7.1 Objectives
Paper I
Part A

01. Calculatea the amount to be paid for a quarter when the annual rates is given.

02. Solves a simple equation of the type $\frac{1+x}{a} = b$ " $a, b, x \in Z^+$ given.

03. Shades a named region of a Venn diagram consisting of the universal set and two intersecting sets.

04. Given the exterior angle formed by producing a side of a triangle, and one of the two interior opposite angles, finds the value of the other interior opposite angle.

05. Given the number of men and number of days to complete a work, finds the number of men required to complete the same work within a given number of days.

06. Fills in the blanks in a logarithmic expression relevant to a given expression of indices.

07. Finds the value of a named angle when a diagram with an angle subtended at the centre by an arc and the angle subtended on the remaining part of the circle by the same arc, and two equal sides are given.

08. Finds, (i) thecommon ratio; and (ii) the third term in a geometric progression whose first term, second term and fourth term are given.

09. Solves two simultaneous equations in which the coefficients of one variable are equal in magnitude.

10. Marks the truth or falsehood of some given statements about the congruent plane figures.

11. Calculates the value of a named angle when the value of an angle between the diagonal of a parallelogram and another side is given in a diagram where the angle between the diagonal and one side is a right angle.

12. Writes the solutions of a given quadratic equation of the form $x(x-a) = 0$.

13. Calculates the volume of a prism whose cross sectional area and length are given.

14. Given the angle of elevation of a certain point when observed from another point, finds the angle of depression of the first point when viewed from the second point.

15. Draws a diagram to clarify the meaning of the statement 'the line joining the mid point of a chord of a circle and the centre is perpendicular to the chord'.

16. Given the time required for a vehicle to reach its destination at a particular speed ,
    (i) finds the distance travelled by the vehicle.
    (ii) finds the time taken by the vehicle to travel the same distance if it travels with another speed.

17. Finds (i) the value of a named angle and (ii) the value of another named angle when two cyclic quadrilaterals in the same circle and an interior angle of one cyclic quadrilateral are given.

18. Given a diagram of a triangular plot of land, indicates in a sketch, the points located on a boundary situated at an equal distance from the other two boundaries.

19. Finds the sin ratio of a named angle when the lengths of two sides except the hypotenuse of a right angled triangle are given.

20. Given the value of one angle of a triangle drawn by joining the two points at the end of a diameter of a circle to another point on the circle , finds the other two angles.

21. Calculates the time interval at which three bells ring simultaneously given the time intervals at which each of the three bells ring in algebraic form.

22. Calculates total weight of the girls and the mean weight of all the children when the mean weight of a certain number of girls and the total weight of a certain number of boys are given.

23. Writes the equation of a straight line passing through the origin of a coordinate plane.

24. Of probable events, finds the probability of a named event when a balanced coin and a regular die with marked sides are tossed simultaneously.

25. Given the equation of a straight line of gradient -1 drawn on a coordinate plane, finds the area between the line and the axes.

Part B

1. (a) Given in fractions how two parts of a product are used and the rest is used for some other purpose , calculates
    (i) the sum of the two parts used initially;
    (ii) the remaining part used for some other purpose.

   (b) (i) Given the amount which is a fraction of a certain sum of money, calculates the remaining portion.
    (ii) Calculates the total sum of money that should be paid after a specified period of time when the annual simple interest rate and the loan amount are given.

2. Given a diagram composed of a sector and a triangular section,
    (i) calculates the arc of the sector.
    (ii) calculates the cost of constructing a fence around the entire land excepting the gate given the expenditure per metre.

(iii) finds the area of the sector shaped plot of land.
(iv) decides on the larger plot comparing the area of a sector and a triangle.
(v) finds the length and the breadth for a rectangular plot of specified area and includes it with relevant dimensions in a given diagram.

3. (a) When the import tax percentsge is given,
   (i) calculates the value of the good after paying tax.
   (ii) when a value of a good after paying tax is given, calculates the value of it before paying tax.

   (b) When the money invested in buying shares and the market price of a share is given,
   (i) finds the number of shares bought.
   (ii) finds the total dividend income , when the dividend per share is given.
   (iii) Explains whether the capital gain obtained by selling the shares exceeds the dividends at a time when the market share value has increased.

4. (a) Given a grid to show the sample space of two mutually exclusive incidents
   (i) indicates the sample spsce on the grid.
   (ii) selects outcomes of an event from the sample space and calculates the probability of that event.
   (iii) calculates theprobability of a named event.

   (b) When a universal set and two other sets are described verbally
   (i) writes the elements of the union of the two sets.
   (ii) writes the elements of the complement set of the intersection of two sets.

5. (a) Given a pie chart with information on a set of data with class intervals represented in 5 sectors and given the central angles of four of them in degrees and the other by an algebraic term,
   (i) finds the value of the central angle given by an algebraic term.
   (ii) fills in the blanks in a table given when the extent represented by a sector of given angle is provided.

   (b) Displays the information given in the table by a histogram.

Mathematics II

Part A

01. (a) For a certain loan amount at a given simple interest rate,
    (i) calculates the interest to be paid for a given time period.
    (ii) calculates the amount to be paid at the end of that period to settle the loan.
    (b) When the consideration of a share and dividends are known, finds the income and gives that as a percentage of the invested amount.
    (c) When the annual income from a fixed deposit is known, calculates the annual interest rate paid for that.

02. (a) (i) Completes a table which includes x values that satisfy an equation of the form the $y = a + bx - x^2$ where a and b are integers.
    (ii) Calibrating axes according to a suitable scale, draws the graph within the given range based on the completed table.

    (b) From the above graph,
    (i) draws its axis of symmetry and writes its equation.
    (ii) writes the range of values for which the function is positive.
    (iii) writes the roots of an equation of the function.

    (c) When the roots of an equation are given, writes the corresponding quadratic function that quadratic equation.

03.(a) When a set of information is given by a table of two rows and two columns and another piece of information by a table of two rows and one column
    (i) represents a given set of data in a matrices and find the produt of fwomatrices of order 2x2 and 2x1
    (ii) describes the values represented by the elements of the matrix obtained by the product of the two matrices.
    (iii) Explains with reasons whether the matrices are commutative or not.

    (b) (i) When the middle number of three consecutive numbers is x and the information on the summation of the three numbers and difference are given, develops an inequality based on the given information.
    (ii) Solves the inequality, finds the solution set

04.(a) Solves an equation which includes algebraic fractions and algebraic expressions in the denominator.
    (b) Finds the length of the shortest side of a triangle when its base and height are given as algebraic expressions and the area is given in square units.

05.(a) Given the width of a river, the bearing of rowing a boat from one point on its bank to a point on the other bank and the bearing of rowing it to another point on the initial bank,
    (i) sketches the information given.
    (ii) finds the distance from the starting point to the point reached on the opposite bank using trigonometric ratios and hence finds the average speed given the time.

