

# CLASS X – MATHEMATICS – CHAPTER 09

## SOME APPLICATIONS OF TRIGONOMETRY

Name:

Date:

- Q01.** If height of the tower = shadow of the tower, then angle of elevation  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$
- Q02.** If length of shadow = 20m and angle of elevation =  $60^\circ$ . Then height of tower.  
(a) 20m (b)  $20\sqrt{2}$ m (c)  $\frac{20}{\sqrt{3}}$  m (d)  $20\sqrt{3}$ m
- Q03.** A little boy is flying a kite. The string of kite makes an angle of  $30^\circ$  with the ground. If length of the kite is  $h = 21$ m then length of string  
(a) 63m (b) 42m (c) 35m (d) 21m
- Q04.** Line joining on eye and the object to be viewed is called  
(a) Horizontal (b) line of sight (c) Vertical line (d) None of these
- Q05.** A person walking 20m towards a chimney in a horizontal line through its base observer that its angle of elevation changes from  $30^\circ$  to  $45^\circ$  then height of chimney is  
(a)  $\frac{20}{\sqrt{3}+1}$  (b)  $\frac{20}{\sqrt{3}-1}$  (c)  $20(\sqrt{3}-1)$  (d)  $20(\sqrt{3}+1)$
- Q06.** Find height of the tower if length of shadow = 10m sun's altitude =  $45^\circ$   
(a) 10m (b) 12m (c) 20m (d) none of these
- Q07.** If the angles of elevation of a tower from two points at distances  $a$  and  $b$  where  $a > b$  from its foot and in the same straight line from it are  $30^\circ$  and  $60^\circ$  then height of the tower is  
(a)  $\sqrt{a+b}$  (b)  $\sqrt{ab}$  (c)  $\sqrt{a-b}$  (d)  $\sqrt{\frac{a}{b}}$
- Q08.** The angle of elevation of the top of a tower from a point on the ground which is 30m away from the foot of the tower is  $30^\circ$ , the height of tower is  
(a) 10 (b)  $10\sqrt{3}$  (c)  $\frac{10}{\sqrt{3}}$  (d)  $3\sqrt{10}$
- Q09.** A 1.6m tall girl stands at a distance of 3.2m from a lamp post and casts a shadow of 4.8m on the ground then the height of the lamp post is  
(a)  $\frac{8}{3}$  (b)  $\frac{3}{8}$  (c)  $8\sqrt{3}$  (d)  $\frac{8}{\sqrt{3}}$
- Q10.** As observed from the top of a 75m tall lighthouse the angles of depression of two ships are  $30^\circ$  and  $45^\circ$ . If one ship is exactly behind the other on the same side of the light house, then distance between the two ships is  
(a)  $75(\sqrt{3}-1)$  (b)  $75\sqrt{3}$  (c) 75 (d)  $\frac{75}{\sqrt{3}}$
- Q11.** The angle of elevation of the sun when the length of the shadow of a pole is  $\sqrt{3}$  times the height of the pole is  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $75^\circ$

## DCA CLASSES

- Q12.** The angle of elevation of the top a building from the foot of the tower is  $30^\circ$  and the angle of elevation of the top of the tower from the foot of the building is  $60^\circ$  if the tower is 50m high then the height of the building is
- (a) 50                      (b)  $\frac{50}{3}$                       (c)  $50\sqrt{3}$                       (d)  $\frac{50}{\sqrt{3}}$
- Q13.** If the angles of elevation of the top of a tower from two points at distances a and b from the base and in the same straight line with it are complementary then the height of the tower is
- (a) ab                      (b)  $\sqrt{ab}$                       (c)  $\frac{a}{b}$                       (d)  $\sqrt{\frac{a}{b}}$
- Q14.** If the height of tower is half the height of the flagstaff on it and the angle of elevation of the top of the tower as seen from a point on the ground is  $30^\circ$  then the angle of elevation of the top of the flagstaff as seen from the same point is
- (a)  $30^\circ$                       (b)  $45^\circ$                       (c)  $60^\circ$                       (d)  $90^\circ$
- Q01.** A man standing on the deck of a ship, which is 10m above the water level, observes the angle of elevation of the top of a hill as  $60^\circ$  and the angle of depression of the base of the hill as  $30^\circ$ . Calculate the distance of the hill from the ship and the height of the hill.
- Q02.** A boy is standing on the ground and flying a kite with 100m of string at an elevation of  $30^\circ$ . Another boy is standing on the roof of a 20m high building and is flying his kite at an elevation of  $45^\circ$ . Both the boys are on the opposite sides of both the kites. Find the length of the string that the second boy must have so that the two kites meet.
- Q03.** The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is  $60^\circ$ . At a Point Y 40m vertically above X, the angle of elevation is  $45^\circ$ . Find the height of the tower PQ and the distance XQ.
- Q04.** At the foot of a mountain the elevation of its summit is  $45^\circ$ . After ascending 1000m towards the mountain up a slope of  $30^\circ$  inclination, the elevation is found to be  $60^\circ$ . Find the height of the mountain.
- Q05.** A round balloon of radius r subtends an angle  $\alpha$  at the eye of the observer while the angle of the elevation of its centre is  $\beta$ . Prove that the height of the centre the balloon is  $r\sin\beta \cdot \operatorname{Cosec}\frac{\alpha}{2}$ .
- Q06.** An airplane flying horizontally 1 km above the ground is observed at an elevation of  $60^\circ$ . After 10 seconds, its elevation is observed to  $30^\circ$ . Find the speed of the airplane in km/hr.

