3.1 Objectives
Mathematics I- Part A

01.   Finds the perimeter of a sector when its radius and the central angle are given.

02.   In an isosceles triangle, when the value of one equal angle is given, finds the value of the other angle.

03.   Calculates the amount received at the end of the year, given the amount deposited and the annual interest rate.

04.   Finds the gradient of a straight line when the coordinates of two points on the line are given.

05.   Expresses with elements the set of numbers given as a description.

06.   Finds the factors of an algebraic expression of the type $x^2 + bx + c$; $b, c \in \mathbb{Z}$

07.   When two class intervals are given, by considering the mid value of one class interval as the assumed mean, completes the deviation column.

08.   Writes the relationship between a named angle and three other named angles in a diagram comprising two triangles formed by the intersection of two straight lines.

09.   Writes positive integers which suit the given inequality.

10.   If the number of days required to complete half a task by a certain number of people is given, finds the number of days required to complete the remaining half of the task with two additional men.

11.   If two fixed points and the distance between the points are given, illustrates in a sketch diagram the locus of a variable point at an equal distance from the two points.

12.   Finds the first approximation of the square root of a whole number which is less than 100 and is not a perfect square.

13.   Simplifies an expression with two algebraic expressions with related denominators.

14.   Given a diagram with a line drawn through the mid point of a side of a triangle parallel to another side
     (i) finds the length of the remaining part of the side when the length of a part of the side which that line meets is given.
     (ii) finds the length of one parallel line segment when the length of the other parallel line segment is given.

15.   Given the area of a parallelogram, calculates the area of a triangle lying between two parallel sides with a base of half the side of the parallelogram.

16.   Writes the sum of two given 2×2 matrices.

60

17. (i) In a given Venn diagram given, shades the area relating to a given set operation.
     (ii) Describes verbally a given area in a Venn diagram.

18. Finds the value of two named angles when one angle of a diagram with several angles contained in a circle is given.

19. Converts to index form an expression given in logarithmic form.

20. If the distance travelled by a motor car in km and its speed in kilometres per hour are given, calculates the time spent in minutes for the journey.

21. Finds the length of a diagonal of a rectangle when its length and breadth are given.

22. Calculates the volume of a right prism of triangular cross section whose area of cross section and length are given.

23. Without solving two given simultaneous equations, decides the sum of two unknowns.

24. In a right angled triangle,
     (i) indicates the sin ratio for a named angle in terms of the sides.
     (ii) writes the corresponding trigonometric ratio given a ratio between the sides of the triangle.

25. Given the vertex angle of the isosceles triangle formed by joining a point on a produced side of a cyclic quadrilateral to an adjoining vertex , finds the value of the interior opposite angle, opposite to the angle formed by producing the side.

Paper1 Part B

(1) (a)   When the annual property value and annual rates percentage are given

            (i) calculates the annual rates.
            (ii) finds the rates to be paid per quarter.

     (b) (i)   When percentage increment of annual valuation and new annual rates percentage are given, finds the new annual assessment value.

          (ii)   Calculates the percentage increment of the rates by calculating the annual rates.

(2) (a)   When the assessment on the time required and the number of people required to complete a work is given,

            (i)   based on the amount of work that can be completed by a certain number of people within a certain number of days, calculates the amount of work that can be completed within one day by a different number of people.

            (ii)   Finds the total amount of work based on that.

(iii)   Finds the number of people to be employed to complete the work before the scheduled date.

(b)   Finds the annual income tax payable when the monthly income, the amount that is waived from income tax and the income tax percentage for the balance amount are given.

(3)   In a diagram with a rectangular land and an adjacent sector shaped portion, when the length of the rectangle, radius of the sector and the central angle are given,
 (i)   finds the area of the rectangle.
 (ii)   finds the area of the sector.
 (iii)   given the cost of cementing one square unit, calculate the expenditure for cementing the floor of the sector-shaped portion.
 (iv)   separates 1/4 of total land area suitable for given purposes and draws it in the given diagram indicating its measurements.

(4) (a)   If a pie chart and the total amount represented by the pie chart are given,

 (i)   calculates the quantity that is represented by a sector of which the angle subtended at the centre is given.
 (ii)   When the quantity represented by the sector is given, finds the value of the angle subtended at the centre.

(b)   When a table that includes data with grouped class intervals is given,

 (i)   draws the a histogram on the axes given.
 (ii)   develops the frequency polygon based on that histogram.

(5)   When a Venn diagram that represents two intersecting sets is given,
 (a)   (i)   marks the given information in the Venn diagram and finds the number of elements in a given set.
  (ii)   finds the number of elements in another named set.

