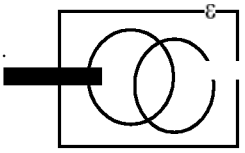
Mathematics I **Time 2 hours**

Answer all the questions on this paper itself

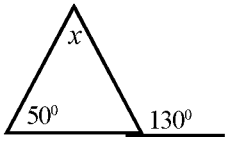
Part A

01. Shade the area corresponding to $A \cap B$ in the Venn diagram given.

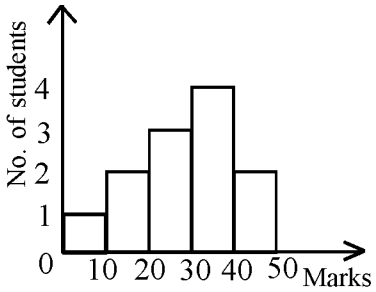


02. Solve the inequality $2x - 1 > x + 1$.

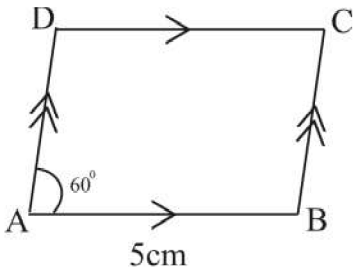
03. Find the value of x based on the information given in the diagram.



04. The histogram shows the marks scored by a group of students. What is the total number of students included in the histogram?



05. Write down the value for $B\hat{C}D$ in terms of the information given in the diagram.



06. If $\begin{pmatrix} 2 & 0 \\ -1 & 1 \end{pmatrix}\begin{pmatrix} 3 & -1 \\ 2 & 1 \end{pmatrix} = \begin{pmatrix} 6 & -2 \\ p & 2 \end{pmatrix}$ find the value of p.

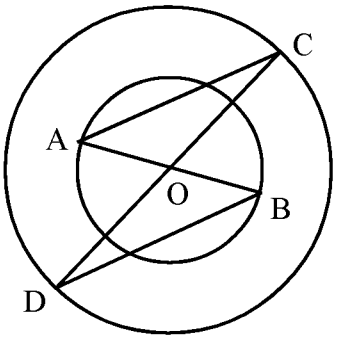
07. There are two concentric circles with centre O.
Fill in the blanks below to show that AOC and BOD are congruent.

OA = ...(.....)

$A\hat{O}C$ = ...(.....)

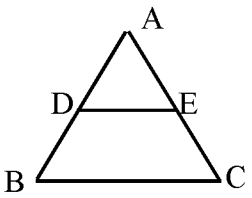
OC=OD (Radius of the large circle)

Therefore, $\Delta AOC \equiv \Delta BOD$ (S.A.S)



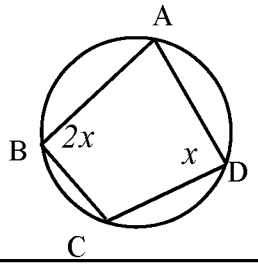
08. Asitha deposited a certain amount of money for two years in a bank which pays 10% annual simple interest and earned Rs. 4,000 as the interest. Find the amount he deposited in the bank.

09. The mid points of the sides AB and AC of the triangle ABC are D and E respectively. Write two relationships between the sides BC and DE.

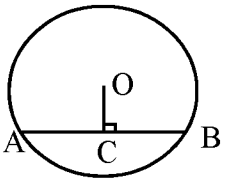


10. Simplify $\frac{4}{3x} \div \frac{1}{6xy}$

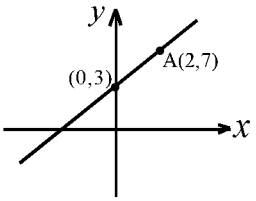
11. A, B, C and D are four points located on the same circle. Find the value of x.



12. In the circle with centre O, AB = 16 cm, OC = 6 cm and $O\hat{C}B = 90^0$. Find the radius of the circle. ($\pi = 22/7$)

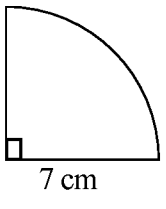


13. According to the data given , find the gradient of the straight line shown.



14. The radius of the sector shown in the diagram is 7 cm.

Find the perimeter of this sector. (Take $\pi = 22/7$)



15. Six people can cut a drain in four days. Three people worked for two days. How many man days are needed for the remaining work?

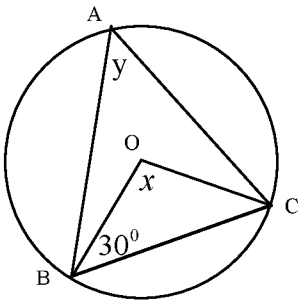
16. Without finding the values x and y values separately, find the value of $x + y$.

$2x + 7y = 10$

$3x - 2y = 5$

---

17. The vertices of the triangle ABC are located on the circle of centre O. If $O\hat{B}C=30^0$, find x and y.

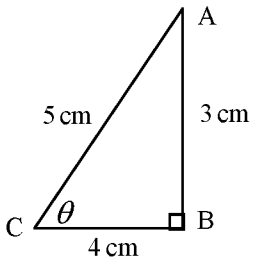


---

18. A vehicle starting from town A at 8.00 a.m, runs with uniform speed of 30 kmh^{-1}. Find the distance travelled by the vehicle when the time is 11.00 a.m.

---

19. Using the given figure, find $\sin\theta$ and $\cos(90 - \theta)$.

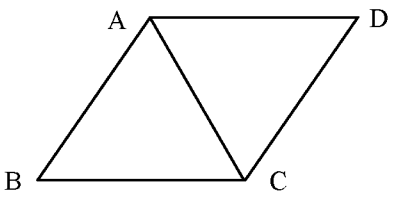


---

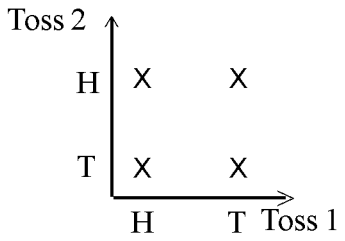
20. $x, x + 3, x + 6, \ldots$ are the first three terms of an arithmatic progression. In the progression,
    i find the common difference.
    ii. indicate the 15^{th} term using x.

