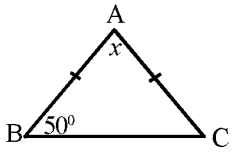
Mathematics I - Part A

Answer all the questions in this paper itsef.

1. From the following, select and write the numbers which do not give a whole number as the square root.
   4, 16, 10, 9, 12

2. Find the value of x according to the data in the figure.



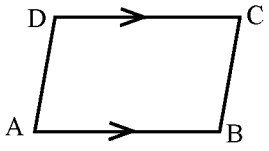
3. The area of a circular lamina is 44 m^2. What is the area of a sector cut from it with an angle of 90^0 at the centre?

4. Solve $\frac{x+1}{5} = 2$.

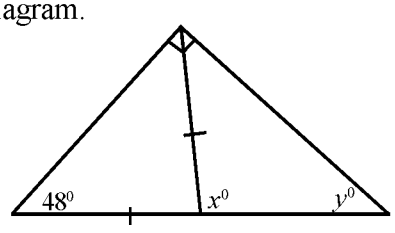
5. A bag contains between 10 and 20 identical balls of different colours including red. When a ball is randomly taken from it, its probability of being a red ball is $\frac{3}{7}$. How many balls were in the bag?

6. $5^3 = 125$. Write this in logarithm form.

7. Write a requirement for the quadrilateral shown in the diagram to be a parallelogram.

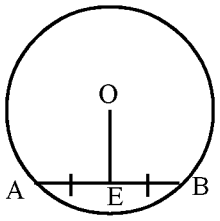


8. Find the values of x and y using the information given in the diagram.



9. Simplify $\frac{x}{4} - y + \frac{x}{2} + 4y$.

10. AB is a chord of the circle of centre O shown in the figure. AE = EB.
(i) What is the relationship between OE and AB?
(ii) Fill in the blank and complete the following expression.
$OB^2 = OE^2 + ...$

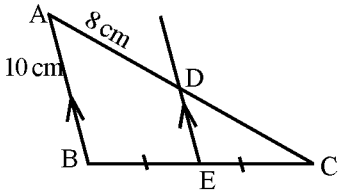


11. The circumference of the base of a right -circular cylinder is 15 cm. Its height is 10 cm. Find the area of the curved surface of the cylinder.

12. $A = \begin{bmatrix} 2 & 5 \\ 3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$, $2A - B = \begin{bmatrix} x & 7 \\ 4 & y \end{bmatrix}$. Find the values of x and y.

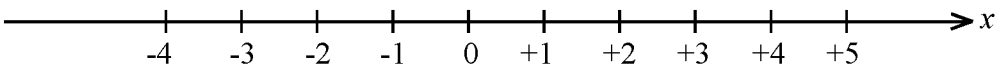
13. Write the equation of the straight line with intercept 4 which is parallel to the straight line given by $y = 3x - 2$.

14. In the diagram, AD = 8 cm and AB = 10 cm. As per the information given, find the lengths of the sides AC and DE.

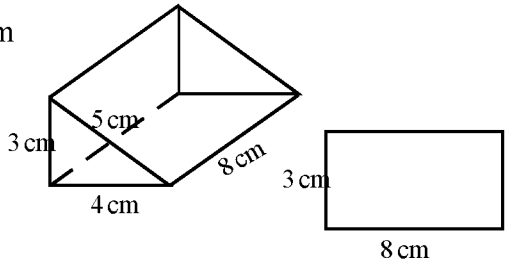


15. 10 men can complete a work in 6 days. After working for two days, two men didn't turn up for work.
(i) How many man days of work are left after two days?
(ii) How many days will be taken by 8 men to complete the rest of the work by 8 men?

16. Solve the inequality $3x + 2 \geq 8$ and indicate the solution on the following number line.



17. One rectangular face of the prism given in the diagram has been drawn. Draw with measurements,the other two rectangular faces.

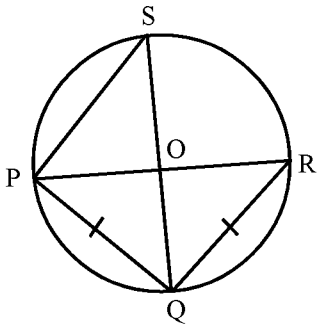


18. A 12% tariff is charged for an item. Find the value of an item worth Rs. 18 000 after paying tariff.

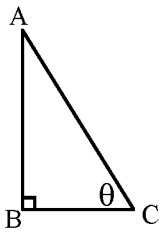
19. PR is a diameter of the circle of centre O shown in the figure. Point Q is located on the circle. PQ = QR.

(i) What is the value of $P\hat{Q}R$?

(ii) What is the value of $P\hat{S}Q$?



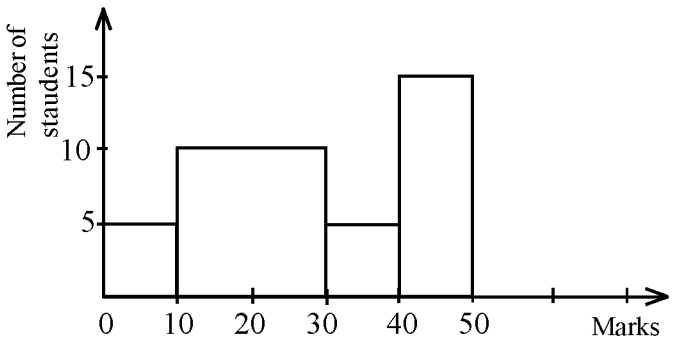
20. Find the value of $\cos\theta$ if $\sin\theta = \frac{12}{13}$.



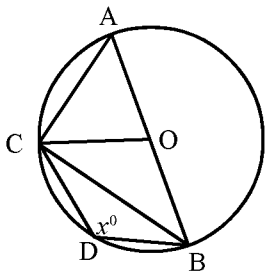
21. A histogram drawn to represent the marks scored by several students in a mathematics test is shown in the diagram.

(i) How many students have scored marks between 10 and 30 ?

(ii) What is the total number of students who appeared for the test?



22. Points C and D are located on the circle shown in the figure where AB is a diameter. If $C\hat{D}B = x^0$, write the magnitude of each of the following angles in terms of x^0.



(i) $C\hat{A}B$

(ii) $C\hat{B}A$

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23. (i) Write the expression $x^2 + 2ax + a^2$ as a perfect square.
(ii) Using it, factorise $x^2 + 2ax + a^2 - 9$.

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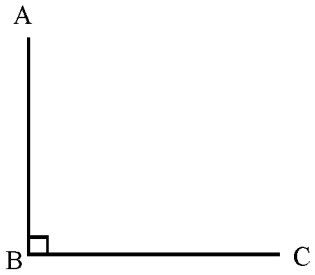
24. A row of ornamental plants should be placed at an equal distance from the two walls AB and BC depicted in the figure. Using the knowledge on loci, draw in the figure how this row of plants should be placed.



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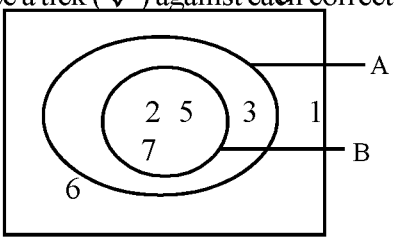
25. According to the information given in the Venn diagram, place a tick (✓) against each correct statement.

$A \cap B = B$	
$A \cap B = A$	
$A \cup B = B$	
$A \cup B = A$	



Part B
Answer all the questions in this paper itself.

1. A father reserved $\frac{1}{5}$ th of a land for himself and divided the remaining portion among his children such that his son received $\frac{1}{2}$ of this portion and the rest was divided equally among the three daughters.

   (i) What fraction of the total land is the extent of land divided among the children?

   (ii) What fraction of the total land was received by the son?

   (iii) What fraction of the total land is left to be divided among the three daughters?

   (iv) If one daughter received 30 ha, find the area of the total land.

   (v) If the value of the part kept by the father was Rs. 4.5 million, what is the value of the part received by a daughter?

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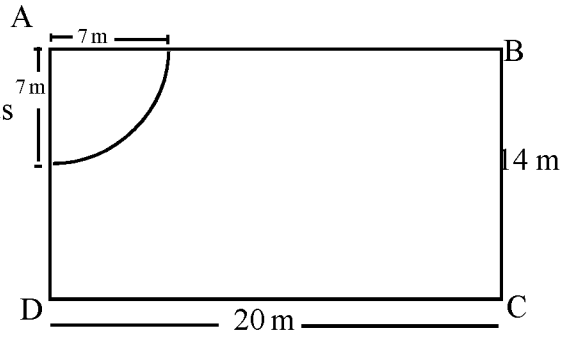
2. ABCD is a rectangular plot of land owned by Saman. The leafy vegetable 'gotukola' has been grown in the shaded area which is a sector of radius 7m. (Take $\pi = \frac{22}{7}$)



   (i) Find the length of the curved boundary of the section where gotukola has been grown.