 (b)   (i)   Indicates in a given grid the sample space of a random expenment.
  (ii)   Finds the probability of a named incident.
  (iii)   Calculates the probability in (ii) above when the two events are not dependent.

Paper II

01. Given the loan, simple interest rate and the time for settlement,
    (i)   calculates the profit when the annual profit percentage is given if the above loan is invested in an enterprise.
    (ii)   finds the interest that should be paid at the end of the period allowed to settle the loan.
    (iii) Using the profit obtained in the first year, calculates the profit that should be obtained during the second year by the business to settle the loan at the end of the year.
    (iv)   When the profit gained during the second year is given, finds the balance that should be paid to settle the loan.

02. Given the breadth of a rectangular flower bed by an algebraic symbol, the relationship between its length and breadth and the area of the flower bed, shows that the length of the bed is a given expression by constructing and solving a quadratic equation.

03. (a) (i)   Writes the order of a given matrix.
        (ii)   Multiplies two matrices of the order 2×2.
        (iii) Shows that the product of two matrices is not commutative.

    (b) (i)   Derives a pair of simultaneous equations based on a given event.
        (ii)   Shows that a given statement is true by solving the simultaneous equations.

04. (a) (i)   Completes an incomplete table carrying values satisfying a function of the farm $y = (x- a)^2 - b$ where a and b are integers.
        (ii)   Draws the graph of the function within the given interval according to a given scale.

    (b) Referring the graph drawn,
        (i)   writes the coordinates of the turning point of the function.
        (ii)   writes the range of the value of x in which the function increases negatively.
        (iii) by comparing with the coordinate of the turning point of the function drawn, writes the coordinates of the turning point of another corresponding function.

05. Based on the given measurements, writes an expression for the increase in the height of the water level in a cuboid tank container party filled with water, in which a solid pyramid of given base length and height is immersed, simplifies it using logarithms tables and gives the answer to one decimal place correctly.

06. Given a grouped frequency distribution containing information related to the production turned out by a producer in a certain number of days during year,
    (i)   writes the modal class.
    (ii)   calculates to the nearest whole number the mean of the daily production taking the mid value of a given class interval as the assumed mean.
    (iii) shows that the monthly profit exceeds a given value when the production cost and the selling price of a unit are given.

07. (a) When a diagram and a scale related to an activity of finding the height of a flag post are given, draws a scale diagram and finds the height of the flag post to the nearest whole number.

    (b) (i) Using the data in a given diagram, finds the lengths to the nearest centimetre a named length.
        (ii) Shows that the area of a named triangle is less than a given value using that length and given measurements.

08. (a) Given the number of bricks to be laid in the first three circular tiers in a compound and the cost for laying one brick, shows that the expenditure for laying bricks in the given number of tiers exceeds a given value.

    (b) Shows that in a geometric progression in which the first three terms are given, the relationship between two named terms is a given relationship.

09. (i) Draws a circle of given radius.
    (ii) Draws a radius of the circle and marks the point at which it meets the circle.
    (iii) Constructs and names the chord located at a given distance from the centre of the circle perpendicular to that radius.
    (iv) Draws a chord of given length from one end of the above chord.
    (v) Constructs the angle bisector of the angle between the above chords and draws a cyclic quadrilateral with the point of intersection of this bisector and the circle as a vertex.

10. Sketches a diagram with given geometric data and verifies that a named quadrilateral is a parallelogram.

11. (a) In a diagram of a circle in which a perpendicularly intersecting chord and a diameter are marked,
        (i) finds the radius of the circle.
        (ii) calculates the length of a named chord.

    (b) Given a diagram of two triangles with marked data,
        (i) names the two pairs of angles that are be equal.
        (ii) finds the length of a given side, given the lengths of a pair of sides of one triangle and the length of one corresponding side in the other triangle.

12. When two named kits containing identical objects are given,
    (i) draws the tree diagram relevant to taking an object from one of the kits.
    (ii) when a pair of dependent events is given, extends the tree diagram in relation to the second event.
    (iii) calculates the probability of a named event.
    (iv) calculates the probability of a named event.
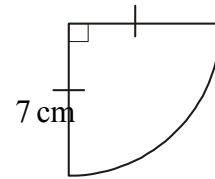   (v) calculates the probability of a named event.