(b) When positions of three points are given, draws, a sketch diagram for that and calculates the distance between two points using Pythagoras theorem.

06. If a frequency distribution of time durations in which a student engaged in games of each day of a month is given,
   (i) writes the modal class of the frequency distribution.
   (ii) calculates the mean of the frequency distribution.
   (iii) calculates the time duration that could be expected to be spent on games during a 90 day period.
   (iv) Justifies a statement that indicates an idea on the time that can be saved by reducing a certain time period of play daily.

Part B

07.(a) Given the first, second and third terms of an arithmetic progression related to day to day life,
   (i) finds the value of a named term of the arithmetic progression.
   (ii) finds the total of a certain number of terms of the arithmetic progression.
   (iii) If the total of a certain number of terms of a given arithmetic progression is given, inquires about the correctness or incorrectness of an idea expressed on that total.

08. Given that the line joining the mid points of two sides of a triangle and the line drawn parallel to a side of the triangle through the opposite vertex meet, and the angle between that line and the side of the triangle is equal to an angle of the triangle, shows that a named quadrilateral is a parallelogram and that its diagonals are equal in length.

09. Given the diagram of the diameter of a circle and a chord perpendicularly bisecting that diameter,
   (i) gives reasons for the two parts of the chord formed by bisection being equal.
   (ii) given the angle between the diameter and the line joining the end of the diameter and an end of the chord, finds the value of the angle between that line and the chord.
   (iii) shows that the angle formed by joining the points at the end of the chord with one end of the diameter is bisected by the diameter.
   (iv) shows that two triangles comprising the sections formed by the intersection of the chord and the diameter are similar.
   (v) when a part of a chord is given in centimetres, shows that the product of the lengths of two sides is equal to a given number.

10. Using the compass and a ruler with cm/mm scale,
   (i) draws an isosceles obtuse triangle when the lengths of two equal sides and the included angle are given.
   (ii) draws the bisector of a given angle and names the point that it intersects the other side.
   (iii) draws a line which goes through a given point and is parallel to a named line.
   (iv) if three points are given, finds the other point and draws the parallelogram.
   (v) identifying the characteristics of a rectangle, gives reasons to show that a given quadrilateral is a rectangle.

11.(a) Given that a logo is cast using a solid hemisphere and a solid right circulam cone whose radius is the same as that of the hemisphere and height is twice that of the radius, shows that the volume of the logo is equal to the volume of a sphere with the same radius.

(b) Simplifies an expression of the form of $\frac{\sqrt[3]{a} \times b}{c^2}$ where a, b, c are in between 0 and 20 using logarithms.

12.(a) When a table containing information on several items is given
- (i) fills in the blanks in a tree diagram drawn to represent two independent events.
- (ii) according to the given information, extends the tree diagram further.
- (iii) finds the probability of a named event using the tree diagram.

(b) Given relevant information related to three sets
- (i) includes relevant information in given Venn diagram.
- (ii) solves a given problem using the Venn diagram.
- (iii) shades a relevant area in the Venn diagram.

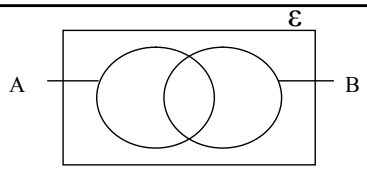
7.2 Question paper
Mathematics I - Part A

Answer all the questions on this paper itself. **Time: Two hours**

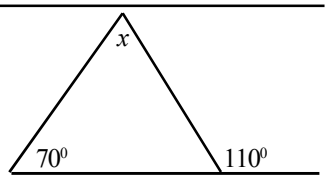
01. If the annual assessment tax rates of a house is Rs.1 600, what is the amount to be paid per quarter.

02. Solve $\frac{1+x}{3} = 4$.

03. Shade the region $A' \cap B$ area in the given diagram.



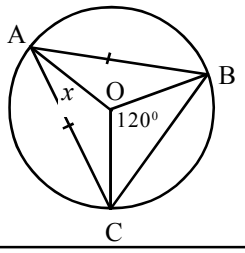
04. Find the value of x.



05. Six men completed digging a well in four days. How many men are required to dig the well in three days?

06. If $2^3 = 8$, $\log_2 ..... = ...$; fill in the blanks.

07. The diagram shows a circle with centre O and a chord BC. A is a point on the circumference. AB=AC and $B\hat{O}C = 120^0$.
Find the value of x.

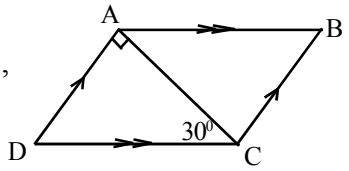


08. $2, 6, b, 54, ...$ are four consecutive terms of a geometric progression
(i) Find thecommon ratio of the progression.
(ii) Find the value of b.

09. If $a - b = 2$ and $2a + b = 13$ find the values of a and b.

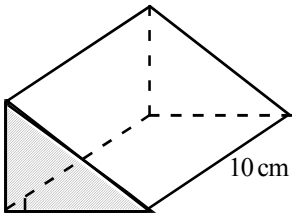
10. Mark each correct statement with '✓' and each incorrect statement with '×'.
    (i) Congruent plane figures are equal in shape and size. ☐
    (ii) All circles are congruent. ☐
    (ii) Two right angled triangles are congruent only when the hypotenuse and a side of one triangle is equal to those of the other. ☐

11. $D\hat{A}C$ is a right angle in the parallelogram ABCD. If $A\hat{C}D = 30^0$, find the value of $A\hat{B}C$.

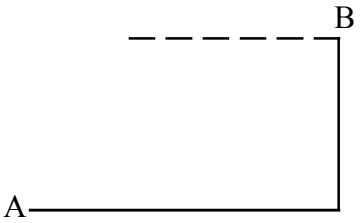


12. Solve $x(x-2) = 0$.

13. The cross sectional area of the right angled right prism is 12 cm^2 and its length is 10 cm. Calculate the volume of the prism.



14. The angle of elevation of point B on top of a tower is 60^0 for an observer at A. What is the angle of depression of point A for an observer at B ?



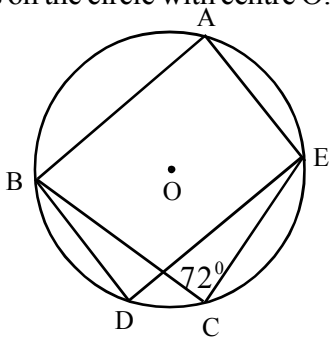
15. Draw a diagram to clarify the meaning of the statement 'the line joining the mid point of a chord of a circle and the centre is perpendicular to the chord'.