   (ii) What is the area of the section in which gotukola has been grown?

   (iii) What is the area of the remaining part of the land where gotukola is not grown?

   (iv) Saman plans to separate out a right-angled triangular plot of land so that its area is three times the gotukola grown area. If BC is to be one of its boundaries and the other boundary is to lie on DC, sketch the plot of land that can be separated out with measurements on the diagram given.

3. A man invested Rs. 50 000 to buy shares when the market price of a shsare of 'Lanka' company became Rs. 10.

(i) How many shares did he buy?

(ii) If an annual dividend of Rs. 2 is paid for a share, find his annual income from dividends.

When the market price of a share of 'Lanka' company became Rs. 14 the man sells all his shares.

(iii) Find his capital gain.

(iv) If he sold all his shares for the aforesaid market price after receiving the annual dividend, indicate the sum of his dividend income and capital gain as a percentage of the invested amount.

(v) If an investor receives the above dividends and capital gain, what is the total income he gets at the end of the year if Rs. 100 000 is invested?

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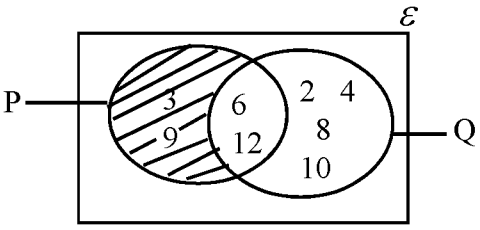
4. (a) Answer the questions asked on the Venn diagram given below.



(i) Describe set P in words.
P = { .....}

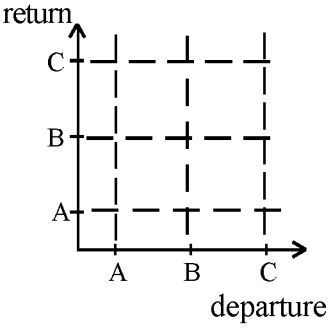
(ii) Indicate the shaded area in set notation.
.....

(iii) Fill in the blank. $n\ (P \cap Q)$ = ...

(b) A,B and C are three types of buses running on a particular route. A passenger has an equal chance of travelling in these three types of buses.

(i) Indicate on the grid the sample space of the type of bus a man will travel on during his departure and return.

(ii) Mark on the grid the event of the passenger getting buses not belonging to the same type during the departure and return journeys and find its probability.



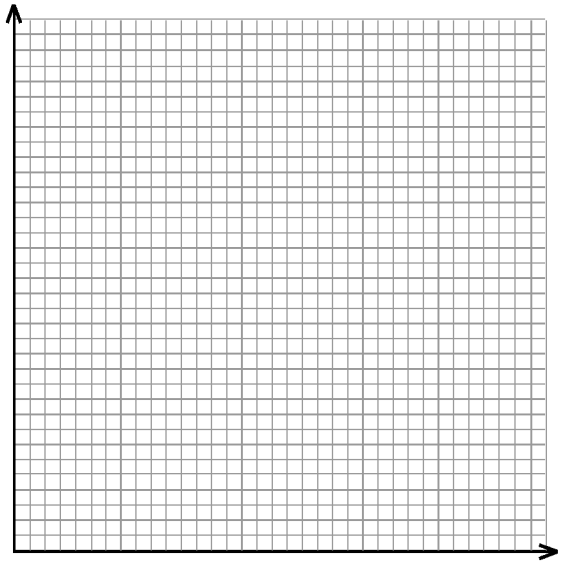
5. Details of the donations made by grade 10 students for a pirith chanting ceremony at school are given below.(If x belongs to the class interval 0 - 20, then $0 \leq x < 20$.

Class interval (Donation)	Frequency (Number of students)	Cumulative frequency
0 - 20	8	8
20 - 40	12	20
40 - 60	15	.....
60 - 80	10	.....
80 - 100	.....	50

(i) Complete the above table.

(ii) Write the class interval to which the donation made by the highest number of students belong.

(iii) Draw the cumulative frequency graph on the given axes.



(iv) If money was collected like this, what is the minimum amount of money that may have been collected from all the students?

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 sphere of radius r is $\frac{4}{3}\pi r^3$.

Part **A**

Answer five questions only

1. A sum of Rs. 360 000 is obtained from a financial institution at an annual simple interest rate of 12% under the agreement of paying off the loan within a period of 3 years.

   (i) What is the total interest that should be paid in 3 years?
   (ii) If the instalments are paid equally and monthly, find the monthly instalment with the interest.
   (iii) What is the monthly income received if the loan amount is deposited in another institution at a monthly interest rate of 2%?
   (iv) By the end of the loan period, will the income received from the deposit exceed the loan amount? Give reasons for your answer.

2. (a) An incomplete table which gives values of y corresponding to some of the x values of the function $y = (x + 2)(x - 1)$ is indicated below.

x	- 4	-3	-2	-1	0	1	2	3
y	10	4	0	-2	-2	....	4	10

   (i) Complete the blank in the table.
   (ii) Draw the graph of the function within the range given, selecting a suitable scale.

   (b) Using the graph,
   (i) write the equation of the axis of symmetry of the graph.
   (ii) find the roots of the equation $y = 0$.
   (iii) write the range of value of x where $y \leq 0$.

   (c) Write the equation of the quadratic function y of which the roots of the equation $y = 0$ are -1 and 3 and the coefficient of x^2 is 1.

3. (a) The price of a guava (pera) fruit is greater than the price of an orange by Rs.15. Price of two oranges and a guava fruit is Rs. 165.

   (i) Construct a pair of simultaneous equations using this information.
   (ii) Find separately, the price of an orange and the price of a guava fruit.
   (iii) Sunil has Rs. 230. Find the number of each type of fruit he can buy separately without leaving any balance.

(b) (i) Solve the quadratic equation $3x^2 - 4x - 2 = 0$ by using the formula or by any other method and show that its roots are $x = \frac{2 \pm \sqrt{10}}{3}$.

(ii) Find the value of the root $x > 0$ taking $\sqrt{10}$ as 3.16.

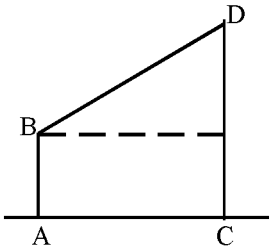
4. (a) (i) Simplify $(x+1)^2 + 5(x+1) + 4$.

(ii) Factorise $3x^2 + 11x + 10$.

(b) (i) Simplify $\frac{1}{x+1} - \frac{2}{3(x-1)}$.

(ii) Two parcels contain wood apple and beli fruits. First parcel contains 3 wood apples and 5 beli fruits. Second parcel contains 4 wood apples and 4 beli fruits. Indicate this information by a matrix and write the order of the matrix.

5. (a) The diagram shows a tree AB 4.5 m tall and a tower located 50 m away from it on a horozontal plane. The angle of elevation of D from B is 42^0.

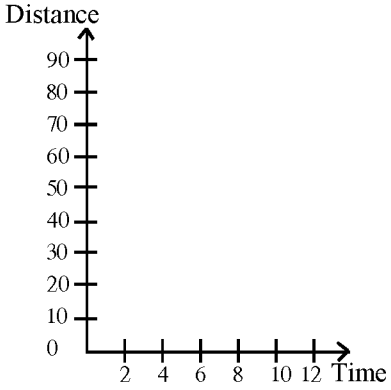


(i) Copy the diagram and include the above information in it.

(ii) Calculate the height of the tower correctly to two decimal places using trigonometric tables.

(b) The following table presents the distance traveled by a moving object and the time taken for it.

Time (second)	2	4	6	8	10	12
Distance(metres)	10	20	30	50	70	90



(i) Draw the given axes on the answer script and on it draw a distance-time graph to show the motion of the object.

(ii) Show that the speed of the object in the final 6 seconds is twice its speed in the initial 6 seconds.

6. The following frequency distribution indicates the amount of rice soldby a sales outlet on each day during 30 days of a month.

Amount of rice sold in a day (kg)	Number of days (f)
0 - 8	1
8 - 16	2
16 - 24	6
24 - 32	10
32 - 40	5
40 - 48	4

(i) What is the modal class of this distribution?

(ii) As there are 2 500 kg of rice in the store,the merchant assumes that the rice is enough for the period of three months (90 days) to come. On the basis of the mean of the amount of rice sold per day, decide with reasons whether the assumption of the merchant is acceptable or not.

