MATHS

NCERT - NCERT MATHEMATICS (Bengali)

APPLICATIONS OF TRIGONOMETRY

Example

1. The top of a clock tower is observed at engle of elevation of α° and the feet of the tower at

is the distance of d meters from the observer.

Draw the diagram for this data.

2. Rinky observes a flower on the ground from the balcony of the first floor of a building at an angle of depression $\beta°$. The height of the first floor of the building is x meters. Draw the diagram for this data.

3. A large balloon has been tied with a rope and it is floating in the air. A person has observed the balloon from the top of a building at angle of elevation of θ_1 and foot of the rope at an angle of depression of θ_2. The height of the building is h feet. Draw the diagram for this data.

4. A boy observed the top of an electric pole at an angle of elevation of $60°$ when the

observation point is 8 meters away from the foot of the pole. Find the height of the pole.

5. Rajender observes a person standing on the ground from a helicopter at an angle of depression $45°$. If the helicopter flies at a height of 500 meters from the ground, what is the distance of the person from Rajender?

6. Two men on either side of a temple of 30 meter height observe its top at the angles of elevation $30°$ and $60°$ respectively. Find the distance between the two men.

7. A straight highway leads to the foot of tower. Ramaiah standing at the top of the tower observes a car at an angle of depression $30°$. The car is approaching the foot of the tower with a uniform speed. Six seconds later,

the angle of depression of the car is found to be $60°$. Find the time taken by the car to reach the foot of the tower from this point.

Exercise 12 1

1. A tower stands vertically on the ground. From a point which is 15 meter away from the foot of the tower, the angle of elevation of the

top of the tower is $45°$. What is the height of the tower?

2. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground by making $30°$ angle with the ground. The distance between the foot of the tree and the top of the tree on the ground is 8 m. Find the height of the tree before falling down.

3. A contractor wants to set up a slide for the children to play in the park. He wants to set it up at the height of 2 m and by making an angle of $30°$ with the ground. What should be the length of the slide?

4. Length of the shadow of a 15 meter high pole is $5\sqrt{3}$ meters at 8 O'clock in the moming.

Then, what is the angle of elevation ofthe Sun rays with the ground at the time?

5. You want to erect a pole of height 10 m with the support of three ropes. Each rope has to make an angle $30°$ with the pole. What should be the length of the rope?

6. Suppose you are shooting an arrow from the top of a building at an height of 6 m to a target on the ground at an angle of depression of $60°$. What is the distance between you and the object?

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7. An electrician wants to repair an electric connection on a pole of height 9 m. He needs to reach 1.8 m below the top of the pole to do

repair work. What should be the length of the ladder which he should use, when he climbs it at an angle of $60°$ with the ground? What will be the distance between foot of the ladder and foot of the pole?

8. A boat has to cross a river. It crosses the river by making an angle of $60°$ with the bank of the river due to the stream of the river and travels a distance of 600m to reach the

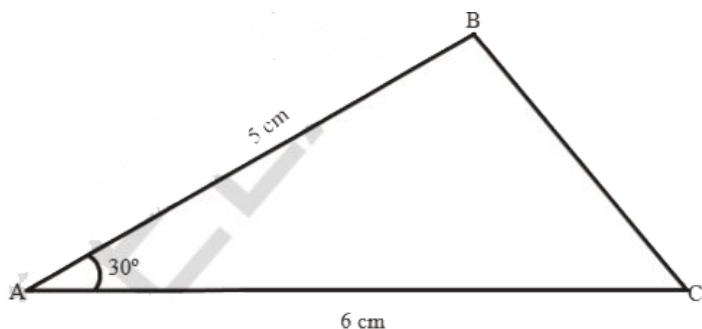another side of the river. What is the width of the river?

9. An observer of height 1.8 m is 13.2 m away from a palm tree. The angle of elevation of the top of the tree from his eyes is $45°$ What is the height of the palm tree?

10. In the adjacent figure. AC = 6 cm, AB = 5 cm and $\angle BAC = 30°$. Find the area of the triangle.

Exercise 12 2

1. A TV tower stands vertically on the side of a road. From a point on the other side directly opposite to the tower, the angle of elevation of the top of tower is $60°$ From another point 1m away from this point, on the line joining this point to the foot of the tower, the angle of elevation of the top of the tower is $30°$. Find the height of the tower and the width ofthe road.

