MLM FOR CLASS-X

NUMBER SYSTEM

1. Use prime factorisation to find the HCF of 4052 and 12576.
   [3]

2. Use prime factorisation to find the HCF of: (i) 135 and 225 (ii) 196 and 38220 (iii) 867 and 255.
   [3+3+3]

3. Consider the numbers 4^n, where n is a natural number. Check whether there is any value of n for which 4^n ends with the digit zero. [3]
4. Find the LCM and HCF of 6 and 20 by the prime factorization method. [2]
5. Find the HCF and LCM of 6, 72 and 120, using the prime factorization method. [2]
6. Given that HCF (306, 657) = 9, find LCM (306, 657). [2]
7. Check whether 6^n can end with the digit 0 for any natural number n. [3]
8. Explain why $7 \times 11 \times 13 + 13$ is composite number. [2]
9. Prove that √5 is irrational. [3]
10. Prove that 3 -2 √5 is irrational. (2)

POLYNOMIALS

1. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients. [3]
2. Find the zeroes of the polynomial $x^2 – 3$ and verify the relationship between the zeroes and the coefficients. [2]
3. Find a quadratic polynomial, the sum and product of whose zeroes are –3 and 2, respectively.

   [2]

4. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.
   (i) $X^2 – 2x – 8$ (ii) $4s^2 – 4s + 1$ (iii) $6x^2 – 3 – 7x$
   [3+3+3]
5. Find a quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively.
   (i) 0, 5/2 (iI) 1, -1 (IIi) -4, 1/3

   [2+2+2]

PAIR OF LINEAR EQUATION IN TWO VARIABLES

1. Check whether the pair of equations

   $x + 3y = 6$ and $2x – 3y = 12$ is consistent. If so, solve them graphically. [3]

2. Half the perimeter of a rectangular garden, whose length is 4 m more than its width, is 36 m. Find the dimensions of the garden. [3]
3. Draw the graphs of the equations $x – y + 1 = 0$ and $3x + 2y – 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis, and shade the triangular region. [3]
4. Solve the following pair of equations by substitution method:
   $7x – 15y = 2$ and $x + 2y = 3$ [2]
5. Solve $2x + 3y = 11$ and $2x – 4y = – 24$ and hence find the value of 'm' for which $y = mx + 3$. [2]
6. Five years hence, the age of Jacob will be three times that of his son. Five years ago, Jacob's age was seven times that of his son. What are their present ages? [3]
7. Use elimination method to find solutions of the following pair of linear equations :
   $2x + 3y = 8$ and $4x - 6y = 7$ [2]
8. A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid Rs 27 for a book kept for seven days, while Susy paid Rs 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day. [4]

9. Solve the following pair of equations :
   $6x + 3y = 6$ and $2x + 4y = 5$ [2]

QUADRATIC EQUATIONS

1. The area of a rectangular plot is 528 m^2. The length of the plot (in metres) is one more than twice its breadth. We need to find the length and breadth of the plot. [3]
2. The product of two consecutive positive integers is 306. We need to find the integers. [3]
3. Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age. [3]
4. Find the roots of the quadratic equation $6x^2 – x – 2 = 0$. [2]
5. Find two numbers whose sum is 27 and product is 182.[2]
6. Find two consecutive positive integers, sum of whose squares is 365. [2]
7. Find the roots of the equation $5x^2 – 6x – 2 = 0$ by the method of quadratic formula . [3]
8. Find the roots of the following quadratic equations, if they exist, using the quadratic formula:
   (i) $3x^2 – 5x + 2 = 0$ (ii) $x^2 + 4x + 5 = 0$ (iii) $2x^2 – 2\sqrt{2}x + 1 = 0$ [2+2+2]
9. In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of their marks would have been 210. Find her marks in the two subjects. [3]
10. Find the values of k for each of the following quadratic equations, so that they have two equal roots.
    (i) $2x^2 + kx + 3 = 0$ (ii) $kx (x – 2) + 6 = 0$ [2+2]

