Class X Maths

Most Important Questions (2020)

Chapter 1: Real Numbers

1. By what number should 1365 be divided to get 31 as the quotient and 32 as the remainder? [2]

2. Using Euclid's algorithm, find the HCF of 405 and 2520. [2]

3. If HCF (26, 169) = 13, then find LCM (26, 169). [2]

4. Given that $\sqrt{2}$ is irrational, prove that $5 + 3\sqrt{2}$ is an irrational number. [2]

5. Three sets of English, Mathematics and Science books containing 336, 240 and 96 books, respectively, have to be stacked in such a way that all the books are stored subject wise and the height of each stack is the same. How many stacks will be there? [3]

6. Without actually performing long division, state whether the following rational numbers will have a terminating decimal expansion or a non-terminating repeating decimal expansion:

    (i) $\dfrac{13}{3125}$ (ii) $\dfrac{17}{8}$ [4]

7. Prove that $\sqrt{6}$ is irrational. [4]

8. Find the largest number which divides 378 and 510 leaving the remainder 6 in each case. [4]

Chapter 2: Polynomials

1. Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder.
    $p(x) = x^3 - 3x^2 + 5x - 3, g(x) = x^2 - 2$ [3]

2. Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{\dfrac{5}{3}}$ and $-\sqrt{\dfrac{5}{3}}$. [4]

3. If $\dfrac{2}{3}$ and -3 are the zeroes of the polynomial ax² + 7x + b, then find the values of a and b. [3]

4. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be x + a. Find k and a. [4]

Chapter 3: Pair of Linear Equations

1. Solve the following system of equations graphically:

   2x + 3y = 2

   x − 2y = 8   [4]

2. 2 men and 5 boys complete a piece of work in 4 days, while 3 men and 6 boys complete it in 3 days. Find the time taken by one man alone and one boy alone to complete the work.   [4]

3. A boat goes 12 km upstream and 40 km downstream in 8 hours. It can go 16 km upstream and 32 downstream in the same time. Find the speed of the boat in still water and the speed of the stream.   [4]

4. A fraction becomes $\frac{1}{3}$, if 2 is added to both its numerator and denominator. If 3 is added to both its numerator and denominator, then it becomes $\frac{2}{5}$. Find the fraction.   [4]

Chapter 4: Quadratic Equations

1. Find the discriminant of the following equation: $3x^2 - 2x + 8 = 0$ [1]

2. Find the value of k for which x = 1 is a root of the equation $x^2 + kx + 3 = 0$.   [1]

3. Using completing the square method, show that the equation $x^2 - 8x + 18 = 0$ has no solution. [2]

4. Show that the following equation has real roots, and solve by using the quadratic formula:
   $3x^2 - 32x + 12 = 0$ [2]

5. Solve the following quadratic equation:
   $x^2 - \left(1 + \sqrt{2}\right)x + \sqrt{2} = 0$
                                                                                                  [2]

6. Solve the quadratic equation by the formula method.

   $x^2 + 3x - 7 = 0$ [2]

7. A sailor can row a boat 8 km downstream and return to the start point in 1 hour 40 minutes. If the speed of the stream is 2 kmph, then find the speed of the boat in still water.   [4]

8. Solve the following quadratic equation:
   $\frac{(x-3)}{(x+3)} - \frac{(x+3)}{(x-3)} = 6\frac{6}{7}, (x \neq -3,3)$ [4]

Chapter 5: Arithmetic Progression

1. Find the 6th term from the end of the AP 5, 7, 9,....201. [2]

2. The sum of three numbers in AP is 3 and their product is −35. Find the common difference. [2]

3. The 7th term of an AP is -4 and its 13th term is -16. Find the AP. [3]

4. If the pth term of an AP is q and its qth term is p, then show that its $(p + q)$th term is zero. [3]

5. The 4th term of an AP is zero. Prove that its 25th term is triple its 11th term. [3]

6. How many terms of the AP : 24, 21, 18,... must be taken so that their sum is 78? [3]

7. 200 logs are stacked in such a way that there are 20 logs in the bottom row, 19 in the next row, 18 in the next row, and so on. In how many rows 200 logs are placed and how many logs are present in the top now? [4]

