UT CHANDIGARH EDUCATION DEPARTMENT

CCT PRACTISE
(E-CONTENT)

CLASS - 10TH (MATHEMATICS-ENGLISH CONTENT)

COMPILED BY: ST. JOHN'S HIGH SCHOOL, CHANDIGARH

GMSSS, SECTOR-23-A, CHANDIGARH

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INDEX

Subject	Medium	Chapter No. & Name	Experiential learning	CCT Literacy Area	Learning Outcomes	Intigration of other subjects with maths
Mathematics	English	1. Real Numbers	To calculate maximum and minimum weight, quantity and time. Visit to a race course to find minimum time taken by a runner.	Quantity	The learner generalises properties of numbers and relations among them studied earlier to evolve results, such as, Euclid's division algorithm, Fundamental Theorem of Arithmetic, and applies them to solve problems related to real life contexts.	English – Letter writing to a friend describing your visit to a race course and how you rightly predicted the probability of winning of the weakest horse.
Mathematics	English	2. Polynomials	Speedometer, odometer, curves of rollercoaster rides. Visit to an amusement park	Change & Relationship	The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.	Science-To study speed, distance and time of moving vehicles.
Mathematics	English	3. Pair of Linear Equations in Two Variables	Cost of articles, banking, shopping, budgeting etc. Visit to a market/shopping mall	Change & Relationship	The learner finds solutions of pairs of linear equations in two variables using graphical and different algebraic methods.	English-To express a situation and change it in the mathematical form.
Mathematics	English	4. Quadratic Equations	Profit and loss Speed and distance Ride in a car/bus to study speed time and distance	Change & Relationship	The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.	Social studies-To study market rise and relating it with economics.

Mathematics	English	5. Arithmetic Progressions	Patterns and trends in daily life i.e increase in body temperature of a patient cost of construction, penalty charges. Visit to a builder for penalty charges of construction beyond completion date	Quantity	The learner develops strategies to apply the concept of A.P to daily life situations.	Science-Trends in growth of cells in biology. Social Studies-Study of population increase and factors responsible for it. Hindi/Punjabi-Designing an advertisement for sale of plots/flats by a local builder.
Mathematics	English	6. Triangles	Construction of buildings and bridges Visit to a construction site ,traffic park to study traffic signs, bridges, lakes to observe sail boats etc.	Shape & Space	The learner works out ways to differentiate between congruent and similar figures. The learner establishes properties for similarity of two triangles logically using different geometrical criteria established earlier such as Basic Proportionality Theorem etc.	Art and craft , Social studies-Design of a bridge using art and craft skills which can further be connected to social studies.

Mathematics	English	7. Coordinate Geometry	Location of points and places on world map Visit to any tourist place and studying the map of the place and coordinates of different points.	Shape & Space	The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.	Geography - Study of different points/ locations on maps.
Mathematics	English	8. Introduction to Trigonometry	Calculation of heights of buildings, space crafts, tides and light house. Visit to a lighthouse, hills, monuments, buildings etc.	Change & Relationship	The learner determines all trigonometric ratios with respect to a given acute angle (of a right triangle)	Space sciences/ Astronomy-To calculate distance of celestial objects and elevation of aircrafts. Art- Drawing a landscape with hills ,oceans, light house etc.
Mathematics	English	9. Some Applications of Trigonometry	Calculation of heights of buildings, space crafts, tides and light house. Visit to a lighthouse, hills, monuments, buildings etc.	Change & Relationship	The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.	Science-Study of space crafts, satellites, high tide/low tide etc.
Mathematics	English	10. Circles	Fields , school buildings , monuments Study of planets , moon and sun Visit to science city, sports stadium, lakes etc.	Shape & Space	The learner understands different concepts of tangents, secants and circles.	Science -Shapes of cells and atomic structures in biology and chemistry.

Mathematics	English	12. Areas Related to Circles	Bakery shop for sizes of cakes and pizza , Circumference of wheels and alloys. Visit to an auto wheel factory, Restaurants, roundabouts etc.	Shape & Space	The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.	Social studies/ Science- Study of the crop pattern, growing conditions for crops, soil quality etc. in an agricultural field and calculating area of different parts of the field.
Mathematics	English	13. Surface Areas and Volumes	Oil tankers, space objects like rocket launcher, aeroplanes, ships etc. Industrial visits to oil companies, visits to toy shops/factories etc.	Shape & Space	The learner finds surface areas and volumes of 3D objects in the surroundings by visualising them as a combination of different solids like cylinder and a cone, cylinder and a hemisphere, combination of different cubes etc.	Space sciences- Study of fuel consumption in a rocket launcher. Social studies– Study of packing and storage of goods, oil producing countries, industrial production of goods, import, export etc.
Mathematics	English	14. Statistics	Medical study ,scores of players, population study and weather pattern Visit to a hospital , cricket or football match etc.	Uncertainty & Data	The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.	Geography -To study weather forecast for an area Science-Study of different medical facilities provided in hospitals of rural and urban areas and the medical trends in terms of birth and death rate.
Mathematics	English	15. Probability	Weather forecast department to study rainfall, snowfall	Uncertainty & Data	The learner determines the probability of an event.	Geography/Science -Study of rainfall trend in an area.

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and a relation among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

1. In a survey, it was found that 9 out of every 11 households are donating some amount of their income to an orphanage or old age home or institutions for physically handicapped. What fractions of households are not donating? Write it in decimal form and find what kind of decimal expansion it has.

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

2. Teacher asked the students "can we write $0.\overline{47}$ in $\frac{p}{q}$ form as $\frac{47}{100}$? Mukta answered "No, It is $\frac{47}{99}$. Is Mukta correct? Justify her answer.

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

3. Radio Lemon is a nationwide network of private FM radio stations in India, very popular amongyoungsters. To attract more listeners, Radio Lemonalong with sponsors is organizing an event'Rocking Listeners' for two days. During this time, they will be giving a free dinner voucher to every 100th caller and a free movie ticket to every 30th caller. How many callers must get through before one of them receives both a dinner voucher and a   movie ticket.

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

4.   Every day two friends A & B enter a square field at one of its vertices, jog for a while, and leave by the same vertex. A jogs along the boundary of the field (Always in the same direction) while B jogs along the diagonal joining the entry vertex and its opposite (Changing the direction only when he/she reaches a vertex). A & B never jog the same distance. Do you agree? Justify your answer

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

5. A 15-year-old was attending a marriage ceremony and was getting bored. He sat on a chair and started to observe the arrangements around. The lightening bulbs were attracting him. 4 different colored lights were flickering. One of the lights flickers every 6 second, 2nd light flickers every 8 seconds, 3rd light flickers every 9 seconds and 4th light flickers every 10 seconds. How many seconds unit all lights will flickers at the same time again.

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

6. To perform a practical activity the teacher wanted to divide the class of 52 into four groups in a random order and instructed the students:

   Group I: If counted in fours, zero will remain.

   Group II: If counted in fours, 1 will remain.

   Group III: If counted in fours, 2 will remain.

   Group IV: If counted in fours, 3 will remain.

   a) How can you write the groups mathematically using Euclid's Division Lemma?
   b) List the entries of Group I, Group II, Group III and Group IV. What do you observe?

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

7.   During Christmas, students of a certainschool donated 240 pastries, 150 biscuit Packets and 200 chocolates to an old agehome. These were to be packed in smaller identical boxes such that all boxes have same number of each item. How many biscuit packets, chocolates and pastries are there in each box?

CLASS - 10

CHAPTER – 1 REAL NUMBERS

Learning Outcome: The learner generalizes properties of numbers and relations among them studied earlier to evolve results such as Euclid's division algorithm, Fundamental theories of arithmetic, and applies them to solve problems related to real life contexts.

8.   A house was under renovation. The owner decided to buy square shaped tiles for his bathroom. Upon asking the mason he found out the dimensions of the bathroom were 8ft × 10ft. The size of the tiles(in inches) should be such that minimum number of tiles are used. Help the owner in finding the size of each tile (in inches) and the number of tiles required.

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

ROLLER COASTER RIDE

1. Wow!all kids loves the roller coaster ride, isn't!Let's observe a section of roller coaster in the below given figure.

The Blue Streak Roller Coaster Ride at Cedar Point Amusement Park, Lake Erie Ohio
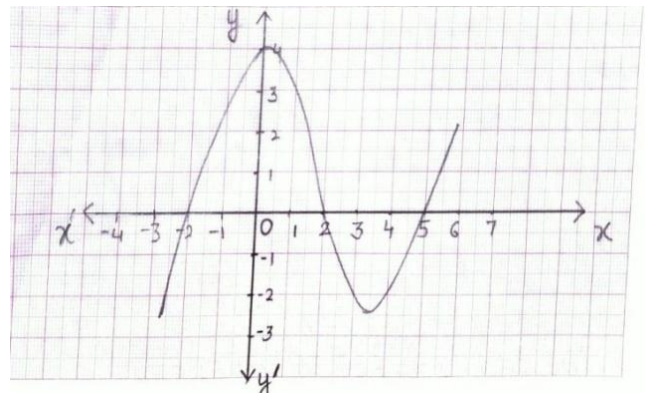
     i)

     ii) Which equation does the above section represent the following:-

         a. $Y=ax^2+bx+c$, $a \neq 0$

         b. $Y=ax^3+bx^2+cx+d$, $a \neq 0$

         c. $Y=ax+ b$, $a \neq 0$

     iii) How many zeroes does the polynomial have? (See figure)

     iv) Write the zeroes of polynomial.

     v) Form the polynomial using the zeroes obtained in part (ii).

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

2. Volume of a rectangular solid is given by $f(x) = 3x^4 - 3x^3 - 33x^2 + 54x$.
   If its length is given by $3x$ and width by $(x-2)$. Find the height of the solid.
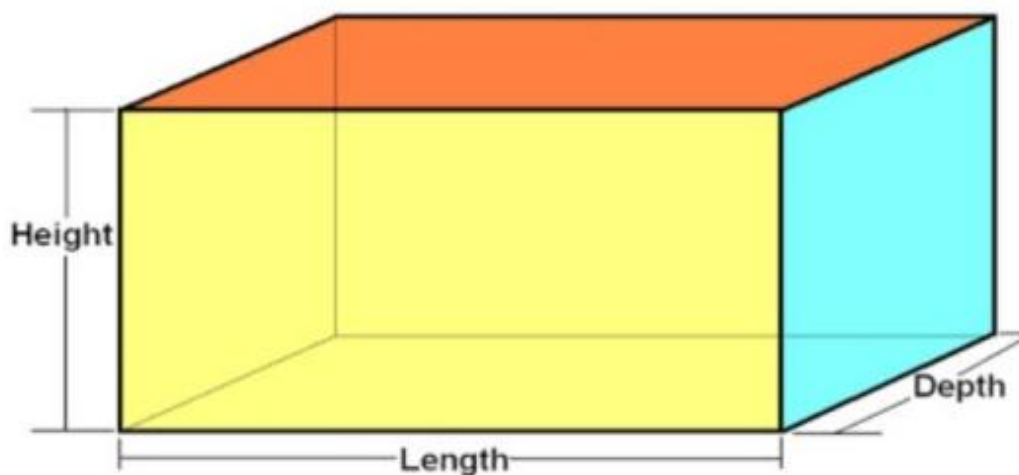
Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

3. Measurement of concentration of drug is a very important factor to know the suitability of the medicine for a patient by a doctor to see the effect of alcohol in victims' body. Let 'C' denotes the concentration of drug in blood after 't' hours given by $C=-2t^3+6t^2-8t+8$ mg/deciliter. Find out what will be concentration after 4 hours?
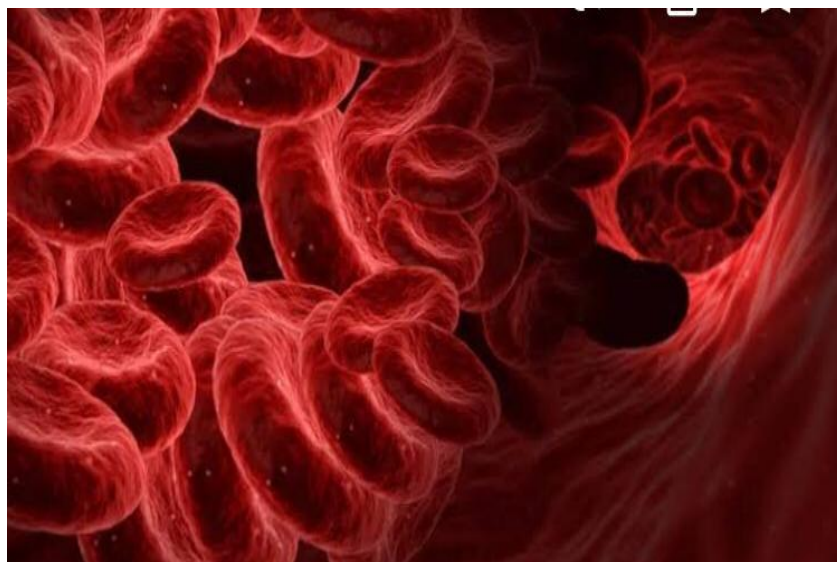
CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

4. Laira is locked in her house and the only open window is on the second floor. She made a phone call to his neighbor for the ladder. There is bush along the edge of house. If the length of the ladder is supposed to be x meter, height of window is 2 meters less than the ladder and bush is 4 meter less than the ladder.

   i) Write an expression for the same.
   ii) Find the length of the ladder.

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

5.   A rectangular swimming pool is twice as long as it is wide. A small concrete walkway surrounds the pool. The walkway is constant 2 feet wide & has an area of 196 square feet. Find the dimension of the pool.
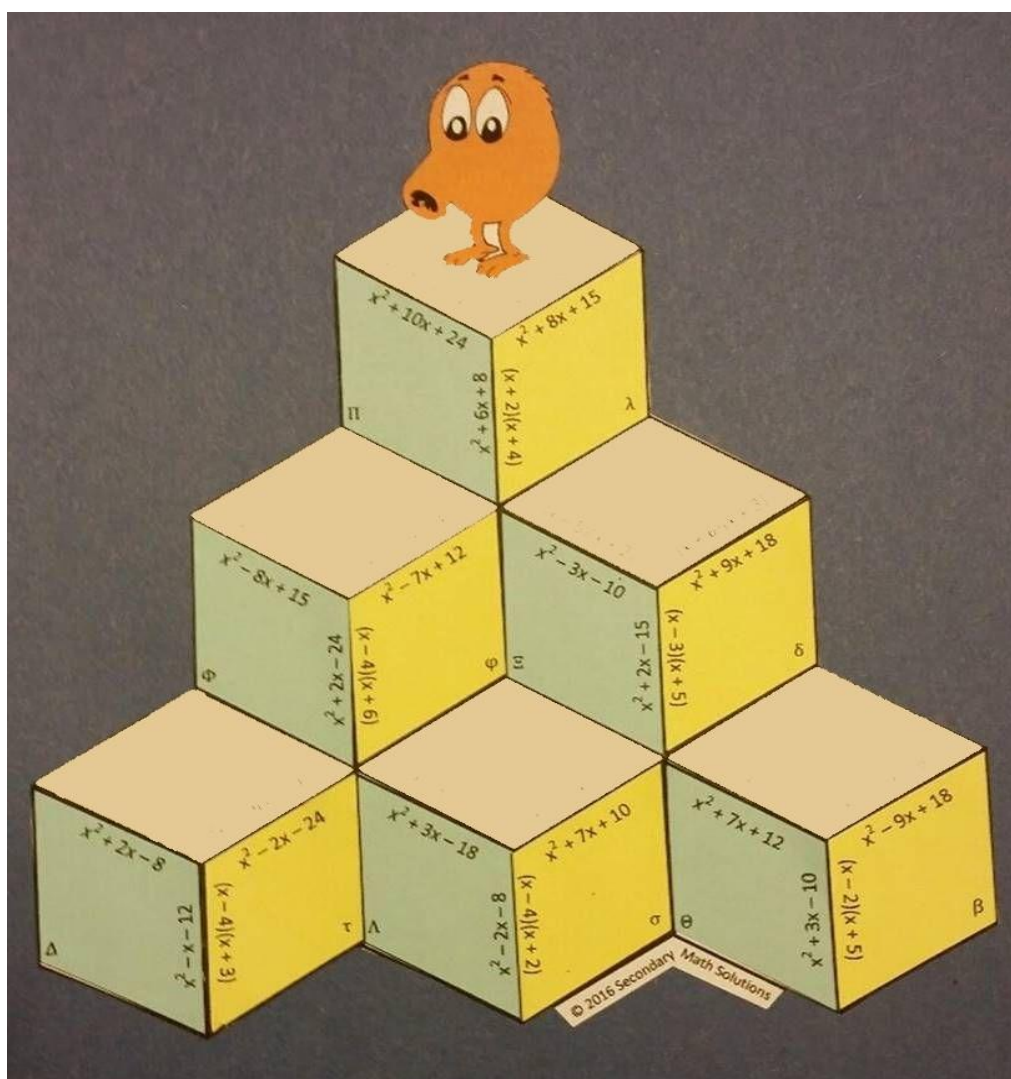
CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

BAKING IS FUN

6. Yummy Pan Cake Recipe

    Ingredients (A)Flour

    (B)Sugar

    (C)Milk

    (D)Egg

    (E)Vanilla Essence teaspoon

    To make a pan cake we need one cup of flour, one fourth cup of sugar, one third cup of milk, 2 eggs & half teaspoons of vanilla essence.

    i) Saara wants to make a pancake. Help her to make an algebraic expression for preparing 1 pan cake.
    ii) the cake was so yummy that she wants to make 5 pan cakes for her friends. Write down the algebraic expression for 5 pan cakes.