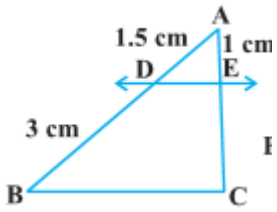
11. Sum of the areas of two squares is 468 m2. If the difference of their perimeters is 24 m, find the sides of the two squares. [3]

ARITHMETIC PROGRESSION

1. Find the 10th term of the AP : 2, 7, 12, . . . [2]
2. Which term of the AP : 21, 18, 15, . . . is – 81? Also, is any term 0? Give reason for your answer. [3]
3. Determine the AP whose 3rd term is 5 and the 7th term is 9. [2]
4. Check whether – 150 is a term of the AP : 11, 8, 5, 2 . . . [2]
5. The 17th term of an AP exceeds its 10th term by 7. Find the common difference. [2]
6. Which term of the AP : 3, 15, 27, 39, . . . will be 132 more than its 54th term? [3]
7. How many three-digit numbers are divisible by 7? [3]
8. How many multiples of 4 lie between 10 and 250? [2]
9. Find the sum of first 22 terms of an AP in which d = 7 and 22nd term is 149. [2]
10. Find the sum of first 51 terms of an AP whose second and third terms are 14 and 18 respectively. [3]
11. Find the sum of the first 40 positive integers divisible by 6. [2]
12. Find the sum of the first 15 multiples of 8. [2]
13. Find the sum of the odd numbers between 0 and 50. [2]

TRIANGLES

Q.1: In the given figure, DE || BC. Find EC. (1)



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Q.8: State and prove Basic Proportionality Theorem. (4)

COORDINATE GEOMETRY

Q.1: Find the distance between the given pairs of points (a, b), (– a, – b) (1)

Q.2: Find the length of all the sides of a triangle whose vertices are (1, –1), (– 4, 6) and (–3, –5). (1)

Q.4: Find the coordinates of a point A, where AB is the diameter of a circle whose centre is (2, –3) and B is (1, 4). (2)

Q.5: Find the coordinates of the point which divides the join of (–1, 7) and (4, –3) in the ratio 2 : 3. (2)

Q.6: Find the point on the x-axis which is equidistant from (2, –5) and (–2, 9). (3)

Q.8: Find a relation between x and y such that the point (x, y) is equidistant from the point (3, 6) and (– 3, 4). (3)

Q.9: Show that the points (1, 7), (4, 2), (–1, –1) and (– 4, 4) are the vertices of a square. (3)

Q.10: Find the ratio in which the line segment joining A(1, – 5) and B (–4, 5) is divided by the x-axis. Also find the coordinates of the point of division. (4)

INTRODUCTION TO TRIGONOMETRY

Q.1: In Δ ABC, right-angled at B, AB = 24 cm, BC = 7 cm. Find: sin A, cosA. (2)

Q.2: If sin A = 3 / 4 calculate tan A. (2)

Q.3: Evaluate $2 \tan^2 45° + \cos^2 30° – \sin^2 60°$ (2)

Q.4: Show that $\cos 30° \cos 60° – \sin 30° \sin 60° = 0$ (2)

Q.6: If $\sin (A – B) = 1/2$ $\cos (A + B) = 1/2$ where $0° < A + B \leq 90°$, $A > B$, find A and B. (3)

Q.7: Prove that $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$ (3)

Q.8: Prove that :

$\sec A (1 – \sin A)(\sec A + \tan A) = 1$. (3)

Q.10: Prove that :

$(\text{cosec}\ \theta - \cot\theta)^2 = \frac{1 - \cos\theta}{1 + \cos\theta}$ (3)

SOME APPLICATIONS OF TRIGONOMETRY

Q.1: A tower stands vertically on the ground. From a point on the ground, which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower. (2)

Q.2: A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole, if the angle made by the rope with the ground level is 30°. (2)

Q.3: The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it is 60°. Find the height of the tower. (3)

Q.4: From a point on the ground, the angles of elevation of the bottom and the top of a transmission tower fixed at the top of a 20 m high building are 45° and 60° respectively. Find the height of the tower. (4)

Q.5: The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building. (4)

