Standard: 10th Subject: Mathematics

Q1. A statue 1.46 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation 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 pedestal. $\left(\text{Use } \sqrt{3} = 1.73\right)$. **6 Mark**

Q2. The angle of elevation of a jet fighter 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 is flying at a speed of 720 km/hour, find the constant height at which the jet is flying. $\left[\text{Use } \sqrt{3} = 1.732\right]$ **6 Mark**

Q3. From the top of a 7m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of the foot of the tower is 30°. Find the height of the tower. **(**

Q4. The angle of elevation of a cloud from a point 60m above a lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud from the surface of the lake. **(**

Q5. An aeroplane when flying at a height of 3000 m from the ground passes vertically above another aeroplane at an instant when the angles of elevation of the two planes from the same point on the ground are 60° and 45° respectively. Find the vertical distance between the aeroplanes at that instant. Also, find the distance of first plane from the point of observation. $(\text{Take}\sqrt{3} = 1.73)$ **5**

Q6. A ladder set against a wall at an angle 45° to the ground. If the foot of the ladder is pulled away from the wall through a distance of 4m, its top slides a distance of 3m down the wall making an angle 30° with the ground. Find the final height of the top of the ladder from the ground and length of the ladder. **5**

Q7. The angle of elevation of the top of a tower 24m high from the foot of another tower in the same plane is 60°. The angle of elevation of the top of second tower from the foot of the first tower is 30°. Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers. **5**

Q8. The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. From a point Y, 40m vertically above X, the angle of elevation of the top Q of tower PQ is 45°. Find the height of the tower PQ and the distance PX. [Use $\sqrt{3} = 1.73$] **4 Mark**

Q9. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Ten 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. **4 Mark**

Q10. From the top of an 8m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower. $(\text{Take}\sqrt{3} = 1.732)$. **4 Mark**

Q11. From a point P on the ground the angle of elevation of the top of a tower is 30° and that of the top of a flag staff fixed on the top of the tower, is 60° If the length of the flag staff is 5m, find the height of the tower. **4 Mark**

Q12. If $\sec\theta + \tan\theta = m$, show that $\frac{m^2-1}{m^2+1} = \sin\theta$. **4 Mark**

Q13. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 30°. The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30°. Find the speed of flying of the bird. $\left(\text{Take}\sqrt{3} = 1.732\right)$ **4 Mark**

Q14. At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30°. The angle of depression of the reflection of the cloud in the lake, at A is 60°. Find the distance of the cloud from A. **4 Mark**

Q15. Prove that- **4 Mark**

$\frac{1}{1+\sin^2\theta} + \frac{1}{1+\cos^2\theta} + \frac{1}{1+\sec^2\theta} + \frac{1}{1+\text{cosec}^2\theta}$

Q16. The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of depression from the top of the tower of the foot of the hill. is 30°. If the tower is 50m high, find the height of the hill. **4 Mark**

Q17. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. $[\text{Use } \sqrt{3} = 1.732]$ **4**

Q18. A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5m. From a point on the ground the angles of elevation of the top and bottom of the flagstaff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower. $\left(\text{Take } \sqrt{3} = 1.732\right)$ **4**

Q19. From the top of a 7m high building the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower. **4**

Q20. If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, then prove that $\tan\theta = 1$ or $\tan\theta = \frac{1}{2}$. **4**

Q21. The angle of elevation of the top of a building from the foot of a tower is 30° and the angle of elevation of the top of a tower from the foot of the building is 60°. If the tower is 50m high, then find the height of the building. **4**

Q22. The angle of elevation of an aeroplane from a point on the ground is 60° After a flight of 30 seconds, the angle of elevation from the same point becomes 30°. If the aeroplane is flying at a constant height of $3000\sqrt{3}$m, find the speed of the aeroplane. **4**

Q23. The angle of elevation of the top of a tower at a distance of 120 m from a point A on the ground is 45°. If the angle of elevation of the top of a flagstaff fixed at the top of the tower, at A is 60°, then find the height of the flagstaff. $[\text{Use } \sqrt{3} = 1.73]$ **4 Mark**

Q24. Prove that $\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{1}{\sec A - \tan A}$ **4 Mark**

Q25. Prove that: $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$. **4 Mark**

Q26. The angle of elevation of the top of a building from the foot of a tower is 30°.The angle of elevation of the of the tower from the foot of the building is 60°. If the tower is 60m high, find the height of the building. **4 Mark**

