MATHEMATICS QUESTION BANK CLASS X

Chapter-1 Number System

1. What is the HCF of smallest prime number and the smallest composite number?
2. Given that $\sqrt{2}$ is irrational, prove that $(5 + 3\sqrt{2})$ is an irrational number.
3. Find HCF and LCM of 404 and 96 and verify that HCF × LCM = Product of the two given numbers.
4. Write whether $\frac{2\sqrt{45}+3\sqrt{20}}{2\sqrt{5}}$ on simplification gives an irrational or a rational number.
5. Given that $\sqrt{3}$ is an irrational number, prove that $(2 + \sqrt{3})$ is an irrational number.
6. Using Euclid's division algorithm find the HCF of the numbers 867 and 255.
7. Write whether the rational number 7/75 will have a terminating decimal expansion or a or-terminating repeating decimal expansion.
8. If two positive integers p and q are written as $p=a^2b^3$and $q=a^3b$ are prime numbers, then verify: LCM (p, q) × HCF (p, q) = pq
9. Show that exactly one of the numbers n, n + 2 or n + 4 is divisible by 3.

Chapter-2 Algebra

1. If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k.
2. In an AP, if the common difference (d) = –4, and the seventh term (a_7) is 4, then find the first term.
3. In Fig. 1, ABCD is a rectangle. Find the values of x and y.

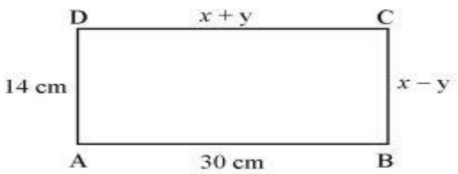


Fig. – 1

4. Find the sum of first 8 multiples of 3.
5. Find all zeroes of the polynomial $(2x^4 - 9x^3 + 5x^2 + 3x - 1)$ if two of its zeroes are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$.
6. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.
7. A motor boat whose speed is 18 km/hr in still water takes 1hr more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

   OR

   A train travels at a certain average speed for a distance of 63 km and then travels at a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete total journey, what is the original average speed?
8. The sum of four consecutive numbers in an AP is 32 and the ratio of the product of the first and the last term to the product of two middle terms is 7 : 15. Find the numbers.
9. If $x = a$, $y = b$ is the solution of the pair of equations $x - y = 2$ and $x + y = 4$, find the values of a and b.
10. If one root of $5x^2 + 13x + k = 0$ is the reciprocal of the other root, then find value of k.
11. Divide 27 into two parts such that the sum of their reciprocals is 3/20.
12. In an A.P if sum of its first n terms is $3n^2 + 5n$ and its k^{th} term is 164, find the value of k.
13. For what values of m and n the following system of linear equations has infinitely many solutions.
    $3x + 4y = 12$
    $(m + n)x + 2(m - n)y = 5m - 1$
14. Obtain all zeroes of $3x^4 - 15x^3 + 13x^2 + 25x - 30$, if two of its zeroes are $\sqrt{5/3}$ and $-\sqrt{5/3}$.

15. A faster train takes one hour less than a slower train for a journey of 200 km. If the speed of slower train is 10 km/hr less than that of faster train, find the speeds of two trains.

OR

Solve for x

$\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, , a≠ 0, b≠ 0, x≠ 0

16. Find the value(s) of k, if the quadratic equation$3X2 - K\sqrt{3}X + 4 = 0$ has equal roots.

17. Find the eleventh term from the last term of the AP: 27, 23, 19, ..., –65.

18. The sum of first n terms of an AP is given by $S_n=2n^2 +3n$. Find the sixteenth term of the AP.

19. Find the value(s) of k for which the pair of linear equations kx + y = k^2 and x + ky = 1 have infinitely many solutions.

20. Find all the zeroes of the polynomial $3x^4+6x^3-2x^2-10x-5$if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

21. Seven times a two digit number is equal to four times the number obtained by reversing the order of its digits. If the difference of the digits is 3, determine the number.

22. A train travelling at a uniform speed for 360 km would have taken 48 minutes less to travel the same distance if its speed were 5 km/hour more. Find the original speed of the train.