Mathematics I - Part A

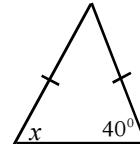Answer all the questions on this paper itself.   **Time: Two hours**

1. Find the perimeter of the sector given in the diagram.
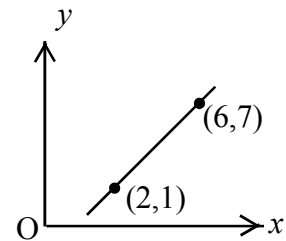
    (Take $\pi = \dfrac{22}{7}$)

    7 cm

2. According to the given data find x.

    x 40^0

3. A student deposits Rs.1000 under 8% annual simple interest. What is the interest after a year.
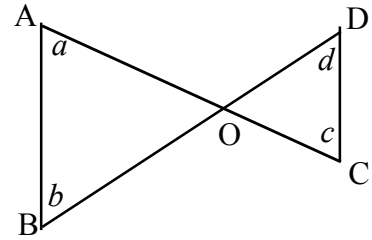
4. Find the gradient of the given straight line.

    y

    (6,7)

    (2,1)

    O x

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. Points A 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 $\dfrac{1}{x} + \dfrac{2}{3x}$.

14. According to the information given in the diagram, find the values of x and y.
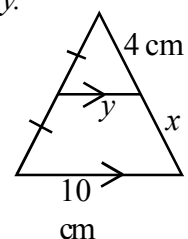
15. If the area of the parellologram ABCD is 100 cm², find the area of the triangle ECF according to the information given in the diagram.
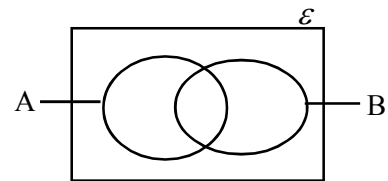

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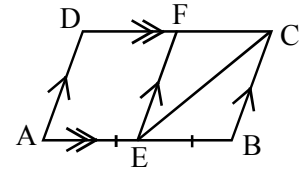
16. Simplify $\begin{pmatrix} 2 & 3 \\ 5 & 4 \end{pmatrix} + \begin{pmatrix} 1 & 1 \\ 3 & 2 \end{pmatrix} = \begin{pmatrix} \dots & \dots \\ \dots & \dots \end{pmatrix}$
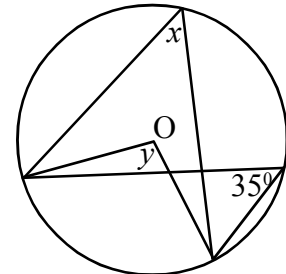
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17. ε = {students in a class}
         A = {students studying music}
         B = {boys}
   In the Venn diagram given
      (i)   shade the area $A \cap B$.
      (ii) describe the shaded area in words.
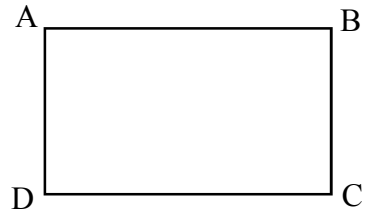

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18. Centre of the circle in the diagram is 'O'.
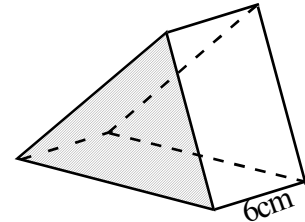   Using the given data, find values for x and y.

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

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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.

     A _____ B
     | |
     D _____ C

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22. The figure indicates a prism with shaded cross sectional
     area of 25 cm². If its lenght is 6 cm, find the volume of the prism.

     6cm

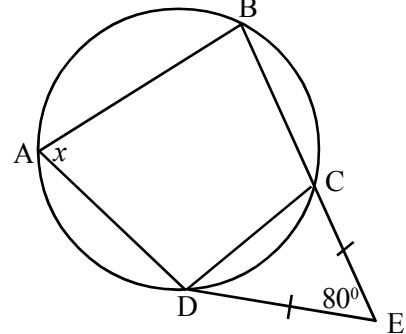
23. If $x + 2y = 9$
             $2x + y = 6$,   find the value of $x + y$ without simplifying the equations.

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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 $\dfrac{AC}{BC}$.

     A

     C θ B

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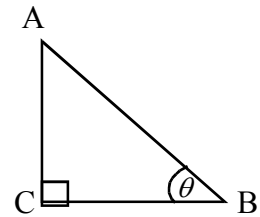
25. A, B, C and D are four points on the circle. Side BC is produced to E so that DE = CE.
     $C\hat{E}D = 80^0$. Find the value of x.

     B

     A x

     C

     D   80⁰

     E

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.

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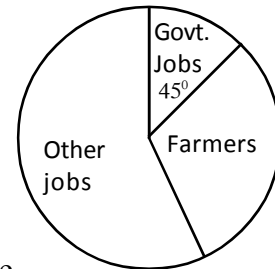
      (ii)   What is the total length of the road?