8. The sum of n terms of two A.P.'s are in the ratio 3n + 5:5n + 7. Then, find the ratio of their nth term. [4]

9. The sum of three terms of an A.P. is 21 and the product of the first and the third terms exceeds the second term by 6, find three terms. [4]


Chapter 6: Triangles

1. Given $\Delta ABC \sim \Delta PQR$, if $\dfrac{AB}{PQ} = \dfrac{4}{9}$ then find $\dfrac{ar\Delta ABC}{ar\Delta PQR}$. [1]

2. In the given figure, $\Delta OAB \sim \Delta OCD$. If AB = 8 cm, BO = 6.4 cm, OC = 3.5 cm and CD = 5 cm, find (i) OA and (ii) DO. [3]
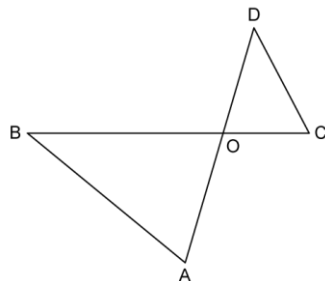
3. In the given figure, O is a point inside ΔPQR such that $\angle POR = 90°$, OP = 6 cm and OR = 8 cm. If PQ = 24 cm and QR = 26 cm, prove that ΔPQR is right angled. [3]
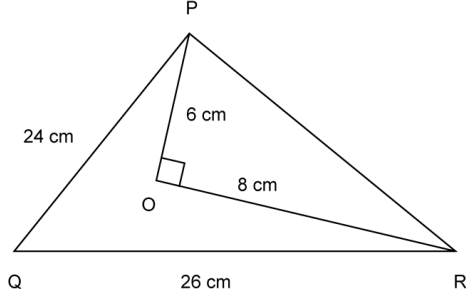
4. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, prove that the other two sides are divided in the same ratio. [4]

5. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides. [4]

6. AD is a median of a triangle ABC and AM is perpendicular to BC. Prove that
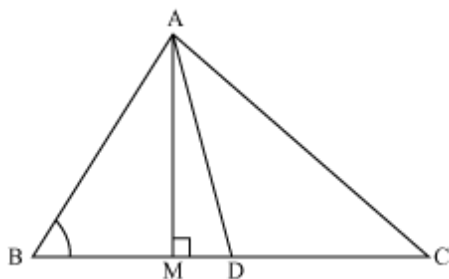
    i. $AC^2 = AD^2 + BC \cdot DM + \left(\dfrac{BC}{2}\right)^2$

    ii. $AB^2 = AD^2 - BC \cdot DM + \left(\dfrac{BC}{2}\right)^2$

    iii. $AC^2 + AB^2 = 2AD^2 + \dfrac{1}{2}BC^2$ [4]

Chapter 7: Coordinate Geometry

1. Show that the points P(a, b + c), Q(b, c + a) and R(c, a + b) are collinear. [3]

2. The line segment joining the points (3, -4) and (1, 2) is trisected at points P(a, -2) and $Q\left(\dfrac{5}{3}, b\right)$ then find the values of a and b. [3]

3. If A(6, -1), B(1, 3) and C(k, 8) are three points such that AB = BC, find the value of k. [3]

4. Given figure shows the arrangement of desks in a classroom. Anita, Atharva and Atish are seated at A, B and C respectively. Do you think they are seated in a line? Give reasons for your answer.