Q27. **4 Mark**

The angle of elevation of the top Q of a vertical tower PQ from a point X on the ground is 60°. From a point Y, 40 m vertically above X, the angle of elevation of the top Q of tower is 45^{0}. Find the height of the tower PQ and the distance PX. $(\text{Use } \sqrt{3} = 1.73)$

Q28. The angles of elevation of the top of a tower from two points at a distance of 4 m and 9 m from the base of the tower and in the same straight line with it are 60° and 30° respectively. Find the height of the tower. **4 Mark**

Q29. From a point on the ground, the angle of elevation of the top of a tower is observed to be 60°. From a point 40 m vertically above the first point of observation, the angle of elevation of the top of the tower is 30°. Find the height of the tower and its horizontal distance from the point of observation. **4 Mark**

Q30. A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5m. From a point on the ground the angles of elevation of the top and bottom of the flagstaff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower. $\left(\text{Take } \sqrt{3} = 1.732\right)$ **4 Mark**

Q31. Two poles of equal height are standing opposite to each other on either side of the road, which is 100m wide. From a point between them on the road, the angle of elevation of the top of the are 60° and 30°, respectively. Find the height of the poles. **4**

Q32. Prove that: **4**

$$\frac{(1+\cot\theta+\tan\theta)(\sin\theta-\cos\theta)}{(\sec^3\theta-\text{cosec}^3\theta)} = \sin^2\theta\cos^2\theta$$

Q33. The angle of elevation of a cloud from a point 60m above the surface of the water of a lake is 30° and the angle of depression of its shadow in water of lake is 60°. Find the height of the cloud from the surface of water. **4**

Q34. A man observes a car from the top of a tower, which is moving towards the tower with a uniform speed. If the angle of depression of the car changes from 30° to 45° in 12 minutes, find the time taken by the car now to reach the tower. **4**

Q35. As observed from the top of a 100m high light house from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. $\left[\text{Use } \sqrt{3} = 1.732\right]$ **4**

Q36. The angle of elevation of the top of a vertical tower from a point on the ground is 60°. From another point 10 m vertically above the first, its angle of elevation is 30°. Find the height of the tower. **4**

Q37. If $\sec\theta = \text{x} + \frac{1}{4\text{x}}, \text{x} \neq 0$, find $(\sec\theta + \tan\theta)$. **4 Mark**

Q38. Evaluate: **4 Mark**

$$\frac{\text{cosec}^2(90^{\circ}-\theta)-\tan^2\theta}{2(\cos^2 37^{\circ}+\cos^2 53^{\circ})} - \frac{2\tan^2 30^{\circ}\sec^2 37^{\circ}.\sin^2 53^{\circ}}{\text{cosec}^2 63^{\circ}-\tan^2 27^{\circ}}$$

Q39. A statue 1.6m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation 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 pedestal. $(\text{use}\sqrt{3} = 1.73)$ **4 Mark**

Q40. From the top of a hill, the angles of depression of two consecutive kilometre stones due east are found to be 45° and 30° respectively. Find the height of the hill. **4 Mark**

Q41. **4 Mark**

The angle of elevation of the top of a tower at a distance of 120 m from a point A on the ground is 45°. If the angle of elevation of the top of a flagstaff fixed at the top of the tower, at A is 60°, then find the height of the flagstaff. $[\text{Use}\sqrt{3} = 1.73]$

Q42. Gadisar Lake is located in the Jaisalmer district of Rajasthan. It was built by the King of Jaisalmer and rebuilt by Gadsi Singh in 14th century. The lake has many Chhatris. One of them is shown below: **4 Mark**

Observe the picture. From a point A h m above from water level, the angle of elevation of top of Chhatri (point B) is 45° and angle of depression of its reflection in water (point C) is 60°. If the height of Chhatri above water level is (approximately) 10m, then.

1. Draw a well-labelled figure based on the above information;
2. Find the height (h) of the point A above water level.

$(\text{use}\sqrt{3} = 1.73)$

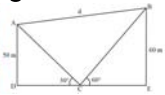
Q43. The angle of elevation of an airplane from point A on the ground is 60°. After a flight of 10 seconds, on the same height, the angle of elevation from point A becomes 30°. If the airplane is flying at the speed of 720km/ hr, find the constant height at which the airplane is flying.