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

SANTA CLAUS ON HIS WAY!

7. Jingle bells jingle bells, jingle all the way, Santa Claus with the gifts is on his way!

Complete the entries in the Christmas tree with the following pattern, on the bottom of the row multiply the polynomials in the adjacent triangles and write the answer in the triangle directly above the two triangles.

Calculate multiplying in this way until you reach the top of the tree to win exciting gifts.

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

HELP! HELP! HELP

8. This cute little animal is stuck on the top of the box; anyone who saves this poor little creature will be awarded by the pet's owner. So, to reach the top of the box one has to do factorization, let us see who wants to achieve a reward!
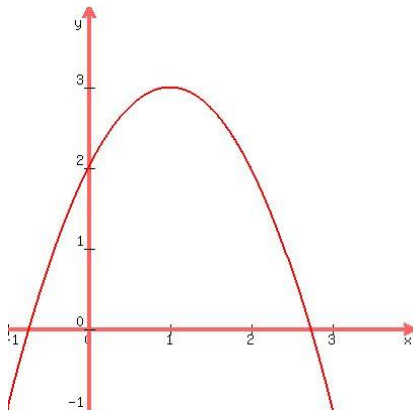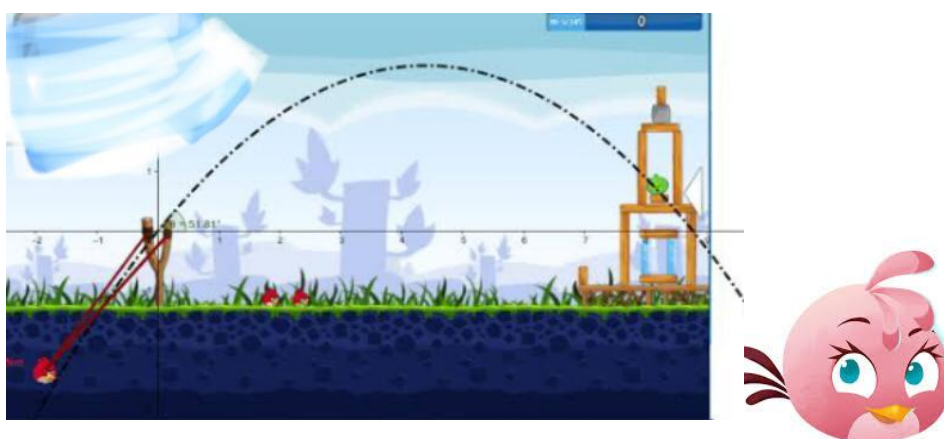
CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

ROCKET LAUNCHING

9   A young boy is launching a toy rocket from the top of an 8-storey building (80 feet high). The expression given for the maximum height that his rocket will reach is $H = -16t^2 + 64t + 80$.

What is the the maximum height that the rocket will reach and how many seconds will it take to reach that height?

CLASS - 10

CHAPTER – 2 POLYNOMIALS

Learning Outcome: The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial.

ANGRY BIRDS

10   Angry birds follow a path to hit their target and if they miss it they fall on the ground If the height of the bird from ground is given by h, where   H = $-16t^2+104t+56$, in time t (seconds)

Find the time taken by the bird to hit the ground?

CLASS - 10

CHAPTER – 3 LINEAR EQUATIONS IN TWO VARIABLES

Learning Outcome: The learner finds the solutions of pairs of linear equations in two variables using graphical and different algebraic methods

THE GUITAR CLASS

1   A music teacher runs a guitar class for 20 weeks. The class meets each week in a rented music studio. Suppose that

a)   It cost the teacher c dollars to ran the studio for 20 weeks

b)   The class contains n students.

c)   Each student pays the teacher a single fee of f dollars for the course.

d)   The teacher makes a profit of p dollars at the end of the 20 weeks.

(i)   Suppose that c is 400and f is 70, write an equation to show how the profit p, depends on n, the no. of students attending

(ii)   Is it possible that for any no. of students' music teacher works with zero profit?

(iii)   If the teacher makes a profit of 300 dollars, then how many are attending the guitar class

CLASS - 10

CHAPTER – 3 LINEAR EQUATIONS IN TWO VARIABLES

Learning Outcome: The learner finds the solutions of pairs of linear equations in two variables using graphical and different algebraic methods

2   You are filling an aquarium with water from the kitchen sink .The aquarium starts with 3 gallons of water. The sink adds water at a rate of 2.5 gallons per minute.

a)   Write a linear equation to represent how much water is in the tank after a certain amount of time.

b)   How much gallons of water is collected after 2 minutes.

c)   Capacity of aquarium is 30 gallons, but due to stones & artificial plants etc. It can contain only 28 gallons water up to the brim. How much time will it take to full the aquarium completely.

d)   Dad noticed the fish tank was dirty; he took out 5 mugs of dirty water. The capacity of 1 mug is 0.5 gallons. He added 2 mugs of clean water into the aquarium, what is the final amount of water left in the aquarium.

CLASS - 10

CHAPTER – 3 LINEAR EQUATIONS IN TWO VARIABLES

Learning Outcome: The learner finds the solutions of pairs of linear equations in two variables using graphical and different algebraic methods

3   The West Hartford Senior Centre is trying to establish a transportation system of small and large vans. It can spend $1, 00,000 for both sizes of vehicles and $500 per month for maintenance. The WHSC can purchase a small van, which carry 7 passengers, cost $10,000 and maintain it for $100 per month. The large vans, which carry 15 passengers, cost $20,000 each and can be maintained for $75 per month.

    a)   How many of each type of van should they purchase?

    b)   In this situation how many passengers can travel?

CLASS - 10

CHAPTER – 3 LINEAR EQUATIONS IN TWO VARIABLES

Learning Outcome: The learner finds the solutions of pairs of linear equations in two variables using graphical and different algebraic methods

ON YOUR OWN

4   You have been waiting for your whole life to finally be out on your own. You just rented a new apartment that you now must furnish. Fortunately many of your relatives have given you much of what you will need. Unfortunately you still don't have a TV, a fridge, a laptop and a car.

32 Inch LCD($ 540)
$300 down payment
Balance in 3 months
Interest free instalment
(a)

42 inch LCD ($950)
$50 down payment
Balance in 12 months
Interest free instalment
(b)

46 Inch LCD$(1118)
$150 down payment
Balance in 12 months
Interest free instalment
(c)

You are the type that always wants the best of everything but now that you are on your own, can you afford the best?Based on the information in the given advertisement, choose the biggest/best item that you can afford.Flat screen TV: You figured that you can afford only $75 a month payment for a TV.There are three best deals of TV displayed in the shop.

a)   GOOD NEWS!!! Your grandmother just told you that she will pay the down payment for your T.V .So which TV is the biggest one that you can afford without paying any extra money (interest)?

CLASS - 10

CHAPTER – 3 LINEAR EQUATIONS IN TWO VARIABLES

Learning Outcome: The learner finds the solutions of pairs of linear equations in two variables using graphical and different algebraic methods

BABY SITTER

5. Babysitter A charges a flat fee of $3.00 and $8.00 per hour.

    Babysitter B charges a flat fee of $5.00 and $7.00per hour.

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    You need a babysitter for 5 hours. Which one is a better deal?

CLASS - 10

CHAPTER – 4 QUADRATIC EQUATIONS

Learning Outcome: The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.

1.   Radha was very nervous when she entered her son Pranshu's school in Chandigarh today as his class test result had to be declared. Pranshu was good in studies but this month he had got sick due to which Radha was nervous whether he had performed well or not. The teacher welcomed them and gave Pranshu's result to Radha. She was relaxed to see that he had done well in the test.

   a)   The teacher told her that Pranshu got 6 marks more in Hindi than he got in Maths. The product of both marks is 112. Can you help Radha find his marks in Hindi and Maths.

   b)   When Radha entered the classroom, she observed that the length of the room is 2m more than the breadth. On the notice board in a corner it was mentioned that the area of the room is 80m^2. Can you help Radha find the length and breadth of the room.

   c)   Radha found out that the product of Pranshu's present age and that of his teacher's age is 456. His teacher is 26 years elder to him. Can you help Radha find their present ages?

CLASS - 10

CHAPTER – 4 QUADRATIC EQUATIONS

Learning Outcome: The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.

2.   Rajan thought of a two-digit number in such a way that the product of its digits is 18. If 63 is subtracted from the original number, the digits interchange their places. Can you find the original number that was thought of by Rajan?

CLASS - 10

CHAPTER – 4 QUADRATIC EQUATIONS

Learning Outcome: The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.

SWIMMING POOL

3.   The length of a rectangle is twice its breadth. The area of the rectangle is $288m^2$. Find the length and breadth of the rectangle.

CLASS - 10

CHAPTER – 4 QUADRATIC EQUATIONS

Learning Outcome: The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.

4. Rahul and Sameer both solved a quadratic equation. While solving it, Rahul made a mistake in reading the constant term and obtained the roots as 5 and -3, whereas Sameer made a mistake in the coefficient of x and obtained the roots as 1 and -3. Can you find the correct roots of the quadratic equation?

CLASS - 10

CHAPTER – 4 QUADRATIC EQUATIONS

Learning Outcome: The learner demonstrates strategies of finding roots and determining the nature of roots of a quadratic equation.

5   If the price of an article is increased by Rs 2 per dozen than the present price, the number of things available for Rs 56 is 8 less than before. Then what is the present price per dozen?

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

A NATURAL GEYSER

1   A natural geyser is a popular attraction at Yellow Stone National Park in the United States that produces long eruptions that are easily predictable and surprisingly no one controls it. The time between eruptions is based on the length of the previous eruption. If the eruption lasts 1 minute, then the next eruption will occur in 46 minutes. If the eruption lasts 2 minutes, then the next eruption will occur in 58 minutes. If the eruption lasts for 3 minutes then the next eruption will occur in 70 minutes and so on. The maximum duration of the eruption is 5 minutes.

    a)   Suppose the eruption continues further after 5 minutes and it lasts for n- minutes, then when will the next eruption occur?

    b)   What will be the duration of the eruption, if the next eruption has to occur in 214 minutes?

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

ELANTE PARKING CHARGES

2   The following table shows the parking charges of the vehicles at Elante Mall, Industrial area, Chandigarh.

a)   Write the formula to find out the parking charges if the car is parked for n hours where $0 < n \leq 10$ on weekdays.

b)   If the flat rate is abolished and the same parking charges continue for 10-24 hours as it is for 1-10 hours. What will be the charges paid if the car is parked for 21 hours on a weekend?
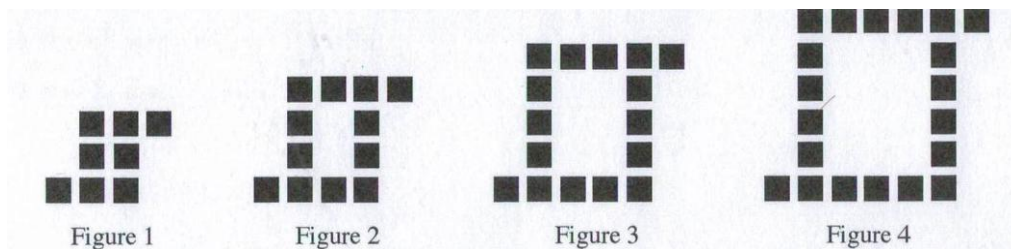
CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

TILES DESIGN

3   The first four figures of a series of designs formed by a number of square tiles are shown.

Figure 1   Figure 2   Figure 3   Figure 4

a)   Complete the table below.

Diagram	1	2	3	4	5	6	7
Number of square tiles	8						

b)   Write down an expression in term of n, for the number of square tiles in figure n.

c)   Find the number of square tiles required in figure 38.

d)   Find the value of k such that figure k has 288 square tiles.

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

ARRAY OF NUMBERS

4   The diagram below shows an array of 45 consecutive numbersA 3 x 3 square is placed in various positions to choose 9 numbers. Two such possible squares are shown.

a)   Given that the middle number of the square is 15, find the sum of the 9 numbers.

b)   Given that the number in the middle of a chosen square is x, find the sum of the 9 numbers, in terms of x)

c)   If the sum of the 9 numbers in a square is 297, find the value of the smallest number within the chosen square.
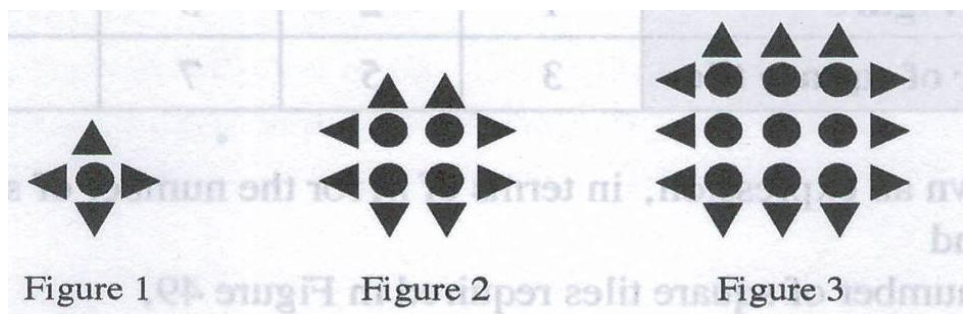
CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

FUN IN PATTERNS

5   A sequence of figures, made up of triangles and circles, is as shown.

Figure 1   Figure 2   Figure 3

a)   Complete the table below.

Figure	Number of triangles	No. of circles	Total number of triangles and circles
1	4	1	5
2	8	4	12
3	12	9	21
4			
5			

b)   Find an expression, in terms of n, for
   (i)   the number of triangles,
   (ii)   the number of circles,
   (iii)   the total number of triangles and circles.

c) Hence, find
  (i) the total number of triangles and circles required in Fig. 29,
  (ii) the number of triangles given that there are 196 circles
  (iii) the total number of triangles and circles given that there are 148 triangles.

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

PLACING THE STONES

6   Along a road lies an odd number of stones placed at intervals of 10 meters. These stone have to be assembled around the middle stone. A person can carry only one stone at a time. A man started the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 Km.Find the number of stones.

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

SELLING THE TICKETS

7   Tickets for a certain show were printed bearing numbers from 1 to 100. The odd number tickets were sold by receiving cents equal to thrice the number on the ticket, while the even number of tickets were issued by receiving cents equal to twice the number on the ticket.How much was received by the issuing agency?
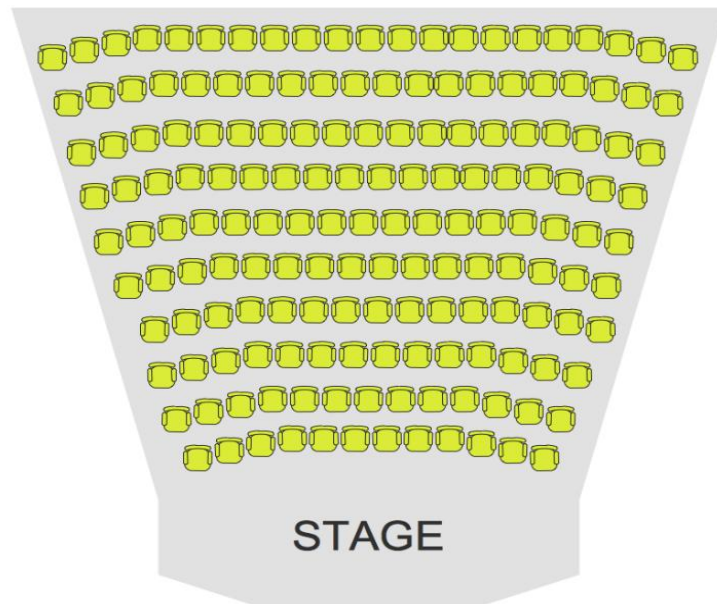
CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

TRAPEZOID

8   A gardener plans to construct a trapezoidal shaped structure in his garden. The longer side of the trapezoid needs to start with a row of 97 bricks. Each row must be decreased by 2 bricks on each end & the construction should stop at 25th row.

   a) How many bricks does he need to buy?
   b) How many bricks are there in the top row?

CLASS - 10

CHAPTER – 5 ARITHMETIC PROGRESSION

Learning Outcome: The learner develops strategies to apply the concept of A.P. to daily life situations.

