - a^2$ $= a^2(6x^2 - x - 1)$ $= a^2(6x^2 - 3x + 2x - 1)$ $= a^2\{3x(2x - 1) + 1(2x - 1)\}$ $= a^2(3x + 1)(2x - 1)$	1 1 1	③	
	(ii) $\frac{2}{(a-5)^2} - \frac{3}{(5-a)}$ $= \frac{2}{(a-5)^2} + \frac{3}{(a-5)}$ $= \frac{2+3(a-5)}{(a-5)^2}$ $= \frac{2+3a-15}{(a-5)^2}$ $= \frac{3a-13}{(a-5)^2}$	1 1 1	③ $\triangle 6$	
				10

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Mathematics Question Paper - 2

Question No.			Answer	Marks		Other
(4)	(a)	(i)	Area = $\frac{1}{2} (x+2) (x+1)$	1	①	
		(ii)	$\frac{1}{2} (x+3) (x+1) = 2$ $x^2 + 3x + 2 = 4$ $\therefore x^2 + 3x - 2 = 0$	1	②	
	(b)	(iii)	$x^2 + 3x - 2 = 0$ $x = \frac{-3 \pm \sqrt{9+8}}{2}$ $= \frac{-3 \pm \sqrt{17}}{2}$ $= \frac{\pm\sqrt{17} - 3}{2}$	1	②	
		(iv)	BC > 0 $BC = \frac{+4.12 - 3}{2}$ $= 0.56cm$ $AB = \begin{pmatrix} 2 & -1 \\ 0 & 3 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 0 \end{pmatrix}$ $= \begin{pmatrix} -1 & 4 \\ 9 & 0 \end{pmatrix}$	1	③	 

Question No.			Answer	Mark	Other	
(5)	(i)	(i)	Copy the diagram and mark the relevant data	2	②	
		(ii)	$\sin 30^\circ 30' = \frac{AB}{20}$ $0.5075 = \frac{AB}{20}$ $AB = 20 \times 0.5070$ $AB = 10.14m$	2		
			$\cos \hat{CAB} = \frac{AB}{AC}$	1		
			$\cos \hat{CAB} = \frac{10.14}{15}$ $= 0.6760$	1		
			$\therefore \hat{CAB} = 47^\circ 25'$	1		
				1	⑧	

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Mathematics Question Paper - 2

Question No.	Answer	Marks	Other																																																		
6.	(i) 24 - 30	1	①																																																		
	(ii) 48 minutes	1	①																																																		
	(iii)																																																				
	<table border="1"> <thead> <tr> <th>Time spent (minutes)</th> <th>No. of days</th> <th>Mid value</th> <th>d</th> <th>fd</th> </tr> </thead> <tbody> <tr> <td>0 - 6</td> <td>1</td> <td>3</td> <td>-24</td> <td>-24</td> </tr> <tr> <td>6 - 12</td> <td>3</td> <td>9</td> <td>-18</td> <td>-54</td> </tr> <tr> <td>12 - 18</td> <td>3</td> <td>15</td> <td>-12</td> <td>-36</td> </tr> <tr> <td>18 - 24</td> <td>4</td> <td>21</td> <td>-6</td> <td>-24</td> </tr> <tr> <td>24 - 30</td> <td>10</td> <td>27</td> <td>0</td> <td>0</td> </tr> <tr> <td>30 - 36</td> <td>6</td> <td>33</td> <td>6</td> <td>36</td> </tr> <tr> <td>36 - 42</td> <td>2</td> <td>39</td> <td>12</td> <td>24</td> </tr> <tr> <td>42 - 48</td> <td>1</td> <td>45</td> <td>18</td> <td>18</td> </tr> <tr> <td></td> <td>30</td> <td></td> <td></td> <td>-138+78=-60</td> </tr> </tbody> </table>	Time spent (minutes)	No. of days	Mid value	d	fd	0 - 6	1	3	-24	-24	6 - 12	3	9	-18	-54	12 - 18	3	15	-12	-36	18 - 24	4	21	-6	-24	24 - 30	10	27	0	0	30 - 36	6	33	6	36	36 - 42	2	39	12	24	42 - 48	1	45	18	18		30			-138+78=-60	4	Mid value -1 column d - 1 column fd - 1 Σfd -1
Time spent (minutes)	No. of days	Mid value	d	fd																																																	
0 - 6	1	3	-24	-24																																																	
6 - 12	3	9	-18	-54																																																	
12 - 18	3	15	-12	-36																																																	
18 - 24	4	21	-6	-24																																																	
24 - 30	10	27	0	0																																																	
30 - 36	6	33	6	36																																																	
36 - 42	2	39	12	24																																																	
42 - 48	1	45	18	18																																																	
	30			-138+78=-60																																																	
	$\text{Mean} = A + \frac{\Sigma fd}{\Sigma f}$ $= 27 + \frac{-60}{30}$ $= 25$	1																																																			
	Mean = 25 minutes	1	⑥																																																		
	(iv) Time that could be expected to be wasted in the bank during 60 days = 25×60 minutes = 25 hours $25 > 24$ \therefore more than 24 hours	1																																																			
		1	②																																																		
			10																																																		

