

Class – X

Mathematics (Revision Assignment) Applications of Trigonometry

1. If the angle of elevation of a cloud from a point  $h$  meters above a lake is  $\alpha$  and the angle of depression of its reflection in the lake is  $\beta$ , prove that the height of the cloud is  $\frac{h(\tan\beta + \tan\alpha)}{\tan\beta - \tan\alpha}$
2. The shadow of the tower, when the angle of elevation of the sun is  $45^\circ$ , is found to be 10 m longer than when it was  $60^\circ$ . Find the height of the tower.
3. A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of  $30^\circ$ . A girl standing on the roof of 20 m high building finds the angle of elevation of the same bird to be  $45^\circ$ . Both boy and girl are on the opposite sides of the bird. Find the distance of the bird from the girl.
4. At a point on the level ground the angle of elevation of a vertical tower is found to be such that its tangent is  $\frac{5}{12}$ . On walking 192 m towards the tower, the tangent of the angle is found to be  $\frac{3}{4}$ . Find the height of the tower.
5. The angle of elevation of a jet plane from a point A on the ground is  $60^\circ$ . After a flight of 15 seconds, the angle of elevation changes to  $30^\circ$ . If the height of the second tower is 60 m, find the height of the first tower.
6. The angle of elevation of the top of the hill at the foot of the tower is  $60^\circ$  and the angle of elevation of the top of the tower from the foot of the hill is  $30^\circ$ . If the height of the tower is 50 m, what is the height of the hill?
7. The angles of elevation and depression of the top and bottom of the light house from the top of the building 60 m high are  $30^\circ$  and  $60^\circ$  respectively. Find the difference between the heights of the light house and the building. Also, find the distance between the light house and the building.
8. From the top of the hill, the angle of depression of two consecutive milestones due east are found to be  $30^\circ$  and  $45^\circ$ . Find the height of the hill.
9. The horizontal distance between two towers is 75 m and the angle of depression of the top of the first tower as seen from the top of the second tower, which is 160 m high, is  $45^\circ$ . Find the height of the first tower.
10. A man standing on the deck of the ship, which is 8 m above the water level. He observes the angle of elevation of the top of the hill as  $60^\circ$  and the angle of depression of the bottom of the hill as  $30^\circ$ . Find the distance of the hill from the ship and the height of the hill.
11. The angle of elevation  $\theta$  of the top of the light house, as seen by a person on the ground is such that  $\tan\theta = \frac{5}{12}$ . When a person moves a distance of 240 m towards the light house, the angle of elevation becomes  $\phi$  such that  $\tan\phi = \frac{3}{4}$ . Find the height of the light house.
12. A ladder rests against a wall at an angle of  $\alpha$  to the horizontal. Its foot is pulled away from the wall through a distance  $d$ , so that it slides a distance  $h$  down the wall, making an angle  $\beta$  with the horizontal. Show that  $\frac{d}{h} = \frac{\cos\alpha - \cos\beta}{\sin\beta - \sin\alpha}$ .

13. A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height  $h$ . At a point on the plane, the angles of elevation of the bottom and top of the flag staff are  $\alpha$  and  $\beta$  respectively. Prove that the height of the tower is  $h \frac{\tan \alpha}{\tan \beta - \tan \alpha}$
14. A round balloon of radius  $r$  subtends an angle  $\alpha$  at the eye of the observer while the angle of elevation of its centre is  $\beta$ . Prove that the height of the centre of the balloon is  $r \sin \beta \operatorname{cosec} \frac{\alpha}{2}$ .