---

21. In the diagram $A\hat{B}C=B\hat{A}C$ and $A\hat{C}D=A\hat{D}C$. Name two sides equal to side BC.



22. The following grid shows the sample space related to the experiment of tossing a coin twice. What is the probability of getting the same side on both occasions?



23. The area of the curved surface of a cylinder of radius 7 cm is 440 cm^2. Find the height of the cylinder. (Take $\pi = {}^{22}/_{7}$)

24. Solve $\frac{a}{2} - \frac{a}{3} = 1$.

25. Indicate the 18^{th} term of the geometric progression 8, 16, 32, ... as a power of two.

Part B

Answer all the questions on this paper itself.

01.(a) A community organisation decided to divide $\frac{2}{3}$ of its funds equally among four social service organisations. What fraction of the initial fund is due for each organisation?

(b) $\frac{2}{3}$ of the students sitting a mathematics paper scored less than 40 marks. 25% of the students scored more than 75 marks. The balance is 40 students.

i. Write the number of students who scored more than 75 marks as a fraction of the total number of students in the simplest way.

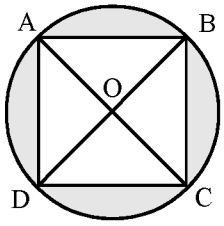
ii. Indicate the number of students scoring from 40 to 75 marks as a fraction of the total number of students.

iii. What is the total number of students who sat the paper?

iv. If each of $\frac{1}{10}$ of the total students who scored high marks were given Rs.500 worth prizes, find the amount of money needed to be spent on prizes.

---

02. A square shaped exhibition camp was constructed on a circular plot of land of 70 m radius. The land is divided into four equal parts as shown in the diagram.



(Take $\pi = 22/7$)

i. What is the angle at the centre of the sector shaped plot AOB ?

ii. Find the area of the sector shaped plot AOB.

iii. What is the area of the triangular plot of land AOB belonging to the camp?

iv. Find the area of the shaded part not belonging to the camp.

iv. What is the perimeter of the shaded part of the sector AOB? (Take $\sqrt{2} = 1.4$)

03. (a) The annual estimated value of a house is Rs. 15 000. The urban council charges an annual rates of 8% for this property.

(i) What is the annual rates charged for the house?

(ii) What is the rates is paid for a quarter?

(iii) If the rates charged for a quarter for another house in the same authorised area is Rs. 460, what is the annual estimated value of that house?

(b) A tariff of 30% is charged for an imported television. The price of the television with the tariff is Rs. 65 000. What is the value of the television before imposing the tariff?

---

04. The probability of a randomly selected student who has sat the G.C.E Advanced Level examination during a particular year, passing the examination is 3/5. The probability of randomly selected student who has passed the examination gaining admission to a universityis 1/5.

(i) What is the probability of a randomly selected student from those who sat the examination during a particular year failing Advanced Level examination?

(ii) Draw a tree diagram to represent the events of passing and failing the Advanced Level examination.

(iii) Extend the previous tree diagram to indicate the probabilities of a student who has passed gaining university admissions or not

(iv) Find the probability of a student selected at random of those who sat in particular year passing the Advanced Level Examination and gaining admission to the university .

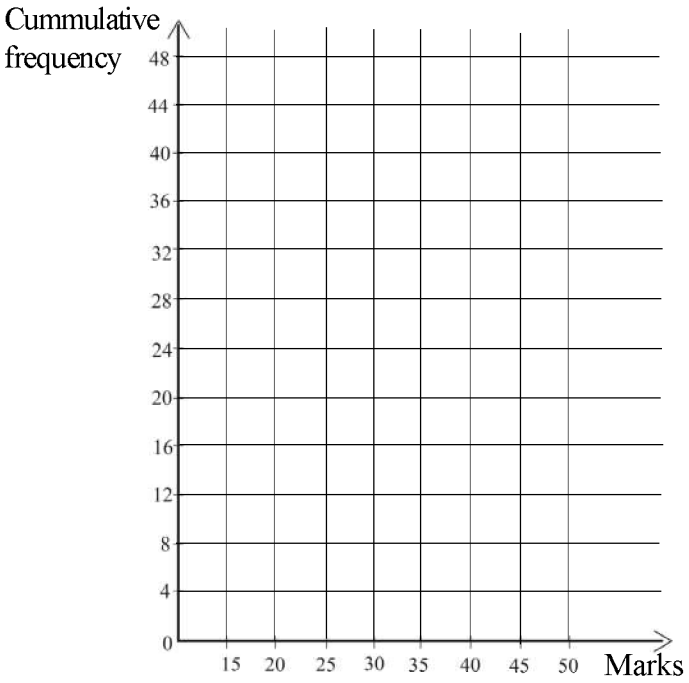
(v) If 150 students appeared for the Advanced Level examination from a particular school, find the number of students who can be expected to gain admission to a university .

05' A frequency distribution of the marks awarded for an assignment is given below.

Class interval	Frequency	Cumulative frequency
15 - 20	3	3
20 - 25	5	8
25 - 30	9	
30 - 35	14	
35 - 40	8	39
40 - 45	6	45
45 - 50	3	

a) Complete the cumulative frequency column.

b) Draw the cumulative frequency curve on the following coordinate plane.



c) i) Find the mean score of a student using the cumulative frequency curve.

ii) When selecting the 25% of this group who scored the highest marks,what is the minimum score that should be obtained by a student to be selected?

iii) Find the percentage of students who scored less than 25 marks.

Mathematics II | **Three hours**

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

Part A

Answer only five questions.