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- Q07.** From a window ( $h$  m high above the ground) of a house in a street, the angles of elevation and depression of the top and foot of another house on the opposite side of the street are  $\alpha$  and  $\beta$  respectively show that the height of the opposite house is  $h(1 + \tan\alpha \cdot \cot\beta)$  m.
- Q08.** A ladder rests against a wall at an angle  $\alpha$  to the horizontal. Its foot is pulled away from the wall through a distance 'a' so that it slides a distance 'b' down the wall making an angle ' $\beta$ ' with the horizontal. Show that  $\frac{a}{b} = \frac{\cos\alpha - \cos\beta}{\sin\beta - \sin\alpha}$
- Q09.** A girl who is 1.2 m tall, spots a balloon moving with the wind in a horizontal line at a height of 88.2m from the ground. The angle of elevation of the balloon from the eye of the girl at any instant is  $60^\circ$ . After some time, the angle of elevation reduces to  $30^\circ$ . Find the distance travelled by the balloon during the interval.
- Q10.** From the top of a tower 96m high, the angles of depression of two cars on a road at the same level as the base of the tower and on same side of it are  $\theta$  and  $\phi$ , where  $\tan\theta = \frac{3}{4}$  and  $\tan\phi = \frac{1}{3}$ . Find the distance between the two cars
- Q11.** A vertical tower stands on a horizontal plane and surmounted by vertical flagstaff of height  $h$ . At a point on the plane, the angles of elevation of the bottom and the top of the flagstaff are  $\alpha$  and  $\beta$  respectively prove that the height of the tower is  $\frac{h \tan\alpha}{\tan\beta - \tan\alpha}$
- Q12.** The angle of elevation of the top of a tower at a point on the level ground is  $30^\circ$  after walking a distance of 100m towards the foot of the tower along the horizontal line through the foot of the tower on the same level ground the angle of elevation to the top of the tower is  $60^\circ$  find the height of the tower.
- Q13.** As observed from the top of light house 100m high above sea level the angle of depression of a ship sailing directly towards it changes from  $30^\circ$  to  $60^\circ$ . Determine the distance travelled by the ship during the period of observation (use  $\sqrt{3}=1.732$ )
- Q14.** The angles of elevation of the top of a tower from two points P and Q at distances of  $a$  and  $b$  respectively from the base and in the same straight line with are complementary prove that the height of the tower is  $\sqrt{ab}$  where  $a > b$
- Q15.** An aeroplane flying horizontally at a height of 1.5 km above the ground is observed at a certain point on the earth to subtend an angle of  $60^\circ$ . After 15 seconds, its angle of elevation is observed to be  $30^\circ$  calculate the speed of aeroplane in km/hr.

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- Q16.** A man is standing on the deck of a ship which is 25m above water level. He observes the angle of elevation of the top of a lighthouse as  $60^\circ$  and the angle of depression of the base of the light house as  $45^\circ$  calculate the height of the lighthouse
- Q17.** An aeroplane when flying at a height of 3125 m from the ground passes vertically below another plane at an instant when the angle of elevation of the two planes from the same point on the ground are  $30^\circ$  and  $60^\circ$  respectively. Find the distance between the two planes at that instant
- Q18.** 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 20m high building finds the angle of elevation of the same bird to be  $45^\circ$ . Both the boy and the girl are on opposite side of the bird. Find the distance of the bird from the girl.
- Q19.** At a point on level ground, the angle of an elevation of a vertical tower is found to be such that its tangent is  $\frac{5}{12}$  on walking 19.2m towards the tower, the tangent of the angle of elevation is  $\frac{3}{4}$ . Find the height of tower
- Q20.** From the top of a building 60m high, the angles of depression of the top and bottom of a vertical lamp post are observed to be  $30^\circ$  and  $60^\circ$  respectively. Find  
(i) the horizontal distance between the building and the lamp post  
(ii) The height of the lamp post [Take  $\sqrt{3}=1.732$ ]
- Q21.** A man standing on the deck of a ship which is 10m above the water level observes the angle of elevation of the top of a hill as  $60^\circ$  and the angle of depression of the base of the hill as  $30^\circ$ . calculate the distance of the hill from the ship and the height of the hill
- Q22.** The angle of elevation of a jet-plane from a point P on the ground is  $60^\circ$ . After a flight of 15 seconds the angle of elevation (change to  $30^\circ$ ). If the jet plane is flying at a constant height of  $1500\sqrt{3}$  find the speed of the jet plane in km/hour.
- Q23.** A pole 5m high is fixed on the top of a tower. The angle of elevation of the top of pole observed from a point A on the ground is  $60^\circ$  and the angle of depression of the point A from the top of the tower is  $45^\circ$ . Find the height of the tower. (Take  $\sqrt{3}=1.732$ )
- Q24.** From a window 15m high above the ground in a street. The angles of elevation and depression of the top and foot of another house on the opposite side of the street are  $30^\circ$  and  $45^\circ$  respectively. Show that the height of the apposite house is 23.66m [Take  $\sqrt{3}=1.732$ ]