Q44. Prove that:

$$\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta\,\text{cosec}\,\theta - 2\sin\theta\cos\theta.$$

Q45. Prove that $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\text{cosec}^2 A}{\sec^2 A - \text{cosec}^2 A} = \frac{1}{1-2\cos^2 A}$

Q46. Kite festival is celebrated in many countries at different times of the year. In India, every year 14th January is celebrated as International Kite Day. On this day many people visit India and participate in the festival by flying various kinds of kites.
The picture given below, shows three kites flying together:



In Fig. the angles of elevation of two kites (Points A and B) from the hands of a man (Point C) are found to be 30° and 60° respectively. Taking AD = 50m and BE = 60m find:

1. The lengths of strings used (take them straight) for kites A and B as shown in the figure.
2. The distance 'd' between these two kites.

Q47. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of elevation of the bird is 45°. The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is 30°. Find the speed of flying of the bird. $\left(\text{Take}\sqrt{3} = 1.732\right)$ **4 Mark**

Q48. 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° and 30° respectively. Find the height of the poles and the distances of the point from the poles. **4 Mark**

Q49. A moving boat is observed from the top of a 150m high cliff moving away from the cliff. The angle of depression of the boat changes from 60° to 45° in 2 minutes. Find the speed of the boat in m/min. **4 Mark**

Q50. **4 Mark**

There are two poles, one each on either bank of a river just opposite to each other. One pole is 60m high. From the top of this pole, the angle of depression of the top and foot of the other pole are 30° and 60° respectively. Find the width of the river and height of the other pole.

Q51. A boy standing on a horizontal plane finds a bird flying at a distance of 100m from him at an elevation of 30°. A girl standing on the roof of a 20m high building, finds the elevation of the same bird to be 45°. The boy and the girl are on the opposite sides of the bird. Find the distance of the bird from the girl. $\left(\text{Given } \sqrt{2} = 1.414\right)$ **4 Mark**

Q52. The angle of elevation of an aeroplane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the plane is flying at a constant height of $3600\sqrt{3}$ metres, find the speed of the aeroplane. **4 Mark**

Q53. Prove that, in a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides. **4 Mark**

Q54. The hypotenuse (in cm) of a right angled triangle is 6cm more than twice the length of the shortest side. If the length of third side is 6cm less than thrice the length of shortest side, then find the dimensions of the triangle. **4 Mark**

Q55. In a right-angled triangle, prove that the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Q56. From the top of a tower 100m high, a man observes two cars on the opposite sides of the tower with angles of depression 30° and 45° respectively. Find the distance between the cars. $\left[\text{Use } \sqrt{3} = 1.73\right]$

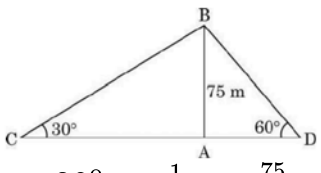
Q57. Prove that:
$\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \text{cosec } A + \cot A$

Q58. There is a small island in the middle of a 100m wide river anda tall tree stands on the island. P and Q are points directly opposite to each other on two banks and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30° and 45°, find the height of the tree. $(\text{Use } \sqrt{3} = 1.732)$.

Q59. The horizontal distance between two poles is 15 m. The angle of depression of the top of first pole as seen from the top of second pole is 30°. If the height of the second pole is 24 m, find the height of the first pole. $\left[\text{use } \sqrt{3} = 1.732\right]$

Q60. Prove that: **3 Mark**
$\frac{\sin\theta - \cos\theta + 1}{\cos\theta - \sin\theta - 1} = \frac{1}{\sec\theta - \tan\theta}$

Q61. Two men on either side of a cliff 75m high observe the angles of elevation of the top of the cliff to be 30° and 60°. Find the distance between the two men. **3 Mark**



$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{75}{AC}$

Q62. **3 Mark**

The angle of elevation of the top of a hill at the foot of a tower is 60° and the angle of elevation of the top of the tower from the foot of the hill is 30°. If height of the tower is 50m, find the height of the hill.