01. A bank pays 15% simple annual interest for fixed deposits.

(i) How much interest do you receive for Rs.100.00 ?

(ii) If Rs.25,000 is deposited for two years, what is the total amount you will get at the end of two years ?

(iii) If a certain amount of money was deposited for three years, and Rs.18,000 was received as the interest, what was the amount deposited in the bank?

(iv) How long will it take to get Rs.9,000 as the interest for Rs.30,000 ?

(v) If Rs. P is deposited for a period of 't' year, then show that $P\left(1+\frac{3t}{20}\right)$ is the total amount which will be received at the end of the time period 't'.

02. The motion of a stone thrown from a lighthouse to the sea is given by $h = 2(9 + 5t - t^2)$. h is the height from sea level to the rock and t is the time of motion of the stone.
Given below is a table with h values relevant to t values to draw the graph of the function of h.

t	0	1	2	2.5	3	4	5	6	7
h	18	26	30	30.5	P	26	18	6	-10

(i) Find the value of P. (ii) Find the height of the lighthouse.

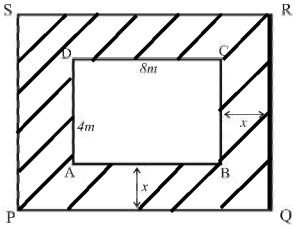
(iii) Calibrate the axes so that 10 small squares represent one unit on the x axis and 10 small squares represent five units on the y axis and draw the graph of the function h.

(iv) Calculate the maximum height that can be reached by the stone using the graph.

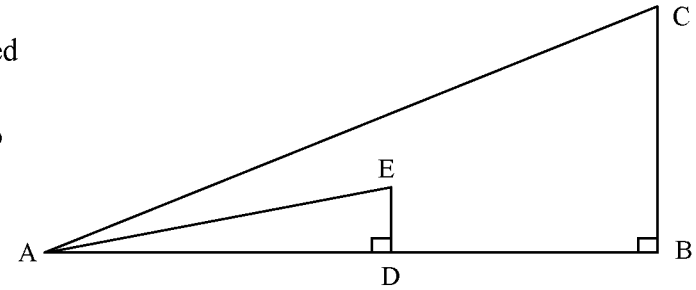
(v) Find the time the stone moved at a height of 25 m above the ground.

03. (a) Solve $\frac{x^2}{x+2} + \frac{4}{x+2} = 2$.

(b) A flower bed ABCD 8 m long and 4 m wide is given in the diagram. The road around it is shown by the shaded portion. Area of the road is 24 m^2. Using the information given in the diagram ,derive a quadratic equation and show that when it is solved, the value of x is $\left(\sqrt{15}-3\right)$ m .



04. A man on a flat land at point A, sees the top C of a tower BC located at a point B on the same ground at an angle of elevation of 65^0. He also sees the top of another tower 5 m high erected at a point D in between A and B at an angle of elevation of 30^0. The horizontal distance between D and B is 25 m. Calculate the height of the tower BC using trigonometric ratios assuming that the man and the two towers are on the same plane.



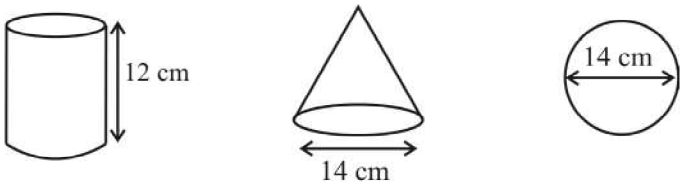
05. a) The price of five oranges and seven apples is Rs. 335. Five apples can be bought for the amount spent for six oranges.

(i) Develop a pair of simultaneous equations based on the above information considering that the price of an orange is Rs. x and the price of an apple is Rs. y.

(ii) By solving those two simultaneous equations, find the price of an orange and the price of an apple separately.

b) Find the factors of $8a^3 - 50\,ab^2$.

06.



The diagram shows a cylinder with a 14 cm base diameter and 12 cm height, a right circular cone, with half the height of the cylinder and with 14 cm base diameter and a sphere with 14 cm diameter.

(i) What is the radius of the base of the cylinder?

(ii) Show that the ratio between the volume of the cylinder and the volume of the sphere is 9:7.

(iii) Show that the slant height of the cone is $\sqrt{85}$ cm.

(iv) Find the surface area of the curved surface of the cone using the logarithms tables. (Take $\pi = 3.14$)

Part - B

Answer only five questions.

07. (a) The n^{th} term of an arithmetic progression is $5n-3$.

(i) Write the first three terms of the progression.

(ii) Find the 10th term of the progression.

(iii) Which term of the progression assumes the value 57 ?

(iv) Find the sum of the first 10 terms of the progression.

(b) If the first term of a geometric progression is 3 and the common ratio is (-2), find the 7^{th} term.

08. Do the following constructions using the ruler and the compass only. Show the construction lines clearly.

In a quadrilateral ABCD, AB = 4 cm, $B\hat{A}D = 120^0$ and AD = 5 cm. Point C is equidistant from points B and D and 4 cm from E, the mid point of BD. C is located on the side opposite to that of A with respect to BD.

(i) Construct the quadrilateral ABCD satisfying the above requirements.

(ii) Construct the circle which passes through points B,C and D.

(iii) Measure and write the radius of the circle.

(iv) Draw a tangent to the circle through B.

09. The table given below shows the scores of Pubudu who participated in a few cricket matches within the first nine months of the year.

Score (Class interval)	No. of matches (Frequaency f)
00 - 20	1
20 - 40	3
40 - 60	5
60 - 80	11
80 - 100	5
100 - 120	4
120 - 140	1

(i) What is the class interval which includes the median ?

(ii) Considering the mid value of the class interval having the median as the assumed mean, calculate the mean score of Pubudu.

