Height and distance

1. A boat is sailing towards a lighthouse of height $20\sqrt{3}$ m at a certain speed. The angle of elevation of the top of the lighthouse changes from 30° to 60° in 10 seconds.
What is the time taken (in seconds) by the boat to reach the lighthouse from its initial position?
(A) 10 **(B)** 15
(C) 20 **(D)** 60

2. A tower is broken at a point P above the ground. The top of the tower makes an angle 60° with the ground at Q. From another point R on the opposite side of Q angle of elevation of point P is 30°. If QR = 180 m, then what is the total height (in metres) of the tower?
(A) 90 **(B)** $45\sqrt{3}$
(C) $45(\sqrt{3} + 1)$ **(D)** $45(\sqrt{3} + 2)$

3. Two points P and Q are at the distance of x and y (where y > x) respectively from the base of a building and on a straight line. If the angles of elevation of the top of the building from points P and Q are complementary, then what is the height of the building?
(A) xy **(B)** $\sqrt{(y/x)}$
(C) $\sqrt{(x/y)}$ **(D)** $\sqrt{xy}$

4. The tops of two poles of height 60 metres and 35 metres are connected by a rope. If the rope makes an angle with the horizontal whose tangent is 5/9 metres, then what is the distance (in metres) between the two poles?
(A) 63 **(B)** 30
(C) 25 **(D)** 45

5. A Navy captain going away from a lighthouse at the speed of $4[(\sqrt{3}) - 1]$ m/s. He observes that it takes him 1 minute to change the angle of elevation of the top of the lighthouse from 60°to 45°. What is the height (in metres) of the lighthouse?
(A) $240\sqrt{3}$ **(B)** $480[(\sqrt{3}) - 1]$
(C) $360\sqrt{3}$ **(D)** $280\sqrt{2}$

6. Two trees are standing along the opposite sides of a road. Distance between the two trees is 400 metres. There is a point on the road between the trees.The angle of depressions of the point from the top of the trees are 45° and 60°. If the height of the tree which makes 45° angle is 200 metres, then what will be theheight (in metres) of the other tree?
(A) 200 **(B)** $200\sqrt{3}$
(C) $100\sqrt{3}$ **(D)** 250

7. A tower stands on the top of a building which is 40 metres high. The angle of depression of a point situated on the ground from the top and bottom of thetower are found to be 60° and 45° respectively. What is the height (in metres) of tower?
(A) $20\sqrt{3}$ **(B)** $30(\sqrt{3} + 1)$
(C) $40(\sqrt{3} - 1)$ **(D)** $50(\sqrt{3} - 1)$

8. From a point P, the angle of elevation of a tower is such that its tangent is 3/4. On walking 560 metres towards the tower the tangent of the angle ofelevation of the tower becomes 4/3. What is the height (in metres) of the tower?
(A) 720 **(B)** 960
(C) 840 **(D)** 1030

9. The angle of elevation of an aeroplane from a point on the ground is 60°. After flying for 30 seconds, the angle of elevation changes to 30°. If the aeroplane is flying at a height of 4500 m, then what is the speed (in m/s) of aeroplane?
(A) 50√3 **(B)** 100√3
(C) 200√3 **(D)** 300√3

10. A kite is flying in the sky. The length of string between a point on the ground and kite is 420 m. The angle of elevation of string with the ground is 30°. Assuming that there is no slack in the string, then what is the height (in metres) of the kite?
(A) 210 **(B)** 140√3
(C) 210√3 **(D)** 150

11. A balloon leaves from a point P rises at a uniform speed. After 6 minutes, an observer situated at a distance of 450√3 metres from point P observes that angle of elevation of the balloon is 60°. Assume that point of observation and point P are on the same level. What is the speed (in m/s) of the balloon?
(A) 4.25 **(B)** 3.75
(C) 4.5 **(D)** 3.45

12. The distance between the tops of two building 38 metres and 58 metres high is 52 metres. What will be the distance (in metres) between two buildings?
(A) 46 **(B)** 42
(C) 44 **(D)** 48

13. The angles of elevation of the top of a tree 220 meters high from two points lie on the same plane are 30° and 45°. What is the distance (in metres) between the two points?
(A) 193.22 **(B)** 144.04
(C) 176.12 **(D)** 161.05

14. The angles of elevation of the top of a tower 72 metre high from the top and bottom of a building are 30° and 60° respectively. What is the height (in metres) of building?
(A) 42 **(B)** 20√3
(C) 24√3 **(D)** 48

15. A pole is standing on the top of a house. Height of house is 25 metres. The angle of elevation of the top of house from point P is 45° and the angle of elevation of the top of pole from P is 60°. Point P is on the ground level. What is the height (in metres) of pole?
(A) 10 (√(3 + 1)) **(B)** 15 (√(3 + 1))
(C) 25 (√(3 –1)) **(D)** 20 (√(3 – 1))

16. A ladder is placed against a wall such that it just reaches the top of the wall. The foot of the ladder is at a distance of 5 metres from the wall. The angle of elevation of the top of the wall from the base of the ladder is 15°. What is the length (in metres) of the ladder?
(A) 5√6 – 5√3 **(B)** 5√6 – 5√2
(C) 5√2 – 1 **(D)** 5√3 + 5√2

17. An aeroplane is flying horizontally at a height of 1.8 km above the ground. The angle of elevation of plane from point X is 60° and after 20 seconds, its angle of elevation from X is become 30°. If point X is on ground, then what is the speed (in km/hr) of aeroplane?
(A) 216√3 **(B)** 105√3
(C) 201√3 **(D)** 305√3

18. A flag of height 4 metres is standing on the top of a building. The angle of elevation of the top of the flag from a point X is 45° and the angle of elevation of the top of building from X is 30°. Point X is on the ground level. What is the height (in metres) of the building?
(A) √3+2 **(B)** 2(√3 + 1)
(C) 4(√3 + 1) **(D)** (√3 + 1)

19. The height of a tower is 120 meters. The elevation angle of the top of the tower at point-B is 75 °. Point-B is on the ground surface. What is the distance (in meters) of point-B from the base of the tower?

(A) $120 (2 – \sqrt{3})$ **(B)** $180 (3 – \sqrt{3})$
(C) $180 (\sqrt{3} – 1)$ **(D)** $180 (\sqrt{3} + 1)$

20. Mohit is standing at some distance from a 60 meters tall building. Mohit is 1.8 meters tall. When Mohit walks towards the building, then the angle of elevation from his head becomes 60° from 45°. How much distance (in metres) Mohit covered towards the building?

(A) $18.6 (4 – \sqrt{3})$ **(B)** $58.2 – 24.6\sqrt{3}$
(C) $19.4 (\sqrt{3} + 1)$ **(D)** $19.4 (3 – \sqrt{3})$