### **Keeping in touch: (Arithmetic Progressions)**

1. Show that the sequence defined by  $a_n = 5n - 7$  is an AP, and find its common difference.
2. The  $n^{\text{th}}$  term of an AP is  $6n + 2$ . Find the common difference.
3. If the  $n^{\text{th}}$  term of the AP 9, 7, 5, ..... is same as the  $n^{\text{th}}$  term of the AP 15, 12, 9, ..... Find  $n$ .
4. Find the  $10^{\text{th}}$  term from the end of the AP 8, 10, 12, ..... 126.
5. Three numbers are in AP. If the sum of these numbers be 27 and the product 648, find the numbers.
6. Show that  $(a - b)^2$ ,  $(a^2 + b^2)$  and  $(a + b)^2$  are in AP.
7. Find the sum of first  $n$  odd natural numbers.
8. In an AP the first term is 8,  $n^{\text{th}}$  term is 33 and the sum to the first  $n$  terms is 123. Find  $n$  and  $d$ , the common difference.
9. Find the sum of  $n$  terms of the series:  $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, \dots$

Class – X

**Mathematics (Revision Assignment) Surface Areas and Volumes**

1. A circus tent is cylindrical up to a height of 3 m and conical above it. If the diameter of the base is 105 m and the slant height of the conical part is 53 m, find the total canvas used in making the tent.
2. A solid toy is in the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their common diameter is 4.2 cm and the height of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the solid toy.
3. A solid is composed of a cylinder with hemispherical ends. If the whole length of the solid is 104 cm and the radius of each of the hemispherical ends is 7 cm, find the cost of polishing its surface at the rate of Rs. 10 per  $\text{dm}^2$ .
4. A cylindrical tub of radius 5 cm and length 9.8 cm is full of water. A solid is in the form of a right circular cylinder mounted on a hemisphere is 3.5 cm and the height of the cone outside the hemisphere is 5 cm, find the volume of the water left in the tub.
5. A vessel is in the form of inverted cone. Its height is 8 cm and 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 in the vessel, one fourth of the water flows out. Find the total number of lead shots dropped in the vessel.
6. A solid iron pole consists of a cylinder of height 220 cm and the base diameter is 24 cm, which is surmounted by a cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that  $1 \text{ cm}^3$  of iron has approximately 8 g mass.
7. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also find the cost of the canvas of the tent at the rate of Rs. 500 per  $\text{m}^2$ .
8. An ice cream cone consists of a right circular cone of height 14 cm and diameter of the circular top is 5 cm. It has hemisphere on the top with the same diameter as of the circular top. Find the volume of the ice cream in the cone.
9. The height of a solid cylinder is 15 cm and 7 cm. Two equal conical holes or radius 3 cm and height 4 cm are cut off. Find the volume and surface area of the remaining solid.
10. A spherical ball of radius 3 cm is melted and recast into 3 spherical balls. The radii of the two balls are 1.5 cm and 2 cm respectively. Determine the radius of the third ball.

11. A sphere of diameter 6 cm is dropped in a cylindrical vessel partly filled with water. The diameter of the cylinder is 12 cm. If the sphere is completely submerged in water, by how much will the level of water rise in the cylinder?
12. A rectangular vessel is  $20\text{ cm} \times 16\text{ cm} \times 11\text{ cm}$  is full of water. This water is poured into a conical vessel of base radius 10 cm. If the vessel is completely filled, find the height of the conical vessel.
13. A well, whose diameter is 7 m, has been dug 22.5 m deep and the earth dug out is used to form an embankment 10.5 m wide around it. Find the height of the embankment.
14. A conical vessel of radius 6 cm and height 8 cm is completely filled with the water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed. What fraction of the water over flows?
15. A bucket made of aluminum sheet is of height 20 cm and its upper and lower ends are of radius 25 cm and 10 cm respectively. Find the cost of making the bucket, if the aluminum sheet costs Rs. 70 per  $100\text{ cm}^2$ .
16. The height of a cone is 30 cm. A small cone is cut off at the top by a plane parallel to the base. If its volume be  $\frac{1}{27}$  of the volume of the given cone, at what height above the base is the section made?
17. The height of a right circular cone is trisected by two planes parallel to the base at equal distances. Show that the volumes of the three portions, starting from the top, are in the ratio 1:7:19.