AUDITORIUM SEATING PLAN

9   A contractor has constructed an auditorium. The layout is given in the figure. He has room for 5 more rows for seating. One row in the front and

STAGE

4 rows at the back following the same pattern as given in the layout.

a)   How many chairs will be there in the last row?

b)   How many people can be accommodated in the auditorium?

c)   If there are n rows, write the number of chairs in the nth row.

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

1. Peter is sewing a rectangular tablecloth for his dining room table. The table cloth measures 90 cm by 180 cm She wants to sew a piece of decorative ribbon along both diagonals of the table cloth. How much ribbon is required?
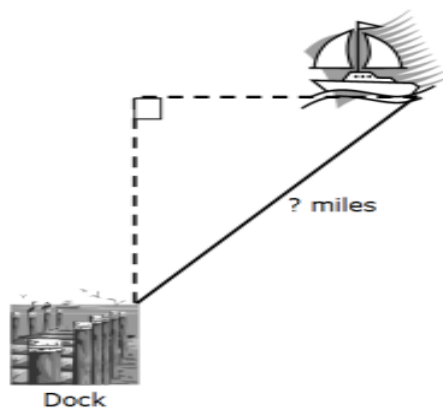
   a) about 201 cm

   b) about 402cm

   c) about 270 cm

   d) about 540cm
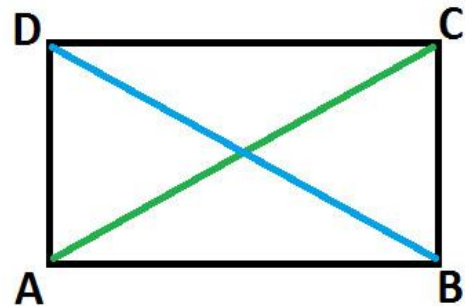
CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

2.   A boat left a dock and sailed 16 miles north and then sailed 16 miles east as shown in the figure:

? miles

Dock

Which of the following is correct:

a) Shortest distance back to the dock is 16 miles

b) Shortest distance back to the dock is between 21 and 22 miles

c) Shortest distance back to the dock is between 22 and 23 miles.

 d) Shortest distance back to the dock is approximately 32 miles.

CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

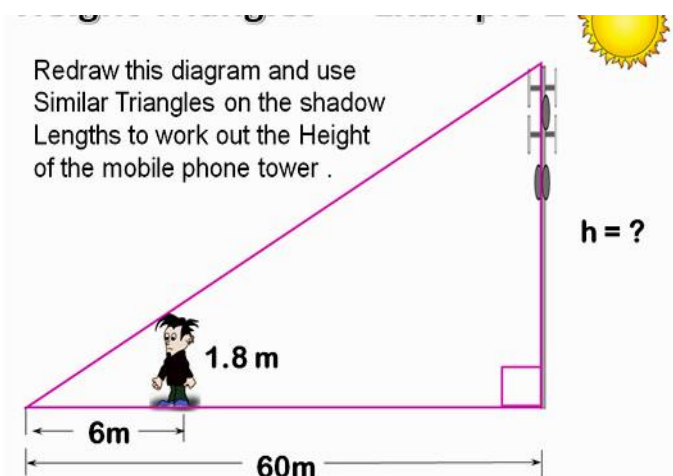3. Two ladders are leaning against a wall at the same angle as shown. Find height of smaller ladder:
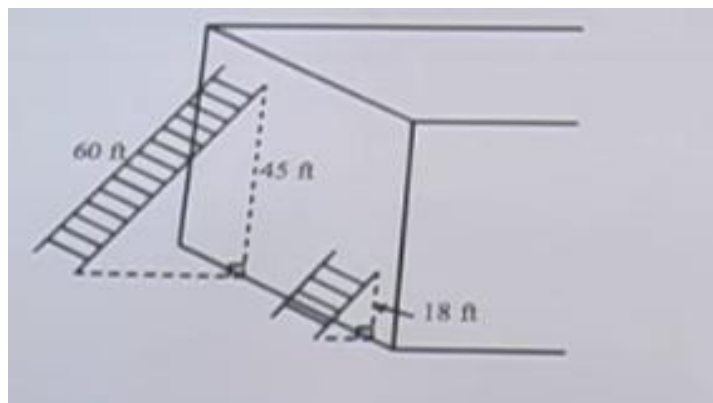
CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

SHADOWS

4. Shadow is nothing but space when the light is blocked by an opaque object. It is just that part where light does not reach. When you stand in the sun, you are able to see your shadow behind you. This is because our body is opaque and does not allow the light to pass through it. This is how the shadow is formed behind us. Shadows are formed when the sun is shining at different objects at an angle.

   By comparing the lengths of the two shadows, against the two heights, using similar triangles, we can calculate the unknown heights. In the following examples we can find height of objects by comparison of triangles.

Redraw this diagram and use Similar Triangles on the shadow Lengths to work out the Height of the mobile phone tower .

h = ?

1.8 m

6m

60m

CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

5. On a bright sunny day, a tree projects a shadow on the ground. There is a yardstick of 3 feet height which is placed parallel to the tree. At the same time the shadow of yardstick is 5 feet. If the total length of the shadow of tree is 25 feet as shown in the picture given below. Find the height of the tree.
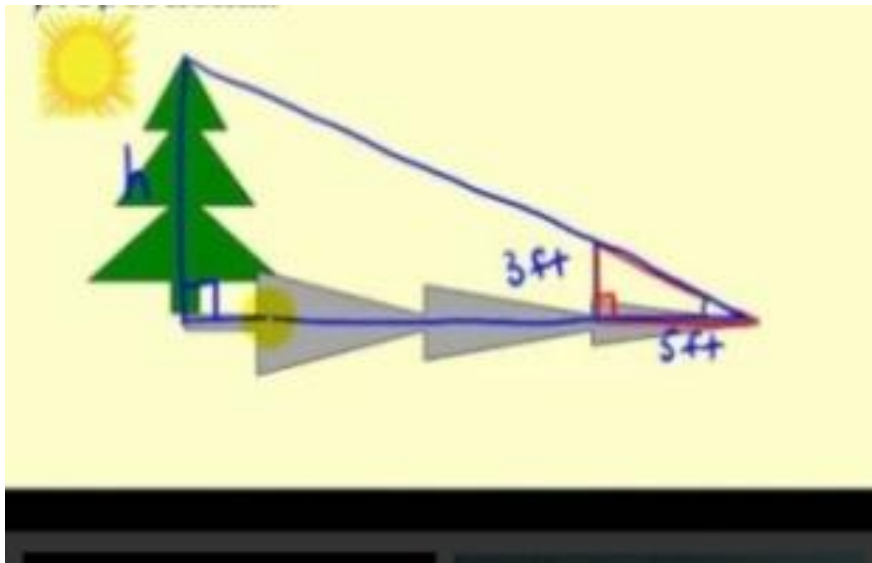
CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner works out ways to differentiate between congruent and similar files.

6.   A garden has a triangular flower bed on both its sides. And dotted line shows the walk way.Find total length of walk way.
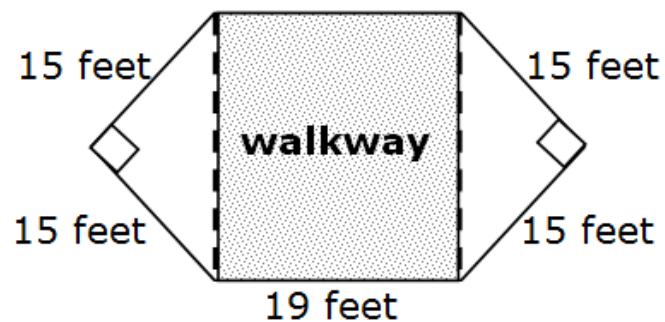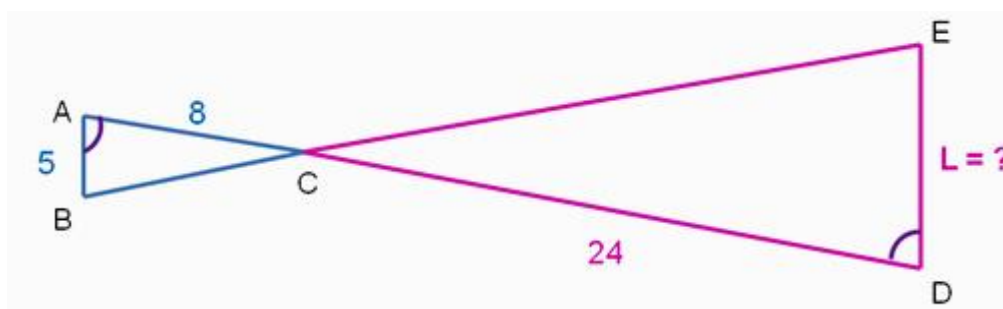

15 feet   walkway   15 feet

15 feet   15 feet

19 feet

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner establishes properties for similarity of two triangles logically using different geometrical criteria established earlier such as Basic Proportionality Theorem.

BOW TIE SHAPED TRIANGLE AND CAMERA LENSES

7. Camera lenses have a bow tie shape of pair of triangles.
    Example of bow tie shaped triangle is given below in which AB is parallel toDE and AD and BE are intersecting lines

    Given above conditions find value of L. and explain which concept of triangles is applicable in the given situation

When light passes through camera lens, the original image ends up upside down or inverted This is why cameras have a mirror inside them. To put the image right way up we can view it while taking photographs
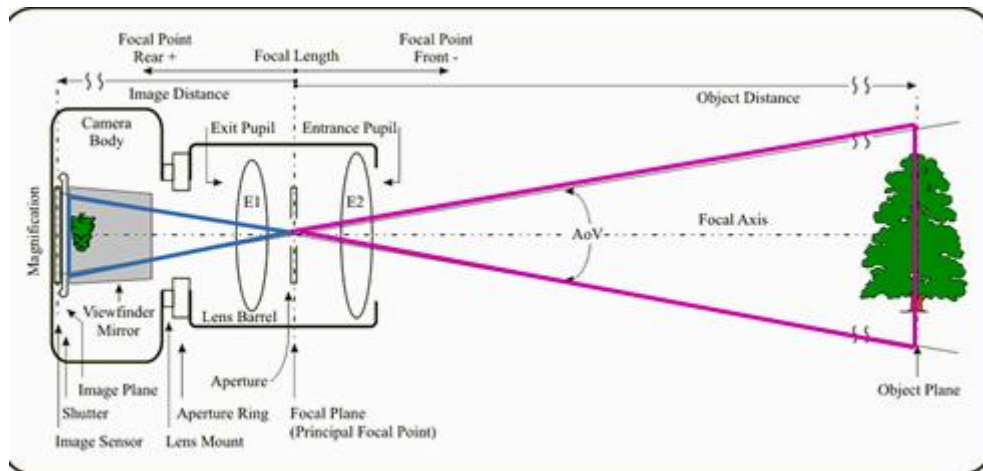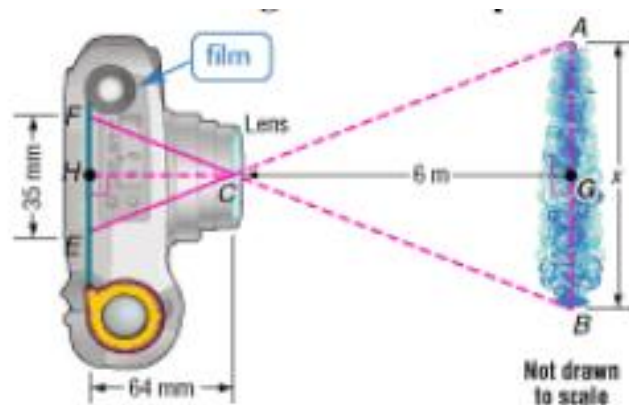
CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner establishes properties for similarity of two triangles logically using different geometrical criteria established earlier such as Basic Proportionality Theorem.

8. Hridyaa clicked a photograph of a tree with her camera. Figure shows the distance of the tree from the lens of the camera is 6 m. Height of camera is 35 mm. Total length of camera along with the lens is 64mm.

   a) Help her find the height of the tree. Explain

   b) Find relation between triangle EFC and triangle ABC (MXC6L07)

CLASS - 10

CHAPTER – 6 TRIANGLES

Learning Outcome: The learner establishes properties for similarity of two triangles logically using different geometrical criteria established earlier such as Basic Proportionality Theorem.

ADVENTURES OF FLY FISHING

9. The activity of trying to catch fish using a hook made to look like a fly or other insect in order to attract the fish is an adventure sport called fly fishing.

    Nazima is fly fishing in a stream. The tip of her fishing rod is 1.8 m above the surface of the water and the fly at the end of the string rests on the water 3.6m away and 2.4 m from a point directly under the tip of the rod.
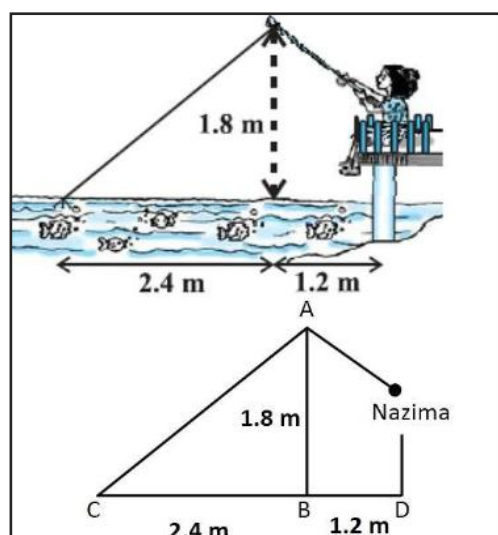
    a) Assuming that her string (from the tip of her rod to the fly) is taut, how much string does she have out?

    b) If she pulls in the string at the rate of 5cm per second, what will be the horizontal distance of the fly from her after 12 seconds?

CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

WHEAT FIELD

1   From the corner of the wheat field O taking as origin seema moves 6 units towards north and then eight units towards east and reaches at point B what are the coordinates of point B

If she decides to come back to the point O diagonally then find the distance travelled by her.

CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

CAMPAINGNING

2. Students of class 9th started a campaign to raise a social awareness about the hazards of deforestation. They decided to make a banner with a slogan "GO GREEN, BREATH CLEAN" in the shape of the square A B C D whose vertices are A(1,3) B(1,-1) and C (5,-1) . Find the fourth vertex D also find the area of the cloth used to make the banner.
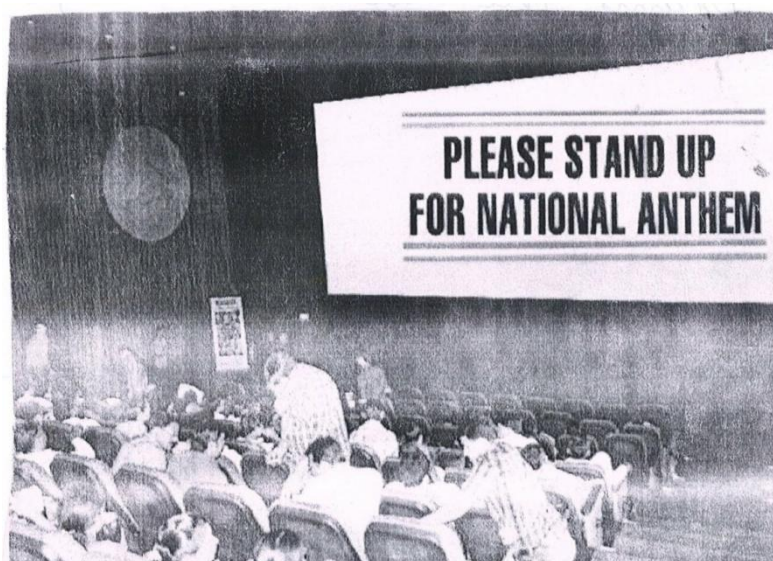
CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

WATCHING MOVIE

3.   After the completion of Board Exams the three students of Class X decided to watch a movie at Elante Mall. But they did not book the tickets in advance. They bought it on the time and could not get the seats together.

In Cinema hall they were seated at A $(1, -1)$, B $(5, 2)$, C $(x, 5)$. In the interval they found that they are setting in straight line. What are possible co-ordinates of C?