Q.6: From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower. (4)

Q.7: The angles of depression of two ships from the top of a lighthouse and on the same side of it are found to be 45° and 30°. If the ships are 200 m apart , find the height of the lighthouse. (4)

CIRCLES

Q.1: How many tangents can a circle have? (1)

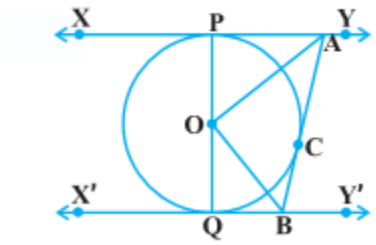
Q.2: A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Find PQ . (1)

Q.3: Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact. (3)

Q.4: Prove that the lengths of tangents drawn from an external point to a circle are equal. (3)

Q.5: A quadrilateral ABCD is drawn to circumscribe a circle .Prove that AB + CD = AD + BC (3)

Q.6: In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B. Prove that ∠ AOB = 90°. (4)



Q.7: Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre. (4)

Q.8: Prove that the parallelogram circumscribing a circle is a rhombus. (3)

AREAS RELATED TO CIRCLES

1) Write the formula to find area of a sector of a circle.
2) Find the area covered by the minute hand 7 cm long when it moves from 2 to 5.
3) Find the area of the quadrant of a circle of diameter 14cm.
4) Find the area of minor segment of quadrant of a circle of radius 7cm.

↙

5) The area of a circle is 154cm^2. Find the length of arc making an angle 60° at the centre.

6) Find the area of the sector of a circle with radius 14cm and angle 30°.

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SURFACE AREAS AND VOLUMES

1. 2 cubes each of volume 64 cm3 are joined end to end. Find the surface area of the resulting cuboid.
2. From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid to the nearest cm^2.
3. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π.
4. A vessel is in the form of an inverted cone. Its height is 8 cm and the radius of its top, which is open, is 5 cm. It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5 cm are dropped into the vessel, one-fourth of the water flows out. Find the number of lead shots dropped in the vessel.

5. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.

STATISTICS

1. A survey was conducted by a group of students as a part of their environment awareness programmed in which they collected the following data regarding the number of plants in 20 houses in a locality. Find the mean number of plants per house.

No. of plants	100-150	150-200	200-250	250-300	300-350
No. of houses	4	5	12	2	2

2. The following table shows the ages of the patients admitted in a hospital during a year:

Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65
No. of participants	6	11	21	23	14	5

Find the mode and the mean of the data given above. Compare and interpret the two measures of central tendency.

3. The distribution below gives the weights of 30 students of a class. Find the median weight of the students.

Weight in kg	40-45	45-50	50-55	55-60	60-65	65-70	70-75
No. of students	2	3	8	6	6	3	2

4. The following distribution gives the daily income of 50 workers of a factory.

Daily income (in Rs.)	100-120	120-140	140-160	160-180	180-200
No. of workers	12	14	8	6	10

Find mean , median and mode.

5. The following table gives production yield per hectare of wheat of 100 farms of a village.

Production yield (in kg/ha)	50-55	55-60	60-65	65-70	70-75	75-80
No. of farms	2	8	12	24	38	16

Find mean , median and mode.

PROBABILITY

1. Find the probability of getting a head when a coin is tossed once. Also find the probability of getting a tail.

2. A box contains 3 blue, 2 white, and 4 red marbles. If a marble is drawn at random from the box, what is the probability that it will be (i) white? (ii) blue? (iii) red?
3. If P(E) = 0.05, what is the probability of 'not E'?
4. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is (i) red ?(ii) not red?
5. A box contains 5 red marbles, 8 white marbles and 4 green marbles. One marble is taken out of the box at random. What is the probability that the marble taken out will be
   (i) red ? (ii) white ? (iii) not green?

6. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:

   (i) a king of red colour (ii) a face card (iii) a red face card

   (iv) the jack of hearts (v) a spade (vi) the queen of diamonds

6. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting:

   (i) a queen of blackcolour (ii) a face card (iii) a red face card

   (iv) the jack of hearts (v) a spade (vi) the queen of diamonds

7. A die is thrown twice. What is the probability that
   (i) 5 will not come up either time? (ii) 5 will come up at least once?