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Mathematics (Revision Assignment) Constructions

1. Draw a right angled triangle ABC with  $AB = 4.5$  cm,  $AC = 7.5$  cm and angle  $B = 90^\circ$ . Construct another triangle  $A'BC'$  whose corresponding sides are  $\frac{5}{3}$  times of the given triangle.
2. Construct a  $\triangle ABC$ ,  $BC = 6.5$  cm, angle  $B = 45^\circ$  and angle  $A = 100^\circ$ . Construct another triangle similar to the triangle ABC whose sides are  $\frac{6}{5}$  times of the triangle ABC.
3. Construct an isosceles triangle whose base is 6 cm and altitude 3.5 cm and then another triangle whose sides are  $1\frac{2}{3}$  times the corresponding sides of an isosceles triangle.
4. Draw a circle of radius 4.5 cm. From a point 10 cm away from its center, construct a pair of tangents to the circle.
5. Draw a pair of tangents to a circle of radius 4.5 cm which are inclined to each other at an angle of  $45^\circ$ .
6. Draw a line segment AB of length 11 cm. Taking A as center, draw a circle of radius 4 cm and taking B as center, draw another circle of radius 3 cm. Construct tangents to each circle from the center of the other circle.
7. Draw a circle of radius 5 cm. Take a point P on it. Without using the center of the circle, construct a tangent at the point P. Write steps of construction.
8. Construct a quadrilateral ABCD with angle  $A = 45^\circ$ .  $AB = 5.1$  cm,  $AC = 6$  cm,  $AD = 4.2$  cm and  $BC = 3.6$  cm. Construct another quadrilateral  $A'B'C'D'$  similar to quadrilateral ABCD such that its diagonal  $A'C' = 8$  cm.
9. Construct a  $\triangle ABC$  in which  $BC = 6$  cm, angle  $A = 60^\circ$  and the median through A is 4.5 cm. Draw a  $\triangle A'BC'$  similar to  $\triangle ABC$ , having base  $B'C' = 7.5$  cm.
10. Construct a triangle of sides 4 cm, 6 cm and 7 cm and then a triangle similar to it whose sides are  $\frac{2}{3}$  of the corresponding sides of the first triangle.

Mathematics (Revision Assignment) Circles

1. The radius of the in circle of a triangle is 4 cm and the segments into which one side is divided by the point of contact are 6 cm and 8 cm. Determine the other two sides of the triangle.
2. The in circle of the  $\triangle ABC$  touches the sides BC, CA and AB at D, E and F respectively. Show that
$$AF + BD + CE = AE + BF + CD = \frac{1}{2} (\text{Perimeter of } \triangle ABC)$$
3. A circle is inscribed in a  $\triangle ABC$  having sides 8 cm, 10 cm and 12 cm. Find the length of AD, BE and CF.
4. If all the sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.
5. Two circles touch each other externally at C. Prove that the common tangent at C bisects the other two common tangents.
6. XP and XQ are two tangents to a circle with O from a point X outside the circle. ARB is tangent to circle at R. Prove that  $XA + AR = XB + BR$
7. The four sides AB, AC, PQ are tangent in the given figure, and  $AB = 5$  cm, find the perimeter of  $\triangle APQ$ .
8. Two circles with centres X and Y touch externally at P. If tangents AT and BT meet the common tangent at T, then prove that  $AT = BT$ .
9. Circles are drawn from the three vertices of a  $\triangle ABC$ ; taken as centre to touch each other externally. If the sides of the triangle are 4 cm, 6 cm and 8 cm, find the radii of the circles.
10. Prove that the tangents drawn at the ends of the chord of a circle make equal angles with the chord.
11. The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to a smaller circle, touching it at D. Find the length of AD.