2. Find the value of $\dfrac{\sec 49°}{\cos ec41°}$

3. A statue stands on the top of a 2m tall pedestal. From a point on the ground, the angle ofelevation of the top of the statue is $60°$ and from the same point, the angle of elevation of the top of the pedestal is $45°$. Find the height of the statue.

4. From the top of a building, the angle of elevation of the top of a cell tower is $60°$ and the angle of depression to its foot is $45°$. If distance of the building from the tower is 7m, then find the height ofthe tower.

5. A wire of length 18 m had been tied with electric pole at an angle of elevation $30°$ with the ground. Because it was covering a long distance, it was cut and tied at an angle of

elevation $60°$ with the ground. How much length of the wire was cut?

6. 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 30 m high, find the height of the building.

7. Two poles of equal heights are standing opposite to each other on either side of the road, which is 120 feet wide. From a point between them on the road, the angles of elevation of the top of the poles are $60°$ and $30°$ respectively. Find the height of the poles and the distances of the point from the poles.

8. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m, find the height of the tower from the base of the tower and in the same straight line with it are complementary.

9. 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 $1500\sqrt{3}$ meter, find the speed of the jet plane. $\left(\sqrt{3} = 1.732\right)$

10. The angle ofelevation of the top of a tower from the foot of the building is $30°$ and the angle of elevation of the top of the building from the foot of the tower is $60°$. What is the ratio ofheights of tower and building.

1. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes ofthe girl at an instant is $60°$. After some time, the angle of elevation reduces to $30°$. Find the distance travelled by the balloon during the interval.

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2. The angles of elevation of the top of a lighthouse from 3 boats A, B and C in a straight line of same side ofthe light house are a, 2a, 3a respectively. If the distance between the boats A and B and the boats B and Care x and y respectively find the height of the light house?

3. Inner part of a cupboard is in the cuboidical shape with its length, breadth and height in the ratio $1:\sqrt{2}:1$. What is the angle made by the longest stick which can be inserted cupboard with its base inside.

4. An iron sperical ball of volume $232848cm^3$ has been melted and converted into a cone

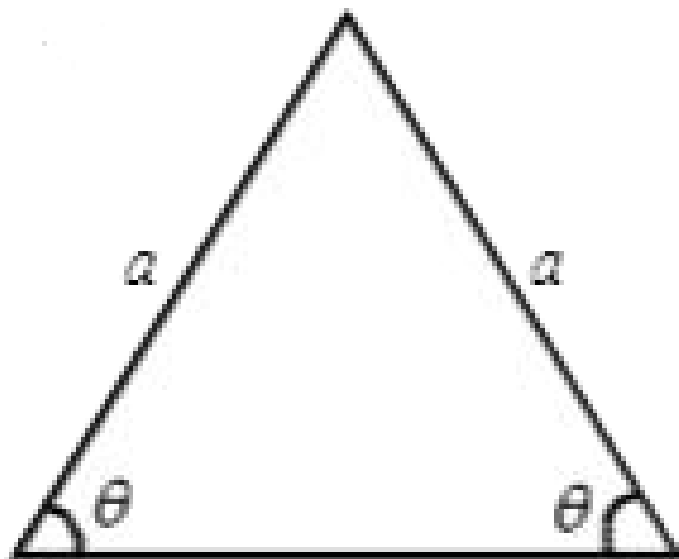with the vertical angle of $120°$. What are its height and base?

5. Show that the area of an Issosceles triangle is $A = a^2 \theta \sin \cos \theta$ where a is the length of one of the two equal sides and θ is the

measure of one oftwo equal angles

6. Aright circular cylindrical tower with height 'h' and radius 'r', stands on the ground. Let 'p' be a point in the horizontal plane ground and

ABC be the semi-circular edge of the top of the tower such that B is the point in it nearest top. The angles of elevation of the points A and B are $45°$ and $60°$ respectively. Show that

$$\frac{h}{r} = \frac{\sqrt{3}\left(1 + \sqrt{3}\right)}{2}.$$

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Think And Discuss

1. You are observing top of your school building at an angle of elevation a from a building at an angle of elevation a from a

point which is at d meter distance from foot of the building

Which trigonometric ratio would you like to consider to find the height of the building?

2. A ladder of length x meter is leaning against a wall making angle θ with the ground. Which trigonometric ratio would you like to consider to find the height of the point on the wall at which the ladder is touching

Do This

1. Find the value of $\dfrac{\cos 53^\circ}{\sin 57^\circ}$