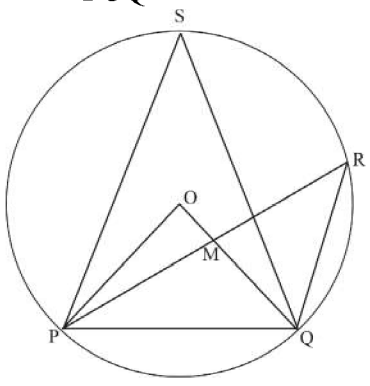
(iii) If Pubudu were toparticipate in 40 matches, what would be his expected total runs scored from all 40 matches?

10. Given below is the information collected in a survey conducted about the language ability of workers serving in an office.
    - Of them, 39 can work in Sinhala, 35 in Tamil and 25 in English.
    - The number able to work in English and Tamil only is 6.
    - The number who can work in Tamil and Sinhala is twice the number who can work in Tamil and English.
    - 11 are able to work in Sinhala and English.
    - Five can work only in Tamil.
    - All workers can work in at least one language of these three languages.

    (i) Include the above information in a Venn diagram.
    (ii) Show that the probability of a randomly selected worker being able to work in at least two languages is greater than 60%.

11. In the isosceles triangle ABC, AB = AC. Line PS drawn parallel to BC intersects AB and AC at Q and R respectively. $P\hat{B}Q = S\hat{C}R$.
    (i) Draw a diagram including the above information.
    (ii) Show that the triangles PBQ and RCS are congruent.

12. The points P, Q, R and S are on the circle of which the centre is O. $P\hat{O}Q = 60^0$.

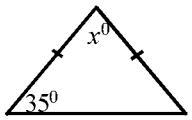


    (i) Find $P\hat{S}Q$.
    (ii) Write the theorem used to get the above answer.
    (iii) What is the relationship between the angles $P\hat{S}Q$ and $P\hat{R}Q$? Give reasons for your answer.
    (iv) Shows that $P\hat{R}Q = M\hat{Q}R - O\hat{P}M$.

Mathematics I - Part A **Time 2 hours.**

Answer all the questions on this paper itself.

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

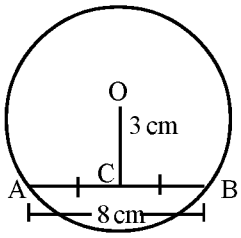


2. It is given that the probability of a seed in a sample of bean seeds germinating is 80%. What is the expected number of germinating seeds are in 200 seeds of that variety of seeds?

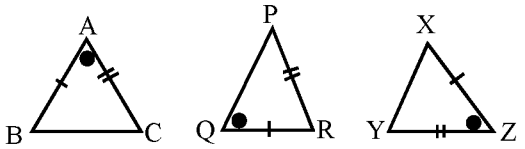
3. A and B are two disjoint sets. Shade $A \cup B$ in a Venn diagram.

4. A train running with uniform speed takes 1/2 an hour to run 60 km. How long will it take to run 80 km?

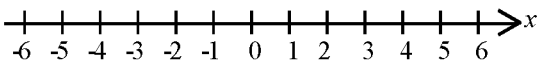
5. AB is a chord in the circle of centre O. Find the radius of the circle as per the information given.



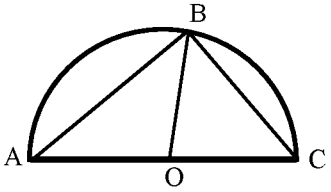
6. Of the triangles given, name the two triangles that are congruent and write the criteria for congruence. (Similar aspects are marked by identical symbols.)



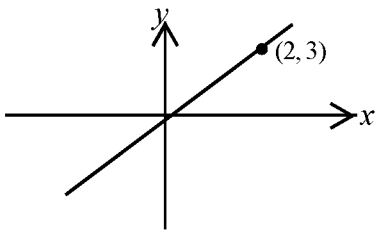
7. Solve the inequality $x + 2 \geq 5$ and indicate the solution on the number line.



8. If $A\hat{B}O = 42^0$ in the semi circle of centre O, find the value of $B\hat{C}O$.

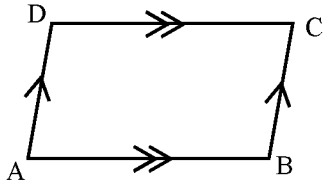


9. The diagram gives the graph of the function $y = mx$.
Find the value of m using the graph.

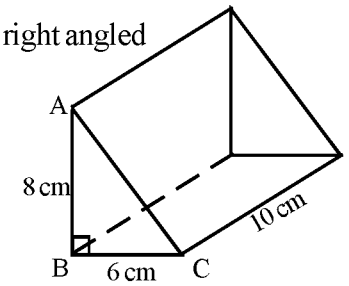


10. Factorise $2x^2 - 9x - 5$.

11. In the parallelogram ABCD, $B\hat{A}D + B\hat{C}D = 104^0$.
Find the value of $B\hat{A}D$.



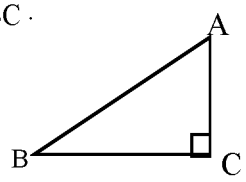
12. The length of the right prism in the figure, whose cross section is a right angled triangle is 10 cm. AB = 8 cm and BC = 6 cm. Find the volume of the prism.



13. Amal takes a loan of Rs. 50 000 at an annual simple interest rate of 12%. Find the total amount that Amal should pay at the end of one year to settle the loan.

14. The true mean of a distribution of numbers is 48.3. If the assumed mean is 49.5 find the mean deviation.

15. In the triangle ABC, AC = $2x$ and BC = $3x$. Find the value of tan $A\hat{B}C$.



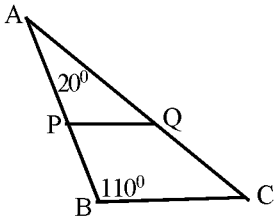
16. 12 people take 6 days to complete a task. How many days will 8 people take to complete the same task?