16. A vehicle took an hour to travel a certain distance on the highway at a speed of 100 km h^{-1}.
    (i) Find the distance travelled by the vehicle in that hour.
    (ii) On a rainy day the vehicle travelled at a speed of 80 km h^{-1}. Calculate the time required for that journey.

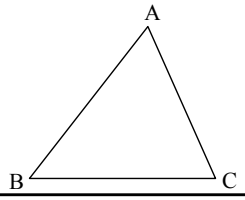
17. ABCE and ABDE are two cyclic quadrilateral with their vertices on the circle with centre O.

(i) What is the value of $B\hat{D}E$ if $B\hat{C}E = 72^0$?

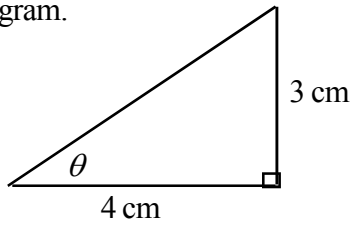
(ii) What is the value of $B\hat{A}E$?



18. The diagram shows a triangular plot. Draw a sketch and mark point X on BC , so that it is equidistant from sides AB and AC.



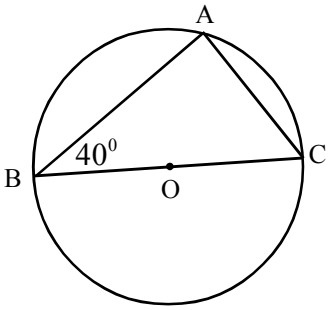
19. Find the value of sin θ according to the information given in the diagram.



20. Points A, B and C are on the circle with centre O. $A\hat{B}C=40^0$

(i) Find the value of $B\hat{A}C$.

(ii) Find the value of $A\hat{C}B$.



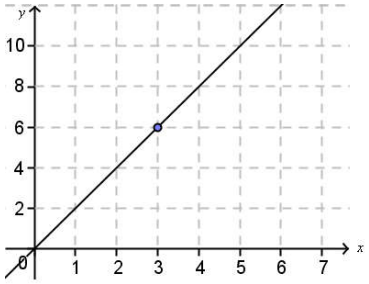
21. Three bells at a religious place ring at $2a$, $3a$ and $4a$ minute intervals. After ringing all three bells ring together, how long will it take to ring together again?

22. the mean weight of four girls is 45 kg. The total weight of six boys is 300 kg.

(i) Find the total weight of the girls.

(ii) Find the mean weight of all the children.

23. Write the equation of the straight line shown in the coordinate plane.



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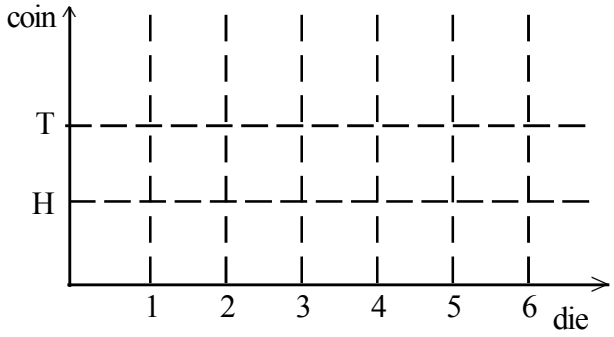
24. A balanced coin and a regular die with its sides marked as 1, 2, 3, 4, 5 and 6 are tossed simultaneously. Mark on the grid the event of head on the coin and an odd number on the die being face up



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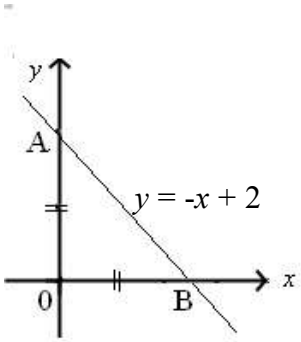
25. The equation of the line AB shown on the coordinate plane is $y = -x + 2$. Find the area of the triangle AOB.



Part B - Answer all the questions on this paper itself.

01.(a) Ranjith, an owner of a livestock farm decided to provide $\frac{2}{5}$ of his monthly milk production to a liquid milk production company to keep, $\frac{1}{8}$ of it for consumption and to give the balance for yoghurt production.

(i) Of the total milk production, what was the fraction that was allocated for the liquid milk production company and for consumption?

(ii) Of the total milk production what was the fraction allocated for yoghurt production?

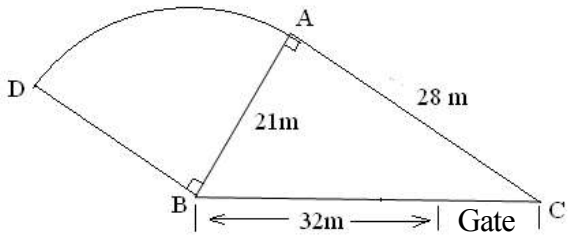
(b) Ranjith has only Rs. 25,000 which is $\frac{1}{3}$ of the required amount of money for yoghurt production. He borrowed the balance from a finance company at 12% simple interest rate to settle in two years.

(i) What is the amount he borrowed?

$\pi = \frac{22}{7}$

(ii) What is the total amount to be paid to settle the loan?

02. The diagram shows a model farm prepared for an exhibition. It consists of a right angled triangle shaped plot ABC and a sector shaped plot ABD. (Take $\pi = \frac{22}{7}$)



(i) What is the length of the arc AD?

(ii) What is the cost incurred to build a fence around the total plot of land excepting the length reserved for the gate at the rate of Rs.50 per metre?

(iii) Find the area of the plot ABD.

(iv) If the organizers expect to allocate a larger area for vegetable cultivation which of the two sections should be selected?

(v) Within this area, a rectangular office of area 35 m^2 has to be constructed so that it is boarded by parts of AB and AC. Length and width of this should be whole numbers and in metres. Draw a sketch of the office with dimensions fulfilling the above requirements.

3. (a) 30% custom duty is charged when importing a good.

(i) What is the value of a Rs.15 000 worth imported television after paying custom duty?

(ii) The price of an imported refrigerator after paying custom duty was Rs. 32 500. What was the price of it before paying the custom duty?

(b) Kumar purchased shares of market price Rs. 10 each by investing Rs. 20 000.

(i) How many shares did he purchase?

(ii) If a dividend of Rs. 1.50 is paid for a share, find the income from dividends.

(iii) Kumar sells all the shares when the market price of a share is Rs. 12. Explain whether the capital profit obtained from it exceeds the income from dividends.

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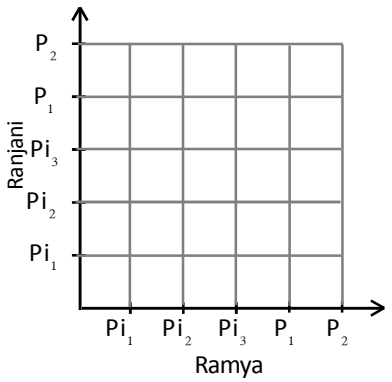
4. (a) There are five identical beauty culture cream bottles in a box. Three of them are pink in colour and the rest are purple in colour. Without looking at the box, Ramya picked one bottle and after that Ranjani picked another bottle in the same way.