Q63. Show that: **3 Mark**

$\frac{\cos^2(45^\circ+\theta)+\cos^2(45^\circ-\theta)}{\tan(60^\circ+\theta)\tan(30^\circ-\theta)} = 1.$

Q64. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cos\theta = 1$. **3 Mark**

Q65. A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle of 30° with it. The height of the breaking point from the ground is 2m. Find the total height of the tree. **3 Mark**

Q66. A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of hill as 30° Find the distance of the hill from the ship and the height of the hill. **3 Mark**

Q67. Evaluate:

$\frac{2}{3}\text{cosec}^2\,58^o - \frac{2}{3}\cot 58^o \tan 32^o - \frac{5}{3}\tan 13^o \tan 37^o \tan 45^o \tan 53^o \tan 77^o.$

Q68. Prove that: $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0.$

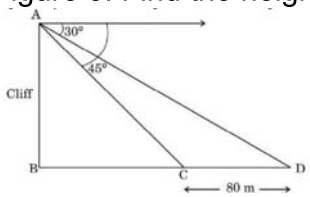
Q69. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 45° If the tower is 30m high, find the height of the building.

Q70. The shadow of a tower at a time is three times as long as its shadow when the angle of elevation of the sun is 60°. Find the angle of elevation of the sun at the time of the longer shadow.

Q71. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are $45^\circ \text{and } 60^\circ$ respectively. Find the height of the tower and the horizontal distance between the tower and the building. $(\text{use } \sqrt{3} = 1.73)$

Q72. An aeroplane when flying at a height of 3125m from the ground passes vertically below another plane at an instant when the angles of elevation of the two planes from the same point on the ground are 30° and 60° respectively. Find the distance between the two planes at that instant.

Q73. Two boats are sailing in the sea 80m apart from each other towards a cliff AB. The angles of depression of the boats from the top of the cliff are 30° and 45° respectively, as shown in Figure 3. Find the height of the cliff. **3 Mark**



Q74. Two men on either side of a 75 m high building and in line with base of building observe the angles of elevation of the top of the building as 30° and 60°. Find the distance between the two men. (Use $\sqrt{3}$ = 1.73) **3 Mark**

Q75. Prove that: **3 Mark**

$\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

Q76. Prove that: **3 Mark**

$\frac{2\cos^3\theta-\cos\theta}{\sin\theta-2\sin^3\theta}$

Q77. Prove that: $\frac{\cot\theta+\text{cosec}\theta-1}{\cot\theta-\text{cosec}\theta+1}=\frac{1+\cos\theta}{\sin\theta}$ **3 Mark**

Q78. Find the value of: **3 Mark**

$\left(\frac{3\tan 41^\circ}{\cot 49^\circ}\right)^2-\left(\frac{\sin 35^\circ\sec 55^\circ}{\tan 10^\circ\tan 20^\circ\tan 60^\circ\tan 70^\circ\tan 80^\circ}\right)^2$

Q79. An aeroplane at an altitude of 200 metres observes the angles of depression of opposite points on the two banks of a river to be 45° and 60°. Find the width of the river. **3 Mark**

$(\text{Use}\sqrt{3}=1.732)$

Q80. From the top of a 7 m high building, the angle of elevation of the top of a tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. **3 Mark**

Q81. If $1+\sin^2\theta=3\sin\theta\cos\theta$, prove that $\tan\theta=1\text{or}\frac{1}{2}$.

Q82. The angle of elevation of an aeroplane from a point on the ground is 60°. After a flight of 30 seconds the angle of elevation becomes 30°. If the aeroplane is flying at a constant height of $3000\sqrt{3}$ m, find the speed of the areoplane.

Q83. Evaluate:

$\left(\frac{3\sin 43^\circ}{\cos 47^\circ}\right)^2-\frac{\cos 37^\circ\text{cosec }53^\circ}{\tan 5^\circ\tan 25^\circ\tan 45^\circ\tan 65^\circ\tan 85^\circ}$

Q84. Prove that: $(\text{cosec A}-\sin\text{A})(\sec\text{A}-\cos\text{A})=\frac{1}{\cot\text{A}+\tan\text{A}}$

Q85. Find A and B if sin (A + 2B) $=\frac{\sqrt{3}}{2}$ and cos (A + 4B) = 0, where A and B are acute angles.