17. Find the perimeter of the semicircular lamina shown in the diagram.
(Take $\pi = 22/7$)

21 cm

18. Rates of Rs. 500 is paid for a quarter for a house valued Rs. 10 000 for an annum. Calculate the rates percentage charged.

19. In the triangle ABC, the mid point of the sides AB and AC are P and Q respectively. If $A\hat{B}C = 110^0$ and $B\hat{A}C = 20^0$, find the value of $A\hat{Q}P$.



20. Simplify $\frac{3}{2x} - \frac{5}{8x}$. ④⑥⑤

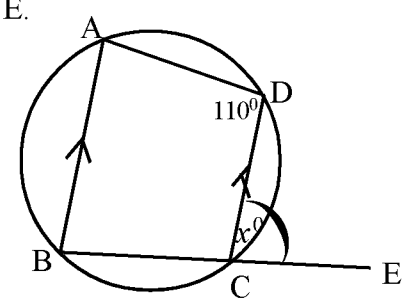
21. If $2a - 3b = 12$ and $a + 6b = -9$, find the value of $(a + b)$ without solving the equation.

22. Which term is 32 in the progression 5, 8, 11, ...

23. If $2\begin{bmatrix} 3 & -2 \\ -5 & x \end{bmatrix} = \begin{bmatrix} 6 & y \\ -10 & 4 \end{bmatrix}$, find the values of x and y.

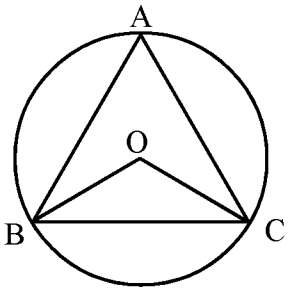
---

24. In the quadrilateral ABCD, BA//CD. Side BC is produced to E. If $A\hat{D}C = 110^0$, find the value of x.



---

25. The vertices of the equilateral triangle are located on the circle of centre O. Find $B\hat{O}C$.



Part B

1. In a certain year, a tea exporting company exports $\frac{2}{7}$ of their produce to Australia and $\frac{3}{4}$ of the balance to India.

   (i) Of the total produce, what fraction is the amount of tea exported that year?

   (ii) Of the total produce, what fraction is the amount of tea left after exporting?

   (iii) $\frac{3}{5}$ of the amount of tea left after export, was sent to the open market. Of the total produce, what fraction of tea was sent to the open market?

   (iv) The amount of tea left after sending to the open market was 25 metric tons. What is the total amount of tea produced that year in metric tons?

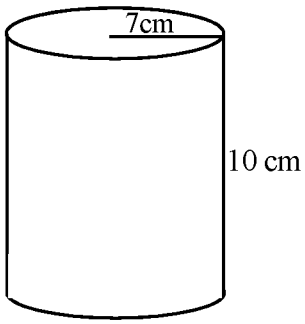
---

2. The diagram shows a cylindrical metal block of radius 7 cm and height 10 cm. (Take $\pi = {}^{22}/_{7}$)

   (i) Find the area of the curved surface of the metal block.

   (ii) Find the area of the whole surface of the metal block.

   (iii) Calculate the volume of the metal block.



   (iv) Find the radius of the cylindrical metal block of volume 6160 cm^3 whose height is equal to the height of the above metal block.

3. (a) 60% is charged as tariff in the import of a vehicle. Varuna imports a vehicle worth Rs. 1 200 000.

(i) How much is the tariff that should be paid?

(ii) What is the value of the vehicle after paying the tariff?

(b) The first Rs. 2 400 000 of the annual income of a businessman is exempted from income tax. An annual income tax of 15% is charged on the income exceeding this amount.

(i) Find the tax that should be paid by a person with an annual income of 3 000 000.

A businessman has paid Rs. 165 000 as income tax.

(ii) Find the income for which tax is paid.

(iii) Find the annual income of the businessman.

---

4. (a) The probability of a bean seed selected from a bean seed sample germinating is $\frac{7}{10}$.

(i) Draw a tree diagram to illustrate the events of germination anf non- germination of a planted seed .

The probability of a germinated plant producing beans is $\frac{7}{8}$.

(ii) Extends the tree diagram in (i) above to show the events of the production and non production of beans.

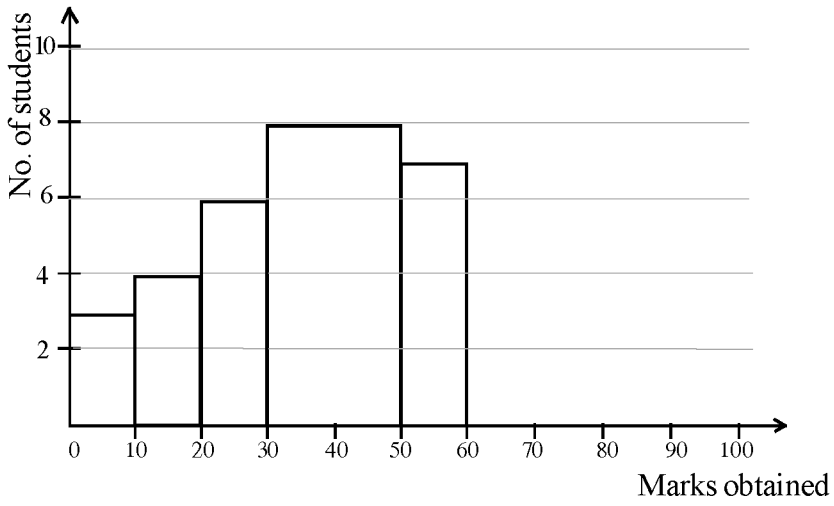
(iii) Using your tree diagram, find the probability ofthe production of beans resulting from a planted bean seed.

(b) Find the probability of getting the same number in both dice when two fair dice numbered 1, 1, 2, 2, 3, 3 are tossed at the same time.

5. An incomplete table containing marks scored by grade 11 students for a test in mathematics is given below.

Marks	Number of students
00 - 10	
10 - 20	
20 - 30	
30 - 50	
50 - 60	7
60 - 100	24

An incomplete histogram drawn to illustrate their marks is given below.