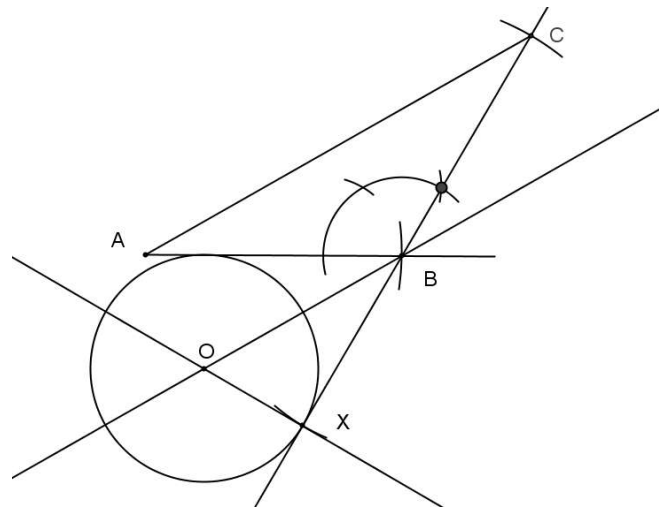
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Mathematics Question Paper - 2

Question No.	Answer	Marks	Other		
(7)	(a) (i)	First three terms 6, 13, 20 $a = 6 \quad d = 7$	1 1	or $T_n = 7n - 1$ $83 = 7n - 1$ ---- 1 $n = 12$ ---- 1	
		(ii)	$T_n = a + (n-1)d$ $83 = 6 + (n-1)7$ $7n = 84$ $n = 12$ $\therefore 83$ is the 12th term	1	①
	(iii)	$S_n = \frac{n}{2} \{2a + (n-1)d\}, n = 12, a = 6, d = 7$		or $S_n = \frac{n}{2}(a+l)$ $n = 12, a = 6, l = 83$	
		$S_n = \frac{12}{2} \{2 \times 6 + (12-1)7\}$	1	$S_n = \frac{12}{2} (6+83)$ ---- 1 $= 6 \times 89$ $= 534$ ---- 1	
		$= 6 \{12+77\}$ $= 534$	1	② $\triangle 5$	
	(b) (i)	512 , 256 , 128 $\frac{256}{512} = \frac{1}{2}, \frac{128}{256} = \frac{1}{2}$ common ratio , so this is a geometric progression	1	①	
		(ii)	$T_n = ar^{n-1}, a = 512, r = \frac{1}{2}, n = 7$ $T_7 = 512 \times \left(\frac{1}{2}\right)^6$ $= 512 \times \frac{1}{64}$ $T_7 = 8$ $\therefore 8$ sparkles during the 7th minutes	1 1	 ②
		(iii)	$T_n = ar^{n-1}$ $2 = 512 \times \left(\frac{1}{2}\right)^{n-1}$ $\frac{2}{512} = \left(\frac{1}{2}\right)^{n-1}$ $\frac{1}{256} = \left(\frac{1}{2}\right)^{n-1}, \left(\frac{1}{2}\right)^8 = \left(\frac{1}{2}\right)^{n-1}$ $9 = n$ \therefore The sparkler was alight for 9 minutes	1	② $\triangle 5$ 10

Question No.	Answer	Marks	Other	
08.	(a)	The line joining the mid points of two sides of a triangle is parallel to the third side and is equal to half of the third side.	1	①
	(b)	Draws the figure and marks the data.	2	
		Parallelogram ABCD	1	
		AQ = QC (diagonals bisect each other)	1	
		CE // AB, AC // BE (given)	1	
		∴ ABEC is a parallelogram	1	
		∴ CP = PB (diagonals bisect each other)	1	
		Considering triangle ABC	1	
		AB // PQ (As AQ = QC, BP = PC)	1	
	∴ $\frac{1}{2} AB = PQ$	1		
	Further more, AB = DC, AB = CE	1		
	2AB = DE	1		
	2 (2PQ) = DE ($\frac{1}{2} AB = PQ$)	1		
	∴ 4PQ = DE	1		
	∴ $PQ = \frac{1}{4} DE$	1	⑨ 10	
09.	(i)	AB or BC Construction of $\hat{A}BC = 120^\circ$ Completes the triangle	1 1 1	③
	(ii)	Produces the side CB and marks X	1	①
	(iii)	Constructs perpendicular to XC at X Angle bisector of ABX Draws the circle, intersection point of perpendicular and bisector as the centre and radius as OX, and marks the point O	1 1 1	③
	(iv)	Radius = 2.9 ± 0.1 cm	1	①
	(v)	Show $\hat{O}BA = 30^\circ$ and $\hat{B}AC = 30^\circ$ OB // AC (alternate angles are equal)	1 1	② 10