Q86. From the top of a 60 m high building, the angles of depression of the top and the bottom of a tower are $45^\circ$and 60°respectively. Find the height of the tower .$[\text{Take}\sqrt{3}=1.73]$

Q87. Two ships are there in the sea on either side of a light house in such a way that the ships and the light house are in the same straight line. The angles of depression of two ships as observed from the top of the light house are 60° and 45°. If the height of the light house is 200 m, find the distance between the two ships. [Use $\sqrt{3}$=1.73]

Q88. The angle of elevation of an aeroplane from a point A on the ground is 60° . After a flight of 15 seconds, the angle of elevation changes to 30° If the aeroplane is flying at a constant height of $1500\sqrt{3}$ m find the speed of the plane in km/hr. **3 Mark**

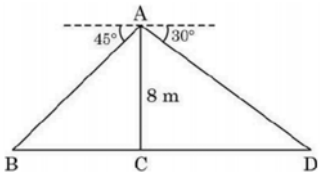
Q89. If $\sin\theta+\cos\theta=\text{p}$ and $\sec\theta+\text{cosec}\theta=\text{q}$, show that $\text{q}(\text{p}^2-1)=2\text{p}$. **3 Mark**

Q90. 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 45°. If the tower is 30m high, find the height of the building. **3 Mark**

Q91. In a right triangle, prove that the square of the hypotenuse is equal to the sum of squares of the other two sides. **3 Mark**

Q92. Prove that: $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}=\frac{1+\sin\theta}{\cos\theta}$ **3 Mark**

Q93. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45°. If the bridge is at a height of 8m from the banks, then find the width of the river. **3 Mark**



Q94. The tops of two poles of heights 20m and 28m are connected with a wire. The wire is inclined to the horizontal at an angle of 30°. Find the length of the wire and the distance between the two poles. **3 Mark**

Q95. If $\sin\theta + \cos\theta = \sqrt{2}$, prove that $\tan\theta + \cot\theta = 2$. **3 Mark**

Q96. Find the value of sin 30° geometrically. **3 Mark**

Q97. Without using trigonometrical tables, evaluate: **3 Mark**

$$\frac{\cos 58^o}{\sin 32^o} + \frac{\sin 22^o}{\cos 68^o} - \frac{\cos 38^o \text{cosec} 52^o}{\tan 18^o . \tan 35^o \tan 60^o \tan 72^o \tan 55^o}$$

Q98. Prove the following: **3 Mark**

$$\sin A(1 + \tan A) + \cos A(1 + \cot A) = \sec A + \text{cosec} A$$

Q99. Prove the following: **3 Mark**

$$(1 + \cot A - \text{cosec} A)(1 + \tan A + \sec A) = 2$$

Q100. Prove the following: (cosec A − sin A)(sec A − cos A) $= \frac{1}{\tan A + \cot A}$ **3 Mark**

Q101. Prove the following: $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} = 1 + \tan A + \cot A$ **3 Mark**

Q102. Prove that: **3 Mark**

$$\frac{\sin\theta}{\cot\theta + \text{cosec}\,\theta} = 2 + \frac{\sin\theta}{\cot\theta - \text{cosec}\,\theta}$$

Q103. If $\tan 2A = \cot(A - 18^\circ)$, where 2A is an angle, find the value of A. **3 Mark**

Q104. If $\tan 2A = \cot(A - 18^\circ)$, where 2A is an acute angle, find the value of A. **3 Mark**

Q105. If $4\tan\theta = 3$, evaluate $\left(\frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1}\right)$ **3 Mark**

Q106. If the mid-point of the line segment joining the points A(3, 4) and B(k, 6) is P(x, y) and x + y – 10 = 0, find the value of k. **3 Mark**

Q107. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$. **3 Mark**

Q108. Prove that: $\frac{\tan\theta}{1-\tan\theta} - \frac{\cot\theta}{1-\cot\theta} = \frac{\cos\theta + \sin\theta}{\cos\theta - \sin\theta}$ **3 Mark**

Q109. From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30° and 45° respectively. If the bridge is at a height of 3m from the banks, then find the width of the river. **3 Mark**

Q110. **3 Mark**

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 50m high, then find the height of the building.

Q111. Prove that: **3 Mark**
sin θ (1 + tan θ) + cos θ (1 + cot θ) = sec θ + cosec θ.