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

ESTIMATING AREAS

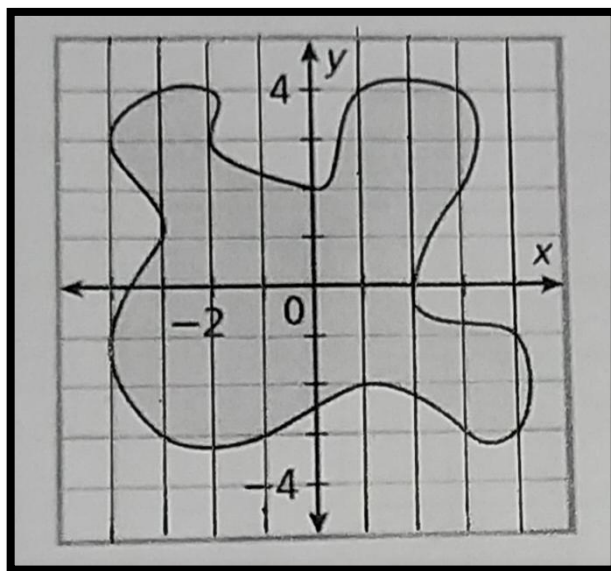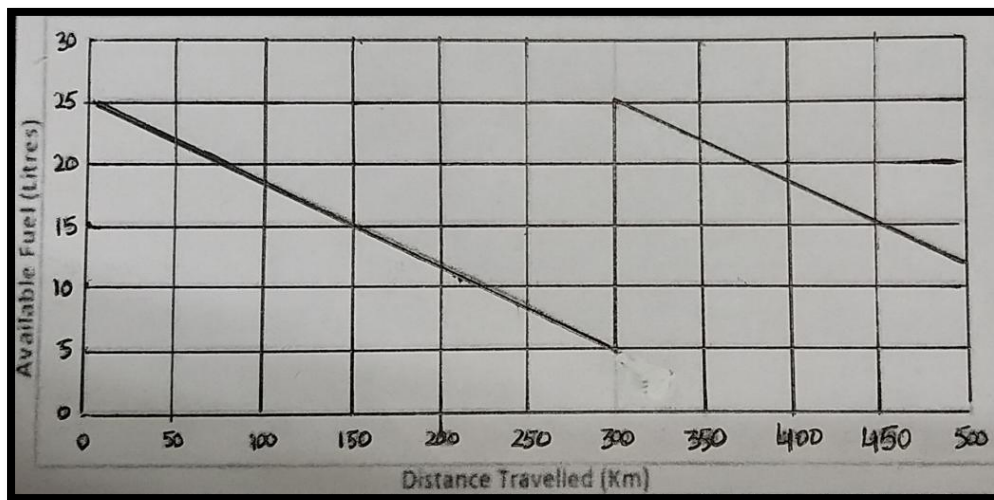4. Estimate the area of irregular shape.

CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

5.   The graph below shows the distance Rohan travelled using his vehicle against the fuel left in the tank.

   a)   What is amount of fuel remains in the vehicle when he travelled by 450 km?
   b)   Did Rohan refill fuel on the way? If yes, how much fuel did he refill.
   c)   What is the mileage of the vehicle?

CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

JOURNEY

6.   A family living at Chandigarh have to attend family function at New Delhi. But they were not able to get railway tickets. So they decided to go by hiring taxi at the rate of Rs. 12 per kilometer calculate the money paid to driver by measuring distance from map.
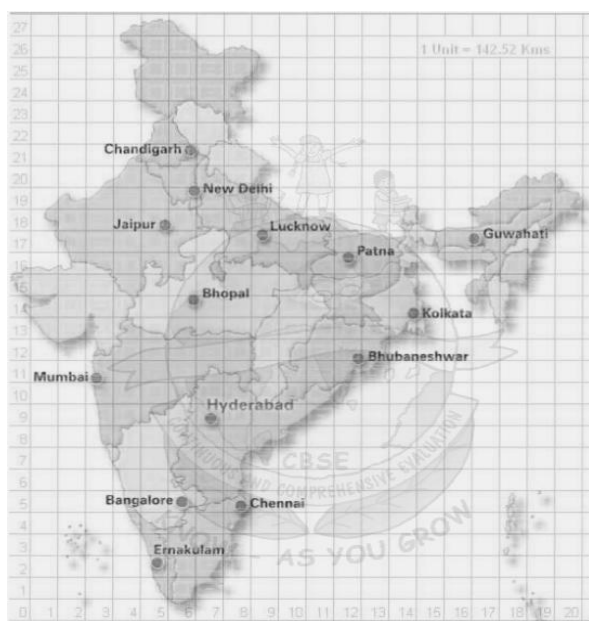
(KC7L08)

1 unit= 28 Km

CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

MEASURING DISTANCE

7. Sabir starts walking from his house to office. Instead of going to office directly he goes to grocery shop, from there to his son's school to attend PTM and then reaches office. What is extra distance travelled by Sabir in reaching his office.
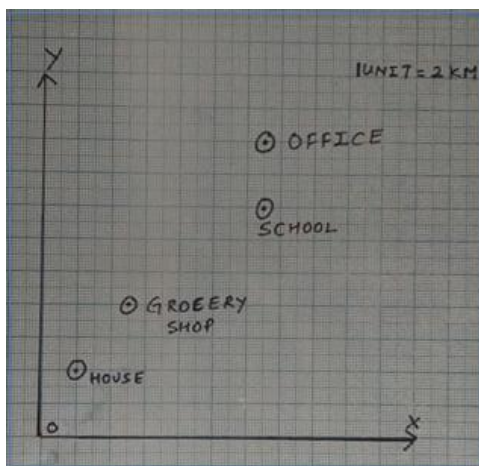
CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

FARMING

8.   A farmer had rectangular plot of dimensions 10m x 9m. He wanted to grow fruits and vegetables in same plot. He made three sections for separate cultivation of fruits and vegetables but he wanted to grow vegetables in larger area. According to you, which region of plot he should choose to grow vegetables. Three sections or left out area. Justify answer by   showing   your work.
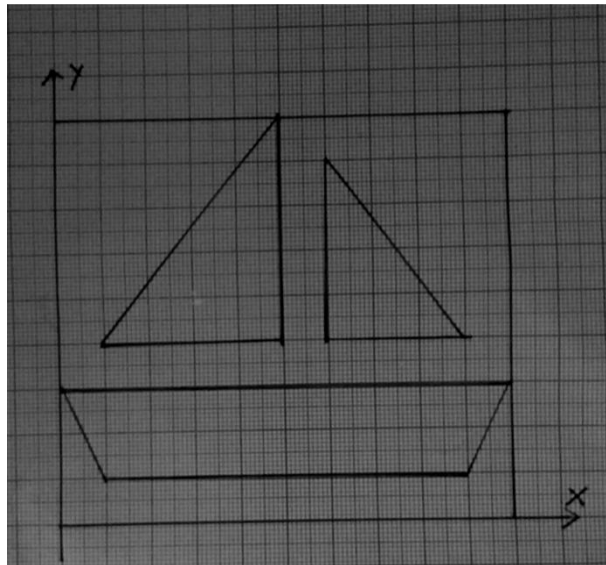
CLASS - 10

CHAPTER – 7 COORDINATE GEOMETRY

Learning Outcome: The learner derives formulae to establish relations for geometrical shapes in the context of a coordinate plane, such as finding the distance between two given points, to determine coordinates of a point between any two given points, to find area of a triangle etc.

ENVIRONMENT ACTIVITY

9   Students of Eco-club were given an activity to plant sampling of roses. They were told to plant sampling of roses in triangular and flower bed area of rectangular garden as shown in figure. Calculate the area in which sampling of roses were planted?
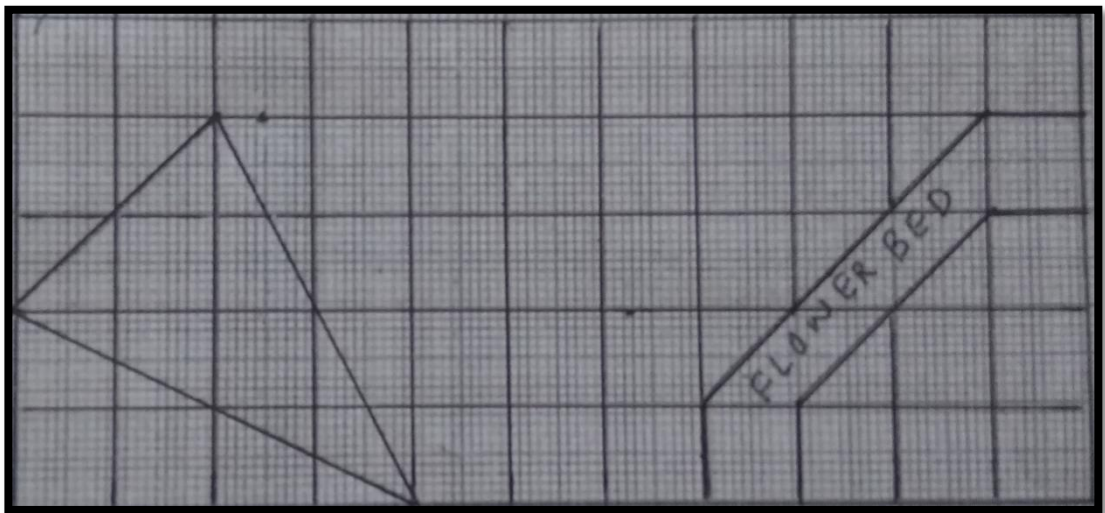
CLASS - 10

CHAPTER – 8 TRIGONOMETRY

Learning Outcome: The learner determines all trigonometric ratios with respect to a given acute angle (of a right triangle)

TEMPLE GATE

1. The following picture is a drawing of the top of a temple gate in which three triangles are inscribed on each other. The top of gate is made t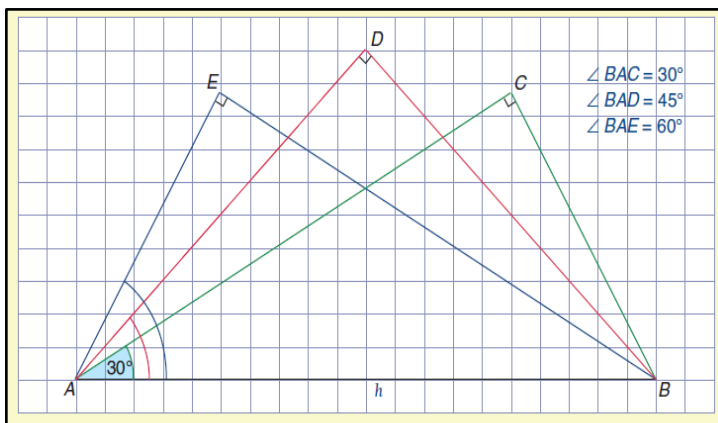o be of steel bars. Here architecture forgets to put the exact measurement of different sides of triangles but he shows that $\angle$ BAC = 30^0, $\angle$ BAD = 45^0 and $\angle$ BAE=60^0 and AB = h. Now the welder wants to make the top of the temple gate using the given information by architecture.

He goes to the temple site and measure the width of the gate and taken h= 12 units.

Now help him in solving the given problems
a) Using trigonometric ratios find the sides CA and BC .
b) Using trigonometric ratios find the sides DA and DB.
c) Using trigonometric ratios find the sides EA and EB.
d) In the triangles given in design he wants to fit fiber sheet of different colours. He want to use red colour fiber sheet in Δ ABC, yellow in ΔADB and green in Δ AEB. The fiber sheets are available per square units in the shop. So he have to calculate the area of the three triangles.
So,
area of Δ ABC= ....square units
area of Δ ADB=........................square units
area of Δ AEB=........................square units

CLASS - 10

CHAPTER – 8 TRIGONOMETRY

Learning Outcome: The learner determines all trigonometric ratios with respect to a given acute angle (of a right triangle)

TRIANGULAR FIELD

2   ABC is a triangular field in which C is a right angle. Two friends are standing on the position A and B and are discussing about the different trigonometric ratios of acute angles falling under them.

Considering angle A as **θ** and angle B as 90 -**θ** fill the table below

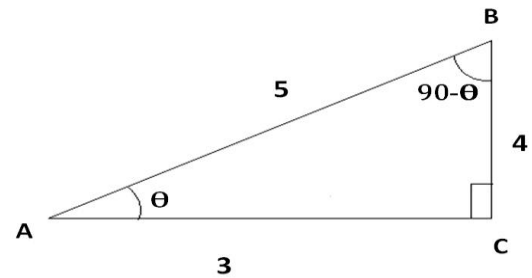| Sr	1	2	3	4	5	6	7	8	Is column 4 = column 8? YES/NO
1	sin **θ**			0.8	Cos (90-**θ**)	$\dfrac{BC}{AB}$	$\dfrac{4}{5}$	0.8	yes
2	tan **θ**				cot (90-**θ**)				
3	sec **θ**				cosec (90-**θ**)				
4	cos **θ**				sin (90-**θ**)				
5	cot **θ**				tan (90-**θ**)				
6	cosec **θ**				sec (90-**θ**)				

CLASS - 10

CHAPTER – 8 TRIGONOMETRY

Learning Outcome: The learner determines all trigonometric ratios with respect to a given acute angle (of a right triangle)

3. From the triangle given above solve the following:

i). If $\theta = 30^0$, OE = 10 cm then find OF and EF.

ii) If AB: EF=1:3 and OA is 5 cm then find OE.

a) 10cm   b)5 cm   c)15 cm   d) 20cm

iii) If AB=OB, then Find θ.

a) 60^0 b)45^0 c)90^0 d)30^0

iv) If OB=BD=DF and $\theta = 30^0$, then find AB: CD: EF

v) If OA = 6 m, OC= 9 m, $\theta = 60^0$, then find area of trapezium ABDC.
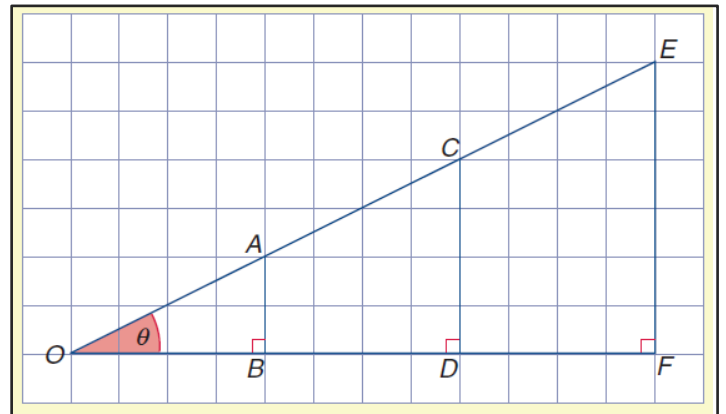
CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

1. A boy standing on a horizontal plane finds a bird flying at a distance of $100\ m$ from him at an elevation of $30°$. A girl standing on the roof of $20\ m$ high building, finds the angle of elevation of the same bird to be $45°$. Both the boy and the girl are on opposite sides of the bird. Find the distance of bird from the girl.

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

2.　A straight highway leads to the foot of a tower. A watchman standing at the top of the tower observes acar at an angle of depression of $30°$, which is approaching the foot of the tower with a uniform speed. Two minutes later the angle of depression was found to be $60°$. The watchman suspects that some terrorists are approaching the tower. It needs half a minute for the watchman to inform the security staff to be on alert.

　i) how much time the car will take to reach he foot of the tower.
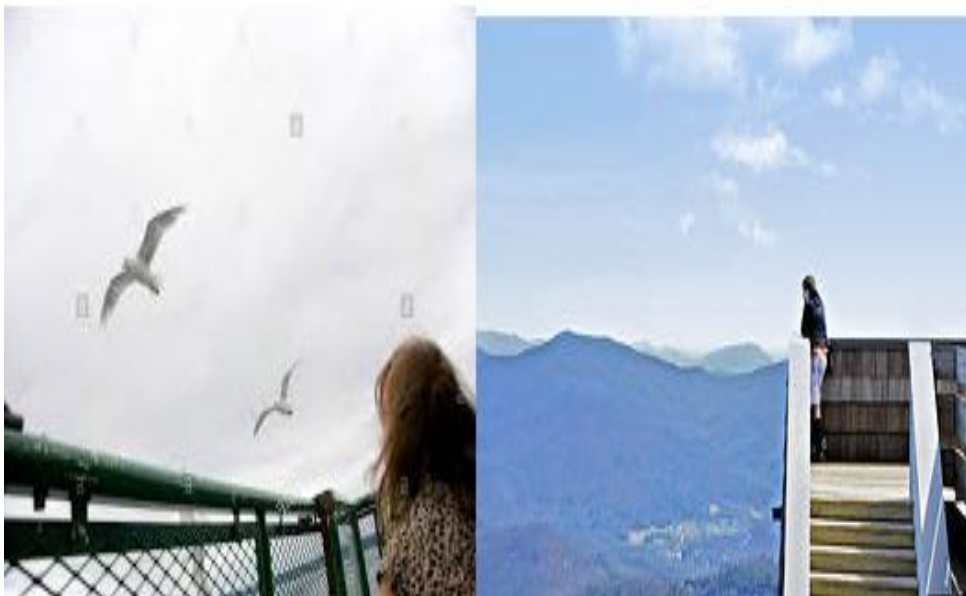　ii) will the security staff be able to safe the tower from the terrorists.

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

3. A bird is sitting on the top of a tree, which is $80m$ high. The angle of elevation of the bird, from a point on the ground is $45°$. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes $30°$. Find the speed of the flying of the bird?