      (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 $\pi = \frac{22}{7}$)
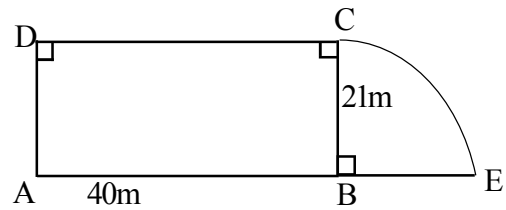
   (i) Find the area of the rectangular part ABCD.

   (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 $1m^2$ is Rs.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 allocated 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.

70
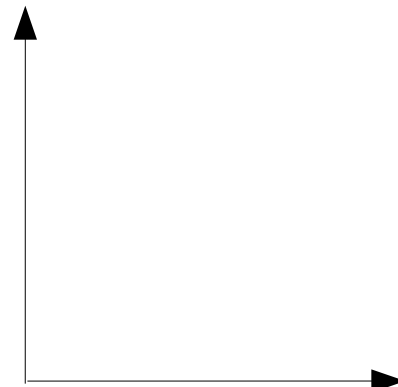
5. (a) 60 students who can work in Sinhalese and Tamil languages participate for a workshop on ethnic harmony. They can work at least in one language. Number of students who are proficient in two languages is 18 In addition, 22 students can work only in Sinhala.
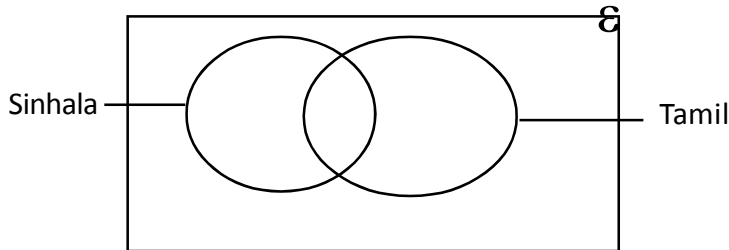
     (i)   Include the above information in the Venn diagram and find the number of students who can work only in Tamil.

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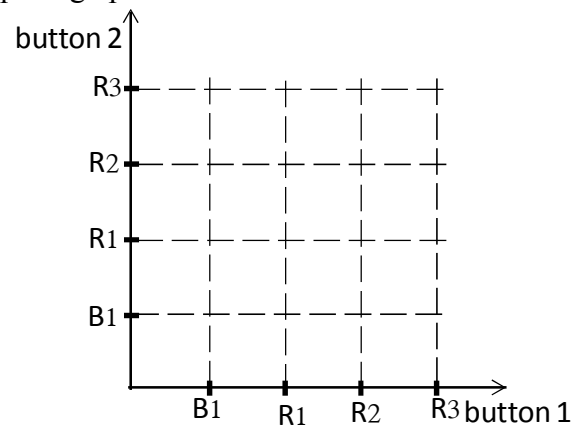
     (ii)   Find the probability of the buttons taken out being of two different colours.

     (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 m² 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.
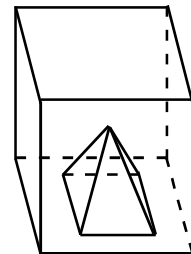
6. Statistics of brooms produced per day by a certain producer last year are given below.

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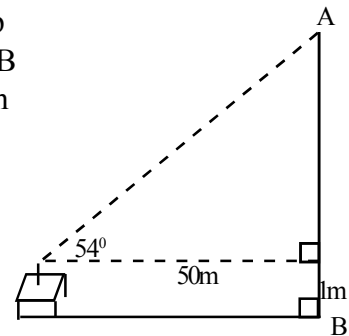
(b)   (i) Based on data in the diagram and trigonometric ratios find the length of DB to the nearest centimetre.

(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 cm².
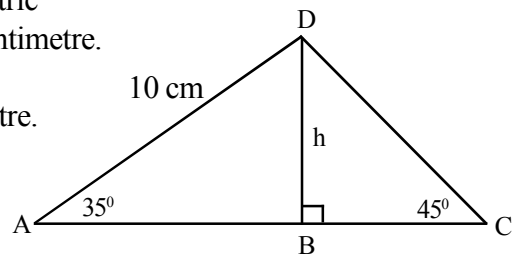
8. (a)   In a circular compound, bricks are fixed in a way that the first tier has 7, second tier has 11 and the next tier has 15. If fixing of a single brick costs Rs. 10, show that the cost for fixing bricks in 15 tiers exceeds Rs. 5 000.