Part B

7. (a) On January 1st , Tanushi deposited Rs. 25 in her till with the idea that every month she will deposite Rs.10 more than the amount she did in the previous month.

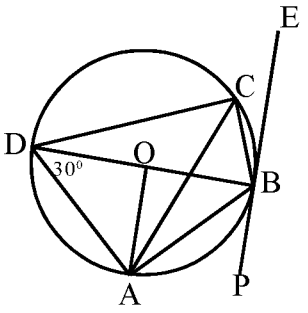
(i) Write the amounts of money Tanushi deposited in the first three months in the respective order. What type of progression is it?
(ii) In which month does Tanushi deposit Rs. 195?
(iii) Tanushi's target is to collect Rs. 3 000 in two years. Explain giving reasons whether Tanushi can achieve her target?

(b) Find the sum of the first 10 terms of the geometric progression 2, 4, 8, ...

8. In the triangle ADC, A is a right angle. E is the mid point of AC. The perpendicular drawn to AC at E meets DC at B.

(i) Draw a diagram to indicate the above information and show that BAD is an isosceles triangle.
(ii) Show that $AC^2 + AD^2 = 4AB^2$.

9. The tangent drawn to the circle of centre O at B is PE.



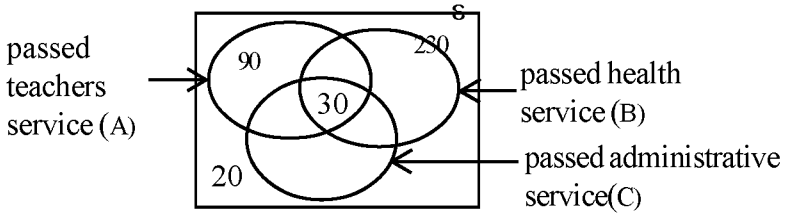
(i) Find the value of $A\hat{O}B$ if $A\hat{D}B = 30^0$. Give reasons.
(ii) Write the theorem for the equality $A\hat{D}B = A\hat{C}B$.
(iii) Give reasons for $A\hat{B}P = 30^0$.
(iv) Show that AOB is an equilateral triangle.
(v) A student says that the lines AB and DC are parallel. Explain with reasons whether you agree or not with this statement.

10. (i) Construct the triangle in which BC = 7.8 cm, BA = 6.4 cm and $A\hat{B}C = 60^0$.
(ii) Construct the locus of a point equidistant from the points A and B.
(iii) Construct the circle which touches AC at A and passes through the point B.
(iv) Measure and write the radius of that circle.
(v) Mark point P which is 6 cm away from both points A and B.
(vi) Construct the rhombus whose side length is 6 cm and of which AB is a diagonal .

11.(a) Show that the number of solid spheres of radius $2r$ that can be made by melting a 2.24 m long uniform cylindrical solid metal rod of radius r cm is $\frac{21}{r}$.

(b) Simplify $\frac{(3.275)^2 \times 0.654}{26.52}$ using the logarithms table and give the answer correct to two decimal places.

12.(a) To recruit personnel to the teacher's service, health service and administrative service, an examination is held under three sections A, B. and C. The candidates should pass A for the teachers' service , B for the health service and C for the administrative service.The number who sat the examination was 460. 100 passed A and C . 90 passed B and C. 50 passed only A and B.



(i) Copy the Venn diagram and complete it with the given information.
(ii) How many have passed both the teachers' service and the health service parts ?
(iii) How many have passed only the adminstrative service part from the three sections?

(b) When issuing a driving licence, first a written test is held and a practical test is held for those who pass the written test. Those who qualify from both are given the licence. The probability of a candidate passing the written test is $\frac{3}{5}$ and passing the practical test is $\frac{3}{4}$.

(i) Draw a tree diagram indicating the probabilities of passing and failing the two tests.
(ii) Find the probability of a candidate passing both the written and practical tests.
(iii) If 500 sit the written test, how many would be expected to get the driving licence?

Mathematics I Time: 2 hours

Part A

Answer all the questions in this paper itself.

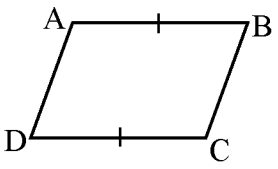
1. The circumference of a circle is 44 cm. What is the length of the arc of a semicircle of the same radius in centimetres?

2. Between which two closest whole numbers does the value of $\sqrt{18}$ lie?

3. Complete by writing the factors in the blanks.

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

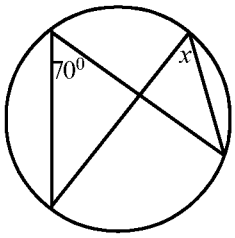
4. In the quadrilateral ABCD, AB = DC. State a requirement for it to be a parallelogram.



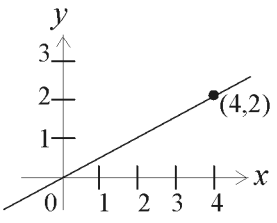
5. Four people can complete a certain work in three days. How many man days are spent for that work?

6. A = { x | $1<x<10$, x is an odd number}. Write the set A with elements.

7. What is the value of x according to the information given in the diagram?

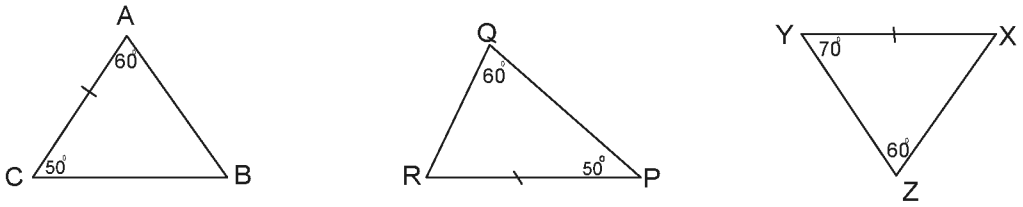


8. Find the gradient of the straight line shown on the coordinate plane.



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

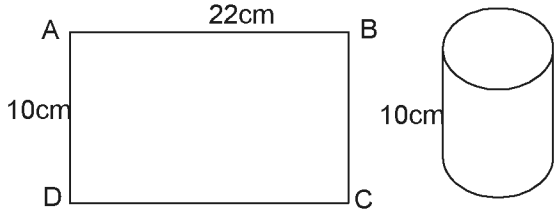
10. Of the following triangles, select and write a pair of congruent triangles.



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

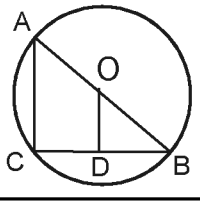
12. Simplify $\frac{4x^2y^2}{3z} \div \frac{2xy}{9z}$

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



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?

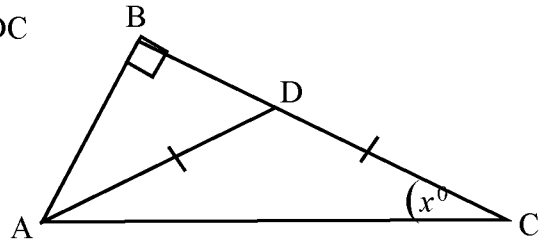
15. AB is a diameter of a circle of centre O. CB is a chord. The perpendicular drawn from O to CB is OD. Write a relationship between AC and OD.



16. AB is a straight line segment 6 cm long. If C lies on one side of AB so that $A\hat{C}B = 90^0$, sketch the locus of C.

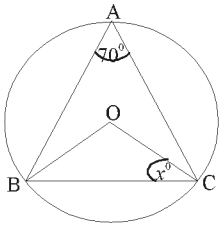
A ——————— B

17. Of the triangle ABC, $\hat{B}$ is a right angle. AD = DC and $B\hat{A}D = 40^0$. 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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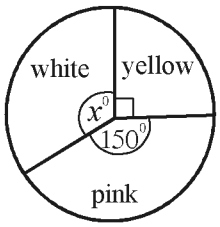
25. The figure shows a pie chart drawn to show the amount of white, yellow and pink flowers in a basket.

(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.

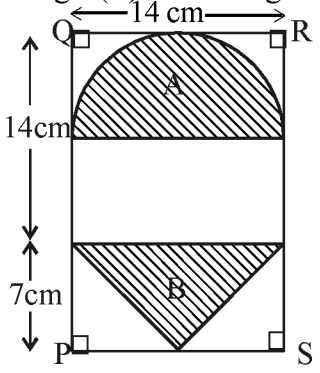
(i) How many shares can Saman buy?

(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 $\pi = 22/7$)



(i) What is the perimetwr 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.

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?