(i) Complete the table using the histogram.

(ii) Complete the histogram according to the data given in the table.

(iii) Draw the frequency polygon using the completed histogram.

(iv) Find the total number of students in the class.

(v) If the students scoring above 60 were passed, indicate the number of failures as a percentage of the total number of students.

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

OL/6/32-S-1 **Mathematics Question Paper - 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 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 $\frac{4}{3}\pi r^3$.

Part A

Answer **five** questions **only**

1. A laptop worth Rs.75 000 is bought by paying $\frac{1}{3}$ its price on the agreement that the rest will be paid in 10 monthly equal installments of Rs.5 412.50. The interest is calculated on the reducing balance .

   (i) What is the total interest payable?

   (ii) Find the annual interest rate.

2. (a) An incomplete table is given below to draw the graph of the function $y = (x+3)(1-x)$.

x	-4	-3	-2	-1	0	1	2
y	-5	0	---	4	3	0	-5

   (i) Find the value of y when $x = -2$.

   (ii) Draw the graph calibrating the axes as appropriate.

   (b) Using the graph,

   (i) write the equation of the axis of symmetry of the graph.

   (ii) find the maximum value of the function.

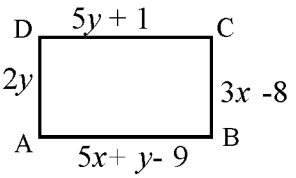
   (iii) write the coordinates of the turning point of the function.

   (c) Find the roots of the equation $y = 0$ and then write the quadratic function $y = (x-a)(x-b)$, $a, b \in \mathbb{Z}$ where y = 0 has roots 2 and -5 .

3. (a) Factorise $a^2 + 2ab + b^2 - c^2$.

   (b) If $3A + \begin{pmatrix} 4 & -1 \\ -2 & 1 \end{pmatrix} = \begin{pmatrix} -2 & 2 \\ 1 & 4 \end{pmatrix}$, find matrix A

   (c) ABCD is a rectangle. The lengths of its sides are given in terms of x and y as indicated in the figure.



   (i) Construct a pair of simultaneous equations, on the basis that the opposite sides of a rectangle are equal.

   (ii) Write the lengths of the sides AB and AD of the rectangle by solving those equations.

4. (a) A man standing on a horizontal ground 75 m away from the base of a communication tower sees its top at an angle of elevation of 30^0. Draw a scale diagram on the scale 1:1500 and find the height of the tower.

(b) A person standing on a flat ground, sees the top of a post situated 10 m away at an angle of elevation of 60^0. (The height of the person is neglected.)

(i) Sketch the above information in a diagram.
(ii) Find the height of the post.
(iii) Find the angle of elevation at which the person sees the top of the post if he walks 4 m towards the post.

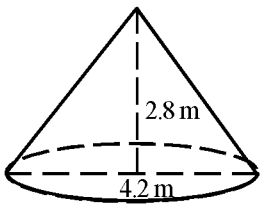
5. From a certain station, two rectilinear railway lines stretch towards the north and the west. Train A heading towards west and train B heading towards north pass the station at the same instance. The uniform speed of B is x km h^{-1} whereas the uniform speed of A is greater by 5 km h^{-1} than that of B. When these two trains had run for 2 hours, the distance between them was 50 km. Based on this information,

(i) show that x satisfies the quadratic equation $x^2 + 5x - 300 = 0$.

(ii) solve that equation and find separately the speed of A and the speed of B.

6. (a) A tent made by a group of scouts is shown in the diagram. It has the shape of a right circular cone. The diameter of the base is 4.2 m and its perpendicular height is 2.8 m.

(i) Find the radius of the base of the tent.
(ii) This tent is fully covered with canvas. Find the area of the canvas used for this in square meters.



(b) Find the value using the logarithms tables . $\dfrac{23.5 \times (0.048)^{\frac{1}{3}}}{(3.824)^2}$

Part B

Answers **five** questions **only**

7. (a) An amateur cyclist practices by cycling along a track, the distance of one round of which is 400 m. He cycles one round on the first day, two rounds on the second day etc, increasing the number of rounds rounds by one every successive day.

(i) If the total distance travelled by the cyclist during n days is S_n, show that $S_n = 200n(n + 1)$

(ii) The trainer of this contender says that he should cycle at least 84 000 m during practice before going to the competition. Find the minium number of days he should practice to meet this requirement.

8. In the following constructions, use a compass and a ruler with a mm/cm scale. Show the lines of construction clearly.

(i) Construct the triangle ABC in which AB = 5 cm, $A\hat{B}C = 90^0$, AC= 6.5 cm.

(ii) Construct the perpendicular bisector of the side BC and name the point it intersects the side AC as X .

(iii) Construct the circle passing through point B touching the side AC at C.

(iv) Measure and write the radius of the circle.

(v) Construct another tangent AE to the circle from point A. Write the theorem used here.

9. Given below is the information regarding the tourists who came to a tourist hotel in year 2013.

No. of tourists	51-60	61-70	71-80	81-90	91-100	101-110	111-120
No. of days	2	4	8	10	12	8	6

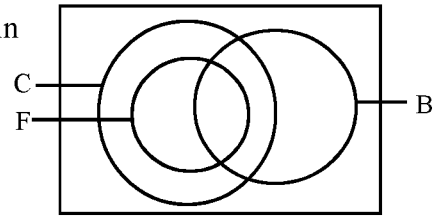
(i) What is the modal class ?

(ii) What is the class interval that includes the median?

(iii) Taking the mid value of the modal class as the assumed mean, find the mean of the number of tourists who visited the hotel in 2013.

(iv) If for 50 days in 2012, the mean of the daily arrival of tourists was 80, show that the arrival of tourists has increased in 2013 by 12.5% compared to 2012.