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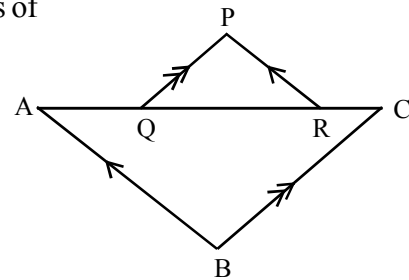
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11. (a) Chord AB and diameter CD of a circle with the centre point O, intersect perpendicularly at point P. PD = 24 cm and CP = 6 cm.

    (i)   What is the radius of the circle in centimetres?
    (ii) Find the length of the chord AB.
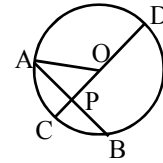
    (b) (i) Copy the diagram given and mark the two pairs of angles which are equal.

    (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.
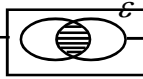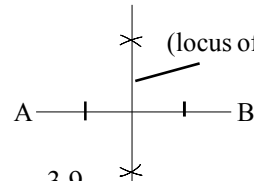
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3.3 Answers and Marking Scheme
Mathematics Paper I - Part A

Question number	Answer	Mark		Question nimber	Answer	Mark
01	$\frac{1}{4} \times 2 \times \frac{22}{7} \times 7$ .... 1 $11 + 14 = 25$ ...1	②		14	$x = 4cm$ ...... 1 $y = 5cm$ 1	②
02	$x = 40^0$	②		15.	$25cm^2$	
03	$\frac{8}{100} \times 1\,000$ ... 1 Rs.80 1	②		16.	$\begin{pmatrix} 3 & 4 \\ 8 & 6 \end{pmatrix}$	②
04	$\frac{7-1}{6-2}$ ..... 1 $= \frac{3}{2}$ 1	②		17.	i. ....1 ii. { boys studying music }...1	②
05	$\{1, 3, 5\}$	②		18	$x = 35^0$ .... 1 $y = 70^0$ 1	②
06	$(a\text{-}5)(a\text{-}2)$ $a^2 - 5a\text{-}2a + 10$ ... 1	②		19	$3^4 = 81$	②
07	$\boxed{\begin{array}{c} 0 \\ \hline 5 \end{array}}$ 1 1	②		20.	$\frac{20}{100}$ hours $= \frac{1}{5}$ hours ..... 1 12 minutes 1	②
08	$a + b = c + d$ ......1 $d = a + b - c$ 1	②		21.	$AC^2 = 15^2 + 8^2$ ...... 1 $AC = 17$ 1	②
09	1 $x < 2$ 1	②		22.	25×6 ..... 1 $150 \, cm^3$ 1	②
10	Work remaining = 24 man days - 1 Number of days needed = 3 - 1	②		23	$3x + 3y = 15$ ...... 1 $x + y = 5$ 1	②
11		②		24.	$\sin\theta = \frac{AC}{AB}$ ..... 1 $\tan\theta$ 1	②
12	3.9	②				
13	$\frac{3}{3x} + \frac{2}{3x}$ ...... 1 $= \frac{5}{3x}$ 1	②		25.	$E\hat{C}D = 50^0$ ......1 $x = 50^0$ 1	②

<u>Part I - B Answers</u>

01.   (a) (i)   Annual rates $= Rs.\ 25\ 000 \times \dfrac{8}{100}$ 01

                                        $= Rs.2\ 000$ 01----②

      (ii)   Rates per aquarter $= Rs.\ \dfrac{2\ 000}{4}$ 01

                                        $= Rs.\ 500$ 01----②

    (b) (i)   New annual property value $= 25\ 000 \times \dfrac{20}{100} + 25000$ 01

                                        $= Rs.\ 30\ 000$ 01----②

      (ii)   New rates $= 30\ 000 \times \dfrac{7}{100}$ 01

                                        $= Rs.\ 2\ 100$ 01

             Increase $= Rs.100$ 01

             Percentage of the rates increase $= \dfrac{100}{2\ 000} \times 100\%$

                                        $= 5\%$ 01---④ **10**

- -

02. (a)   (i) Diastance completed by 50 men in a day $= \dfrac{3\ km}{20} \times 50 = 7\frac{1}{2}\ km$ 02----②

      (ii) Total distance $= 7\frac{1}{2}\ km \times 6$

                                        $= 45\ km$ 02----②

      (iii) Number of men $= \dfrac{300}{4}$ 01

                                        $= 75$ 01----②

    (b)   Annual income $= Rs.\ 250\ 000 \times 12 = Rs.\ 3\ 000\ 000$......01
           Tax paying amount $= Rs.\ 600\ 000$ 01