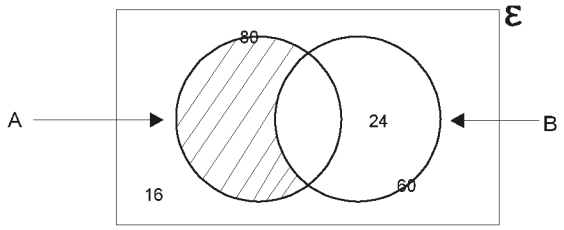
(iii) What is the amount left after depositing in the bank and giving to charity?

(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.



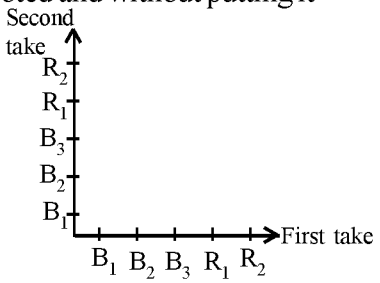
(i) How many girls passed the examination?

(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).

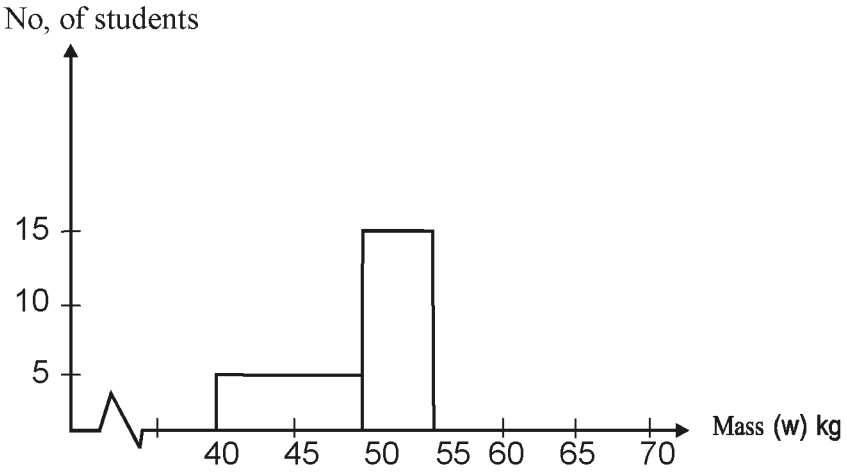


Using it,

(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.

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 $\frac{1}{3}\pi r^3 h$.

Part **A**

Answer five questions only

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 $-4 \le x \le 2$ 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.

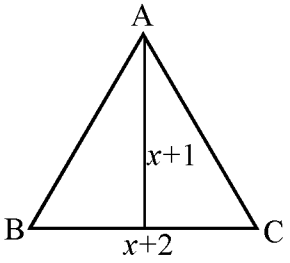
3. (a) $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

   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 $\dfrac{2}{(a-5)^2} - \dfrac{3}{(5-a)}$.

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.

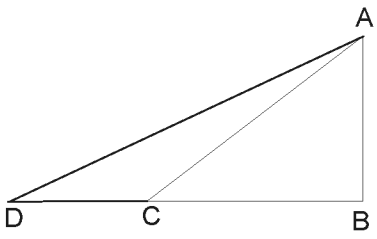
(ii) If the area of the triangle ABC is 2 square units, show that x satisfies the quadratic equation $x^2 + 3x - 2 = 0$.

(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). $A\hat{D}B = 30^0\ 30'$.



(i) Copy the diagram given and mark the relevant data in it.

(ii) Find the value of $B\hat{A}C$ 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 $A\hat{B}C = 120^0$, 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.

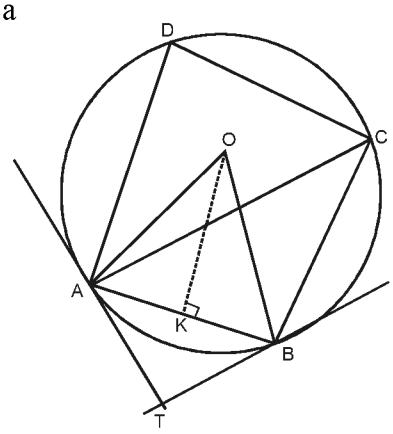
(v) What is the relationship between OB and AC? Give reasons for it.

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.



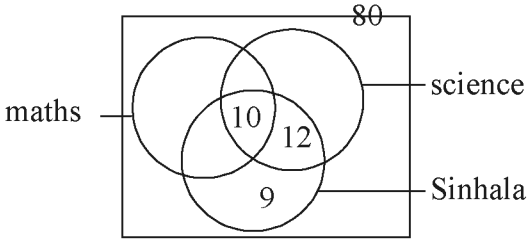
(i) If the length of the chord AB is 16 cm, find the perpendicular distance from O to the chord AB.

(ii) Find $A\hat{C}B$ if $A\hat{O}B = 58^0$.

(iii) Find $B\hat{A}D$ if $A\hat{O}B = A\hat{C}D$.

(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.

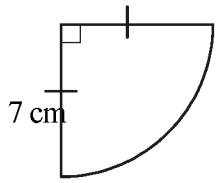
(iii) non-germination of both seeds.

Mathematics I - Part A

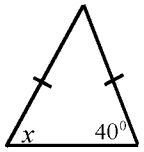
Answer all the questions on this paper itself. **Time: Two hours**

1. Find the perimeter of the sector given in the diagram.

(Take $\pi = \frac{22}{7}$)

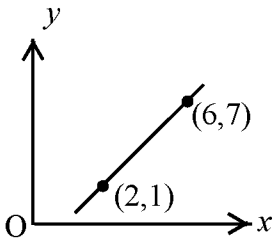


2. According to the given data find x.



3. A student deposits Rs.1000 under 8% annual simple interest. What is the interest after a year.

4. Find the gradient of the given straight line.



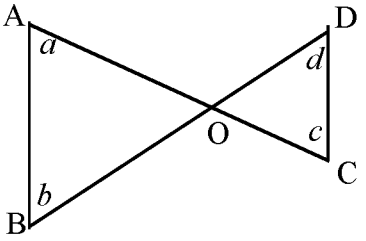
5. Write the set of positive odd numbers less than 6 with its elements.

6. Factorise $a^2 - 7a + 10$.

7. Considering the mid point of the 11 - 15 class interval as the assumed mean, complete the deviation column.

Class interval	Mid value	Deviation
11 - 15	13	
16 - 20	18	

8. Indicate the value of d in terms of a, b and c.



9. Write down the positive integers that satisfy the inequality $x + 2 < 4$.

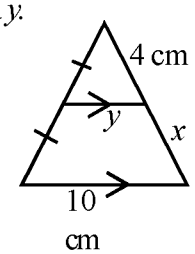
10. To complete half of the work, six men spent four days. If two more people are employed to complete the remaining part of the work, how many days it will take to complete that part of the work?

11. PointsA and B are located 6 cm apart. Draw the locus of C in a sketch diagram so that AC = BC.

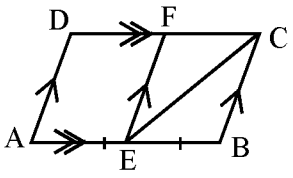
12. Find the square root of 15 to the first approximation.

13. Simplify $\frac{1}{x}+\frac{2}{3x}$.

14. According to the information given in the diagram, find the values of x and y.

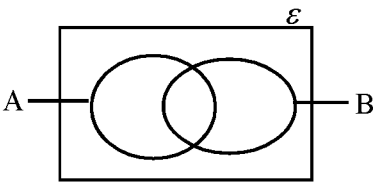


15. If the area of the parellologram ABCD is 100 cm^2, find the area of the triangle ECF according to the information given in the diagram.

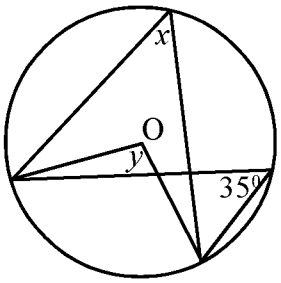


16. Simplify $\begin{pmatrix} 2 & 3 \\ 5 & 4 \end{pmatrix} + \begin{pmatrix} 1 & 1 \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} \ldots & \ldots \\ \ldots & \ldots \end{pmatrix}$

17. ε = {students in a class}
A = {students studying music}
B = {boys}
In the Venn diagram given
(i) shade the area $A \cap B$.
(ii) describe the shaded area in words.



18. Centre of the circle in the diagram is 'O'.
Using the given data, find values for x and y.



19. Write $\log_3 81 = 4$ in index form.

20. If a car runs with a uniform speed of 100 km/h, find the time required to travel 20 km in minutes.

21. In the rectangle ABCD, AB = 15 cm and BC = 8 cm. Find the length of AC.

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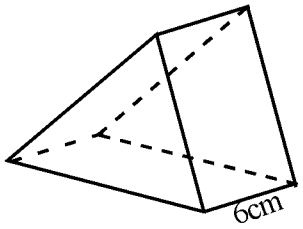
22. The figure indicates a prism with shaded cross sectional area of 25 cm^2. If its lenght is 6 cm, find the volume of the prism.