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

4. At the foot of a mountain, the elevation of its summit is $45°$. After ascending $1000\ m$ towards the mountain up a slope of $30°$ inclination, the elevation is found to be $60°$. Find the height of the mountain. $\left(use\sqrt{3} = 1.732\right)$

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

5. A statue $1.46m$ tall stand on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is $60°$ and from the same point, the angle of elevation of the top of the pedestal is $45°$. Find the height of the pedestal. $(\sqrt{3} = 1.73)$

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

6. As observed from the top of a $75\ m$ high lighthouse from the sea level, the angles of depression of two ships are $30°$ and $45°.$ If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. $\left(Use\sqrt{3} = 1.732\right)$

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

7. An aeroplane, when $3,000\ m$ high, passes vertically above another aeroplane at an instant when their angles of elevation at the same observation point are $60°$ and $45°$ respectively. How many metres higher is the one than the other?
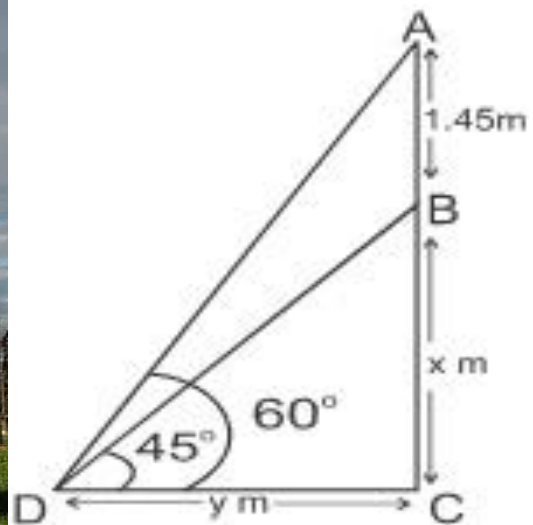
CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

8.   A bridge across a river makes an angle of $45°$ with the river bank (fig.). If the length of the bridge across the river is $150\ m$, what is the width of the river?

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

9   From the top of a building $60\ m$ high, the angles of depression of the top and bottom of a vertical lamp post are observed to be $30°$ and $60°$ respectively. Find

i) the horizontal distance between the building and the lamp post.

ii) the height of the lamp post, $\sqrt{3} = 1.732$.

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

10. A balloon leaves the earth at a point A and rises vertically at uniform speed. At the end of 2 minutes, John finds the angular elevation of the balloon as 60°. If the point at which John is standing is 150 m away from point A, what is the speed of the balloon?

    a) 63 meter/sec
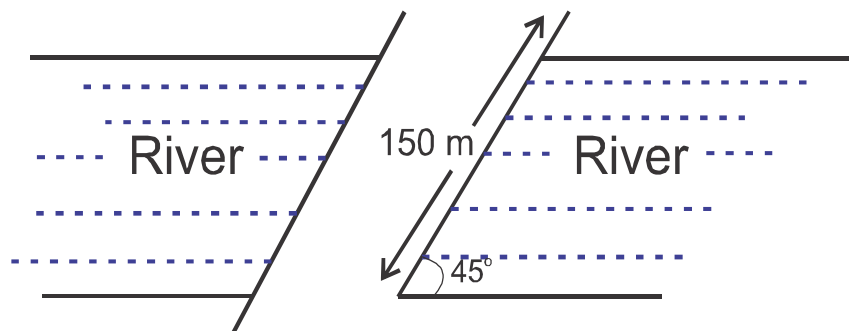   b) 16 meter/sec
    c) 87 meter/sec
    d) 72 meter/sec

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

11. The Taj Mahal was commissioned by Shah Jahan in 1631, to be built in the memory of his wife Mumtaz Mahal, who died on 17 June that year, giving birth to their 14th child, Gauhara Begum. Construction started in 1632, and the mausoleum was completed in 1643, while the surrounding buildings and garden were finished five years later. The imperial court documenting Shah Jahan's grief after the death of Mumtaz Mahal illustrates the love story held as the inspiration for the Taj Mahal.

    Find the height of the topmost part of the dome of Taj Mahal from the following figure. (Given $\tan 79.9^0 = 5.6$).

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.
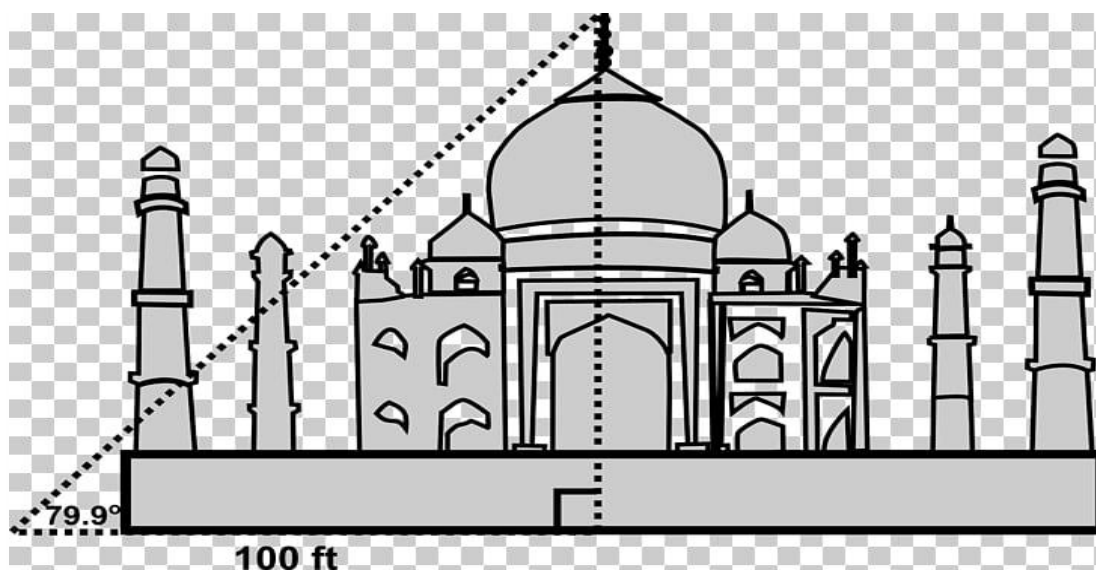
12. Match the column:

(i)When an observer sees an object situated in upward direction, the angle formed by line of sight with horizontal line	(a)Line of Sight
(ii)When an observer sees an object situated in downward direction the angle formed by line of sight with horizontal line	(b)Angle of elevation
(iii) Line segment joining the object to the eye of theobserver	(c)Angle of Depression

CLASS - 10

CHAPTER – 9 APPLICATIONS OF TRIGONOMETRY

Learning Outcome: The learner uses trigonometric ratios in solving problems in daily life contexts like finding heights of different structures or distances between them.

13. The height of a tower and the distance of the point of observation from its foot, both, are increased by 20%. The angle of elevation of its top will be

(a)   increasing
(b)   decreasing
(c)   Remains same
(d)   Can't say

CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

CIRCULAR VESSEL

1.   This is a circular vessel in Anita's home. The vessel and lid together form a sphere. The diameter of the base of the lid is 24 cm and maximum depth is 2 cm.

a) What is the radius of the vessel?

b) What will the volume of milk that can be stored in this vessel?
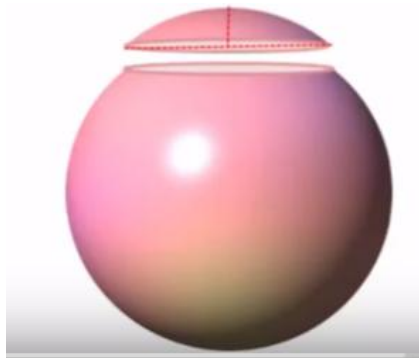
CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

BOW AND ARROW

2. Arjun purchased a bow and arrow from Dussehra Mela. The length of the arrows he purchased is 32 cm. When the bow and arrow are in their normal position, the radius of curvature of the bow is 40 cm and half the length of the arrow is within the bow. Find the minimum length of the string required to make the bow.

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

CIRCULAR TRACK

3. Seema and Rina were practicing for their athletic meet and were running on a circular track of radius 50 m. To check who runs faster among them when they were at points P and Q their coach told them to run towards the flag which is at point T.Also, the straight distance between starting positions of Seema and Rina is 80 m.
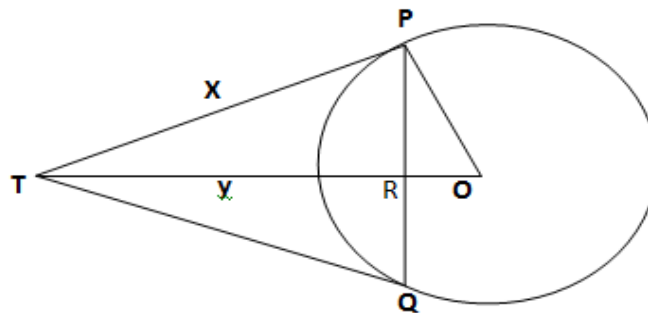
a) Calculate the distance covered by Seema and Rina to reach the flag?

b) Also calculate the distance covered by Rina to reach to the flag. Support   your answer by giving justification.

CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

FLYING AIRPLANE

4.   An airplane, A, is cruising at an altitude of 9000 m. A cross section of Earth is a circle with radius approximately 6400 km. A passenger wonders how far she is from a point Hon the horizon she sees outside the window. Calculate this distance to the nearest kilometre.
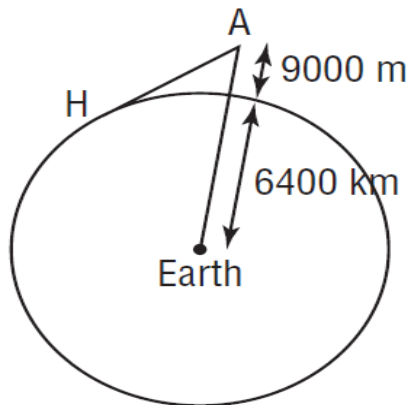
CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

CIRCULAR MIRROR

5.   A circular mirror with radius 20 cm hangs by a wire from a hook. The wire is 30 cm long and is a tangent to the mirror in two places. How far above the top of the mirror is the hook?
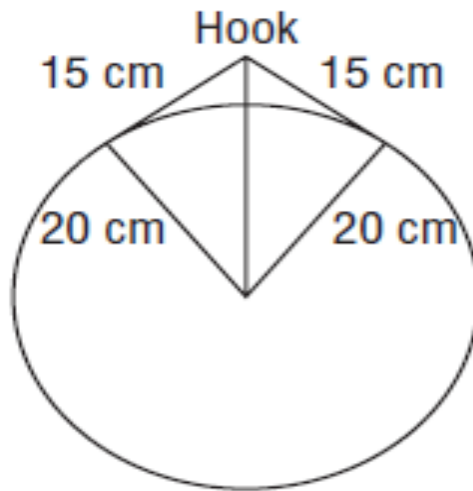
CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

WATER PIPE

6. A horizontal pipe has a circular cross section, with centre O. Its radius is 20 cm. Water fills less than one-half of the pipe. The surface of the water AB is 24 cm wide. Determine the maximum depth of the water, which is the depth CD.
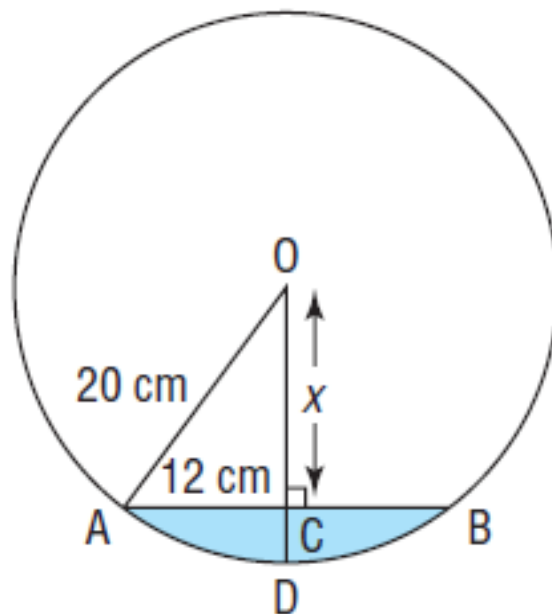
CLASS - 10

CHAPTER – 10 CIRCLES

Learning Outcome: The learner understands different concepts of tangents, secants and circles.

CIRCULAR PLATE

7. A circular plate is supported so it touches two sides of a shelf. The diameter of the plate is 20 cm. How far is the centre O of the plate from the inside corner C of the shelf?
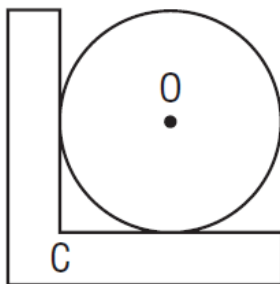
8. Which circle properties helped you find out?

CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

1. Assuming the radius of the quarter circle is r, then what is the area of the shaded region?

A. $\dfrac{r^2\,(\pi-2)}{4}$

B. $\dfrac{r^2\,(\pi-2)}{3}$

C. $\dfrac{r^2\,(\pi-1)}{6}$

D. $\dfrac{r^2\,(\pi-1)}{4}$

CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

2. The area of the largest triangle that can be inscribed in a semi-circle of radius r units is

(A) r^2 sq. units

(B) ½ r^2 sq. units

(C) 2 r^2 sq. units

(D) √2 r^2 sq. units

CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

3. Shopkeeper made square table mats with some design as shown in the figure below. Find the area of the shaded design in given figure, where ABCD is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. (Use π = 3.14).
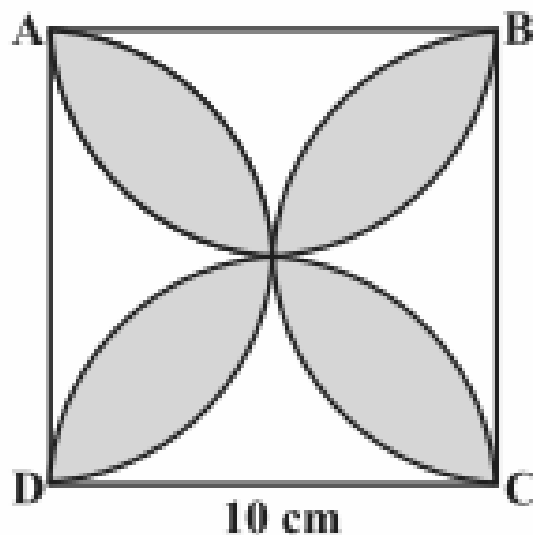
CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

4. Teacher has drawn a figure on the board as shown below. According to the information provided by her the area of sector BAC is $1\frac{1}{3}$times the area of the semicircle. What is the measure of ∠CAB?
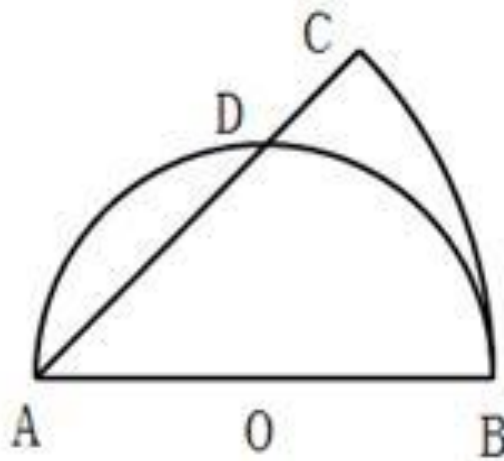
CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

5. If the area of the shaded region is $2\pi - 4$ cm² then what is the radius of the whole sector?
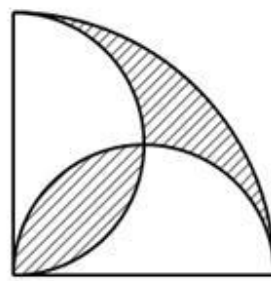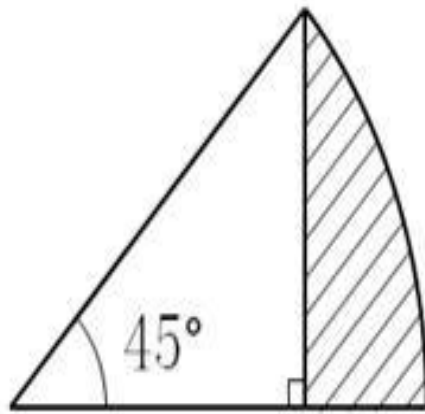
CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

6. The length of the minute hand of the clock shown is 3 cm. Your study duration was 1 hour and 45 minutes. Find the distance travelled by the tip of the minute hand in 1 hour and 45 minutes. (Use π = 3.14)
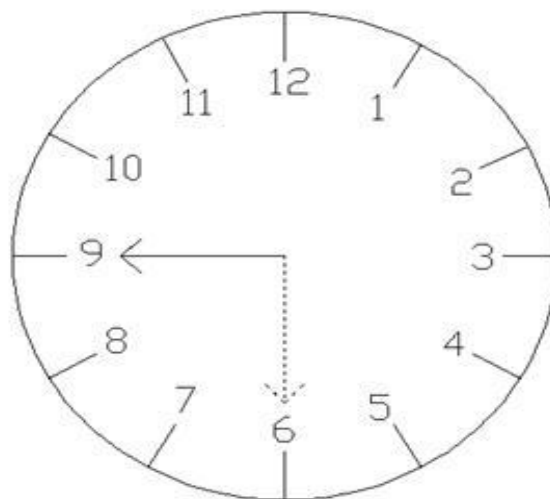
CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

7.   A farmer had a field as shown in figure which is made up of a circle and a triangle ABC and O is the centre of the circle. The diameter of the circle, AB is 10 m. He grew some wheat in the triangular area. If the area of the circle is 1.5 times the area of the triangle then in how much area he was able to grow wheat (Use $\pi = 3.14$)
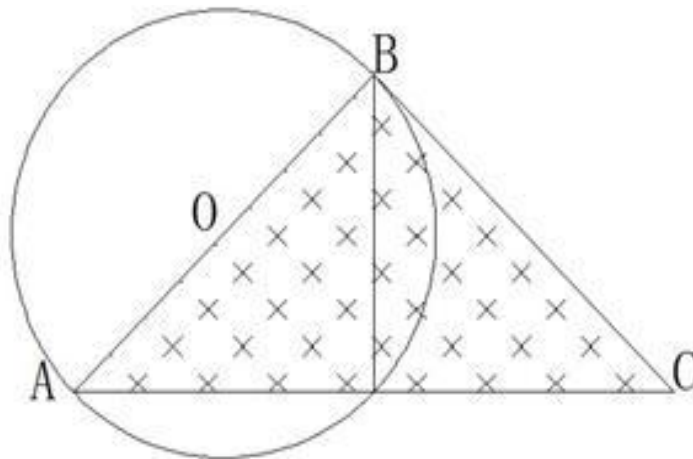
CLASS - 10

CHAPTER – 12 AREAS RELATED TO CIRCLES

Learning Outcome: The learner determines areas of various 2D objects, designs around them. For e.g. design on a handkerchief, design of tiles on the floor, geometry box etc.