(i) Mark all possible outcomes in the given grid.

(ii) What is the probability of both of them getting the same coloured cream bottles

(iii) What is the probability of Ramya getting a pink one and Ranjani getting a purple one?

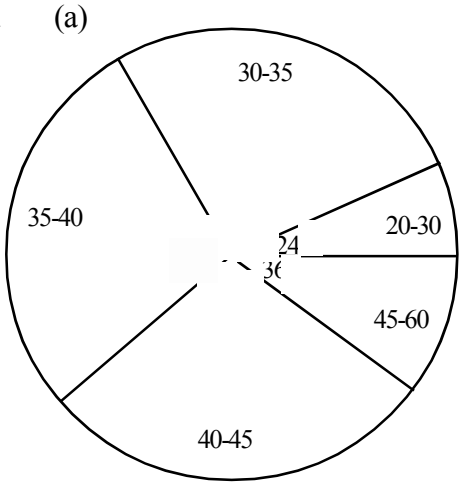
(b) ε = { non negative integers less than 10}
A = { non negative integersless than 8}
B = {multiples of 2 between 0 and 10}

Write the following sets with elements.

(i) $A \cup B$

(ii) $(A \cap B)'$

5. (a)



This pie chart shows information on the masses in kilogrammes of children in grades 6 - 11, collected at a health clinic held in the school.

(i) Find the value of x^0.

(ii) If the circular sector that indicates 30 - 35 weight class represent 48 students, complete the following table based on that.

Class interval (mass in kg)	Frequency (No. of students)
20-30	...
30-35	...
35-40	...
40-45	...
45-60	...

(b) Show the information in a histogram.

Programme of improving G.C.E (O.L.) Examination results

OL/7/32-S-1 **Mathematics Question Paper - 7**

Mathematics II **Three hours**

- Select five question from Part A and five questions from Part B and answer 10 questions.
- 10 marks each are given to all the questions.
- Volume of a straight circular cylinder is $\pi r^2 h$ when the base of its radius is r and height is h.
- Volume of a sphere is $\frac{4}{3}\pi r^3$ when its radius is r.

Part A

Answer only five questions.

01.(a) Jagath borrowed Rs.25 000 at an annualsimple interest rate of 10%.

(i) Calculate the interest to be paid after $2\frac{1}{2}$ years.

(ii) What is the total amount to be paid to settle the loan?

(b) (i) Saman invests Rs.72 000 in a company where the market price of a share is Rs.100. If the company pays Rs.4 as the annual dividend per share, finds Saman's annual income as a percentage of the amount invested.

(ii) He got to know that the income will be doubled if this Rs.72 000 is deposited in a company as a fixed deposit instead of buying shares. If that is true, what is the annual interest rate the company is paying for fixed deposits?

02.(a) Given below is an incomplete table with values of y relevant to a few given values of x of the function $y = 6 + x - x^2$.

x	-3	-2	-1	0	1	2	3	4
y	-6	0	4	6	....	4	0	-6

(i) Find the value of y when x=1.

(ii) Select a suitable scale for the x axis and the y axis and draw the graph of the function based on the values in the above table.

(b) From the graph

(i) draw the axis of symmetry and write its equation.

(ii) write the interval in which the function is positive.

(iii) write the roots of the equation $6 + x - x^2$.

(c) Write the equation roots -1 and 4 and coefficient of x^2 is equal to 1.

03.(a) The table gives information on the fruits bought by two children.

	Apple	Orange
Thamashi	4	3
Amaya	5	2

Fruit	Price
Apple	20
Orange	30

(i) Indicating how fruits were bought by matrix A and the price of fruits by matrix B, find AB.

(ii) Describe how elements of the matrix AB are represented.

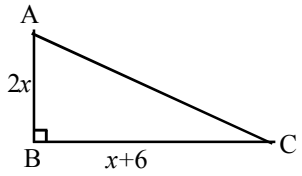
(iii) Can you find B A? Give reasons for your answer.

(b)(i) The sum of three consecutive whole numbers is lesser than 30 but greaterr than 15. Considering the middle number as x, develop an inequality.

(ii) Solve that inequality and write all possible values of x.

04. (a) Solve $\frac{3}{a-2} - \frac{2}{a+2} = \frac{1}{a}$.

(b) Area of triangle ABC in the figure is 10 square units.
Based on the above information, find the length of the shortest side of the triangle. (Consider $\sqrt{19} = 4.35$)



05.(a) The width of a river flowing in the north-south direction is 50 m. Kumara, starting from a point A on one bank of the river rows a boat in a straight line path on a bearing of 120^0 and reaches the point B on the opposite bank. Afterwards he moves from B on a bearing of 250^0 and reaches point C on the initial bank taking 6 seconds for the journey. (Assume that the river is still)

(i) Draw a diagram to include the above information and write the given data on it.
(ii) Using trigonometric tables, find the distance AB to the nearest whole number and calculate the mean speed of the boat if the distance from B to C is 56m.

(b) Nipun walked 60 m to the east from point P and reached point Q. From there he walked 80 m towards the north and reached point R. Draw a sketch diagram to show the above information and find the distance from P to Nipun's current position.

06. A student has recorded the time he spent per day on computer games for a 30 day month. Given below is a frequency table which includes that information.

Time (Minutes)	16-24	24-32	32-40	40-48	48-56	56-64
No. of days	1	3	6	10	8	2

(i) In which time interval was he engaged in the game for a maximum number of days?

(ii) Find the mean time he was engaged in the game per day to the approximate minute.

(iii) Find the time that can be expected to be wasted due to engagement in computer games during a 90 day school term.

(iv) His mother says that the time wasted can be reduced by 20 hours within this three month period by reducing the play by 15 minutes per day. Explain its correctness or incorrectness giving reasons.

Part B
Answer only five questions.

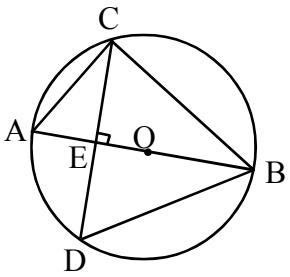
07.(a) A metal sphere is dropped vertically downward from a building for a scientific study. It travelled 5 m in the first second, 15 m in the next second and 25 m in the third second.

(i) What is the distance travelled by the metal sphere durning the 10^{th} second?
(ii) What is the total distance travelled by the metal sphere by the end of the 10^{th} second?
(iii) The initial height at which the sphere was released was 1120 m and the team of researchers expected the metal sphere to reach the ground within t seconds. If $t \geq 4\sqrt{14}$, show that their expectation is realized. (Neglect resistance of air)

(b) In a geometric progression the first term is 5 and the third term is 80. Show that there are two progressions satisfying these condions.