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23. If $x + 2y = 9$
$2x + y = 6$, find the value of $x + y$ without simplifying the equations.

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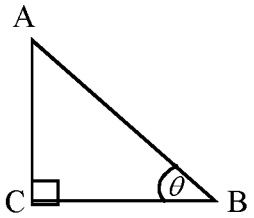
24. As per the information given in the diagram,
(i) write an expression for sin θ in terms of the sides of the triangle.
(ii) name the trigonometric ratio that is indicated by $\frac{AC}{BC}$.



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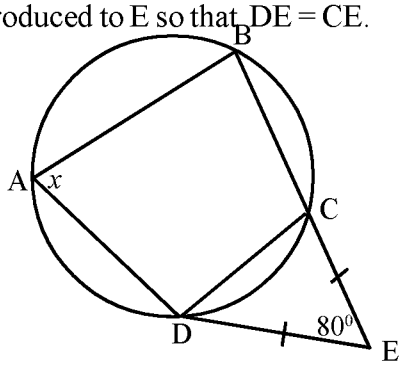
25. A, B, C and D are four points on the circle. Side BC is produced to E so that DE = CE. $C\hat{E}D = 80^0$. Find the value of x.



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

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1. (a) A local authority charges 8% as rates for the properties in its area. For a property which has annual property value of Rs.25,000,

(i) find the amount of the annual rates.

(ii) find the rates to be paid per quarter.

(b) The next year the annual property value was increased by 20% and the rates percentage was decreased to 7%.

(i) What is the new annual property value?

(ii) Find the percentage by which the payable rates is increased due to the change made by the local authority.

---

2. (a) It was assessed that six days have to be spent by 50 people to lay gravel and prepare a gravel road.

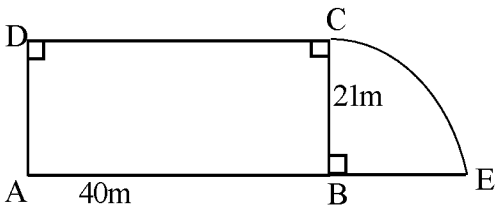
(i) If 10 people can lay gravel for 3 km within 2 days, what is the length of the road that can be completed by 50 men in one day?

(ii) What is the total length of the road?

(iii) Find the number of people to be employed to finish the work of the road 2 days before the scheduled day.

(b) Saman's monthly income is Rs. 250 000. Rs.2 400 000 annual income is waived from income tax and a tax of 15% should be paid for the balance amount. What is the amount of annual income tax paid by Saman?

3. The diagram shows a land consisting of a rectangular part ABCD and a sector-shaped portion BEC attached to it. (Take $\pi = \frac{22}{7}$)



(i) Find the area of the rectangular part ABCD.

(ii) Find the area of the sector shaped part BEC.

(iii) Calculate the total cost to cement the floor area of BCE, if the cost for $1m^2$ isRs.420.

(iv) An 8m long portion at the middle of the boundry 'CD' is reserved for a gate. A right angled triangle shaped portion which is of $\frac{1}{4}$ the area of the rectangle ABCD is allo cated to grow banana. One boundry of that should be either AD or BC and the gate should not be obstructed. Mark that triangle shaped portion with dimensions in the above diagram.

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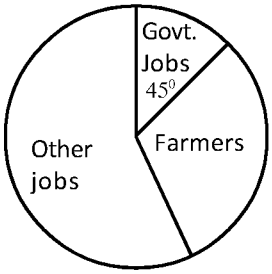
4. (a) Information of a survey collected from 200 villagers on their livelihoods is depicted in a pie chart.
According to the pie chart,



(i) how many people are engaged in government jobs?

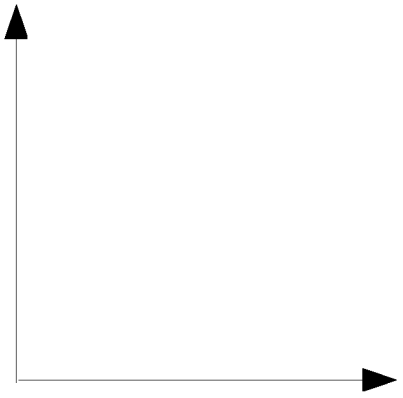
(ii) If the number of farmers depicted in the pie chart is 70, find the angle subtended at the centre by the sector representing farmers.

(b) Information on amounts of rubber latex collected by a collecting centre on daily basis is given in the below table.

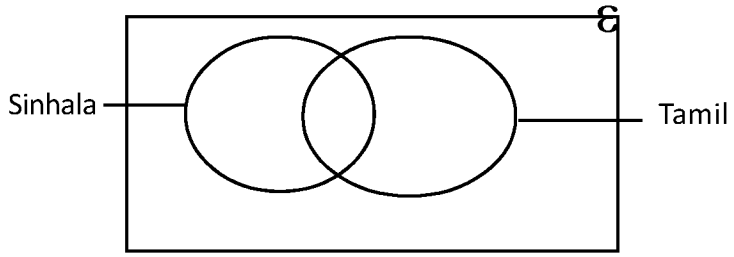
Amount of rubber latex	10 - 15	15 - 20	20 - 25	25 - 30	30 - 40
Number of days	2	5	10	9	4

(i) Represent the information in the table as a histogram on the given Cartesian plane.

(ii) Construct the frequency polygon based on the histogram.



5. (a) 60 students who can work in Sinhalese and Tamil languages participate for a workshop on ethnic harmony. They can work at least in one language. Number of students who are proficient in two languages is 18 In addition, 22 students can work only in Sinhala.

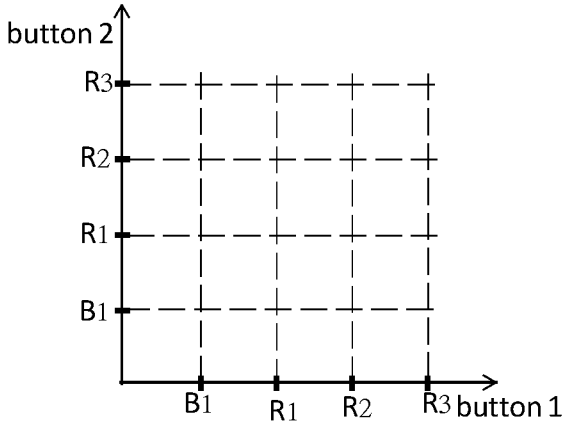


(i) Include the above information in the Venn diagram and find the number of students who can work only in Tamil.

(ii) Find the number of students who can work only in one language.

(b) Four buttons of same shape and size are in a box. One of them is blue and three are red. One button is randomly taken from the box and by putting it back another button is taken out.

(i) Show the relevant sample space by a point graph.



(ii) Find the probability of the buttons taken out being of two different colours.

(iii) Find the probability of the event in (ii) above, when the button taken first is an without putting into the box again and a button is taken again.

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 sphere of radius r is $\frac{4}{3}\pi r^3$.

Part **A**

Answer five questions only

1. Kasun borrowed Rs. 25,000 at an annual simple interest rate of 12% to pay off within two years.

   (i) Kasun invested that amount in a small business. If he earned a profit equivalent to 50% of the invested amount by the end of the first year, how much profit did he earn?

   (ii) Find the interest he should pay in two years for the loan.

   (iii) Kasun expects to pay off the loan with his profit in the first year and the profit he gains in the second year. To achieve that, how much profit should he gain in the second year?

   (iv) But Kasun got only Rs.13,500 as his second year profit. If total profit gained during two years is paid to settle the loan, what is the balance amount to be paid?

2. The width of a rectangular shaped flower bed is x m. The length of the flower bed is two meters greater than its width. Develop a quadratic equation in terms of x if the area of the bed is 17 m^2 and show that the length of the bed is $(3\sqrt{2}+1)$ m.

3. (a) $A=\begin{pmatrix} 2 & 3 \\ -1 & 1 \end{pmatrix}$, $B=\begin{pmatrix} 1 & -2 \\ 3 & 2 \end{pmatrix}$; A and B are two matrices.

   (i) What is the order of matrix A?
   (ii) Find the product AB .
   (iii) Find the product BA and giving reasons show whether BA = AB.

   (b) Grade 6 students who went to the library on the instructions of the teacher brought books to the class. Each boy brought 4 science books and each girl brought 3 science books making a total of 26. Each boy brought 2 maths books and each girl brought one maths book to make a total of 12.

