St. Mary's School, Dwarka
Holiday Homework
Class XI
Subject: Mathematics
Week 3
Worksheet 3

(Application of Trigonometry)

Q 1to 18 carry 3 marks each

1. The angle of elevation of the top of a tower, at a distance of 150m from its foot on a horizontal plane, is found to be 30^0. Find the height of the tower correct to one place of decimal.

2. From a point P on a level ground, the angle of elevation of the top of a tower is 30^0. If the tower is 100m high, how far is P from the foot of the tower?

3. The string of a kite is 150m long and it makes on angle of 60^0 with the horizontal. Find the height of the kite from the ground.

4. The angles of elevation of the top of a tower from two points at a distance 4m and 9m from the base of the tower and in the same straight line with it are complementary. Prove that the height of the tower is 6m.

5. Two poles of equal heights are standing opposite each other on either side of the road, which is 80m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60^0 and 30^0 respectively. Find the height of the poles and the distance of the point from the poles.

6. From the top of a building, 15m high, the angle of elevation of the top of a tower is found to be 30^0. From the bottom of the same building, the angle of elevation of the top of the tower is found to be 60^0. Find the height of the tower and the distance between the tower and the building.

7. The angle of elevation θ of the top of a lighthouse, as seen by a person on the ground, is such that $\tan\theta = 5/12$. When the person moves a distance of 240m towards the lighthouse, the angle of elevation becomes ϕ such that $\tan\phi = ¾$. Find the height of the lighthouse.

8. A vertical tower is surmounted by a flagstaff of height h metres. At a point on the ground, the angles of elevation of the bottom and the top of the flagstaff are α and β respectively. Prove that the height of the tower is $\dfrac{h \tan\alpha}{\tan\beta - \tan\alpha}$

9. The angle of elevation of the top of a tower from a point A on the ground is 30^0. On moving a distance of 20m towards the foot of the tower to a point B, the angle of elevation increases to 60^0. Find the height of the tower and the distance of the tower from point A.

10. An aeroplane, when 3000 m high, passes vertically above another aeroplane at an instant when their angles of elevation at the same observation point are 60^0 and 45^0 respectively. How many metres higher is the one than the other?

11. An aeroplane flying horizontally at a height of 1.5k above the ground is observed at a certain point on earth to subtend an angle of 60^0. After 15 seconds its angle of elevation is 30^0. Calculate the speed of the aeroplane is km/h.

12. From the top of a cliff 50m high, the angles of depression of the top and the bottom of a tower are observed to be 30^0 and 45^0 respectively. Find the height of the tower.

13. From an aeroplane, vertically above a straight horizontal plane, the angles of depression of two consecutive kilometre stones on the opposite sides of the aeroplane are found to be α and β\$ Show that the height of the aeroplane is $\frac{\tan\alpha \tan\beta}{\tan\alpha + \tan\beta}$

14. From a window, 60m high above the ground, of a house in a street, the angle of elevation and depression of the top and bottom of another house on the opposite side of street are 60^0 and 45^0, respectively. Show that the height of the opposite house is $60(1 + \sqrt{3})$m.

15. The angle of elevation of a jet fighter from a point P on the ground is 60^0. After a flight of 15 seconds, the angle of elevation changes to 30^0. If the jet is flying at a speed of 720 km/h, find the height at which the jet is flying.

16. The angle of elevation of a jet plane from a point P on the ground is 60^0. After a flight of 15 seconds, the angle of elevation changes to 30^0. If the jet plane is flying at a constant height of $1500\sqrt{3}$ m, find the speed of the jet plane.

17. An aeroplane flying horizontally 1 km above the ground is observed at an angle of 60^0. IF after 15 seconds, the angle of elevation is observed to be 30^0, find the speed of the aeroplane.

18. The angles of elevation of the top of a rower from two points in the ground at distances 'a' metres and 'b' metres from the base of the tower and in the same straight line are complimentary Prove that the height of the tower is $\sqrt{ab}$ metres.

CASE STUDIES:

19. A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919.The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height. (1x5=5)

i). What is the angle of elevation if they are standing at a distance of 42m away from the monument?

a)30^0
b)45^0
c)60^0
d)0^0

ii). They want to see the tower at an angle of 60^0. So, they want to know the distance where they should stand and hence find the distance.

a) 25.24 m
b) 20.12 m
c) 42 m
d) 24.64 m

iii) .If the altitude of the Sun is at 60^0, then the height of the vertical tower that will cast a shadow of length 20 m is

a)$20\sqrt{3}$m
b) $\frac{20}{\sqrt{3}}$ m
c) $\frac{15}{\sqrt{3}}$ m
d)$15\sqrt{3}$m