08. In triangle ABC, mid points of sides AB and AC are P and Q respectively. The line PQ produced and the line drawn parallel to AB from C meet at R. If $A\hat{B}C = A\hat{C}R$, show that APCR is a parallelogram and that diagonals are equal in length.

09. AB is a diameter of a circle with centre O. Chord CD is drawn perpendicular to AB so that they intersect at point E.



(i) Give reasons for the equality of the lengths of theline segments CE and DE.
(ii) If $C\hat{B}A = 40^0$, find the value of $B\hat{C}D$.
(iii) Show that $C\hat{B}D$ is bisected by AB.
(iv) Show that ACE and BED are equi-angular triangles.
(v) If CE = 6 cm, show that AE.BE = 36 cm^2.

10. Using only a compass and and a ruler with a cm/mm scale,

(i) construct a triangle in which AB = BC = 6.6 cm and $A\hat{B}C = 120^0$.
(ii) construct the bisector of $A\hat{B}C$ and name the point at which it intersects AC as D.
(iii) construct a line parallel to AC through B.
(iv) construct the parallelogram ADBP.
(v) show that the parallelogram you constructed is a rectangle.

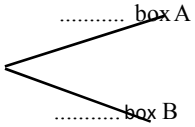
11.(a) A logo is cast by melting a solid, metal hemisphere of radius a and a cone of the same radius a and height $2a$. Assuming no metal is lost, show that the volume of the logo is equal to avolume of the sphere of radius a.

(b) Simplify using logarithms. $\dfrac{\sqrt[3]{12.08} \times 0.72}{5.42^2}$

12. (a) The table presents information on the number of red bulbs and blue bulbs in two identical boxes.

	Red	Blue
A	3	5
B	4	2

(i) From the two boxes, one is randomly selected. An incomplete tree diagram drawn for that event is given below. Complete that tree diagram.



(ii) If a bulb is randomly taken from the selected box, extend the tree diagram to show that event.

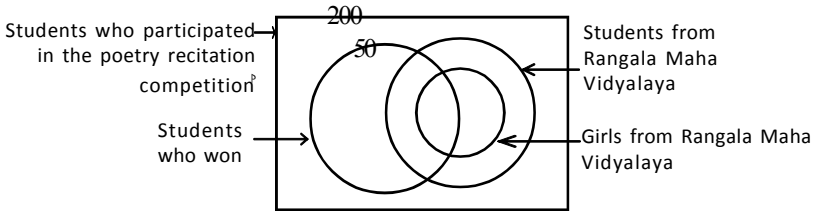
(iii) What is the probability of the bulb taken out being red.

(b) 50 children won a poetry recitation competition in which 200 children participated. Six girls and eight boys participated from Rangala Maha Vidyalaya. Four of those girls won.

(i) Include these information in the following Venn diagram.

(ii) If 43 of the winning students are not from Rangala Maha Vidyalaya, how many boys who participated from Rangala Maha Vidyalaya did not win the competition?

(iii) If Lal participated representing Rangala Maha Vidyalaya and won the competition, shade the area to which he belongs.

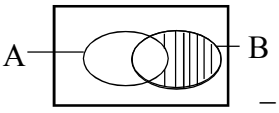


7.3 Answers and Marking scheme

Mathematics II Part A

1. Rs. 400 ----②

2. $1+x=12$ ---1
   $x=11$ ε ----②

3. 

----②

4. $x=110^0-70^0$ ---1
   $x=40^0$ ----②

5. $4\times6=24$ ---1
   $\frac{24}{3}=8$ ----②

6. $\log_2 8=3$ ----②

7. $x=30^0$ ----②

8. (i) 3 ---1
   (ii) 18 ---1 ----②

9. $a=5$ ---1
   $b=3$ ---1 ----②

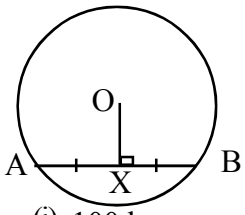
10. (i) ✓ for two correct answers ---1
    (ii) ×
    (iii) × ----②

11. $A\hat{B}C=60^0$ ----②

12. $x=0$ or $x=2$ ----②

13. 120 cm^2 ----②

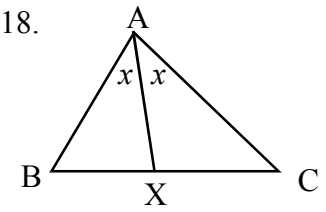
14. 60^0 ----②

15. 

----②

16. (i) 100 km ---1
    (ii) 1 h 15 min ---1 ----②

17. (i) 72^0 ---1
    (ii) 108^0 ---1 ----②

18. 

----②

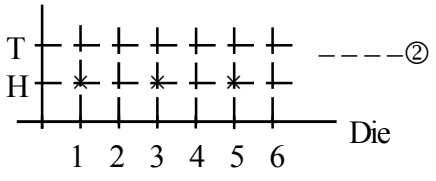
19. $\sin\theta=\frac{3}{5}$ ----②

20. (i) 90^0 ---1
    (ii) 50^0 ---1 ----②

21. 12 minutes ----②

22. (i) 180 kg ---1
    (ii) 48 kg ---1 ----②

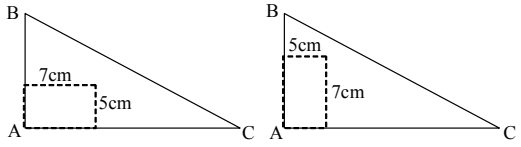
23. Gradient $=\frac{6}{3}=2$ ---1
    $y=2x$ ----②

24. Coin


----②

25. 2 square units ----②

Mathematics I - Part B

1.	(a)(i)	Fraction allocated for liquid milkand production consumption	$=\frac{2}{5}+\frac{1}{8}=\frac{16}{40}+\frac{5}{40}$	1+1			
			$=\frac{21}{40}$	1	③		
	(ii)	Fraction allocated for yoghurtproduction	$=\frac{19}{40}$	2	②	5	
	(b)(i)	$25\,000\times2$ =Rs. 50 000 --- 1+1		2	②		
	(ii)	Total interest for 2 years	$=50\,000\times\frac{12\times2}{100}$	2			
			=Rs.12 000				
		Total amount payable to settle the loan	$=50\,000+12\,000$				
			= Rs.62 000	1	③	5	10
2.	(i)	Length of the curved boundry AD	$=2\pi r\times\frac{\theta}{360}$	1			
			$=2\times\frac{22}{7}\times21\times\frac{90}{360}$				
			=33m	1	②		
	(ii)	Length of the fence	= 33 m+28 m+21 m+32 m	1			
			= 114 m	1			
		Expenditure for the fence	$=114\times50$ = Rs. 5 700	1	③		
	(iii)	Area of the sector	$=2\times\frac{22}{7}\times21\times\frac{90}{360}$				
			$=346.5\ m^2$	1	①		
	(iv)	Area of the triangular part	$=\frac{1}{2}\times21\times28=294\ m^2$	1			
		Area of the sector > Area of the triangular part Vegetable should be grown in the sector part		1	②		
	(v)						
		Obtaining 7 m and 5 m		1			
		marking inside the figure		1	②		10