[3]
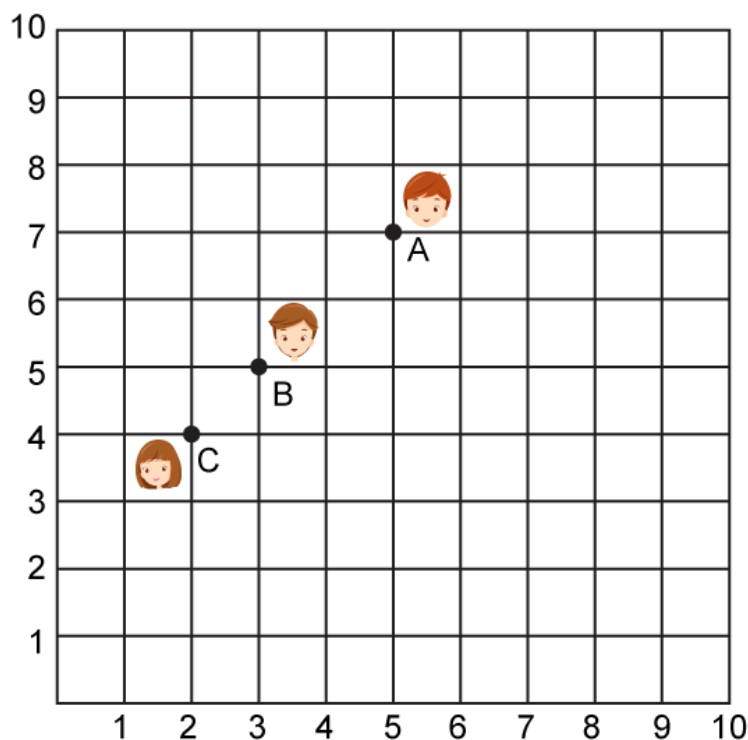
5. Show that the points A(2, 1), B(5, 2), C(6, 4) and D(3, 3) are the angular points of a parallelogram. Is this figure a rectangle? [4]

6. Find the ratio in which the point P(m, 6) divides the line joining A(-4, 3) and B(2, 8). Also, find the value of m. [4]

7. A(-4, -2), B(-3, -5), C(3, -2) and D(2, k) are the vertices of a quadrilateral ABCD. Find the value of k if the area of the quadrilateral is 28 sq. units. [4]

Chapter 8: Introduction to Trigonometry

1. Show that $(\sin 72° + \cos 18°)(\sin 72° - \cos 18°) = 0$ [1]

2. If $\triangle ABC$ is right angled at C, then find the value of $\cos (A + B)$. [1]

3. If $\operatorname{cosec} \theta = 3x$ and $\cot \theta = \dfrac{3}{x}$, then find the value of $3\left(x^2 - \dfrac{1}{x^2} \right)$. [2]

4. Prove that $\dfrac{1 + \sec\theta - \tan\theta}{1 + \sec\theta + \tan\theta} = \dfrac{1 - \sin\theta}{\cos\theta}$ [4]

5. If $\tan \theta = \dfrac{1}{\sqrt{7}}$, show that $\dfrac{\left(\operatorname{cosec}^2\theta - \sec^2\theta \right)}{\left(\operatorname{cosec}^2\theta + \sec^2\theta \right)} = \dfrac{3}{4}$ [4]

6. If $x = \cot A + \cos A$ and $y = \cot A - \cos A$, then show that $\left(\dfrac{x-y}{x+y} \right)^2 + \left(\dfrac{x-y}{2} \right)^2 = 1$ [4]

Chapter 9: Some Applications of Trigonometry

1. A tower stands vertically on the ground. From a point on the ground which is 20 m away from the foot of the tower, the angle of elevation of its top is found to be 60°. Find the height of the tower. $\left[\text{Take } \sqrt{3} = 1.732 \right]$ [3]

2. As observed from the top of a lighthouse, 100 m above sea level, the angle of depression of a ship sailing directly towards the lighthouse changes from 30° to 60°. Determine the distance travelled by the ship during the period of observation. $\left[\text{Take } \sqrt{3} = 1.732 \right]$ [3]