8. A dog is tied with 4 m long rope at a vertex of an equilateral triangle of side 3m. What is the area that the dog can cover? The answer can be expressed in the form a×π, where 'a' is an integer.

CLASS - 10

CHAPTER – 13 SURFACE AREA AND VOLUME

Learning Outcome: The learner finds surface areas and volumes of 3D objects in the surroundings by visualising them as a combination of different solids like cylinder and a cone, cylinder and a hemisphere, combination of different cubes etc.

MATHEMATICS AND ARCHITECTURE

1. Today across the globe, we are experiencing a rise in densely populated urban areas, along with a lack of land resources to provide sufficient housing for the masses. This phenomenon has given rise to a new movement of Micro-housing; one that commands the idea of simple but innovative living in today's urban areas.

   The concept of these revolutionary homes focuses primarily on the innovation of maximum functional area in a minimum footprint, thus redefining the perception of sustainability in urban dwellings.

   Design of a Macro House

   With the idea of micro housing, designers are now coming up with various inventive solutions to solve the persistent issue of space crunch in cities to provide the imperative requirement of ideal housing to as many people as possible.
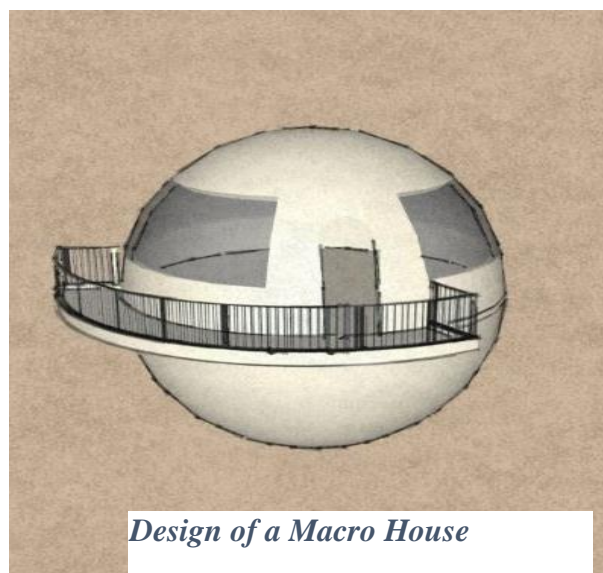
a) Find the total surface area of spherical micro house having radius 3.2 m.

b) Following the principle of maximum functional area in the given housing plan calculate how much air space would be in each spherical shaped micro house, if its radius is 3.2 m?

c) Aman decided to paint the hemispherical dome of his compartment green in colour. Will one bucket full of paint of radii 12 cm, 8 cm with height 21 cm be sufficient to paint the dome of radius 3.2 m, if 1 liter of paint can cover 12 square meter.

d) Quotes were invited for supplying water during a function in the society. The choice was to be made from three types of tankers of inner diameter 1m and total length 6 m as shown in the figure (h = r for the conical part in the first fig.). Which tank will contain maximum water out of the three?
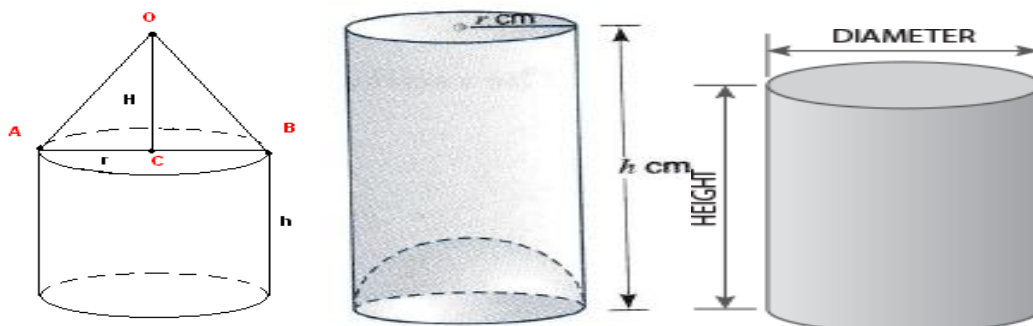
CLASS - 10

CHAPTER – 13 SURFACE AREA AND VOLUME

Learning Outcome: The learner finds surface areas and volumes of 3D objects in the surroundings by visualising them as a combination of different solids like cylinder and a cone, cylinder and a hemisphere, combination of different cubes etc.

MATHEMATICS: A ROLLER RIDE!

2.   Road rollers are used in road, railroad, industrial mining, and airfield construction. Road rollers can be either self propelled or drawn. The working
parts of a road roller are rigid steel drums. The surfaces of thedrums can b e flat or with a grid or cams (lugs).

Tractordrawn rollers with flat drums (static and vibration action), cams, and balloon tired rollers are used to compact earth and road foundations.

The self-propelled rollers with flat drums   (two   drum or three drum, static   or vibration action)   and withballoon tires are used chiefly for compacting road surfaces. The weightof a road roller is from 5 to 50 t ons, and it operates at a speed of 2-8 km/hr.

The students of a school went for a visit to a road construction site. They wanted to know about the specifications and working of the road roller. The teacher gave them few tasks:

a) Considering the area covered by the drum of the roller in one revolution as 10 sq . m and width as 2.1 m , figure out the diameter of the drum.

b) Assuming the drum as solid iron cylinder if we melt it to form small solid cylinders of radius same as in Q 1. and height as 0.3 cm. Figure out how many cylinders can be formed?

c) In order to paint the road roller all over, how many paint buckets we need if the bucket is 35 cm high and the radii of its end are 12 cm and 20 cm and our total requirement of paint is 86.240 litres.

d) Nowadays many roads are constructed using plastic waste and this is possible by the efforts of the "Plastic Man " of India,Rajagopalan Vasudevan

   i. How many rounds the road roller has to make if the road is 5 km long and 8m wide?

   ii. How much time will it take to level the ground for the given dimensions of road if its speed is 5km/hr?

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

FACTORY VISIT

1. Mohit went to visit his friend Rana in Vapi during the summer vacations. Rana's father took them for a visit to his factory. Both the children were very excited about their visit, they saw how various parts were manufactured and assembled to get the final product. They also asked many questions from the workers. The head of the accounts department gave them the data of monthly wages of 1000 workers with two missing frequencies.

Wages (in thousand Rs.)	20-30	30-40	40-50	50-60	60-70	70-80
No. of workers	60	60	x	200	y	285

If the median of the series is 56, find the missing frequencies.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

MARKS ANALYSIS

2. Rajni and Sameera are monitors of class X A and X B respectively. They were asked to find the mean marks of their sections for a particular class test in Mathematics. Rajni found that the mean marks for 80 students of section A to be 40 and Sameera found that the mean marks for 60 students of section B to be 50.

    (a) What is the total marks obtained by students of class X A.
    (b) Find the mean marks in Mathematics for class X as a whole.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

COMPARING TENDENCIES

3.   Ravi and his sister Meena study in the same class. They were given certain questions as assignment. After finishing their assignment, they decided that Ravi will find the mean of the data given below but his sister will find the mode to check if they get the same value for both the measures of central tendencies.

Class Mark	5	15	25	35	45
No. of Students	10	12	8	7	6

(a)   Write the class intervals for the class marks given in the data.
(b)   Write the upper limit of the modal class.
(c)   Calculate the mode of the data.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

MEDIAN-MODE

4.   Aryan is a student of class IX. After a class test their teacher asked to prepare a frequency distribution of the marks obtained by the students. Since there was no student who got less than 10 marks, so Aryan started with class intervals as 10-20, 20-30 ….He also found that the mean marks for the class is 50.His frequency distribution table looked like the following.

Marks Obtained	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No.of students	5	3	4	X	2	6	13

(a)   Find the number of students obtaining marks between 40-50.

(b)   Write the median class of the data.

(c)   Find the sum of lower limit of median class and upper limit of modal class.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

FUN WITH MATHS

5. Avni learnt a new number game ,wherein she was asking the children to think of number less than 40 .She played the game with 20 children and noted the data for number of children thinking a number between 0-10,10-20,……..She also found the arithmetic mean of the data is 16 .To make it challenging she omitted the frequencies of two class intervals

Number Thought	0-10	10-20	20-30	30-
Number of Children	X	4	y	2

(a)   Find the missing frequencies.
(b)   Write the median square.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

DATA ENTRY

6. Ruby was entering marks obtained by students in the test on an excel sheet.She pressed one button by mistake but she was happy to see the mean marks obtained by 110 students are estimated to be 80.Later on, while rechecking the marks entered, she realized that one value was wrongly entered as 73 instead of 3.She corrected the entry and wants to know the mean mark.Find the new mean.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

LEARNING WITH GRAPH

7. Rohan was reading a book and he came across a graph. On looking carefully he realized that it was a less than type ogive. The graph he saw was the following
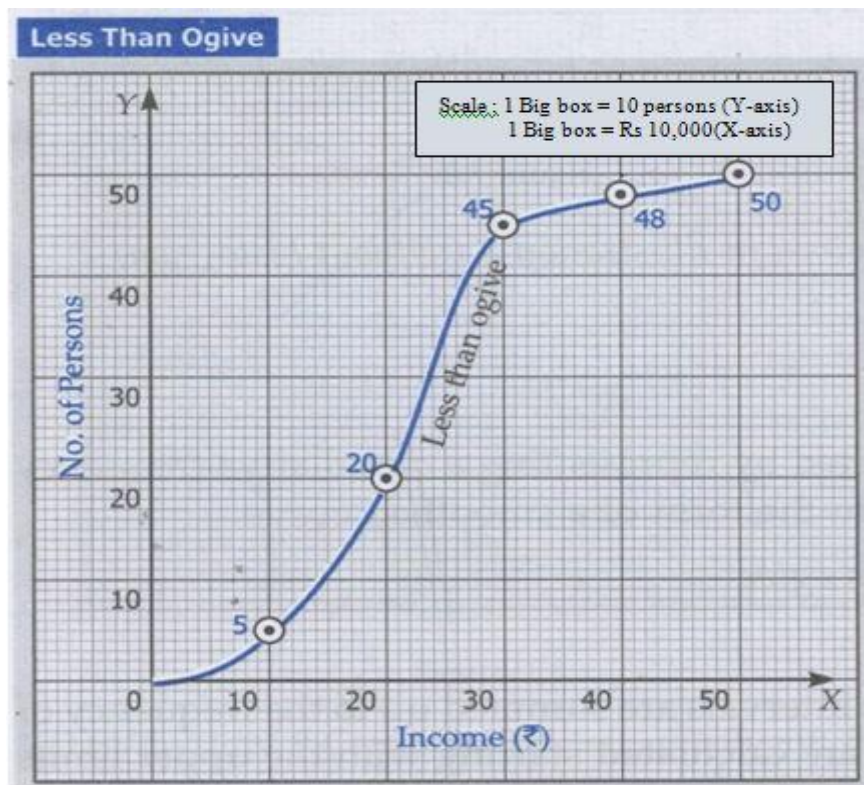
(a) Find the median of the data from the given graph.
(b) Prepare a frequency distribution table from the given graph.
(c) Write the median class.

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

SWACHH BHARAT ABHIYAN.

8. On 2nd October some residents of a colony took part in Swachh Bharat Abhiyan. A boy of the colony collected the data of number of residents with respect to their ages who actively participated. After collecting the data he analyzed the data and prepared a report. Using his report , he drew the graph….
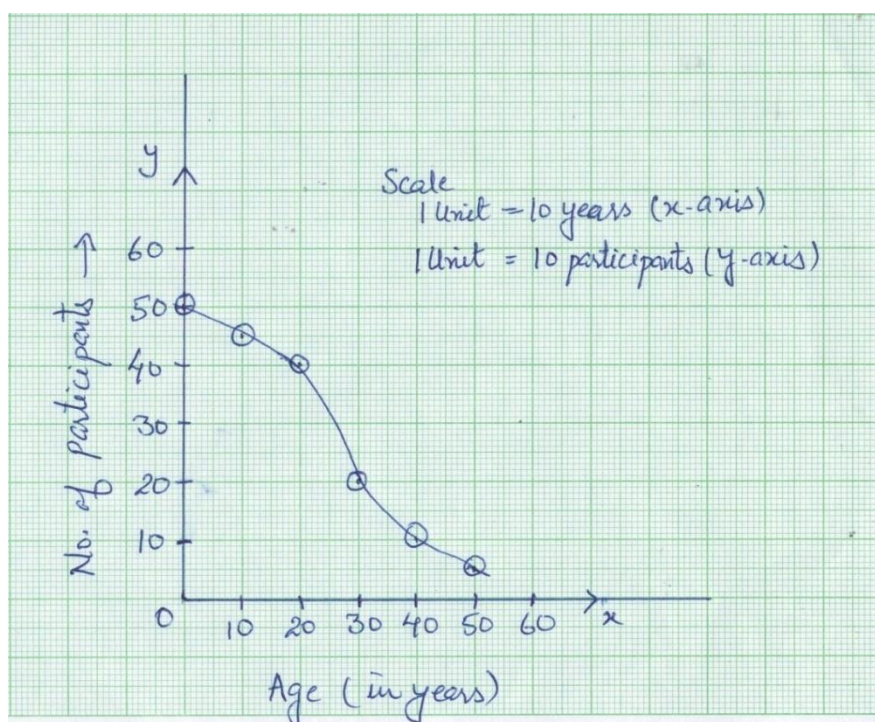
(a) How many persons participated in the Abhiyan?

(b) Find the modal age of participants who participated part in the Abhiyan.

(c) If 5 more persons in the age group of 50-60 years had participated, then what is the new modal age?

CLASS - 10

CHAPTER – 14 STATISTICS

Learning Outcome: The learner calculates mean, median and mode for different sets of data related with real life contexts and observe graphical data to find mode, median etc.

THE DREAM CITY

9. Damoder is a social activist, his aim is to make his city pollution free. To know the causes of pollution he conducted a survey of number of vehicles in his locality and arranged the data in the following table….

AGE GROUP	No. of Vehicles		
	0	1	2
20-25	0	17	07
25-30	14	25	08
30-35	03	15	26
35-40	05	25	17
40-45	06	26	24
45-50	12	30	25
50-55	Y	46	15
55-60	25	x	08

(a) How many persons less than 45 years of age own less than 2 vehicles?

(b) What is the lower limit of the modal class of persons having two vehicles?

(c) If the mean age of persons having 0 vehicles is 46.5 years, find y.

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

1. To make a 750 piece jigsaw puzzle more challenging, a puzzle company includes 5 extra pieces in the box along with the 750 pieces and those 5 extra pieces do not fit anywhere in the puzzle.