   (i) Show the above information in a pair of simultaneous equations considering that the number of girls is x and number of boys is y.

   (ii) By solving those equations, show that the number of boys is greater than the number of girls.

4. Given below is a table of suitable values to draw the graph of the function $y = (x - 1)^2 - 2$.

x	-2	-1	0	1	2	3	4
y	7	.....	-1	-2	....	2	7

(a) (i) Fill in the blanks in the table.

(ii) Draw the graph of the function $y = (x - 1)^2 - 2$ taking 10 small squares as one unit of x axis and 10 as one unit of y axis.

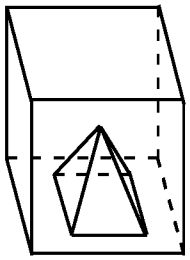
(b) Using the graph

(i) write the coordinates of the turning point.

(ii) find the range of x on which the function is negatively increasing.

(iii) write the coordinates of the turning point of the function $y = (x - 1)^2 - 7$.

5. A side of the base of the solid glass square pyramid is 12.35 cm. Height of it is 15 cm. This pyramid is carefully placed in a cuboid tank of 20 cm length and 16 cm width and filled with water. If the tank contained water to a certain height and the water level rose through a height of h, write an expression for h and find its value to the first decimal place using the logarithmis tables.



6. Statistics of brooms produced per day by a certain producer last year are given below.

Class interval (No. of brooms)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency (No. of days)	26	28	35	34	63	50	46	18

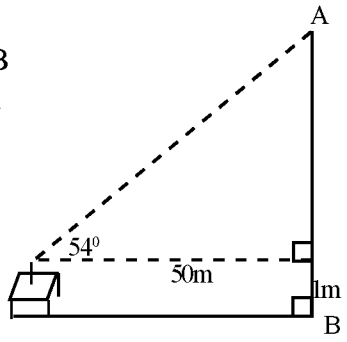
(i) What is the modal class of this distribution?

(ii) Considering the mid value of the 40-50 class interval as the assumed mean, calculate the mean of the number of brooms produced in a day to the closest whole number.

(iii) Production cost of a broom is Rs.40 and he sells it at Rs.90. Show that the profit he gains within a month of 30 days exceeds Rs.60,000.00

Part B
Answer five questions only.

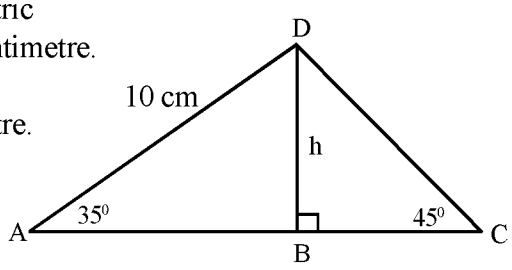
07. (a) The sketch shows some measurements taken by a group of students involved in finding the height of a flag post AB erected on a flat land in the school yard. Draw a diagram to the scale 1 : 1 000 and from it find the height of the flag post to the nearest whole number.



(b) (i) Based on data in the diagram and trigonometric ratios find the length of DB to the nearest centimetre.

(ii) Find the length of AC to the nearest centimetre.

(iii) Using the above values show with reasons that the area of the triangle is less than 50 cm^2.



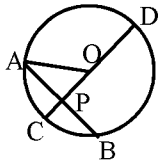
8. (a) In a circular compound, bricks are fixed in a way that the first tier has 7, second tier has 11 and the next tier has 15. If fixing of a single brick costs Rs. 10, show that the cost for fixing bricks in 15 tiers exceeds Rs. 5 000.

(b) If the sixth and ninth term in the progression 12, 6, 3, ... are T_6 and T_9 respectively, show that $T_6 = 8T_9$.

9. Using the compass and the ruler
(i) draw a circle with 4 cm radius.
(ii) draw any radius and mark D at the point it touches the circumference of the circle.
(iii) draw a chord 'AB' at 2.5 cm from the centre and perpendicular to the above radius and name it AB.
(iv) Draw chord BC so that it equals 5 cm.
(v) Mark E on the circle at equal distance from AB and BC and complete the cyclic quadrilateral ABCE .

10. ABCD is a parallelogram where A is an obtuse angle. Side DA is produced up to E so that DA = AE. Also, EB and DC when produced meet at F. Draw a diagram including the given data and verify that ABFC is a parallelogram.

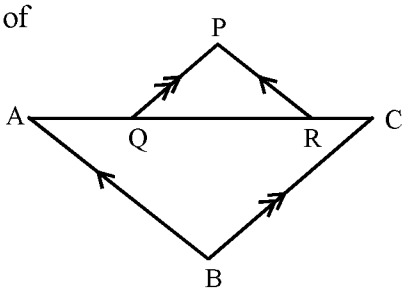
11. (a) Chord AB and diameter CD of a circle with the centre point O, intersect perpendicularly at point P. PD = 24 cm and CP = 6 cm.



(i) What is the radius of the circle in centimetres?

(ii) Find the length of the chord AB.

(b) (i) Copy the diagram given and mark the two pairs of angles which are equal.



(ii) If AB = 18 cm, QR = 12 cm and BC = 15cm find PQ.

12. Two bags contain table tennis balls of the same shape and size. They are numbered as follows;

First bag: 5 balls marked number five, 3 balls marked number two.
Second bag: 2 balls marked number five, 4 balls marked number two.

(i) Draw a tree diagram to show the probability of drawing a ball randomly from the first bag.

(ii) A ball randomly taken out from the first bag is put into the second bag. Later a ball is taken out from the second bag as well. To indicate this, extend the tree diagram you have drawn.

(iii) Find the probability of drawing a ball marked number 5 from the first bag and a ball marked number 2 from the second bag.

(iv) Find the probability of drawing balls with the same number on both occasions.

(v) Find the probability of getting at least one ball with number 2.

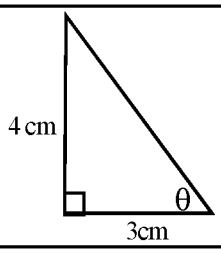
Mathematics I

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

Part A

1. Write the next two terms in the number pattern 7, 11, 15, ...

2. According to the measurements given in the diagram find sin θ.

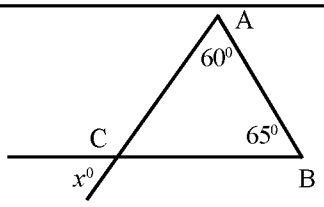


3. Factorise $x^2 + 5x + 6$.

4. Select continuous data from the data given in the following table and write ' ✓ ' against them.

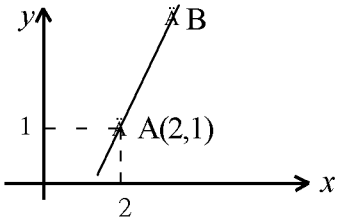
Data	Continuous
Heights of students in a class	
Number of members in a family	
Runs scored in a cricket match	
Ages of students in a class	

5. Find the value of x according to the data given in the diagram.



6. Simplify $\frac{1}{x} - \frac{2}{3x}$.

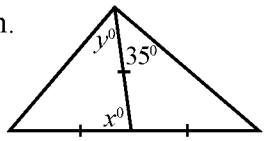
7. The equation of the straight line AB is given by $y = mx - 5$. Find the value of m according to the information given.



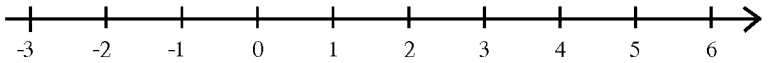
8. A = {integers from 1 to 10}
B = {multiples of 2 less than 10}. Write with elements the set $A \cap B$.

9. Find the least common multiple. $4ab^2$, $6a^2bc$

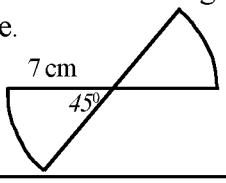
10. Find the values of x and y as per the information given in the diagram.



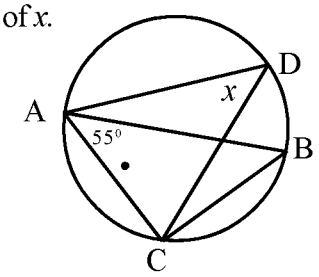
11. Indicate on the number line the solution of the inequality $3x + 5 \geq 2$



12. The diagram shows a wire frame with two sectors, each of radius 7 cm and central angle 45^0. Find the minimum length of wire required to make the wire frame.
(take $\pi = \frac{22}{7}$)

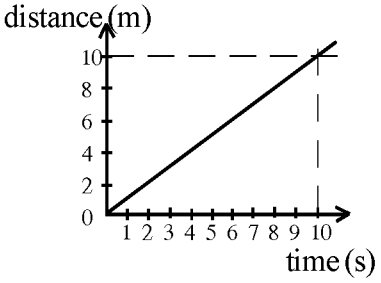


13. AB is a diameter of the given diagram. $B\hat{A}C = 55^0$. Find the value of x.

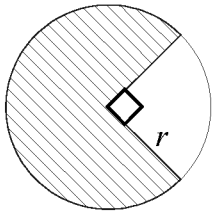


14. An interest of Rs. 5 is charged per month for a loan of Rs. 500. Find the annual simple interest rate.

15. Given in the figure is a distance -time graph that shows the motion of a moving object during10 s.
Calculate the speed of the object in ms^{-1}.