**Class – X**

**Mathematics (Revision Assignment) Co – ordinate Geometry**

1. Find the point on the y – axis which is equidistant from the points (-4, 6) and (5, 9).
2. Show that the following points are the vertices of an equilateral triangle:
  - a) A(1, 1), B(-1, -1) and C(- $\sqrt{3}$ ,  $\sqrt{3}$ )
  - b) P(0, 0), Q(5, 5) and R(2 +  $\sqrt{3}$ , 5)
3. Show that the following points are the vertices of a rectangle:
  - a) A(2, -2), B(8, 4), C(5, 7) and D(-1, 1)
  - b) P(0, -1), Q(-2, 3), R(6, 7) and S(8, 3)
4. If P(x, y) is equidistant from A(a + b, b – a) and B(a – b, a + b), show that bx = ay.
5. Find the ratio in which the line segment joining the points (7, 3) and (-4, 5) is divided internally by y – axis.
6. The co – ordinates of the middle points D, E, F of the sides BC, CA and AB respectively of a  $\Delta ABC$  are (-3, 2), (5, -7) and (11, 7) respectively, find the co – ordinates of the vertices A, B and C.
7. Find the centroid of the triangle whose vertices are (-2, 3), (2, -1) and (4, 0).
8. If the co – ordinates of the mid points of the sides of the triangle are (1, 1), (2, -3) and (3, 4). Find its centroid.
9. If the points (a, 0), (0, b) and (1, 1) are collinear, show that  $1/a + 1/b = 1$ .
10. Find the area of the quadrilateral, the co ordinates of whose vertices are (1, 2), (6, 2), (5, 3) and (3, 4).

**Class – X Mathematics (Revision Assignment) Probability**

1. A bag contains 5 red, 8 white and 7 black balls. A ball is drawn at drawn from the bag.

Find the probability that the ball drawn is:

- i) red or white                      ii) not black                      iii) neither white nor black

2. 17 cards numbered 1 – 17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is:

- i) odd                                      ii) a prime                                      iii) divisible by 3

3. Find the probability that a number selected from the number 1 to 25 is not a prime number when each of the given numbers is equally likely to be selected.

4. Find the probability that a number selected at a random from the numbers 1 – 35 is a:

- i) prime number                      ii) multiple of 7                      iii) multiple of 3 or 5

5. A bag contains 3 red, 5 black and 7 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is:

- i) white                                      ii) red                                      iii) not black                                      iv) red or white

6. Out of 400 bulbs in a box, 15 bulbs are defective. One bulb is taken out at random from the box. Find the probability that the drawn bulb is not defective.

7. A card is drawn from a well shuffled pack of 52 cards. Find the probability that the card is neither a red card nor a queen.

8. A bag contains 5 white balls, 7 red balls and 2 blue balls. One ball is drawn at random from the bag. What is the probability that the ball drawn is:

- i) white or blue                      ii) red or black                      iii) not white                      iv) neither white nor black

9. Cards marked with numbers 3 – 50 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the card drawn is:

- a) divisible by 7                                      b) a number is a perfect square

10. 1000 tickets of a lottery were sold and there are 5 prizes on these tickets. If Saket has purchased one lottery ticket, what is the probability of winning a prize?

11. From a pack of 52 playing cards, jacks, queens, kings and aces of red colour are removed. From the remaining, a card is drawn at random. Find the probability that the card drawn is:

- i) a black queen                      ii) a red card                      iii) a black jack                      iv) a picture card

12. If  $x$  and  $y$  are natural numbers such that  $1 \leq x \leq 4$  and  $3 \leq y \leq 6$ . What is the probability that:

- i)  $x + y \geq 8$                       ii)  $xy$  is even

**Keeping in touch: (Polynomials & Pair of linear equations in two variables)**

1. Draw the graphs of the following equations:  $x - y + 1 = 0$ ,  $3x + 2y - 12 = 0$ . Determine the coordinates of the vertices of the triangle formed by these lines and the  $x -$  axis and shade the triangular region.
2. Find the values of  $a$  and  $b$  so that the following system of linear equations has an infinite number of solutions:  $2x - 3y = 7$  and  $(a + b)x - (a + b - 3)y = 4a + b$