8. A lot of 20 bulbs contain 4 defective ones. One bulb is drawn at random from the lot. What is the probability that this bulb is defective?

ANSWERS

NUMBER SYSTEM

1. HCF = 4
2. (i) 45 (ii) 196 (iii) 51
3. Show
4. LCM =60 , HCF = 2
5. LCM =360, HCF =6
6. 22338
7. Show

8. Show
9. Prove
10. Prove

POLYNOMIALS

1. -2 and -5
2. √3 and -√3
3. $x^2 + 3x + 2$
4. (i) -2,4 (ii) 1/2 ,1/2 (iii) -1/3 , 3/2
5. (i) $2x^2 + 5$ (ii) $x^2 – x - 1$ (iii) $3x^2 + 12x + 1$

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1. YES, x=6 and y =0
2. L=20m and B=16m
3. (-1,0) , (4,0) , (2,3)
4. x = 49/29 , y = 19/29
5. x=-2 , y=5 , m=-1
6. x=40 years, y=10 years
7. x=23/8 ,y=3/4
8. x=Rs 15, y= Rs 3
9. (i) a=5 ,b=1 (ii) k=2
10. x=1/2, y=1

QUADRATIC EQUATIONS

1. L= 33m , B=16 m
2. 17 and 18
3. 7 years
4. 2/3, -1/2
5. 13 and 14
6. 13 and 14
7. (3+√19)/5 ,(3-√19)/5
8. (i) 2/3 ,1 (ii) no real roots (iii) 1/√2 , 1/√2
9. 12,18 or 13,17
10. (i) K=±2√6 (ii) k=6
11. 18 m ,12m

ARITHMETIC PROGRESSION

1. 47
2. (I) n=35 (II) n=8
3. 3,4,5…….
4. No
5. 1
6. 65th term
7. 128
8. 60
9. 1661
10. 5610
11. 4920
12. 960
13. 625

TRIANGLES

(1)2 cm

COORDINATE GEOMETRY

(1)2√a^2+b^2 (2) 2√37 units, 2√61 units, 4√2 units (4) (3,-10) (5)(1,3) (6) (-7,0) (8)3x+y-5=0 (10)1:1 , (-3/2,0)

TRIGONOMETRY

(1) sin A=7/25,cos A=24/25 (2)tan A=3/√7 (3)2 (6)A=45^0,B=15^0

SOME APPLICATIONS OF TRIGONOMETRY

(1)15√3 m (2) 10m (3) 20√3m (4) 20(√3-1)m (5)50/3 m (6) 7(√3+1)m (7) 100(√3+1)m

CIRCLES

(1)Infinitely many (2) √119m

AREAS RELATED TO CIRCLES

(1) $\frac{\theta}{360}\times\pi r^2$
(2) $38.5cm^2$
(3) $38.5cm^2$

(4) 14cm^2

(5) $\frac{22}{3}\text{cm}$

(6) $\frac{154}{3}\text{cm}^2$

SURFACE AREA AND VOLUME:

1. 160 cm^2
2. 18 cm^2
3. π cm^3
4. 100
5. 10

STATISTICS:

1. 211 plants
2. Mode = 36.8 years and Mean = 35.37 years
3. Median weight= 56.67 kg
4. Mean = Rs.145.2, Median = Rs.138.57 and Mode = Rs.125
5. Mean = 69.3 ha, Median = 70.5 ha and Mode = 71.9 ha

PROBABILITY:

1. (i) 1/2 (ii) 1/2
2. (i) 2/9 (ii) 1/3 (iii) 4/9
3. 0.95
4. (i) 3/8 (ii) 5/8
5. (i) 5/17 (ii) 8/17 (iii) 13/17
6. (i) 1/26 (ii) 3/13 (iii) 3/26
   (iv) 1/52 (v) 1/43 (vi) 1/52
7. (i) 25/36 (ii) 11/36
8. 1/5