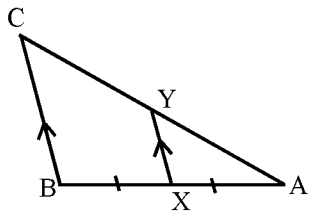
16. The diagram shows a sector of radius r. According to the information given, write an expression for the area of the shaded portion in terms of π and r.



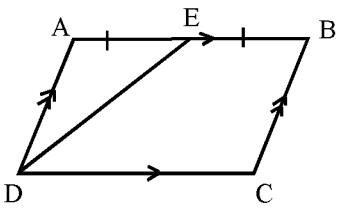
17. The following table gives the number of students in a class with the respective blood group. If a student is randomly selected, find the probability of his/her blood group being B.

Blood group	A	AB	B	O
Number of students	10	13	12	5

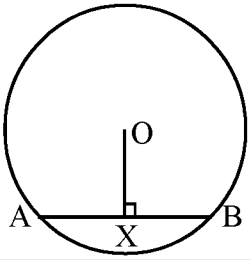
18. In the triangle ABC, AB = 10 cm, AC = 14 cm and BC = 12 cm. If the mid point of AB is X and BC // XY, find the perimeter of the triangle AXY.



19. According to the information given in the diagram, find the ratio between the area of the triangle AED and the area of the parallelogram ABCD.

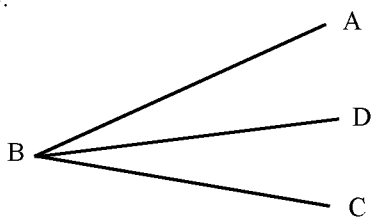


20. The perpendicular drawn from the centre O to the chord AB is OX. If AB = 8 cm and OX = 3 cm, find the radius of the circle.



21. A work completed by 12 men in 10 days is completed by a bulldozer in 8 hours. How much work in man days is done by the bulldozer in one hour?

22. The bisector of $A\hat{B}C$ is BD. Using your knowledge on loci show with the aid of a sketch how to find a point 5 cm away from both lines AB and BC.



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23. If $2\log_2 a = b$, write this in the form of indices making a the subject.

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24. If $3x - y = 8$ and $x + y = 4$, find the value of $x - y$ without solving the equations.

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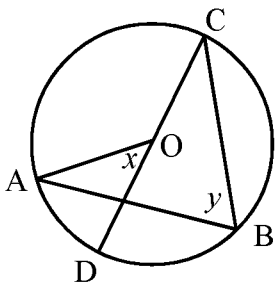
25. The diagram shows a circle with centre O. According to the information given in it, build up a relationship between x and y.



Part B

Answer all the questions on this paper itself

1. (a) The initial part of a certain road is surfaced with tar. The tarred portion is $\frac{2}{7}$ of the entire road.

$\frac{3}{4}$ of the rest of the road is made with concrete. The remaining part is covered with gravel.

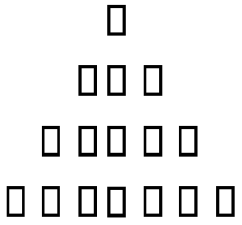
(i) Find which fraction of the entire road is the non tarred part.

(ii) Find which fraction of the entire road is the concrete-laid part.

(iii) Show that the concrete-laid part is three times the gravel- covered part.

(iv) If the concrete-laid part is 225 m find the total length of the road.

2. (a) A student arranges empty match boxes in rows and makes structures as those shown in the diagram. There is one box in the first row, 3 boxes in the second row and 5 boxes in the third row.



(i) Write separately the number of match boxes in the 5th and 6th rows in a structure with six rows of boxes.

(ii) When the number of match boxes in the respective rows are written in sequential order, to what type of progression do they belong?

(iii) If a structure such as the above is made with 10 rows, how many boxes are in the 10^{th} row?

(b) The fourth term and the seventh term of a geometric progression are 40 and 320 respectively.

(i) Find the common ratio of the geometric progression.

(ii) Write the first term of the progression.

3. Two taps A and B are fixed to a tank to fill water into it. When only A is opened, the tanks get filled in 8 hours. When only B is kept open, it takes 12 hours to fill the tank. When the outlet tap C is opened, the tank completely empties in 6 hours.

(i) Find the time taken to fill half of the tank when only A and B are kept open when the tank is empty.

(ii) When the tank is empty, what fraction of it gets filled with water in one hour if all the three taps A, B and C are opened?

(iii) Find the time taken to fill the tank completely with water if all three taps were opened when the tank is exactly half-filled with water.

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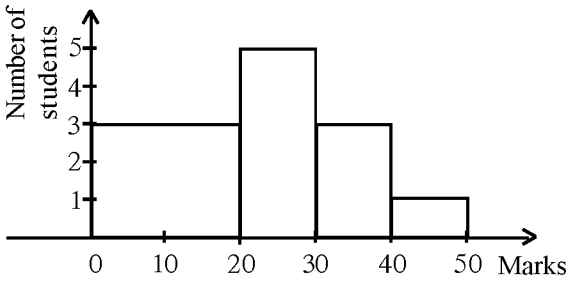
4. Presented here is a histogram based on the marks scored by students out of 50 for a mathematics assignment.



(i) Complete the following table using the histogram.

Marks	0-20	20-30	30-40	40-50
Number of students	.....	.....	.....	1

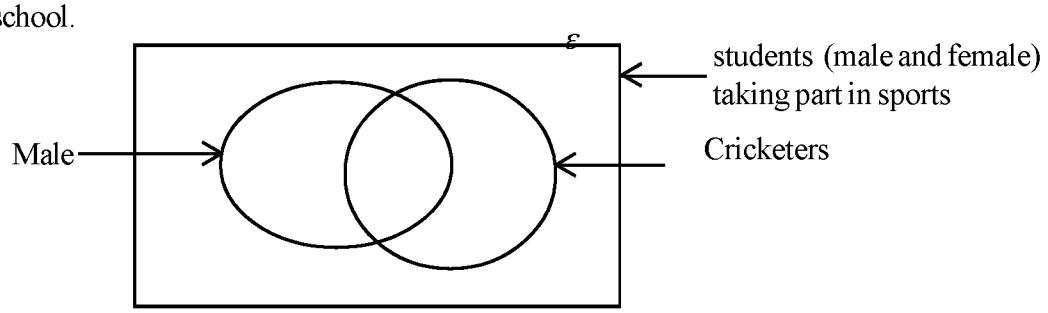
(ii) Draw the frequency polygon on the above histogram.

(iii) It was thought to indicate the above information in a pie chart. The angle of the sector used to represent the number of students scoring 40-50 was 24^0. Find the angles of the other sectors representing the other intervals of marks and complete the following table.

Marks	0-20	20-30	30-40	40-50
Sector angle	.....	.....	.....	24^0

(iv) If the students scoring above 30 marks for the assignment are considered to have achieved the expected achievement level, find what fraction of these students have reached the expected achievement level.

5. (a) The following Venn diagrams shows the information on the students taking part in sports in a school.



(i) If the number playing cricket is 38 and the number of boys playing cricket is 18, indicate relevant information in the Venn diagram and find the number of girls playing cricket.

(ii) In the Venn diagram, shade the area representing the girls not playing cricket.

(iii) If the number of boys and girls taking part in sports is 60 and the number of girls not taking part in cricket is 10, how many boys participate in sports?

(b) (i) Write a formula for $n(A \cup B)$ in terms of n(A), n(B) and $n(A \cap B)$.

(ii) Find the value of $n(A \cup B)$ if $n(A) = 8$, $n(B) = 10$ and $n(A \cap B) = 6$.

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 $\frac{1}{3}\pi r^2 h$
- The volume of a sphere of radius r is $\frac{1}{3}\pi r^2 h$.