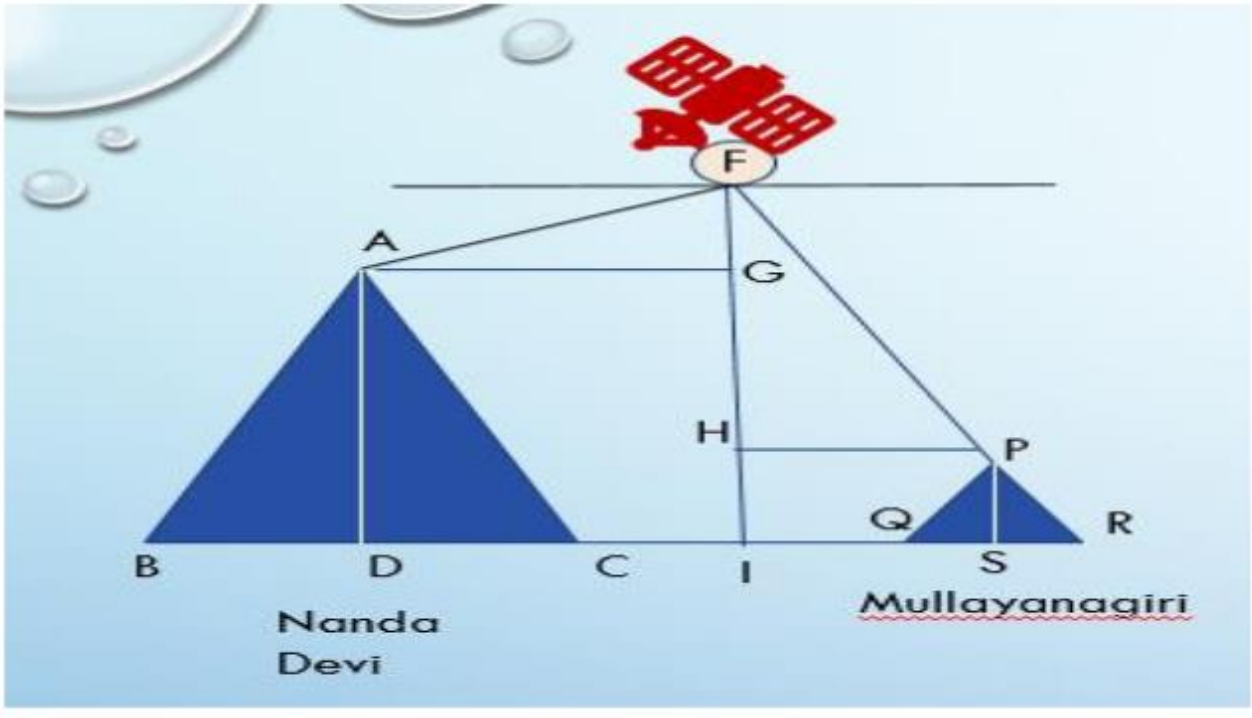
iv). The ratio of the length of a rod and its shadow is 1:1 . The angle of elevation of the Sun is

a)30^0
b)45^0
c)60^0
d)90^0

v).The angle formed by the line of sight with the horizontal when the object viewed is below the horizontal level is

a) corresponding angle
b) angle of elevation
c)angle of depression
d)complete angle

20.



A Satellite flying at height h is watching the top of the two tallest mountains in Uttarakhand and Karnataka, them being Nanda Devi(height 7,816m) and Mullayanagiri (height 1,930 m). The angles of depression from the satellite, to the top of Nanda Devi and Mullayanagiri are 30° and 60° respectively. If the distance between the peaks of two mountains is 1937 km, and the satellite is vertically above the midpoint of the distance between the two mountains. (1x5=5)

i) The distance of the satellite from the top of Nanda Devi is

a)1139.4 km
b)577.52 km
c)1937 km
d)1025.36 km

ii) The distance of the satellite from the top of Mullayanagiri is

a)1139.4 km
b)577.52 km
c)1937 km
d)1025.36 km

iii) The distance of the satellite from the ground is

a)1139.4 km
b)577.52 km
c)1937 km
d)1025.36 km

iv) What is the angle of elevation if a man is standing at a distance of 7816m from Nanda Devi?

a)30^0s
b)45^0
c)60^0
d)0^0

v) If a milestone very far away from, makes 45^0 to the top of Mullanyangiri mountain. So, find the distance of this milestone form the mountain

a)1118.327 km
b)566.976 km
c)1937 km
d)1025.36 km

Project -1

Make a project on the application of trigonometry in defense sector (Airforce)

Project -2

Make a project on the importance of golden ratio in the modern and ancient architecture
(Art integration)