10. There are 65 members in a school sports club. Of them 40 are in the cricket (C) team, 12 are in the football (F) team and 20 are in the basketball (B) team. All members in the football team belong to the cricket team also. The number of members playing cricket and basketball but not football is 11. The number of members belonging to all the three teams is 4.

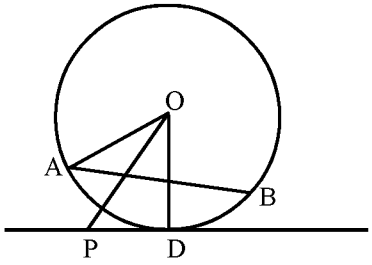


(i) Indicate the above information in a Venn diagram and complete it.
(ii) Write in set notation, the relationship between the sets C and F.
(iii) How many members are playing only basketball?
(iv) How many members do not belong to any of the above three teams?

11. (a) Write two requirements to be satisfied for a quadrilateral to be a parallelogram.

(b) Point X is located within the parallelogram ABCD. The mid point of CX is L. Line BL is produced to Y so that BL = LY. Line AY intersects DX at M. Sketch this information in a diagram and show that the mid point of DX is M.

12. AB is a chord of the circle of centre O in the figure. The tangent drawn to the point D on the circle and the bisector of the angle AOD meet at point P.



(i) Show that $\triangle$ PAO and $\triangle$ PDO are congruent.
(ii) Show that line PA is a tangent to the circle.
(iii) Show that PAOD is a cyclic quadrilateral.
(iv) What is the location of the centre of the circumcircle of the cyclic quadrilateral PAOD ? Give reasons for your answer.

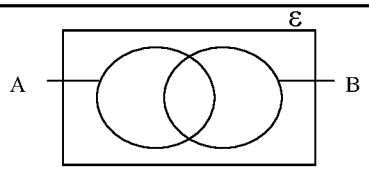
Mathematics I - Part A

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

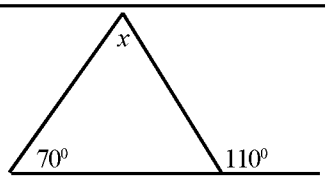
01. If the annual assessment tax rates of a house is Rs.1 600, what is the amount to be paid per quarter.

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

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



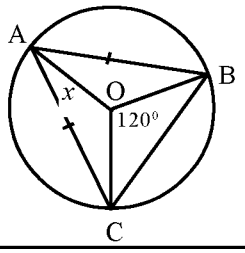
04. Find the value of x.



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

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

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

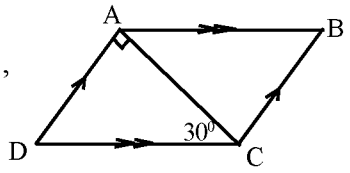


08. $2, 6, b, 54, ...$ are four consecutive terms of a geometric progression
(i) Find thecommon ratio of the progression.
(ii) Find the value of b.

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

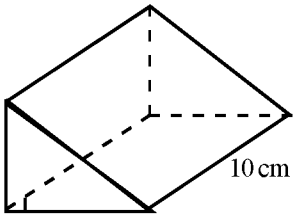
10. Mark each correct statement with '✓' and each incorrect statement with '×'.
    (i) Congruent plane figures are equal in shape and size. ☐
    (ii) All circles are congruent. ☐
    (ii) Two right angled triangles are congruent only when the hypotenuse and a side of one triangle is equal to those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

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

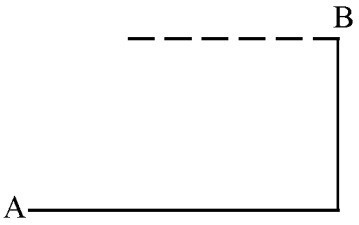


12. Solve $x(x-2) = 0$.

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



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



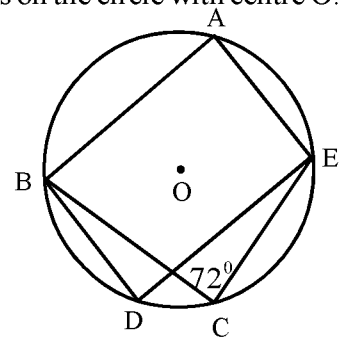
15. Draw a diagram to clarify the meaning of the statement 'the line joining the mid point of a chord of a circle and the centre is perpendicular to the chord'.

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

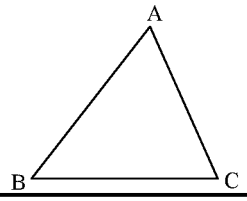
17. ABCE and ABDE are two cyclic quadrilateral with their vertices on the circle with centre O.

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

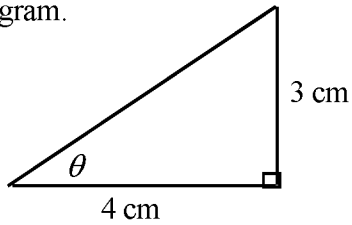
(ii) What is the value of $B\hat{A}E$?



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



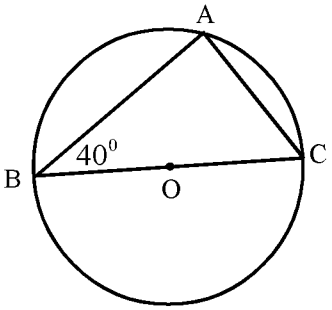
19. Find the value of sin θ according to the information given in the diagram.



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

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

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



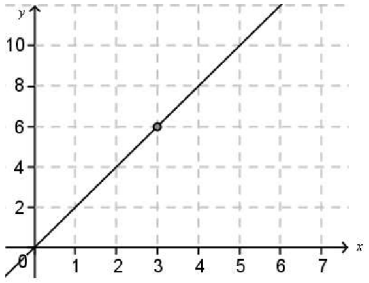
21. Three bells at a religious place ring at $2a$, $3a$ and $4a$ minute intervals. After ringing all three bells ring together, how long will it take to ring together again?