3. Two windmills of height 50 m and 40 m are on either side of the field. A person observes the top of the windmills from a point in between the towers. The angle of elevation was found to be 45° in both the cases. Find the distance between the windmills. [3]
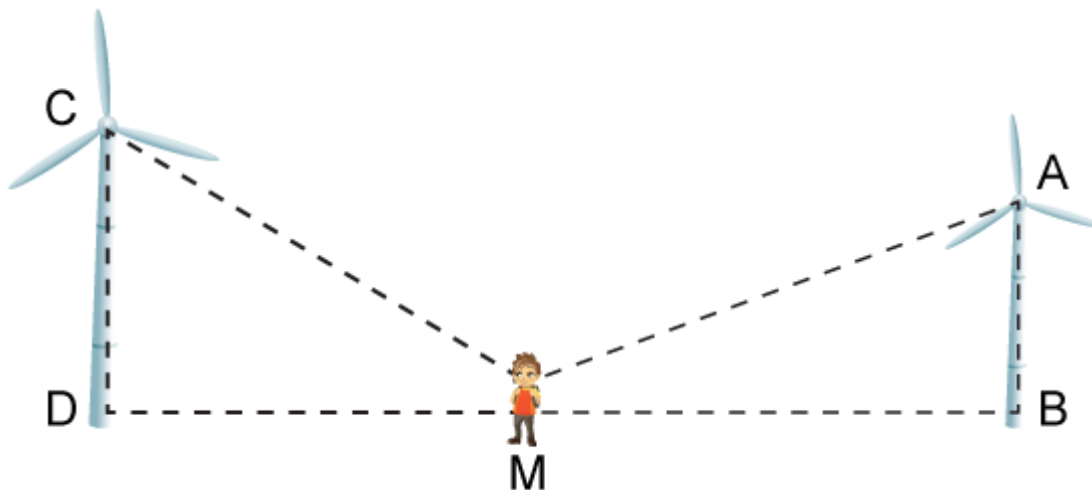

4. The angle of elevation of a jet plane from a point A on the ground is 60°. After a flight of 15 seconds, the angle of elevation changes to 30°. If the jet plane is flying at a constant height of $1500\sqrt{3}m$, find the speed of the jet plane. [4]

5. The angle of elevation of the top of a building from a point A on the ground is 30°. On moving a distance of 30 m towards its base to a point B, the angle of elevation changes to 45°. Find the height of the building and the distance of its base from the point A. $\left[\text{Take } \sqrt{3} = 1.732 \right]$ [4]

Chapter 10: Circles

1. Prove that the lengths of the tangents drawn from an external point to a circle are equal. [3]

2. Out of the two concentric circles, the radius of the outer circle is 5 cm and the chord AC of length 8 cm is a tangent to the inner circle. Find the radius of the inner circle. [4]

3. Prove that the tangents drawn at the end points of a chord of a circle make equal angles with the chord. [3]

4. In Fig.3, from an external point P, two tangents PT and PS are drawn to a circle with centre O and radius r. If OP = 2r, show that $\angle OTS = \angle OST = 30°$. [4]
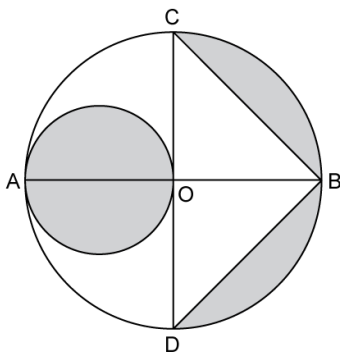

Figure 3
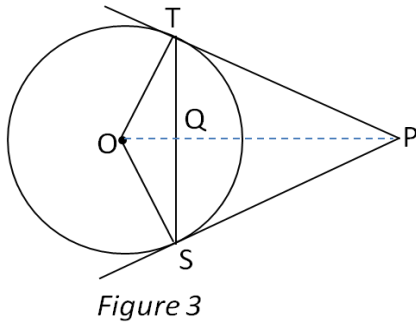
Chapter 11: Constructions

1. Construct a $\triangle ABC$ in which BC = 5 cm, CA = 6 cm and AB = 7 cm. Construct a $\triangle A'BC'$ similar to $\triangle ABC$, each of whose sides is $\dfrac{7}{5}$ times the corresponding sides of $\triangle ABC$. [4]