3. (a) (i) Rs. $15\ 000 \times \frac{130}{100}$ or $15\ 000 \times \frac{30}{100}$ 1

= Rs. 19500 1 ②

(ii) Rs. $\frac{32\ 500}{130} \times 100$ or $x \times \frac{130}{100} = 32\ 500$ 1

Rs. 25 000 1 ② 4

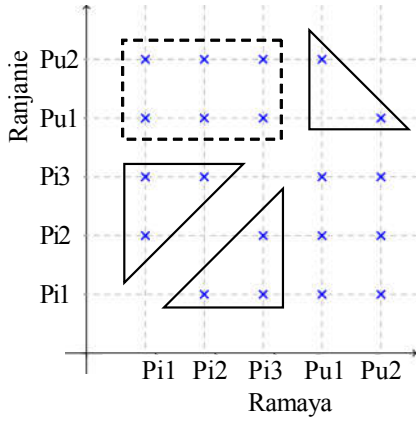
(b) (i) 2000 2

(ii) Rs. 3000 2

(iii) Capital gain = Rs. 4000 2 ⑥ 6 10

Capital gain exceeds dividend income

4. (a)



Receiving same coloured bottles

Ramya receiving pink, Ranjanie receiving purple

(i) Inclusion of all points in the graph 3

(ii) Both receiving same colour $= \frac{8}{20}$ 2

(iii) Ramya receiving pink, Ranjanie receiving purple $= \frac{6}{20}$ 1 ⑥

(b) (i) $A \cup B = \{0,1,2,3,4,5,6,7,8\}$ 2

(ii) $(A \cap B)' = \{0,1,3,5,7,8,9\}$ 2 ④ 10

5. (i) $360^0 - (104^0 + 36^0 + 24^0 + 96^0)$ 1

$x = 360^0 - 260^0$

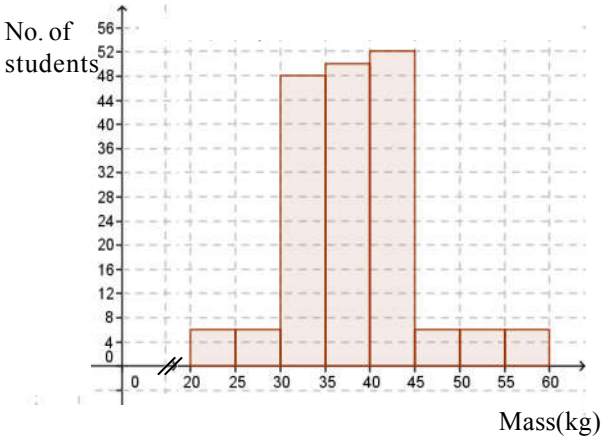
$x = 100^0$ 1 ②

(ii)

Class interval Weight(kg)	Frequency No. of students
20-30	12
30-35	48
35-40	50
40-45	52
45-60	18

1
1
1
1 ④

(b)



Axes 1
20-30 column 1
45-60 colulmns 1
Other columns 1 ④ 10

Mathematics II - Part A

1. (a) (i) Interest payable at the end of $2\frac{1}{2}$ years

$= 25\ 000 \times \frac{10}{100} \times 2\frac{1}{2} = \text{Rs.}6\ 250$ 1+1 ②

(ii) Amount to be paid by Jagath $= 25\ 000 + 6\ 250 = \text{Rs } 31\ 250$ 2 ②

(b) (i) His number of shares $= \frac{72\ 000}{100} = 720$ 1

Dividend income $= 720 \times 4 = Rs\ 2\ 880.00$ 1

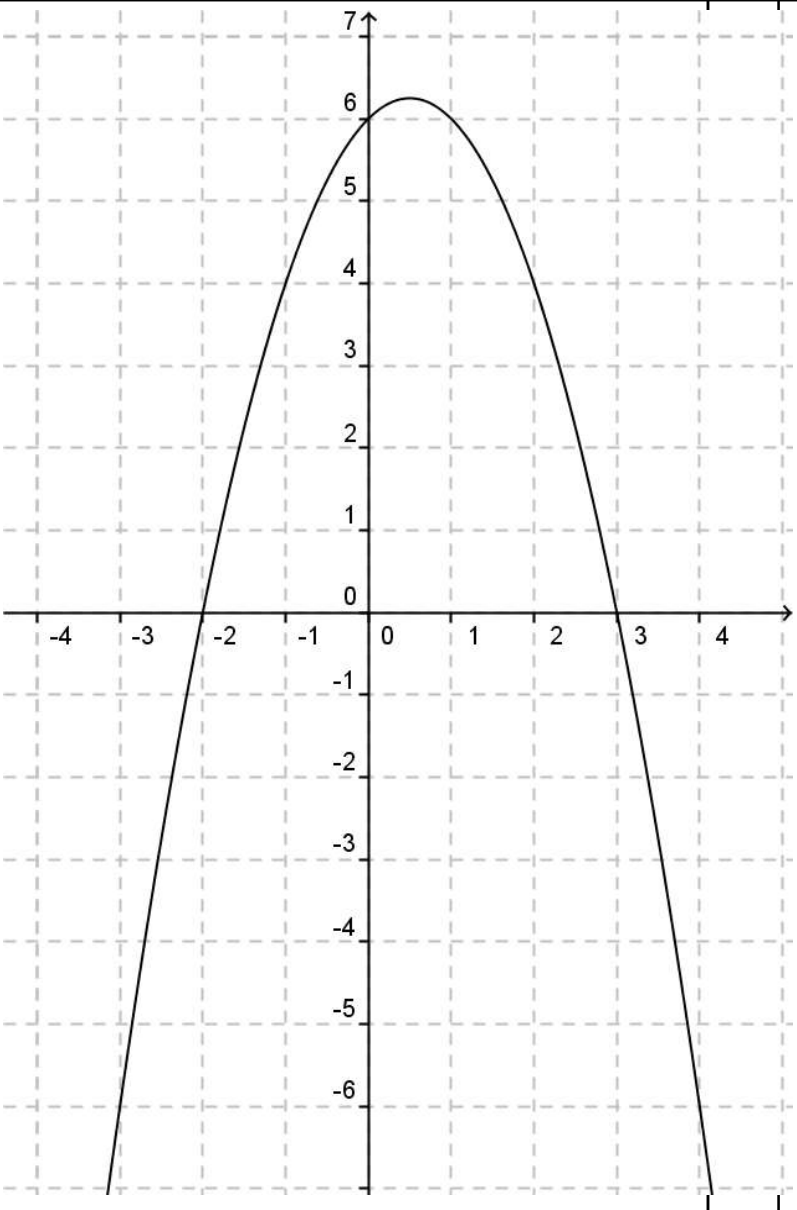
As a percentage of investment $= \frac{2\ 880}{72\ 000} \times 100\% = 4\%$ 2 ④