4. Find the value of  $k$  for which the system of equations has infinitely many solutions:

$$(2k + 1)x + 2y = 7 \text{ and } (k^2 + 1)x + (k - 2)y - 5 = 0$$

5. A father is 3 times as old as his son. In 12 years, he will be twice as old as his son. Find their present ages.
6. A 2 digit number is 4 times the sum of the sum of digits and twice the product of the digits. Find the number.
7. The denominator of a fraction is 4 more than twice the numerator. When both numerator and denominator are decreased by 6, then the denominator becomes 12 times the numerator. Determine the fraction.
8. A sailor goes 8 km downstream in 40 minutes and returns in 1 hour. Determine the speed of the sailor in still water and the speed of the current.
9. Sumit travels 600 km to his home partly by train and partly by car. He takes 8 hours if he travels 120 km by train and rest by car. He takes 20 minutes longer if he travels 200 km by train and rest by car. Find the speed of the train and the car.
10. The area of a rectangle gets reduced by 80 sq. units if its length is reduced by 5 units and breadth is increased by 2 units. If we increase the length by 10 units and decrease the breadth by 5 units, the area is increased by 50 sq. units. Find the length and breadth of the rectangle.
11. A railway half ticket costs half the full fare and the reservation charge is same on the half ticket as on the full ticket. One reserved first class ticket from Mumbai to Ahemdabad costs Rs. 216 and one full and one half tickets costs Rs. 327. What is the basic first class full fare and what is the reservation charge?
12. In a cyclic quadrilateral, the angles are  $(2x + 4)$ ,  $(y + 3)$ ,  $(2y + 10)$  and  $(4x - 5)$ . Find all the angles of the cyclic quadrilateral.
13. 2 women and 5 men can together finish an embroidery work in 4 days, while 3 women and 6 men can finish it in 3 days. Find the time taken by 1 woman alone to finish the work, and also that taken by 1 man alone.
14. Solve graphically:  $x + 3y = 6$ ,  $2x - 3y = 12$ .
15. Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu?
16. If one of the zeroes of  $2x^2 + ax + 3$  is 1, find the other zero and the value of  $a$ .
17. Find the value of 'k' such that the sum of zeroes of the given polynomial  $(k + 1)x^2 + 2kx + 4$  is equal to the product of zeroes.

18. If  $\alpha$  and  $\beta$  are the zeroes of  $6x^2 + x - 2$ , find the value of  $\alpha/\beta + \beta/\alpha$ .
19. If  $\alpha$  and  $\beta$  be the zeroes of  $x^2 - 8x + k$ , find  $k$  if  $\alpha^2 + \beta^2 = 40$ .
20. If  $\alpha, \beta$  are the zeroes of  $x^2 - x - 2$ , form a quadratic polynomial whose zeroes are  $2\beta + 1, 2\alpha + 1$ .
21. If one of the zeroes of  $ax^2 + bx + c$  is double of the other, show that  $2b^2 = 9ac$ .
22. For  $2x^4 - 3x^3 - 3x^2 + 6x - 2$ , find the remaining zeroes if its 2 zeroes are given  $\sqrt{2}$  and  $-\sqrt{2}$ .
23. For what common value of  $x$ , both polynomials  $p(x) = x^2 - x - 6$  and  $q(x) = x^2 + 2x - 15$  becomes zero.

### Real Numbers

1.  $7 \times 11 \times 13 \times 15 + 15$  is a  
(a) Composite number (b) Whole number (c) Prime number (d) None of these
2. For what least value of 'n' a natural number,  $(24)^n$  is divisible by 8?  
(a) 0 (b) -1 (c) 1 (d) No value of 'n' is possible
3. The sum of a rational and an irrational is  
(a) Rational (b) Irrational (c) Both (a) & (c) (d) Either (a) or (b)
4. HCF of two numbers is 113, their LCM is 56952. If one number is 904. The other number is:  
(a) 7719 (b) 7119 (c) 7791 (d) 7911
5. Show that every positive even integer is of the form  $2q$  and that every positive odd integer is of the form  $2q+1$  for some integer  $q$ .
6. Show that any number of the form  $4^n$ , can never end with the digit 0.
7. Use Euclid's division algorithm to find the HCF of 4052 and 12576
8. Given that HCF of two numbers is 23 and their LCM is 1449. If one of the numbers is 161, find the other.
9. Find the greatest of 6 digits exactly divisible by 24, 15 and 36.
10. Prove that the square of any positive integer is of the form  $4q$  or  $4q+1$  for some integer.
11. 144 cartoons of coke can and 90 cartoons of Pepsi can are to be stacked in a Canteen. If each stack is of the same height and is to contain cartoons of the same Drink. What would be the greater number of cartoons each stack would have
12. Prove that Product of three consecutive positive integers is divisible by 6.