           Income tax due $= Rs.\ 600\ 000 \times \dfrac{15}{100}$ 01

                                        $= Rs.\ 90\ 000$ 01----④ **10**

- -

03.   (i) Area of the rectangle ABCD $= 40m \times 21m = 840m^2$ ......02 ----②

        (ii) Area of the sector BCE $= \dfrac{22}{7} \times \dfrac{21 \times 21}{4}$ 01

                                        $= 346.5\ m^2$ 01
             Expenditure for cementing $= 346.5 \times 420$ 01

                                        $= Rs.\ 145\ 530$ ......01---- ④

(iv)   Area of $\triangle ADX$ $= \dfrac{840}{4} m^2$ 01

$\dfrac{840}{4} = \dfrac{1}{2} \times 21 \times AX$ 01

$AX = 20\,m$ 01
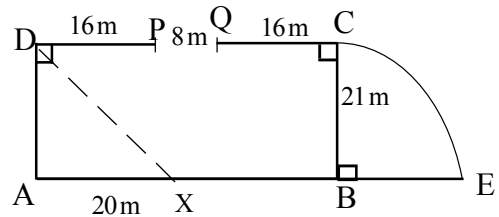
Joining DX 01   ---- ④   **10**

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04.   (a)(i) Number of government employees $= \dfrac{45}{360} \times 200$ 01

          $= 25$ 01   ----②

(ii) Sector angle representing farmers $= \dfrac{70}{200} \times 360^0$ 01

          $= 126^0$ 01   ----②

(b)(i) Calibrating axes 01
Drawing bar corresponding to 30 -40 01

Other bars   ....01-- ③

(ii) Joining mid points of bars 01
Joining mid points of bar 30 -40 01

Joining the terminal point   ......01--- ③   **10**

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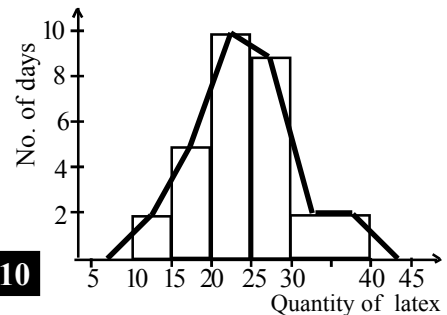
05. (a)(i) Marking 18 and 22 02

Number of students who can work only
in Tamil medium $= 60 - (22 + 18) = 20$ ......02---- ④

(ii) Number of students who can work only in
one language $= 22 + 20 = 42$ ......01+01   ---- ②
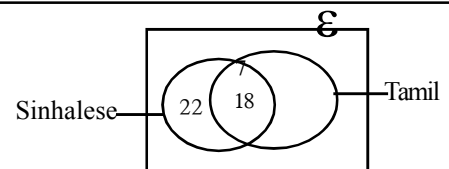
(b)(i)   Marking points 01
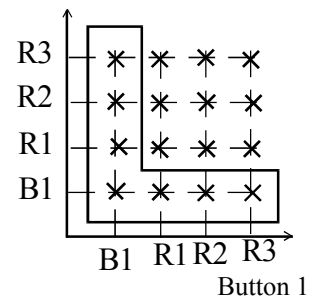(ii)   Probability of being of distinct colours the
two buttons withdrawn $= \frac{6}{16}$ 01
(iii)
Probability $= \frac{6}{12}$ .....02 ---- ④ $\begin{pmatrix} \text{For obtaining 6.....01} \\ \text{For obtaining 12.....01} \end{pmatrix}$
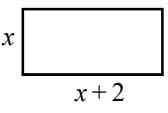
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(01)	(i)	Profit in the first year =Rs. $25\,000 \times \dfrac{50}{100}$	1		
		$= Rs.\ 12\,500$	1	②	
	(ii)	Interest to be paid after two years			
		$= Rs.\ 25\,000 \times \dfrac{12}{100} \times 2$	2		
		$= Rs.\ 6\,000$	1	③	
	(iii)	Total amount to be paid after 2 years			
		$= Rs.\ 31\,000$	1		
		Profit to be gained in the second year			
		$= Rs.\ 31\,000 - 12\,500$	1		
		$= Rs.\ 18\,500$	1	③	
	(iii)	Profit gained to settle the loan in the			
		2nd year $= Rs.\ 13\,500$			
		Further amount required to settle the loan			
		$= Rs.\ 18\,500 - 13\,500 = Rs.\ 5000$	2	②	**10**