2. Draw a circle of radius 4.2 cm. Draw a pair of tangents to this circle inclined to each other at an angle of 45°. [4]

3. Construct a $\triangle ABC$ in which BC = 6.5 cm, AB = 4.5 cm and $\angle ABC = 60°$. Construct a triangle similar to this triangle whose sides are $\dfrac{3}{4}$ of the corresponding sides of $\triangle ABC$. [4]

Chapter 12: Areas Related to Circles

1. The areas of two concentric circles are 962.5 cm^2 and 1386 cm^2. Find the width of the ring. [3]

2. In the given figure, AB is a diameter of a circle with centre O and OA = 7 cm. Find the area of the shaded region. [4]

3. Find the area of the shaded region shown in the given figure. The four corners are circle quadrants, and at the centre, there is a circle. (Take π = 3.14) [4]


1 cm   1 cm
2 cm
4 cm
1 cm   1 cm
4 cm
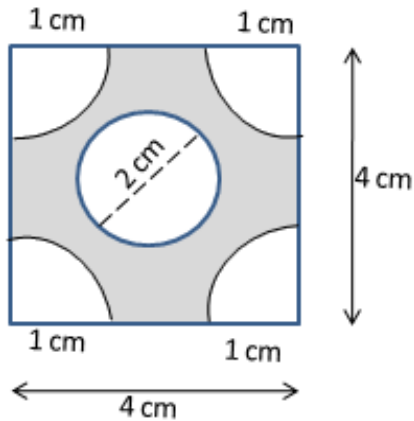
4. A lawn is rectangular in the middle, and it has semicircular portions along the shorter sides of the rectangle. The rectangular portion measures 50 m by 35 m. Find the area of the lawn. [4]

Chapter 13: Surface Areas and Volumes

1. A bucket made of a metal sheet is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends as 8 cm and 20 cm, respectively. Find the cost of the bucket if the cost of the metal sheet used is Rs. 15 per 100cm^2. Use $\pi = 3.14$. [3]

2. A solid metal cone with radius of base 5 cm and height 12 cm is melted to form solid spherical balls of diameter 4 cm each. The number of balls will be formed? [3]

3. Renuka is 12 years old girl. On the result day, Renuka and her father Ashok were very happy as she got first position in the class. While coming back to their home, Renuka asked for a treat from her father as a reward for her success. They went to a juice shop and asked for two glasses of juice.
Rani, a juice seller, was serving juice to her customers in two types of glasses. Both the glasses had inner radius 6 cm. The height of both the glasses was 12 cm.

First type : A glass with hemispherical raised bottom.
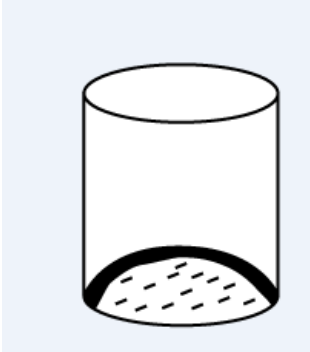
Second type : A glass with conical raised bottom of height 3 cm.
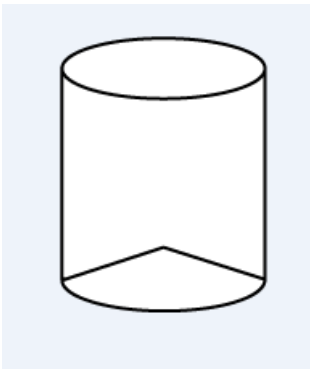
Rani insisted to have the juice in first type of glass and her father decided to have the juice in second type of glass. Out of two, Renuka or her father Ashok, who got more quantity of juice to drink and by how much? [3]

4. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 98 cm and the diameter of each of its hemispherical ends is 28 cm, find the cost of polishing the surface of the solid at the rate of 15 paise per sq. cm. Use $\pi = \dfrac{22}{7}$. [4]

5. A farmer connects a pipe of internal diameter 25 cm from a canal to a cylindrical tank in his field which is 12 m in diameter and 2.5 m deep. If water flows through the pipe at the rate of 3.6 km/h, in how much time will the tank be filled? Also, find the cost of water if the water supply department charges at the rate of Rs. 0.07 m^3. Use $\pi = \dfrac{22}{7}$. [4]

6. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the figure. If the height of the cylinder is 12 cm and its base is of radius 4.2 cm, find the total surface area of the wooden article. Also, find the volume of the wood left in the article. Use $\pi = \dfrac{22}{7}$. [4]

Chapter 14: Statistics

1. Find the mean using the direct method: [2]

Class	Frequency
10–20	11
20–30	15
30–40	20
40–50	30
50–60	14
60–70	10

2. Based on the below graph answer the following questions :
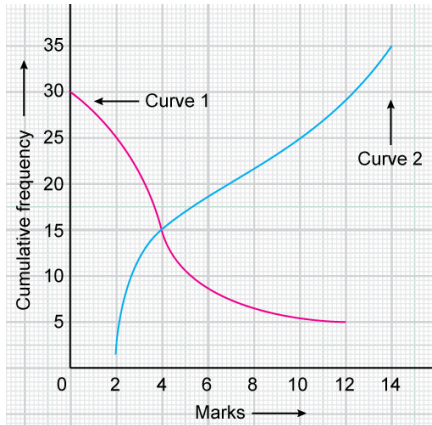
i. Identify less than type ogive and more than type ogive from the given graph.
ii. Find the median.
iii. Obtain the mode of the data if mean is 5. [3]

3. Following is the distribution of marks of 70 students in a periodical test:

Marks	No. of students
Marks less than 10	3
Marks less than 20	11
Marks less than 30	28
Marks less than 40	48
Marks less than 50	70

Draw a cumulative frequency curve for the above data and find the median. [4]

4. Find the missing frequencies f_1 and f_2 in the table given below. It is given that the mean of the given frequency distribution is 50. [4]

Class	Frequency
0–20	17
20–40	f_1
40–60	32
60–80	f_2
80–100	190
Total	120

5. From the following frequency distribution, prepare the 'more than ogive'.

Score	No. of candidates
400–450	20
450–500	35
500–550	40
550–600	32
600–650	24
650–700	27
700–750	18
750–800	34
Total	230

Also find the median. [4]

6. Calculate the median from the following frequency distribution: [4]

Class	Frequency
5–10	5
10–15	6
15–20	15
20–25	10
25–30	5
30–35	4
35–40	2
40–45	2

Chapter 15: Probability

1. 250 lottery tickets were sold and there are 5 prizes on these tickets. If Kunal has purchased one lottery ticket, what is the probability that he wins a prize? [2]

2. A game consists of tossing a one rupee coin 3 times and nothing its outcome each time. Harsh wins if all the tosses give the same result. i.e. three heads or three tails, and loses otherwise. Calculate the probability that Harsh will lose the game. [2]

3. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability of drawing (i) a face card, (ii) a card which is neither a king nor a red card. [3]

4. Two dice are thrown simultaneously. What is the probability that
    (i)   5 will not come up on either of them
    (ii) 5 will not come up on at least one
    (iii) 5 will come up at both dice [3]

5. Tickets numbered 2, 3, 4, 5, ..., 100, 101 are placed in a box and mixed thoroughly. One ticket is drawn at random from the box. Find the probability that the number on the ticket is
    (i)   An even number
    (ii)   A number less than 16
    (iii) A number which is a perfect square
    (iv) A prime number less than 40 [4]