    (i)   If you buy such a puzzle box, break the seal on the box and immediatelySelect 1 piece at random, what is the probability that it will be 1 of those extra pieces:

          (a) 1/5 (b) 1/150   (c) 1/15 1   (d) 5/151

    (ii) If the piece taken out is one of those extra pieces and is not kept back in the lot, then another piece is picked randomly again, what is the Probability that this piece is also one of those extra pieces:

          (a) 2/377 (b) 4/750   (c) 5/755   (d) 1/150

    (iii) If two such boxes were bought by a family for their two children andchildren mixed both the sets together. If a piece is chosen now, what isthe probability that the one piece picked is one of those extra pieces:

          (a) 10/750(b) 1/150   (c) 1/151   (d) 10/1500

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

2. Rohit bought a set of dart board and 5 arrows. He fixed it on the wall in his room marked a point from where aim will be taken. He wants to master the skill of bull's eye and he is all determined for it. So he start practicing it every day. The dart board has alternative black and white rings as seen in the picture. The width of each ring is 10cm. The diameter of the centre black circle is 20cm.

    (i)   Which colour has more probability to behit- black or white? Give reasons

    (ii)   What is the probability that an arrow thrownhits the Bull's Eye? Show the calculation.

    (ii)   Rohit has started getting closer to his target of hitting the bull's eye with Practice in a week. He does not hitthe last three rings anymore. Now if Rohit aims and throws an arrow, what is the probability that his arrow hits the Bull's Eye.

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

3. Apples come in a variety of shapes, colours, and flavours and provide a range of nutrients that can benefit many different aspects of a person's health .For example, they may help to reduce the risk of cancer, obesity, heart disease, diabetes .and several other conditions.

    Bag contains 18 Apples (Golden & Black) out of which x apples are black and y apples are golden.

    (i)   If one apple is drawn at random from the bag .what is the Probability that it is black.

          (a) x / 18   (b) y /18   (c) x+y / 18   (d) x-y / 18

    (ii) If 2 more Black apples are put in the bag   the probability of drawing a black apple will be 9/8 times the probability of black apples in Part (i). Find x

          (a) 10   (b) 11   (c) 8   (d) 16

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

4.   On a School Outing there are 50 boys and 42 girls, the students are allowed to choose one drink and one snack from the menu:
Drinks: Cola, fruit juice, water.
Snacks: Biscuits, cake, muffin.

    (i)   How many different combinations in which a student can make a choice.

    (ii)   What is the probability a student will choose cola as a drink

    (iii)   What is probability the drink chosen is not water.

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

5.   A survey is conducted related to problem of obesity in India, A sample Of 1018 people is collected. Out of which 660 are women and 360 are Men, Out of all the people surveyed 360 are between 20-30 years, 211 are 31 - 40 years old, 447 are Above 40. In 20 -30 age group 60 % are found to be obese .Only 20 % of total people surveyed knew Obesity can trigger diabetes.

   (i)   If one person is chosen at random from the total people surveyed what are the chances that the person falls under 20-30 age group and is obese.

   (ii)   If one person is chosen at random what is the probability that the person knows the relation between obesity and diabetes.

CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

6. Two students Anil and Vijay want to qualify for an examination in a stock exchange .The probability that Anil will qualify the examination is 0.05 ,and that Vijay will qualify is 0.10 .The probability that both will qualify is 0.02 . Their parents are providing them with coaching classes so that they can perform best in these examinations but Anil is not regular with his classes as Vijay is quite dedicated in attending his classes. Find the probability that

    (i)   Both Anil and Vijay will not qualify the examination.

    (ii)   At least one of them will not qualify the examination, and

    (iii)   Only one of them will qualify the examination
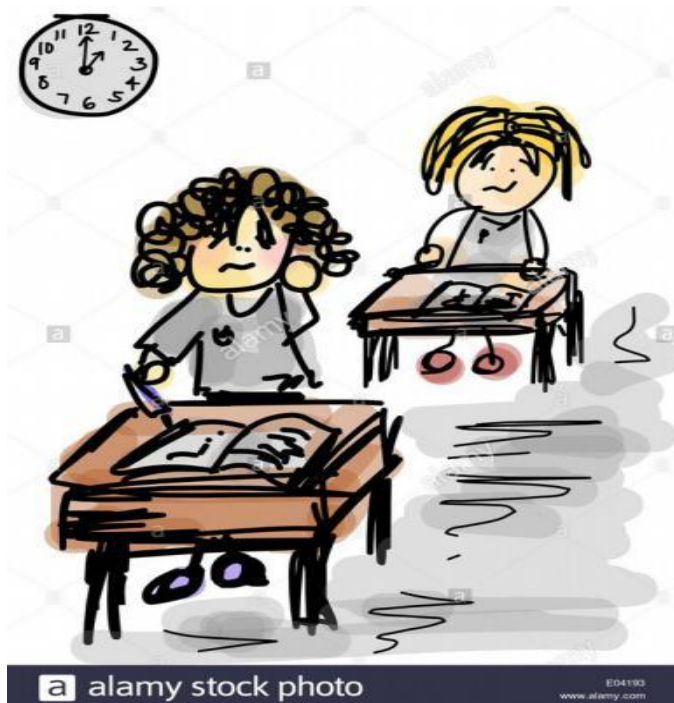
CLASS - 10

CHAPTER – 15 PROBABILITY

Learning Outcome: The learner determines the probability of an event.

7.   In the session 2020-2021 in a school students are given option to join either NCC or NSS so that values of discipline ,dedication , patriotism ,sense of responsibility can be inculcated amongst young kids .One of the class is selected having 60 students where students showed great response towards these activities,30 opted for NCC,32 opted for NSS and 24 opted for both NCC and NSS .If one of these students is to be selected at random such that amongst them one of them can represent the Republic day parade which will give that student a chance in future to serve for country ,find the probability that

(i)   The student opted for NCC or NSS

(ii)   The student opted neither NCC nor NSS.

(iii)   The student opted NCC but not NSS.

ANSWER KEY

CHAPTER - 1
REAL NUMBERS

1. $\frac{2}{11} = 0.\overline{18}$ Non terminating repeating.

2. Mukta is correct

Let x= 0.4777………. (1)

10x=4.777……….. (2)

(2)-(1)

9x=4.3

$X = \frac{4.3}{9} = \frac{43}{90}$

3. No. of caller to receive both the voucher= L.C.M of 100 and 30 = 300

Therefore, 299 callers must get through before the first one. i.e. , 300th caller gets both the vouchers.

4. Distance covered by A along the boundary = 4a metres

Distance covered by B along the diagonal = 2x√2a = 2√2a. metres.

Distance covered by A ≠ Distance covered by B

Hence Rational number ≠ Irrational number

Therefore A & B never jog the same distance

5. L.C.M of 6,8,9,10=360 seconds.

6. a)   G-I: 4m+0
            G-II:4m+1
            G-III:4m+2
            G-IV:4m+3

b).   Group1- 4,8,12,16,20,24……,52
       Group II- 1,5,9,13,17………….,49
       Group III- 2,6,10,14………50

Group IV – 3,7,11,15……51

The groups are evenly divided with 13 members each and all have a pattern with jump of 4.

7.	Number of items in each box = HCF of 240,175,200

$240 = 2^4 \times 3 \times 5$

$150 = 2 \times 3 \times 5^2$

$200 = 2^3 \times 5^2$

$HCF = 2 \times 5 = 10$

Therefore there 10 items in each box.

8.	Size in inches: $10 \times 12 = 120$ inches

$8 \times 12 = 96$ inches

Size of the tile = HCF of 120 and 96

$120 = 2^3 \times 3 \times 5$

$96 = 2^5 \times 3$

$HCF = 2^3 \times 3 = 24$

Size of square tile = 24 inches

Number of tiles = $(120 \times 96) / (24 \times 24) = 20$

CHAPTER - 2

POLYNOMIALS

1.

i.   b

ii.   3

iii. -2,2,5

iv. $X^3-5x^2-4x+20$

2. $3x^4-3x^3-33x^2+54x = 3x(x-2) h$

$h= \dfrac{3x^4-3x^3-33x^2+54x}{3x(x-2)}$

$h=x^2+x-9$

3.   after 4 hours i.e., t=4

C= -2(4)3+6(4)2 -8(4) +8

=-56 mg/ deciliter

4. $x^2 = (x-2)^2+(x-4)^2$

X = 2,10 x = 2 is not possible so therefore x=10 meter .

5.   width = 32 feet
length = 64 feet

6.   i) $p(x) = A + \frac{1}{4}B + \frac{1}{3}C + 2D + \frac{1}{2}E$

II) 5 * p(x)

7.

A	$\frac{1}{2}xyz$
B	$-x^2yz$
C	$-2x^2y^3$
D	$2x^4y^4z^3$

E	$-\dfrac{1}{2}x^4y^4z$
F	$-8x^8y^{10}z^4$
G	$-x^{31}y^{36}z^{15}$

8. $x^2+7x+12 = (x+3)(x+4)$

  $x^2-9x+18 = (x-3)(x-6)$

  $x^2+9x+18 = (x+6)(x+3)$

  $x^2-3x+15 = (x+3)(x+5)$

9.   Maximum height is 144 ft in 2 seconds.

10. $t = 7$ seconds

CHAPTER - 3
LINEAR EQUATIONS IN TWO VARIABLES

1.   (i) $p = nf - c$

                $= 70n - 400$

    (ii) $o = 70n - 400$

                $n = \dfrac{400}{70}$ not on integer therefore No.

    (iii) $300 = 70n - 400$

                $n = 10$

2.   (a)   Volume of water (gallon) $= 3 + 2.5t$; t – minutes

    (b) $V = 3 + (2.5)2 = 8$ gallons
    (c) $t = 10$ minutes
    (d)   Amount of water left $= 28 - 3(0.5) = 26.5$ gallons

3.   (a)   let large van $= x$ and small van $= y$

                $20000 x + 10000 y = 100000$

                $75x + 100 y = 500$

    (b)   Large Van $= 4$

            Small Van $= 2$

4.   (b) option is the best deal as he can afford $ 75 monthly payment.

5.   Baby sitter B is better deal.

CHAPTER - 4

QUADRATIC EQUATIONS

1. a) Marks in Maths = 8, Marks in hindi = 14

   b) Breadth = 8, Length = 10
   c) Teacher's age = 38 years, Pranshu's age = 12 years
2. Original Number = 92

3. Length = 24m, Breadth = 12m

4. Correct roots are 3 and -1

5. Present price per dozen = Rupees 12 per dozen

CHAPTER – 5
ARITHMETIC PROGRESSION

1. a)   In 34+12n minutes

   b)   15 minutes

2. a)   30+10n

   b)   Rs. 450

3. a)

Diagram	1	2	3	4	5	6	7
Number of square tiles	8	12	16	20	24	28	32

   b)   4n + 4

   c)   156

   d) $k = 71$

4. a)   9x

b)   135

c)   23

5. a)

Figure	Number of triangles	No. of circles	Total number of triangles and circles
4	16	16	32
5	20	25	45

b)   (i)   4n

   (ii) n^2

   (iii) n^2+4n

c)   (i)   957

      (ii)   56

      (iii) 1517

6.   25 stones

7.   12600 cent

8.   a)   1225

      b)   1

9.   a)   25

      b)   270

      c) $10+n$

CHAPTER - 6
TRIANGLES

1. b

2. (c)   16√2=22.62

3. Using similarity: 60/x=45/18 hence, x= 24ft

4. h=18m

5. h=15 m

6. 42.42 ft

7. L=15 , Similar Triangles

8. a)   X=3.3m ,

b)   Similar Triangles

9. $AC^2 = BC^2 + AB^2 = 2.4^2 + 1.8^2 = 5.76 + 3.24 = 9$, Hence AC=3m

Let length pulled in 12seconds be BD ,Then new length =.05x12=.60m
Remaining length=(AD)=3-.60=2.4m

10. 2.79m

CHAPTER - 7
COORDINATE GEOMETRY

1.   B(8,6), OB = 10 units

2.   (5,3) , 16 sq units

3.   Area of Triangle $= 0 \Rightarrow x = 9$

4.   Calculated area between 36 to 40 should be considered correct

5.   a)   15 litres

    b)   yes, 20 litres
    c)   Milege = 15 km/l

6.   New Delhi (6, 20)   Chandigarh (4, 22)

Distance on Map $= \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$

$$= 2 \times 1.414$$
$$= 8.828 \text{Units}$$

Actual $= 8.828 \times 28$

Distance $= 247.84$

Money paid to drive $= $ Rs. (247.184×12)

Rs. 2966 approx.

7.   1.2 km
8.   left out area $= 46 \text{ m}^2$
   Farmer will choose left out area to grow vegetables
9.   10.5 sq units

CHAPTER - 8
TRIGONOMETRY

1.   a)   BC = 6 units, AC = $6\sqrt{3}$ units

b)   DA= $6\sqrt{2}$ units ,DB = $6\sqrt{2}$

c)   EA = 6 units, EB =$6\sqrt{3}$ units

    d)   Area of Δ ABC= $18\sqrt{3}$ square units
    Area of Δ ADB= 36 square units
    Area of Δ AEB= $18\sqrt{3}$ square units

2.   All Yes

3.   OF= $5\sqrt{3}$ and EF= 5cm

4.   OE = 15 cm

5.   (b)

6.   1:2:3
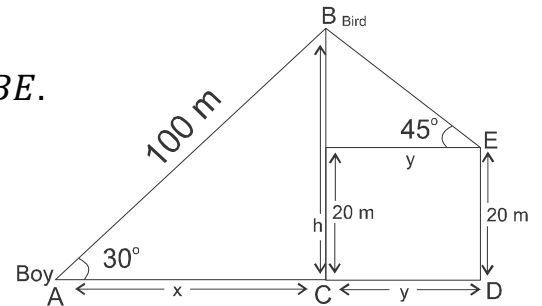
7. $\dfrac{45\sqrt{3}}{8}$ m^2

CHAPTER - 9
APPLICATIONS OF TRIGONOMETRY

1.   Sol. Given: A boy is standing at a distance of $100m$ from the bird flying at an elevation of $30°$. A girl is standing on the roof of $20m$ high building finds the angle of elevation of the bird to be $45°$

Boy and girl are on opposite side of the bird

To find: Distance between the bird and the girl $i.e., BE$.

Solution: In ΔACB,

$$\Rightarrow \qquad \frac{h}{100} = \sin 30° \qquad \Rightarrow h = \frac{1}{2} \times 100 = 50 \ m$$

$$\Rightarrow \qquad BF = h - 20 = (50 - 20)m = 30m$$

In ΔBFE, $\qquad \frac{30}{BE} = \sin 45° \Rightarrow \frac{30}{BE} = \frac{1}{\sqrt{2}}$

$$\Rightarrow \qquad 30\sqrt{2} = BE$$

$$BE = 30 \times 1.414 = 42.420 = 42.42m$$

2.   Sol. i) one minute   ii) yes

Hint: Let MP be the tower, let A and B are the positions of the car. Let $AB = x$ metre

and $BM = y$ metre and height of the tower $MP = h$ metre.