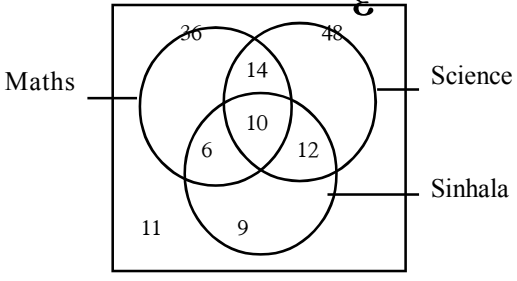
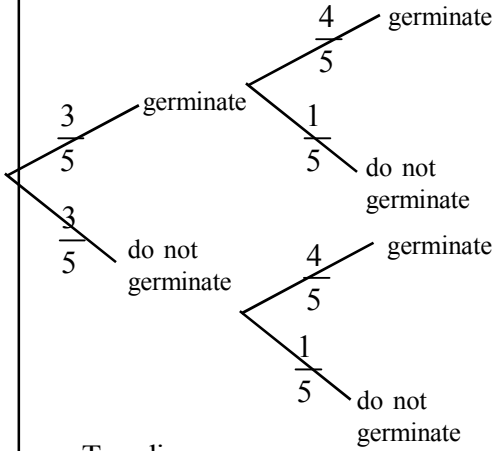
Question No.		Answer	Marks	Other	
s10	(a)	Volume of the cone = $\frac{1}{3}\pi r^2 \times 2r$	1		
		= $\frac{2}{3}\pi r^3$	1		
		As total volume = $\frac{26\pi r^3}{3}$,			
		Volume of water = $\frac{26\pi r^3}{3} - \frac{2\pi r^3}{3}$	1		
		= $\frac{24\pi r^3}{3} = 8\pi r^3$	1		
		As the radius of the bottom of the cylinder is a			
		$\frac{1}{2}(\pi a^2 \times 4r) = 8\pi r^3$	1		
		$a = 2r$	1	Ⓒ	
		(b)	$A = \frac{(1.475)^2 \times \sqrt{18.62}}{0.372}$		
		$\lg A = 2\lg 1.475 + \frac{1}{2}\lg 18.62 - \lg 0.372$	1		
$= 2 \times 0.1688 + \frac{1}{2} \times 1.2700 - \bar{1}.5705$					
If two log values are correct	1				
$= 0.3376 + 0.6350 - \bar{1}.5705$	1				
$= 1.4021$					
$A = 25.24$	1	Ⓓ			
		10			

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Mathematics Question Paper - 2

Question No.	Answer	Marks	Other
11.	(i) OA = 17cm AK = 8 cm (As perpendicular from centre to chord bisects the chord)	1	
	Applying Pythagoras' theorem to right angled triangle OAK $OA^2 = AK^2 + KO^2$ $17^2 = 8^2 + KO^2$ $KO^2 = 17^2 - 8^2$ $KO^2 = 225$ $KO = 15$ ∴ Perpendicular distance from O to chord AB = 15cm	1	③
	(ii) $\widehat{AOB} = 58^\circ$ ∴ $\widehat{ACB} = \frac{58^\circ}{2}$ (Angle subtended at centre is twice the angle subtended at circumference) $= 29^\circ$	1	②
	(iii) $\widehat{AOB} = \widehat{ACD} = 58^\circ$ $\widehat{ACB} = 29^\circ$ ∴ $\widehat{BCD} = 58^\circ + 29^\circ = 87^\circ$ So $\widehat{BAD} = 180^\circ - 87^\circ$ (Opposite angles of a cyclic quadrilateral are supplementary) $\widehat{BAD} = 93^\circ$	1 1 1	③
	(iv) AT = BT Tangents drawn from a exterior point to a circle are equal	1 1	②
			10

Question No.	Answer	Marks	Other
12. (a) (i)	 <p>Marks 6,14,11 in the Venn diagram 1+1+1</p>	3	③
(ii)	Students passed only in science = 12	1	①
(iii)	Students passed either maths or science = 60	1	① $\triangle 5$
(b) (i)	<p>dwarf chilli long chilli</p>  <p>Tree diagram</p>	2	②
(ii)	Probability of germination of both chilli seeds = $\frac{3}{5} \times \frac{4}{5}$ $= \frac{12}{25}$	1	①
(iii)	Probability of non-germination of both seeds = $\frac{2}{5} \times \frac{1}{5}$ $= \frac{2}{25}$	1	① $\triangle 5$
			⑩