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

(i) Find the total weight of the girls.

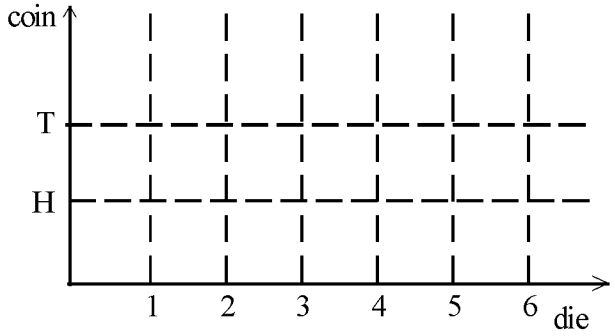
(ii) Find the mean weight of all the children.

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



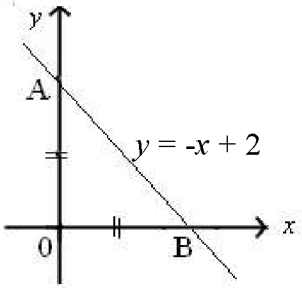
---

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



---

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



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

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

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

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

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

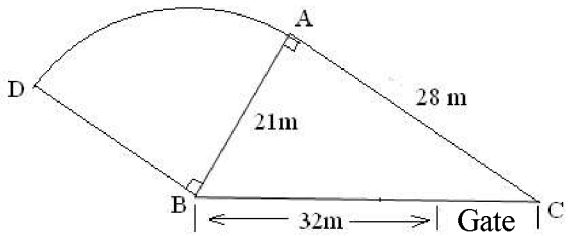
(i) What is the amount he borrowed?

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

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

---

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



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

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

(iii) Find the area of the plot ABD.

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

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

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

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

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

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

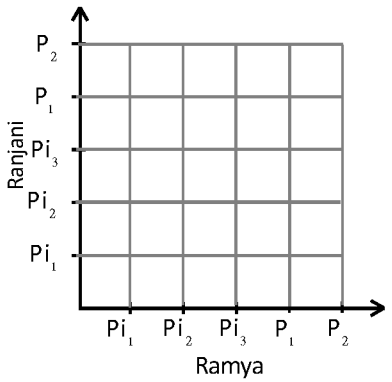
(i) How many shares did he purchase?

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

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

---

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



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

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

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

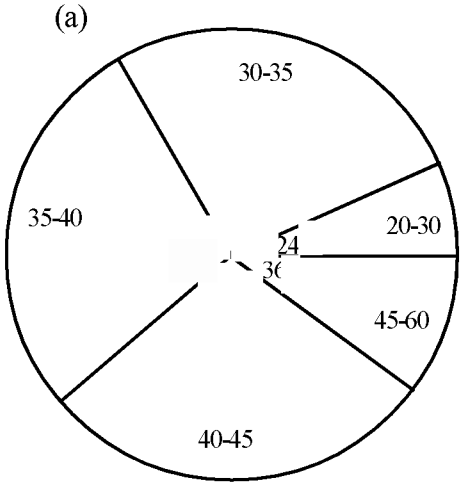
(b) ε = { non negative integers less than 10}
A = { non negative integersless than 8}
B = {multiples of 2 between 0 and 10}

Write the following sets with elements.

(i) $A \cup B$

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

5. (a)



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

(i) Find the value of x^0.

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

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

(b) Show the information in a histogram.

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

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

Mathematics II **Three hours**

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

Part A

Answer only five questions.

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

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

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

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

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

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

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

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

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

(b) From the graph

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

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

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

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

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

	Apple	Orange
Thamashi	4	3
Amaya	5	2

Fruit	Price
Apple	20
Orange	30

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

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

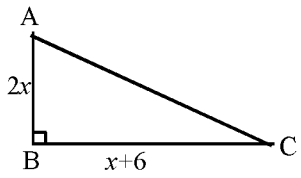
(iii) Can you find B A? Give reasons for your answer.

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

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

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

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



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

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

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

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

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

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

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

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

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

Part B

Answer only five questions.

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

(i) What is the distance travelled by the metal sphere durning the 10^{th} second?

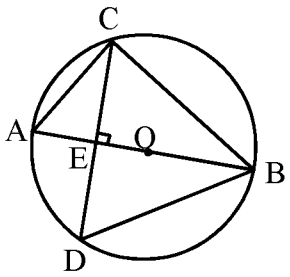
(ii) What is the total distance travelled by the metal sphere by the end of the 10^{th} second?

(iii) The initial height at which the sphere was released was 1120 m and the team of researchers expected the metal sphere to reach the ground within t seconds. If $t \geq 4\sqrt{14}$, show that their expectation is realized. (Neglect resistance of air)

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

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

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



(i) Give reasons for the equality of the lengths of theline segments CE and DE.

(ii) If $C\hat{B}A=40^0$, find the value of $B\hat{C}D$.

(iii) Show that $C\hat{B}D$ is bisected by AB.

(iv) Show that ACE and BED are equi-angular triangles.

(v) If CE = 6 cm, show that AE.BE = 36 cm^2.

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

(i) construct a triangle in which AB = BC = 6.6 cm and $A\hat{B}C=120^0$.

(ii) construct the bisector of $A\hat{B}C$ and name the point at which it intersects AC as D.

(iii) construct a line parallel to AC through B.

(iv) construct the parallelogram ADBP.

(v) show that the parallelogram you constructed is a rectangle.

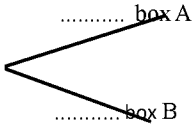
11.(a) A logo is cast by melting a solid, metal hemisphere of radius a and a cone of the same radius a and height $2a$. Assuming no metal is lost, show that the volume of the logo is equal to avolume of the sphere of radius a.

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

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

	Red	Blue
A	3	5
B	4	2

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



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

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

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

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

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

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