OR

Check whether the equation $5x^2 – 6x – 2 = 0$ has real roots and if it has, find them by the method of completing the square. Also verify that roots obtained satisfy the given equation.

23. An AP consists of 37 terms. The sum of the three middle most terms is 225 and the sum of the last three terms is 429. Find the AP.

Chapter-3 Co-ordinate Geometry

1. Find the distance of a point P(x, y) from the origin

2. Find the ratio in which P (4, m) divides the line segment joining the points A(2, 3) and B(6, –3). Hence find m.

3. If A(–2, 1), B(a, 0), C(4, b) and D (1, 2) are the vertices of a parallelogram ABCD, find the values of a and b. Hence find the lengths of its sides.

OR

If A(–5, 7), B(–4, –5), C(–1, –6) and D(4, 5) are the vertices of a quadrilateral, find the area of the quadrilateral ABCD.

4. A(5, 1); B(1, 5) and C(–3, –1) are the vertices of ΔABC. Find the length of median AD.

5. Find the linear relation between x and y such that P(x, y) is equidistant from the points A(1, 4) and B(–1, 2).

6. If coordinates of two adjacent vertices of a parallelogram are (3, 2), (1, 0) and diagonals bisect each other at (2, –5), find coordinates of the other two vertices.

OR

If the area of triangle with vertices (x, 3), (4, 4) and (3, 5) is 4 square units, find x.

7. Find the coordinates of the point on y-axis which is nearest to the point (–2, 5).

8. If $\left(1, \frac{p}{3}\right)$ is the mid-point of the line segment joining the points (2, 0) and$\left(0, \frac{2}{9}\right)$, then show that the line 5x + 3y + 2 = 0 passes through the point (–1, 3p).

9. In what ratio does the x-axis divide the line segment joining the points (–4, –6) and (–1, 7)? Find the co-ordinates of the point of division.

OR

The points A(4, –2), B(7, 2), C(0, 9) and D(–3, 5) form a parallelogram. Find the length of the altitude of the parallelogram on the base AB

Chapter-4 Trigonometry

1. What is the value of $(\cos^2 67° - \sin^2 23°)$?

2. If $4 \tan\theta = 3$, evaluate $\left(\frac{4\,sin\theta - cos\theta + 1}{4\,sin\theta + cos\theta - 1}\right)$

OR

If tan 2A = cot (A – 18°), where 2A is an acute angle, find the value of A

3. Prove that : $\frac{Sin\,A - 2Sin^3\,A}{2Cos^3\,A - Cos\,A} = \tan A$

4. A, B, C are interior angles of ΔABC. Prove that $\text{cosec}\frac{A+B}{2} = \sec C/2$

5. Prove that

$$\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right) = \left(\frac{1-\tan A}{1-\cot A}\right)^2 = \tan^2 A$$

OR

Evaluate

$$\frac{\cos 58°}{\sin 32°} + \frac{\sin 22°}{\cos 68°} - \frac{\cos 38° \,\text{cosec}\, 52°}{\sqrt{3}\,(\tan 18° \tan 35° \tan 60° \tan 72° \tan 55°)}$$

6. If $\sin\ (A + 2B) = \frac{\sqrt{3}}{2}$ and cos (A + 4B) = 0, A > B, and A + 4B ≤ 90°, then find A and B.

7. If $\cos A = \frac{2}{5}$, find the value of $4 + 4\tan^2 A$

8. Evaluate: $\frac{cosec^2 63^0 + tan^2 24^0}{cot^2\ 66^0 + sec^2 27^0} + \frac{sin^2\ 63^0 + cos63^0 sin27^0 + sin27^0 \sec 63^0}{2(cosec^2 65^0 + tan^2 25^0\ )}$

OR

If $Sin\theta + Cos\theta = \sqrt{2}$, then evaluate : tan θ + cot θ .