(ii) Fix deposite amount $= 72\ 000$

Interest $= 2\ 880 \times 2 = Rs\ 5\ 760.00$ 1

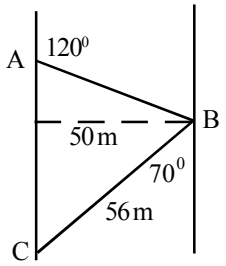
Interest rate paid by the bank $= \frac{5\ 760}{72\ 000} \times 100\% = 8\%$ 2 ② 10

2.	(a) (i)	When $x = 1, y = 6$		1	①	
	(ii)	Marking points		2		4
		Drawing the curve		1	③	
	(b) (i)	Drawing the axis of symmetry		1		
		$x = 1/2$		1	②	
	(ii)	$-2 < x < 3$		2	②	
	(iii)	roots -2 and 3		1	①	
	(iv)	$(x+1)(x-4) = 0$		1	①	6 10



3.	(a) (i)	$A=\begin{pmatrix}4 & 3\\ 5 & 2\end{pmatrix}, B=\begin{pmatrix}20\\ 30\end{pmatrix}, AB=\begin{pmatrix}170\\ 160\end{pmatrix}$	4	④		A නාහාසය ලිවීමට --1 B නාහාසය ලිවීමට --1 AB ගුණිතය සෙවීම -- 2
	(ii)	<table><tr><td></td><td>Cost for fruits</td></tr><tr><td>Thamashi</td><td>170</td></tr><tr><td>Amaya</td><td>160</td></tr></table>	1	①		
	(iii)	BA cannot be found No. of columns in B is not equal to the number of rows in A.So cannot be multiplied	1	①	6	
	(b)	Let the three consecutive numbers be $x-1, x, x+1$				
		$15 < x-1+x+x+1 < 30$	1			
		$15 < 3x < 30$				
		$5 < x < 10$	1			
		Solution set $\{6,7,8,9\}$	1			
		$\therefore$ Possible values of x are6,7,8 or 8	1	④	4	10
4.	(a)	$\frac{3(a+2)-2(a-2)}{(a-2)(a+2)}=\frac{1}{a}$	1			
		$a(3a+6-2a+4)=a^2-4$	1			
		$10a=-4$				
		$a=-2/5$	1	③	3	
	(b)	$\frac{2x(x+6)}{2}=10$	1			
		$x(x+6)=10$				
		$x^2+6x-10=0$	1			
		$x^2+6x+9=19$	1			
		$(x+3)^2=19$	1			
		$x+3=\pm\sqrt{19}$				
		$x=-3\pm\sqrt{19}$	1			
		$x=1.35$ or $x=-7.35$	1			
		Since x should be positive, length of the shortest side $= 2x = 2 \times 1.35 = 2.70$	1	⑦	7	10

5. (a) (i) For figure



2 ②

(ii) $\sin 60^0 = \frac{50}{AB}$ 1

$AB = \frac{50}{0.8661}$ 1

$AB = 57.736$

$= 58$ m 1

.Total distance travelled $= 58 + 56$

$= 114$ m 1

Mean speed $= \frac{114}{6}$

$= 19$ m s $^{-1}$ 1 ⑤ 7

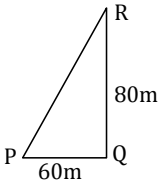
(b) For the sketch 1

$PR^2 = 60^2 + 80^2$ 1

$= 3600 + 6400$

$= 10\,000$

$PR = 100$ m



1 ③ 3 **10**

6.

Time (minutes)	No. of days f	Mid value x	Deviation d	fd
16-24	1	20	-24	-24
24-32	3	28	-16	-48
32-40	6	36	-8	-48
40-48	10	44	0	0
48-56	8	52	8	64
56-64	2	60	16	32
	30			-120+96

$\Sigma fd = -24$

(i) Interval playing most 40 - 48 1 ①

(ii) Mid value column 1

Deviation column 1

Σfd column 1

Mean $= A + \frac{\Sigma fd}{30}$

$= A + \frac{(-24)}{30} = 43.2$ 1+1

Mean = 43 (to nearest minute) 1 ⑥

(iii) Time for 90 days $= \frac{43 \times 90}{60}$

$= 64\ \frac{1}{2}$ h — 1 — ①

(iv) Time for 90 days(with 15 min each day) $= \frac{15 \times 90}{60}$

$= 22\frac{1}{2}$ h — 1

$\therefore$ Mother's statement is true — 1 — ② — **10**

---

7 (i) 5, 15, 25, ...Distance confirms to an arithmetic progression — 1

$T_n = a + (n-1)d$

$T_{10} = 5 + (10-1)10 = 95$

Distance travelled in the 10^{th} second $= 95$ m — 1 — ②

(ii) $S_n = \frac{n}{2}(a + l)$ — 1

$S_{10} = \frac{10}{2}(5 + 95)$ — 1

$S_{10} = \frac{10}{2}(100)$ $\quad S_{10} = 500$ m — 1 — ③

Total distance travelled by the end of the 10^{th} second= 500 m

(iii) $S_n = \frac{n}{2}[2a + (n-1)d]$

$1120 = \frac{t}{2}[10 + (t-1)10]$

$2240 = t[\cancel{10} + 10t \cancel{-10}]$ — 1

$2240 = 10t^2$

$t = \sqrt{224} = 4\sqrt{14}$

$\therefore$ if $t \geq 4\sqrt{14}$ the expectation is realized. — 1

(b) (i) $5, x, 80$

Let $T_1 = 5, T_3 = 80, T_2 = x$ — 1 — ②

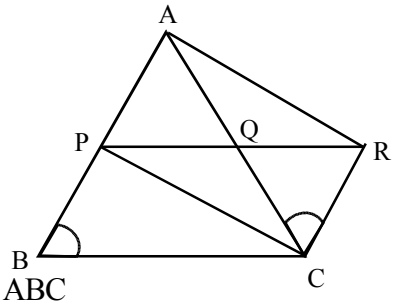
Common ratio $= \frac{80}{x} = \frac{x}{5}$