From $\Delta \ AMP$, $\qquad h/x + y = \tan 30°$...........(i)

From $\Delta \ BMP$, $\qquad h/y = \tan 60°$................(ii)

Dividing (ii) by (i), we get

$\qquad h/y \ x \ (x + y)/h \ = \tan 60°/\tan 30°$

$\qquad (x + y)/y = \sqrt{3}/1/\sqrt{3}$

$\qquad x + y = 3y$

$\qquad x = 3y - y$

$\qquad x = 2y$
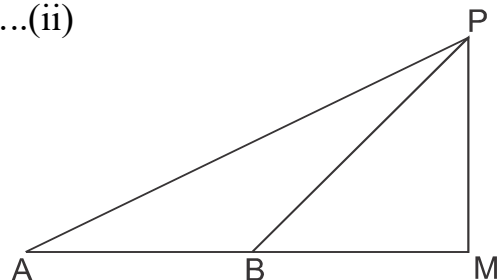
Now, speed of the car $= AB/2 \ min = x\sqrt{2m}/min$

Hence time taken by the car to travel from B to M

$$= BM/x/2min = 2y/x = 1min.$$

3.   Sol. Let bird is at A and after 2 seconds it reaches at E.

$\qquad \therefore \qquad$ Distance covered $= AE$

In right ΔABC, $\qquad \frac{BC}{AB} = \cot 45°$

$$\frac{BC}{80} = 1 \Rightarrow BC = 80\ m$$

In right $\Delta EDC,$ $\quad\quad\quad\quad \frac{DC}{DE} = \cot 30°$

$\Rightarrow$ $\quad\quad\quad\quad\quad\quad DC = 80 \times \sqrt{3}$ $\quad\quad\quad\quad [\because DE = AB]$

Now, $\quad\quad\quad BD = CD - BC = 80\sqrt{3} - 80 = 80(\sqrt{3} - 1) = 80 \times$ $0.732 = 58.56\ m$

Now, $\quad\quad\quad\quad BD = AE = 58.56\ m$

$\therefore$ $\quad\quad\quad\quad$ Speed of bird $= \frac{58.56}{2} = 29.28 m/sec.$

4. Sol. Let AB is the height of the mountain and C is the foot of the mountain

$\therefore$ $\quad\quad\quad\quad\quad\quad \angle ACB = 45°$

$\therefore$ $\quad\quad\quad\quad\quad\quad \angle BAC = 45°$

After moving 1000 along CD at an angle of $30°$ with the horizontal the angle of inclination at $D = 60°$

$\Rightarrow$ $\quad\quad\quad\quad\quad\quad \angle ADF = 60°$

$\Rightarrow$ Draw $\quad\quad\quad\quad DE \perp BC$

In right $\Delta DEC,$ $\quad\quad \frac{DE}{DC} = \sin 30°$

$\Rightarrow$ $\quad\quad \frac{DE}{1000} = \frac{1}{2}$ $\quad\Rightarrow DE = \frac{1}{2} \times 1000 = 500m$

$\because$ $\quad\quad\quad\quad DE = BF$ $\Rightarrow BF = 500\ m$

Now $\quad\quad\quad \angle ACD = 45° - 30° = 15°$

In right ΔAFD , $\quad\quad \angle ADF = 60°$

$\therefore$ $\quad\quad\quad\quad \angle FAD = 30°$

$\quad\quad\quad\quad \angle DAC = 45° - 30° = 15°$

$\therefore$ In ΔCDA , $\quad\quad AD = CD$

$\Rightarrow$ $\quad\quad\quad\quad AD = 1000m$

In right ΔADF , $\quad\quad \frac{AF}{AD} = \sin 60°$

$\Rightarrow$ $\quad\quad\quad \frac{AF}{1000} = \frac{\sqrt{3}}{2}$ $\quad\quad \Rightarrow AF = 500\sqrt{3}m$

Now $\quad\quad AF = AF + BF = (500\sqrt{3} + 500)m = 500(\sqrt{3} + 1)m$
$\quad\quad\quad\quad = 500(1.732 + 1) = 500 \times 2.732 = 1366m$
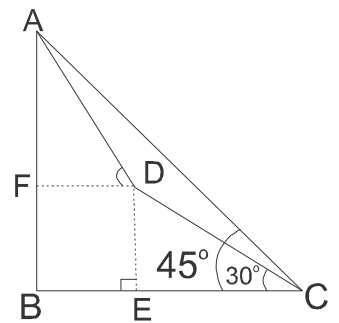
5. Sol. Let AB is statue, BC is pedestal and $BC = x\ m, CD = y\ m.$

In right ΔBCD , $\quad\quad \frac{BC}{CD} = \tan 45°$

$\Rightarrow$ $\quad\quad\quad\quad\quad \frac{x}{y} = 1$ $\quad\quad\quad\quad \Rightarrow x = y$

......(i)

In right ΔACD , $\qquad \dfrac{AC}{CD} = \tan 60°$

$\Rightarrow \qquad\qquad\qquad \dfrac{x+1.46}{y} = \sqrt{3}$

$\Rightarrow \qquad\qquad\qquad \dfrac{x+1.46}{x} = 1.73$

[*using* (*i*)]

$\Rightarrow \qquad\qquad\qquad x + 1.46 = 1.73x \Rightarrow 0.73x = 1.46 \Rightarrow x = 2$

$\therefore \qquad\qquad$ Height of pedestal $= 2$ *m.*

6. [Hint: Here, in right $\Delta S_2 PQ$,

$$\dfrac{75}{S_2 P} = \tan 45° = 1$$

$\Rightarrow \qquad\qquad S_2 P = 75\ m$

In right $\Delta S_1 PQ$,

$$\dfrac{75}{x+75} = \dfrac{1}{\sqrt{3}}$$

$\Rightarrow \qquad\qquad x + 75 = 75\sqrt{3}$

$\Rightarrow \qquad\qquad\qquad x = 75\left(\sqrt{3} - 1\right) m.\,]$

7. $\qquad \dfrac{P_2 B}{AB} = \tan 60°$

$\qquad AB = 1000\sqrt{3}$

$\qquad \dfrac{P_1 B}{AB} = \tan 45°$

$\qquad P_2 P_1 \ = \ P_2 B - P_1 B$

$\qquad\qquad = 3000 - 1000\sqrt{3}$

$\qquad\qquad = 1268\ m$

8. Sol. Let *AB* be the width of the river.

In rt. ΔABC ,
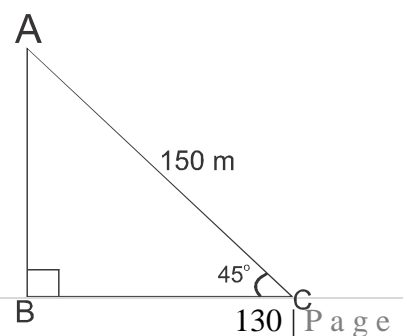
$$\sin 45° = \frac{AB}{AC}$$

$$AB = AC \ \sin 45°$$

$$= 150 \times \frac{1}{\sqrt{2}}$$

$$= 150 \times \frac{\sqrt{2}}{2}$$

$$= 106.05 \ m$$

Therefore the width of the river is *106.05 m.*

9. Sol. Let *AB = 60 m* is height of building and *CD* is lamp post.

i) In rt. ΔABD , $\qquad \frac{AB}{BD} = \tan 60°$

$\Rightarrow \qquad \frac{60}{BD} = \sqrt{3} \Rightarrow \frac{60}{\sqrt{3}} = BD$

$\Rightarrow \qquad BD = \frac{60 \times \sqrt{3}}{3} = 20\sqrt{3} \ m$

$\Rightarrow \qquad BD = 20 \times 1.732 = 34.64 \ m$
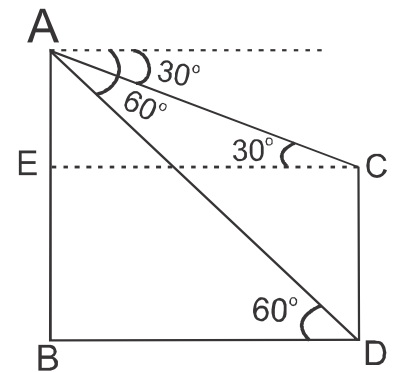
ii) In rt. ΔAEC , $\qquad \frac{AE}{EC} = \tan 30°$

$\Rightarrow \qquad \frac{AE}{20\sqrt{3}} = \frac{1}{\sqrt{3}} \qquad\qquad [\because EC = BD \ ]$

$\Rightarrow \qquad AE = 20 \ m$

and $\qquad EB = AB - AE = 60 - 20 = 40 \ m$

Also $\qquad EB = CD$

$\Rightarrow \qquad CD = 40 \ m$

$\therefore$ Height of lamp post $= 40 \ m$

10. Answer: 16 meter/sec
11. Ans: 560 feet
12.   Answer: (i)-b, (ii)-c , (iii)- a

13. Answer: c) Remains same

CHAPTER - 10
CIRCLES

1. a)   37 cm

    b) $V = 212,260 \text{ cm}^3 = 212.26$ litres

2. 64cm

3. a)   97.15 m

    b)   The distance covered by Rina to reach the flag will be same as that of Seema because the distance from flag to point P and Q will be like two tangents to the circle with radius 50 cm from a same point T,and length of tangents from same point to a circle are always equal in length

4. $d = 339.5\tilde{3}$ km ~ 340km
5. 5 cm

6. 4cm

7. $10\sqrt{2}$ cm

8. Length of tangents from external point are equal

CHAPTER - 12
AREAS RELATED TO CIRCLES

1. A is the correct option.

2. A is the correct option

3. 57 cm^2

4. $\angle CAB = 60°$

5. Radius = 4 cm

6. Distance travelled by minute hand is 32.97 m

7. He was able to grow wheat in 52.3 m²

8. The total area the dog can cover is 14 m²

CHAPTER - 13
SURFACE AREA AND VOLUME

1. a) Surface area of sphere = $4\pi r^2$

    $= 128.73 m^2$

    b) Volume of the sphere = $4/3\pi r^3$

    $= 137.31 m^3$

    c) Yes

    d) Volume of the first tank = $\pi r^2 h + 1/3\pi r^2 h_1$

    Volume of the second tank = $\pi r^2 h$

    Volume of the third tank = $\pi r^2 h - 2/3\pi r^3$

    The second tank will contain maximum water.

2. (a) $2\prod rh = 10$

    $2 \times 3.14 \times r \times 2.1 = 10$

    $r = 1.51m$ approx.

    (b) $\prod r^2 h = n \times \prod r^2 H$

    $n = 7$

    (c) Volume of 1 bucket = $\frac{1}{3} \times \prod \times 35 \times (12^2 + 20^2 + 12 \times 20)$

    Number of buckets = (86.240×1000)/volume of 1 bucket = 3 buckets

    (d) (i) width of road is 8m and width of drum is 2.1 m, number of rounds = 8/2.1 = 4 rounds

    (ii) speed = 5km/hr, roller covers 5 km in one hour = length of road

    To cover 4 rounds for leveling it will take 4 hours

CHAPTER - 14
STATISTICS

1. <u>FACTORY VISIT</u>

Context: Personal

Context Category: Uncertainty and Data

Full Credit:

Wage (in Rs) (x)	No. of Workers(f)	c.f.
20-30	60	60
30-40	60	120
40-50	X	120+x (cf)
50-60 median class	200 (f)	320+x
60-70	Y	320+x+y
70-80	285	605+x+y
	N=∑f= 1000	

$$M = l \ + \frac{\frac{N}{2}-cf}{f} \times h$$

Correct substitution of values

x = 260

y = 135

- Partial Credit: * Correct table, correct formula and substitution
- Upto finding x = 26

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand

1	Employing mathematical concepts, facts, procedures	Fixed response	High

2. MARKS ANALYSIS

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit: $80 \times 40 = 3200$

No Credit: Any other answer or missing answer

(b)   Full Credit: $44.29 (\frac{80 \times 40 + 60 \times 50}{80 + 60} = \frac{6200}{140} = 44.286)$

Partial Credit: Correct substitution

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand
2 (a)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(b)	Employing mathematical concepts, facts, procedures	Fixed response	High

3. COMPARING TENDENCIES

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit:

Class Mark	No. of Students	Marks/Class Interval
5	10	0-10
15	12	10-20
25	8	20-30
35	7	30-40
45	6	40-50

No Credit: Any other answer or missing answer

(b) Full Credit: 20

No Credit: Any other answer or missing answer

(b)   Full Credit:

Marks (x)	No. of Students(f)
0-10	10 f_0
10-20modal class	12 f_1
20-30	8 f_2
30-40	7
40-50	6

$$Z = 1 + \frac{f1 - f0}{2f1 - f0 - f2} \times h$$

Correct substitution of values

$Z = 13.33$

Partial Credit: Correct table, correct formula and substitution

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive

			Demand
3 (a)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(b)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(c)	Employing mathematical concepts, facts, procedures	Fixed response	High

4. MEDIAN-MODE

Context: Personal

Context Category: Uncertainty and Data

(a) Full Credit:

Marks obtained	Class Mark (x_i)	No. of Students(f_i)	f_i x_i
10-20	15	5	75
20-30	25	3	75
30-40	35	4	140
40-50	45	f	45f
50-60	55	2	110
60-70	65	6	390
70-80	75	13	975
		$\sum f_i = 33+f$	$\sum f_i x_i = 1765+45f$

$$X = \frac{\sum f_i x_i}{\sum f_i}$$

or $50 = \dfrac{1765+45f}{33+f}$

$f = 23$

Partial Credit: Correct table, correct formula and substitution

No Credit: Any other answer or missing answer

(b)   Full Credit

Marks obtained	No. of Students(f_i)	c.f.
10-20	5	5
20-30	3	8
30-40	4	12
40-50	23	35
50-60	2	37
60-70	6	43
70-80	13	56

Median class: 40-50

Partial Credit: Correct table but median class is not written

No Credit: Any other answer or missing answer

(c)   Full Credit: 40+50 = 90 (Modal class 40-50)s

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand
(a)	Employing mathematical concepts, facts, procedures	Fixed response	High
(b)	Employing mathematical concepts, facts,	Fixed response	Average

(c)	Employing mathematical concepts, facts, procedures	Fixed response	Average

(continued from previous: "procedures" at top)

5.   FUN WITH MATHS

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit:

Number Thought	Class Mark (x_i)	No. of Children(f_i)	$f_i\, x_i$
0-10	5	x	5x
10-20	15	4	60
20-30	25	y	25y
30-40	35	2	70
		20 = 6+x+y	$\sum f_i\, x_i$ =130+5x+25y

$$X = \frac{\sum f_i\, x_i}{\sum f_i}$$

$$16 = \frac{130+5x+25y}{20}$$

$$x + 5y = 38$$

$$x + y = 14$$

$$x = 8$$

$$y = 6$$

Partial Credit: Correct table, correct formula and substitution

No Credit: Any other answer or missing answer

6. <u>DATA ENTRY</u>

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit:

$$\sum x(Wrong) = 80 \times 110 = 8800$$

New Mean $= \dfrac{8800 + 37 - 73}{110} = \dfrac{8764}{110} = 79.67$

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand
1	Employing mathematical concepts, facts, procedures	Fixed response	High

7. <u>LEARNING WITH GRAPH</u>

a)   Median = 22000

b)

Income	Number of Person
0 - Rs. 10000	5
10,000 – 20,000	15
20,000 – 30,000	25
30,000 – 40,000	3
40,000 – 50,000	2

c)   Medial class = 20,000 – 30,000.

8. <u>SWACHH BHARAT ABHIYAN.</u>

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit: 50

No Credit: Any other answer or missing answer

(b)

Age more than (in years)	c.f.	Age Group (in years)	Number of Participants
0	50	0-10	5
10	45	10-20	5 f_0
20	40	20-30 (modal class)	20 f_1
30	20	30-40	10 f_2
40	10	40-50	5
50	5	50-60	5

$$Z = 1 + \frac{f1-f0}{2f1-f0-f2} \times h$$

Correct substitution of values

$Z = 24$

Partial Credit: Correct table, correct formula and substitution

No Credit: Any other answer or missing answer

c)   Full Credit: Modal class remains the same :20-30

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand
(a)	Employing mathematical concepts, facts,	Fixed response	Average

	procedures		
(b)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(c)	Employing mathematical concepts, facts, procedures	Fixed response	High

9. THE DREAM CITY

Context: Personal

Context Category: Uncertainty and Data

(a)   Full Credit: 136

No Credit: Any other answer or missing answer

(b)   Full Credit: 30

No Credit: Any other answer or missing answer

(c)

AGE GROUP	0 Vehicles(f_i)	Class Mark (x_i)	$f_i\ x_i$	
20-25	0	22.5	0	
25-30	14	27.5	385	
30-35	03	32.5	97.5	
35-40	05	37.5	187.5	
40-45	06	42.5	255	
45-50	12	47.5	570	
50-55	Y	52.5	52.5y	
55-60	25	57.5	1437.5	

	$\sum f_i = 65+y$		$\sum f_i x_i$ $=2932.5+52.5y$	

$$X = \frac{\sum fi\ xi}{\sum fi}$$

$$46.5 = \frac{2932.5+52.5y}{65+y}$$

$$y = 15$$

Partial Credit: Correct table, correct formula and substitution

No Credit: Any other answer or missing answer

Classification of Test Item:

Item No.	Process Category	Item Format	Cognitive Demand
(a)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(b)	Employing mathematical concepts, facts, procedures	Fixed response	Average
(c)	Employing mathematical concepts, facts, procedures	Fixed response	High

CHAPTER - 15
PROBABILITY

1. (i)   c

    (ii)   a

    (iii)   c

2. (i) Red area:

area of red circle + area of red ring 1 + area of red ring 2

= $\pi (10)^2 + \pi [(30)^2 - (20)^2] + \pi [(50)^2 - (40)^2]$

= $1500 \, \pi \, cm^2$

White area: area of 3 white rings

$= \pi[(20)^2 - (10)^2]+ \pi [(40)^2 - (30)^2] + \pi [(60)^2 - (50)^2]$

$= 2100 \, \pi \, cm^2$

White colour has higher probability to be hit.

(ii)   Radius of the dart= 60 cm ;

Area of the dart = $\pi(60)^2 \, cm^2$

Area of the Centre Bull's Eye=$\pi(10)^2 \, cm^2$

Probability of bull's eye = 1/36

(iii)   Area excluding last three rings: $\pi (30)^2 \, cm^2$

Probability = 1/9

3. (i)   a

    (ii)   c

4. (i)   9

    (ii)   1/9

    (iii)   2/3

5. (i)   60 % of 360 = 216

    216 /1018 = 108/509

(ii)   0.2

6. (i)   0.87

(ii) 0.98

(iii) 0.11

7.   (i)   19/30

(ii)   11/30

(iii) 2/15

TURN YOUR OBSTACLES

INTO YOUR WAY TOWARDS SUCCESS
-ERIC WORRE