(02)		Length $= x+2$	1		
		Area $=\ x^2 + 2x$	1		
		$x^2 + 2x = 17$	1		
		$x^2 + 2x = 17$			
		$x^2 + 2x + 1 = 17 + 1$	1		
		$(x + 1)^2 = 18$	1		
		$x + 1 = \pm\sqrt{18}$	1		
		$x + 1 = \pm 3\sqrt{2}$	1		
		$x\ = +3\sqrt{2} - 1$ or $-3\sqrt{2} - 1$			
		$x\ = -3\sqrt{2} - 1$ Since $x > 0$			
		Breadth of the bed $=\ 3\sqrt{2} - 1$	1		
		Length of the bed $=\ x + 2 = 3\sqrt{2} - 1 + 2$	1		
		$= (3\sqrt{2} + 1)\,m$	1		**10**

(03)	(a)	(i)	2×2	1	①	
		(ii)	$AB = \begin{pmatrix} 11 & 2 \\ 2 & 4 \end{pmatrix}$	1	①	
		(iii)	$BA = \begin{pmatrix} 4 & 1 \\ 4 & 11 \end{pmatrix}$	1		
			$\therefore BA \neq AB$	1	② ◬4	
	(b)	(i)	$3x + 4y = 26$	1		
			$x + 2y = 12$	1	②	
		(ii)	$2x + 4y = 24$.			
			Subtraction	1		
			$x = 2$	1		
			$y = 5$	1		
			Number of girls = 2			
			Number of boys = 5			
			$2 < 5$	1	④ ◬6	
					10	

(04)	(a)	(i)	$2, -1$	2	②	
		(ii)	Marking the axes correctly	1		
			Marking at least 5 points correctly	1		
			Smooth curve	1	③ ◬5	
	(b)	(i)	$(1, -2)$	1		
		(ii)	$1 < x < 2.5$	2		
		(iii)	$(1, -7)$	2	⑤ ◬5	
					10	

(05)	(a)		Because h is the height to which water level rises				
			$\frac{1}{3} \times 12.35 \times 12.35 \times 15 = 20 \times 16 \times h$	1			
			$h = \dfrac{(12.35)^2 \times 5}{20 \times 16}$	1			
			$h = \dfrac{(12.35)^2}{64}$	1			
			$\lg h \quad = 2 \lg 12.35 \ - \lg 64$	1			
			$\qquad = 2 \times 1.0916 - 1.8062$	1+1			
			$\qquad = 2.1832 - 1.8062$	1			
			$\qquad = 0.3770$	1			
			$\therefore h = \text{anti} \log 0.3770$				
			$\qquad = 2.382$	1			
			$h = 2.4 \text{cm}$	1		**10**	

(06)							

class interval	x	f	d	fd
0 - 10	5	26	-40	-1040
10 - 20	15	28	-30	-840
20 - 30	25	35	-20	-700
30 - 40	35	34	-10	-340
40 - 50	45	63	0	0
50 - 60	55	50	10	500
60 - 70	65	46	20	920
70 - 80	75	18	30	540

$\sum f = 300$ $1960 - 2920$
$= -960$

	(i)		40 - 50	1	①		
	(ii)		Mid value column	1			
			Deviation column	1			
			fd column	1			
			$\sum fd$	1			
			$\text{Median} \ = A + \dfrac{\sum fd}{\sum f}$				
			$\qquad = 45 - \frac{960}{300}$	1			
			$\qquad = 45 - 3.2$	1			
			$\qquad = 41.8$				
			$\qquad = 42$	1	⑦		
	(iii)		Income from selling brooms in one month $= 42 \times 30 \times 50$				
			$\qquad\qquad\qquad = \text{Rs.}63\,000$	1			
			$63\,000 > 60\,000$	1	②	**10**	

(07)	(a)		Drawing scale diagram	2		
			Height $= 70$ m	1	③	△3
	(b)	(i)	$\sin 35^0 = \dfrac{h}{10}$	1		
			$h = 0.5736 \times 10$	1		
			$h = 5.736$			
			$BD = 6$m	1	③	
		(ii)	$\cos 35^0 = \dfrac{AB}{10}$	1		
			$AB = 0.8192 \times 10 = 8.192 \simeq 8$			
			$AC = 6 + 8 = 14$cm	1	②	
		(iii)	Area of $ACD = \dfrac{1}{2} \times 6 \times 14$	1		
			$= 42$ cm^2			
			$42 < 50$	1	②	△7