$x^2 = 400$

$\therefore x = \pm 20$ — 1

As x has two values, two progressions are possible — 1 — **10**

8 Drawing the diagram and marking all the data. 2



Considering triangle ABC
Mid point of AB is P(datum)
Mid point of AC is Q(datum)
$\therefore$ PQ // BC (Mid point theorem) 1

$$PQ = \frac{1}{2}BC$$

$\therefore$ PR // BC
AB // CR
$\therefore$ PB // CR
$\therefore$ PBCR is a parallelogram.(as opposite sides are parallel) 1
BC = PR (opposite sides of a parallelogram) 1

$$PQ = \frac{1}{2}BC \text{ (verified)}$$

$$\therefore PQ = \frac{1}{2}PR$$

$\therefore$ PQ = QR, AQ = QC(datum)
$\therefore$ APCR is a parallelogram (because disgonals intersect) 1
$A\hat{C}R = B\hat{A}C$ (alternate angles AB // RC) 1
$A\hat{C}R = A\hat{B}C$ (datum)
$\therefore B\hat{A}C = A\hat{B}C$ 1
AC = BC
(in a triangle, sides opposite equal angles are equal) 1
PR = BC (verified)
$\therefore$ PR = AC 1 10
i.e., diagonals are equal in length

9. (i) The line drawn from the centre perpendicular to a chord bisects the chord. 1 ①

(ii) $B\hat{C}D = 50^0$ 1 ①

(iii) Showing AB bisects CBD

As $B\hat{C}D = 50^0$, $A\hat{C}D = 40^0$ 1

As $A\hat{C}D = 40^0$, $A\hat{B}D = 40^0$ 1

$\therefore A\hat{B}C = A\hat{B}D = 40^0$ 1 ③

$\therefore$ AB bisects $CBD\angle$

(iv) In $ACE\Delta$ and $DBE\Delta$

$C\hat{A}E = B\hat{D}E$ (angles in the same sector) 1

$A\hat{E}C = B\hat{E}D$ (right angles)

$A\hat{C}E = E\hat{B}D$ remaining angles of the traingles) 1 ②

The two triangles are equi-angular

(v) In $ACE\Delta$ and $BED\Delta$

$\frac{CE}{BE} = \frac{AE}{DE}$ (corresponding sides of equi-angular triangles) 1

$CE.DE = AE.BE$

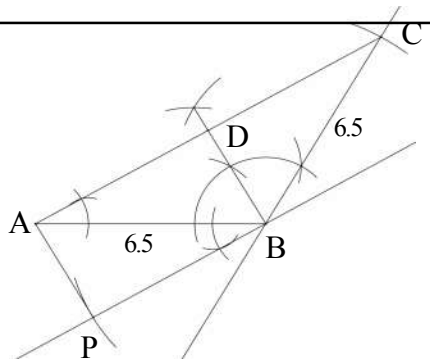
$CE = DE$

$CE^2 = AE.BE$ 1

$CE = 6$

$AE.BE = 36$ 1 ③ **10**

10. (i)



AB or BC - 1
120^0 - 1
Construction of ABC - 1

3 ③

(ii) Bisector and marks D 1 ①

(iii) Constructing the parallel line 2 ②

(iv) Constructing parallelogram 1 ①

(v) $A\hat{B}D = 60^0$ (BD is the bisector) 1

$B\hat{A}D = 30^0$ (ABC is an isoscels triangle) 1

$\therefore A\hat{D}B = 90^0$ 1 ③ **10**

ADBP is a rectangle.

11 (a) (i) Volume of the cone $= \frac{1}{3} \times \pi \times a^2 \times 2a$ 1 ①

$= \frac{2}{3} \pi a^3$

(ii) Volume of the semisphere $= \frac{1}{2} \times \frac{4}{3} \pi a^3$

$= \frac{2}{3} \pi a^3$

Total volume of metal $= \frac{2}{3} \pi a^3 + \frac{2}{3} \pi a^3 = \frac{4}{3} \pi a^3$ 1 ①

(iii) Volume of a sphere of radius $a = \frac{4}{3} \pi a^3$ 1

Volume of metal is equal to the volume of a sphere with radius a 1 ② 4

(b) $A = \frac{\sqrt[3]{12.08} \times 0.72}{5.42^2}$

$\lg A = \frac{1}{3} \lg 12.08 + \lg 0.72 - 2 \lg 5.42$ 1

$\lg A = \frac{1}{3} \times 1.0720 + \bar{1}.8573 - 2 \times 0.7340$ 1

$\lg A = 0.3573 + \bar{1}.8573 - 1.4680$ 2

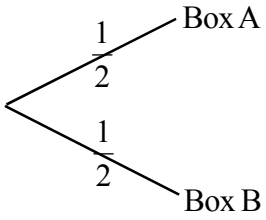
$\lg A = \bar{2}.7499$ 1

$A = Anti \log \bar{2}.7499 = 0.05622$ 1 ⑥ 6

10

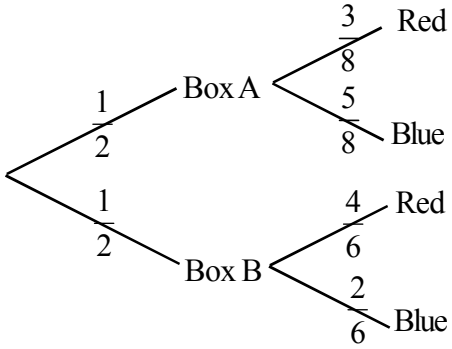
10

12' (i)



1 ①

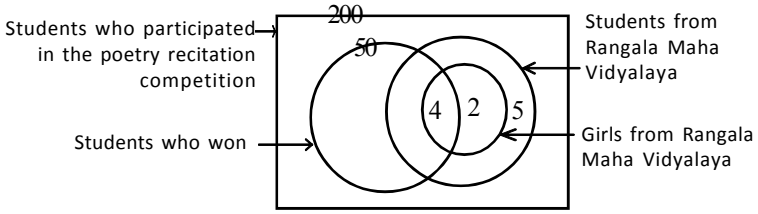
(ii) Extending the tree diagram



1+1 ②

(iii) Probability of the bulb taken being red $= \frac{3}{16} + \frac{4}{12} = \frac{25}{48}$ 1+1 ② 5

(b) (i)



2 ② Mark 4-1 Mark 2-1

(ii) Winning students in Rangala M.V. $= 50 - 43$

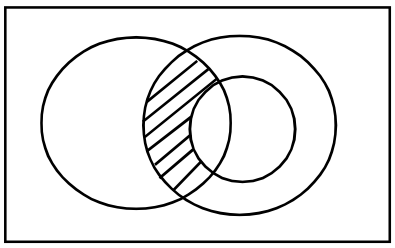
$= 7$

Winning boys in Rangala M.V $= 7 - 4 = 3$ 1

Non-winning boys in Rangala M.V $= 8 - 3$

$= 5$ 1 ②

(iii) Shading the Venn Diagram



1 ① 5 10