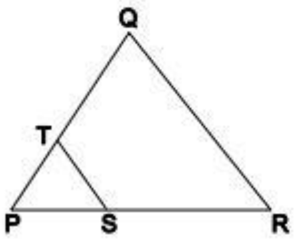
9. Prove that $\frac{COS\theta - sin\theta + 1}{cos\theta + sin\theta - 1} = cosec\theta + cot\theta$

Chapter -5 Similar Triangle

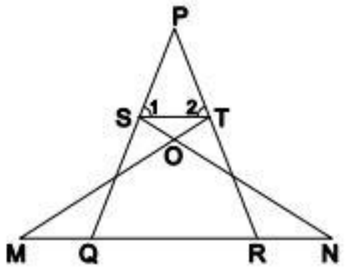
1. Given Δ ABC ~ Δ PQR, if $\frac{AB}{PQ} = \frac{1}{3}$, then find $\frac{ar\ \Delta ABC}{ar\ \Delta PQR}$
2. Prove that the area of an equilateral triangle described on one side of the square is equal to half the area of the equilateral triangle described on one of its diagonal.

   OR

   If the area of two similar triangles are equal, prove that they are congruent.
3. In an equilateral Δ ABC, D is a point on side BC such that BD = 1/3 BC. Prove that $9(AD)^2 = 7(AB)^2$.
4. If Δ ABC ~ ΔQRP, $\frac{ar(\Delta ABC)}{ar(\Delta QRP)} = \frac{9}{4}$, and BC = 15 cm, then find PR.
5. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
6. In given figure, ST || RQ, PS = 3 cm and SR = 4 cm. Find the ratio of the area of Δ PST to the area of Δ PRQ

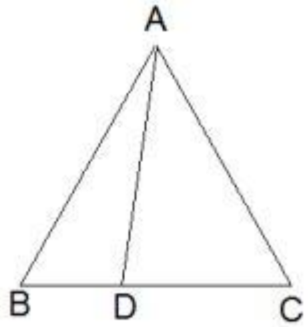


7. In given figure $\angle = \angle \Delta \cong \Delta$ 1 2 and NSQ MTR , then prove that $\Delta \Delta$ PTS ~ PRQ .



OR

In an equilateral triangle ABC, D is a point on the side BC such that BD = $\frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$.



8. Show that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

OR

9. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides

Chapter-6 Tangent To a Circle

1. Prove that the lengths of tangents drawn from an external point to a circle are equal.
2. X is a point on the side BC of ΔABC. XM and XN are drawn parallel to AB and AC respectively meeting AB in N and AC in M. MN produced meets CB produced at T. Prove that $TX^2 = TB \times TC$
3. In Fig. (1), ABC is a triangle in which $\angle B = 90^{\circ}$, BC = 48 cm and AB = 14 cm. A circle is inscribed in the triangle, whose centre is O. Find radius r of in-circle.

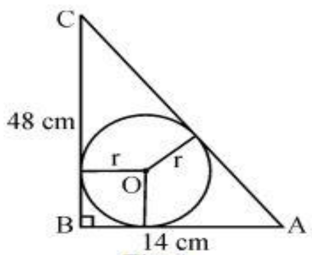


Fig. 1

4. In fig. (2) AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P. Find the length of AP.

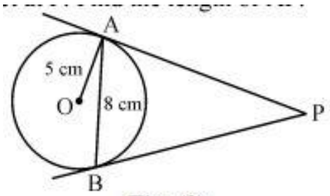
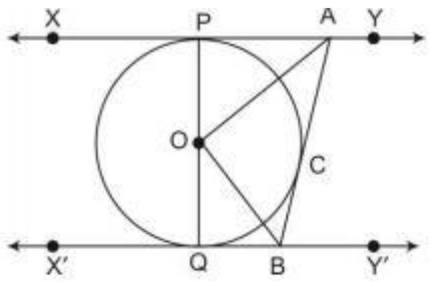


Fig. (2)

OR

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

5. In 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°.



Chapter-7 Construction

1. Draw a triangle ABC with BC = 6 cm, AB = 5 cm and ∠ ABC = 60°. Then construct a triangle whose sides are 3/4 of the corresponding sides of the Δ ABC.
2. Construct a triangle with sides 6 cm, 8 cm and 10 cm. Construct another triangle whose sides are 3/5 of the corresponding sides of original triangle.
3. Draw a triangle ABC with side BC = 7 cm, ∠ B= 45°, ∠A = 105°. Then, construct a triangle whose sides are 4/3 times the corresponding sides of ΔABC.