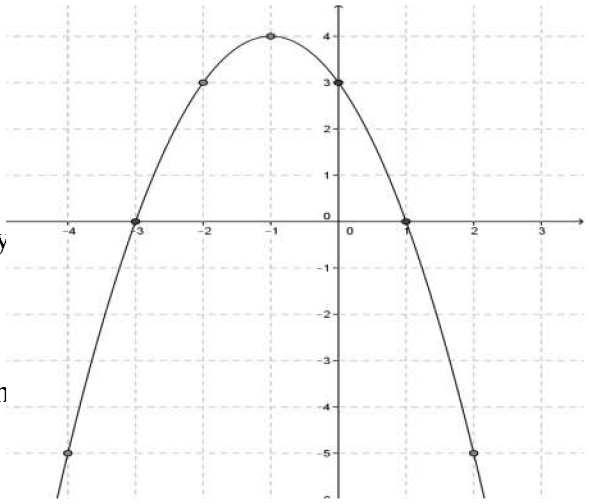
Part **A**

Answer five questions only

1. (a) In a company, the market price of a share is Rs.50. The company pays dividends of Rs.2 per share per year. Sarath invests Rs. 25 000 to buy shares of the company.
   (i) Find the number of shares to which Sarath is entitled.
   (ii) What is the income of Sarath in that year from his shares?
   (iii) If Kamal earns an income of Rs.2 500 for the shares in that company, find the investment made by Kamal in the company.

   (b) A man takes a loan of Rs. 50 000 for a period of two years at an annual compound interest rate of 10%.
   (i) Find the amount that should be paid at the end of two years to settle the loan.
   (ii) Give reasons for the fact that taking the same loan for the same period at an annual simple interest rate of 11% is disadvantageous.

2. The figure shows the graph of a quadratic function drawn within the range $-4 \le x \le 2$.
   Using the graph,
   (i) write the value of y when $x = 0$.
   (ii) write the interval of values of x in which the function increases positively
   (iii) find the value of k if this quadratic function takes the form $y = k - (x+1)^2$.
   (iv) According to the above value of k, fin the roots of the equation $k - (x+1)^2 = 0$.



   (v) Write the function of which the coordinates of the maximum point is (-2,0) and the coefficient of x^2 is 1.

3. (a) (i) Write the order of the matrix $A = \begin{pmatrix} 2 & 1 \\ -1 & 0 \end{pmatrix}$.

   (ii) If $B = \begin{pmatrix} 1 & 0 \\ 2 & 1 \end{pmatrix}$ find the product AB.

(b) Varuni bought 2 guava fruits and 3 naran fruits for Rs. 48. Sandali bought 4 guava fruits and two naran fruits for Rs. 64 from the same vendor.

(i) Construct a pair of simultaneous equations taking the price of a guava fruit as x and the price of a naran fruit as y.

(ii) Find separately the price of a guava fruit and of a naran fruit by solving the above equations.

(iii) Varuni says that an equal number of guava fruits and naran fruits can be obtained by giving Rs. 100 to the vendor. Do you agree with this? Give reasons.

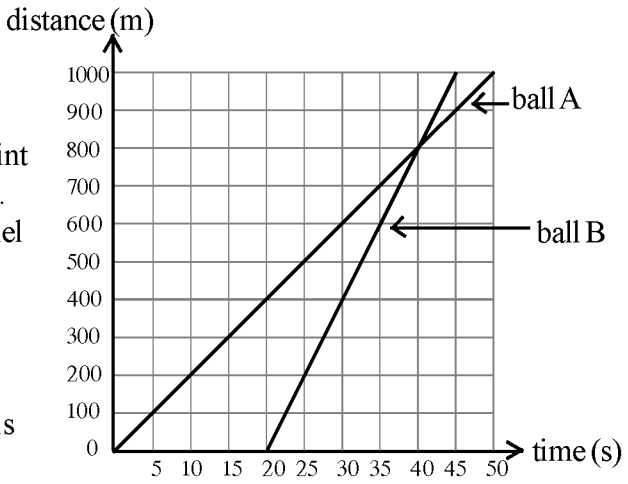
4. (a) Amal sees a mountain top due east at an angle of elevation of 30^0. When he walks 100 m towards the east Amal sees the same mountain top at an angle of elevation of 60^0. Using a 1: 2000 scale ,

(i) draw a scale diagram to indicate these information.

(ii) find the length of the line segment in the scale diagram representing the height of the mountain.

(iii) find the true height from the ground to the mountain top.

(b) The diagram indicates a distance time graph drawn to illustrate the motion of two balls A and B used in an experiment. Both balls start motion from the same point and B starts to move 20 seconds after A. Both balls move in rectilinear paths parallel to each other.



(i) What is the distance in metres traveled by B in the first 5 seconds after starting to move .

(ii) Find the speeds of A and B balls separately.

(iii) Till the moment when B goes past A, show that the ratio of the times during which the balls A and B moved is 2 : 1.

5 The distance between the two towns X and Y is 120 km. To reach town Y from X , a driver A drives his vehicle at the average speed of x km h^{-1}. A driver B drives his vehicle at a speed of 20 km h^{-1} less than that of A and comes to town Y from X. If B takes one hour more than A for the journey, find the average speed of A.

6. The following frequency distribution shows the information collected on the number of units of water used daily by the residents of a housing scheme.

Number of units of water	20-25	25-30	30-35	35-40	40-45	45-50
Number of days	2	4	10	8	5	1

A local government authority charges Rs. 7 for a single unit of water while the supply of a unit of water costs the authority Rs. 12.The manager at the monthly meeting proclaims that it costs an extra sum of Rs. 8650 per day to supply water to 50 houses . Using the mean, substantiate the manager's statement.

Part B

7. (a) The radius of the base of a solid cylinder is $2a$ and its height is $3h$.
   (i) Find the area of the curved surface of the cylinder in terms of π, a and h
   (ii) Indicate the volume of that cylinder in terms of π, a and h

   (b) The radius of the base of a right circular cone is $2a$ and its height is $2a$. Find its volume in terms of π and a.

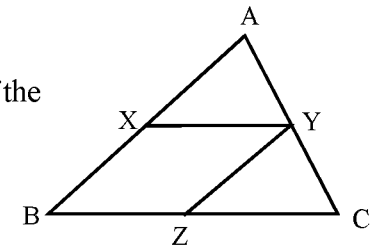
   (c) (i) If the cylinder and the cone are made of the same material, indicate the volume of the material from which the cylinder and the cone are made in terms of π and a when $h = 2a$.
   (ii) The cylinder and the cone are melted and spheres of radius a are made without wastage. Find the number of spheres that are made.

8. (i) Draw a circle of radius 3.5 cm. Name its centre O.
   (ii) Mark a point on the circle and name it A. Construct the tangent that touches the circle at point A.
   (iii) Mark point B on the tangent, 6 cm away from point A. Construct another tangent to the circle from point B. Name the point at which that tangent touches the circle as C.
   (iv) Construct the circle passing through A, B, C and O. Measure and write its radius.

9. A man when buying a television set worth Rs. 40 000, first pays Rs. 10 000 in cash. He promises to pay the remaining amount by way of reducing balance under the annual interest rate of 12% within a period of 60 months in equal instalments. What is the instalment he should pay monthly?

10. (a) Explain the mid point theorem using a suitable diagram.

    (b) In the triangle ABC shown in the diagram, the mid points of the sides AB, AC and BC are X, Y and Z respectively.



    (i) Show that XYZB is a parallelogram.
    (ii) Show that AB + AC + BC = 2(XY + YZ + XZ).
    (iii) Prove that XYZB is a rhombus if AB = BC.

11. (a) Draw the right angled triangle ABC so that $\hat{B}$ is a right angle. Write Pythagoras' theorem with respect to this triangle.
    (b) ABC is a triangle in which $\hat{B}$ is a right angle. In it, point X is located on BA and point Y

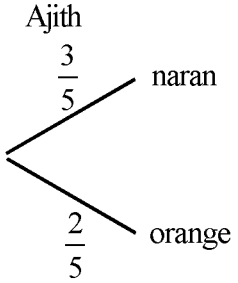
is located on BC so that 2BX = AX and 2BY = YC. Draw a diagram including the above data and show that $9(CX^2 + AY^2) = 10AC^2$.

12. A bag contains 3 naran - flavoured toffees and 2 orange flavoured toffees of identical shape and size. Ajith took a toffee randomly from the bag and tasted it. Afterwards Kamal also took a toffee from the bag and tasted it.

(i) Indicate the sample space on a grid.

(ii) Using it, calculate the probability of both getting the same flavoured toffees.

Amith had a thought of representing these information in a tree diagram. An incomplete tree diagram drawn for this is shown here.



(iii) Copy this tree diagram in your paper and complete the rest of it.

(iv) Using that diagram , find the probability of both getting naran flavoured toffees.

(v) Amith says that there is a greater probability of both receiving toffees of the same flavour rather than toffees of different flavours. Give reasons to show that this statement is not true.