10

(08)	(a)		$a = 7, d = 4$			
			$S_{15} = \dfrac{15}{2}\{2 \times 7 + (15-1) \times 4\}$	1		
			$\quad = \dfrac{15}{2} \times 70$	1		
			$\quad = 525$	1		
			Expenditure $\quad = $ Rs. 525×10			
			$\quad\quad\quad\quad\quad = $ Rs. 5250	1		△5
			$\therefore\ 5\ 250 > 5\ 000$	1	⑤	
	(b)		$a = 12$, $r = \frac{1}{2}$	1		
			$T_6 = 12 \times \left(\frac{1}{2}\right)^5 = \frac{3}{8}\quad --(1)$	1		
			$T_9 = 12 \times \left(\frac{1}{2}\right)^8 = \frac{3}{64}\quad --(2)$	1		
			$\dfrac{(1)}{(2)}\quad\quad \dfrac{T_6}{T_9} = 8$	1		
			$T_6 = 8T_9$	1	⑤	△5

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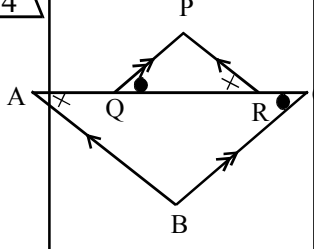
(09)		(i)	Drawing the circle	1	①	
		(ii)	Drawing the radius and marking 2.5 cm	1		
			Constructing the perpendicular from 2.5	2		
			Drawing chord AB	1	④	
		(iii)	Drawing BC	1	①	
		(iv)	Constructing the bisector of angle ABC	2		
			Marking point E	1		
			Completion of the cyclic quadrilateral	1	④	

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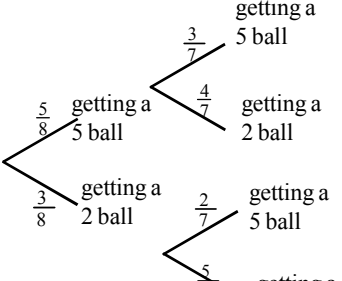
(10)			Drawing the diagram	2		
			DA=AE (Data)	1		
			DA=BC (Opposite sides of the parallelogram)	1		
			$\therefore$ BC=AE			

$E\hat{A}B=A\hat{B}C$ (alternate angles,EA//BC)   1

$B\hat{C}F=A\hat{B}C$ (alternate angles, DF//BC)   1

$\therefore E\hat{A}B=B\hat{C}F$

Comparing triangles   EAB and BCF,

$E\hat{A}B=B\hat{C}F$ (already verified)

$A\hat{B}E=C\hat{F}B$ (corresponding angles, AB//CF)   1

AE=BC (Verified)

$\therefore \triangle ABE \equiv \triangle BCF$ (A,A,S)   1

In the quadrilateral ABFC

AB = CF (Corresponding sides of congruent triangles)   1

AB // CF   (Data)   1

$\therefore$ ABFC is a parallelogram
(A pair of opposite sides are equal and parallel)

10

(11) (a) (i) Radius $= \dfrac{24+6}{2} = 15$ cm   1   ①

(ii) OP $= 15 - 6$
$= 9$ cm   1

Applying Pythagoras' theorem to triangle APO
$AP^2 + PO^2 = AO^2$ 1
$AP^2 = 15^2 - 9^2$
$= 144$
$AP = 12$cm

$AB = 24$cm   1   ③ △4

(b) (i) Marking equal angles $P\hat{R}Q = Q\hat{A}B$ 1

$P\hat{Q}R = R\hat{C}B$ 1   ②

(ii) Showing $\triangle PQR$ and $\triangle ABC$ are similar   2

$\dfrac{18}{12} = \dfrac{15}{PQ}$ 1

$PQ = \dfrac{12 \times 15}{18} = 10$ cm   1   ④ △6   **10**

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(12)

(i) Drawing the tree diagram   1   ①

(ii) Extension of the tree diagram   2   ②

(iii) Probability of getting a 5 ball first and a 2 ball second
$$= \frac{5}{8} \times \frac{4}{7} = \frac{20}{56}$$ 2   ②

(iv) Probability of getting balls of the same type on both
occasions $= \frac{5}{8} \times \frac{3}{7} + \frac{3}{8} \times \frac{5}{7} = \frac{30}{56}$ 3   ③

(v) Probability of getting a 2 ball
$$\frac{5}{8} \times \frac{4}{7} + \frac{3}{8} \times \frac{2}{7} + \frac{3}{8} \times \frac{5}{7} \text{ or } \left(1 - \frac{5}{8} \times \frac{3}{7}\right)$$ 1
$$= \frac{41}{56}$$ 1   ②   **10**