Q112. Prove that: **3 Mark**
$(\sin\theta + 1 + \cos\theta)$
$(\sin\theta - 1 + \cos\theta).\sec\theta\ \text{cosec}\ \theta = 2.$

Q113. Prove that: **3 Mark**
$\sqrt{\frac{\sec\theta-1}{\sec\theta+1}} + \sqrt{\frac{\sec\theta+1}{\sec\theta-1}} = 2\ \text{cosec}\ \theta$

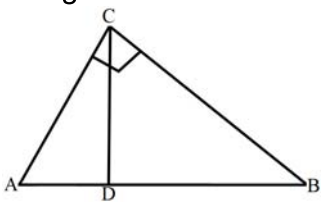
Q114. Prove that $(\sin\theta + \text{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta.$ **3 Mark**

Q115. Prove that:
$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\ \text{cosec}\ \theta$

Q116. Prove that:
$\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\text{cosec A - 1}}{\text{cosec A} + 1}$

Q117. Prove that:
$(1 + \cot A - \text{cosec A})(1 + \tan A + \sec A) = 2$

Q118. In Fig. $\angle ACB = 90^\circ$ and $CD \perp AB$. prove that CD^2 = BD × AD.



Q119. A, B and C are interior angles of a triangle ABC. Show that

1. $\sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}$
2. If $\angle A = 90^\circ$, and $\tan(A - B) = \frac{1}{\sqrt{3}}, 0^\circ < A + B < 90^\circ, A > B$, then find the values of A and B.

Q120. If $\tan(A + B) = 1$ and $\tan(A - B) = \frac{1}{\sqrt{3}}, 0^\circ < A + B < 90^\circ, A > B$, then find the values of A and B. **3 Mark**

Q121. 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 50m high, then find the height of the building. **3 Mark**

Q122. $\text{Simplify:}\frac{\sin^3\theta+\cos^3\theta}{\sin\theta+\cos\theta} + \sin\theta\cos\theta$ **2 Mark**

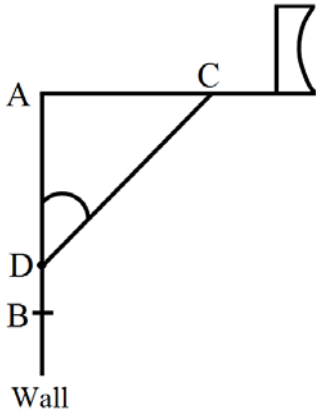
Q123. Without using trigonometric tables, evaluate the following: **2 Mark**
$(\sin^2 25^o + \sin^2 65^o) + \sqrt{3}(\tan 5^o \tan 15^o \tan 30^o \tan 75^o \tan 85^o)$

Q124. Evaluate: **2 Mark**
$\frac{\cos 72^\circ}{\sin 180^\circ} + \frac{\sin 11^\circ}{\cos 79^\circ} - \tan 15^\circ \tan 75^\circ$

Q125. Evaluate: **2 Mark**

$$\left(\frac{\sin 47^\circ}{\cos 43^\circ}\right)^2 + \left(\frac{\cos 30^\circ}{\cos 30^\circ}\right)^2 - (\sin 60^\circ)^2$$

Q126. The rod AC of a TV disc antenna is fixed at right angle to the wall AB and a rod CD is supporting the disc as shown in Fig. If AC = 1.5m long and CD = 3m, find **2 Mark**
(i) $\tan\theta$ (ii) $\sec\theta + \text{cosec}\theta$.



Q127. If $\tan\theta = \sqrt{3}$, find the value of $\left(\frac{2\sec\theta}{1+\tan^2\theta}\right)$

Q128. Prove that $1 + \frac{\cot^2\alpha}{1+\text{cosec }\alpha} = \text{cosec }\alpha$

Q129. If $\cot\theta = \frac{15}{8}$, hen evaluate $\frac{(2+2\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(2-2\cos\theta)}$

Q130. Show that $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$

Q131. If $\sin\alpha = \frac{1}{\sqrt{2}}$ and $\cot\beta = \sqrt{3}$, then find the value of $\text{cosec }\alpha + \text{cosec }\beta$.

Q132. If $\sin\theta + \cos\theta = \sqrt{3}$, then find the value of $\sin\theta \cdot \cos\theta$.

Q133. If A = 60° and B = 30°, verify that:
$\sin(A + B) = \sin A \cos B + \cos A \sin B$

Q134. Evaluate: $2\sqrt{2}\cos 45^\circ \sin 30^\circ + 2\sqrt{3}\cos 30^\circ$

Q135. If $\sin\theta + \sin^2\theta = 1$, then prove that $\cos^2\theta + \cos^4\theta = 1$. **2 Mark**

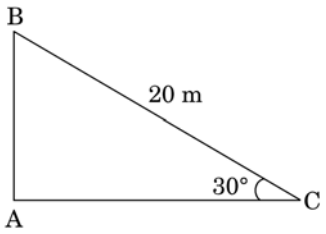
Q136. If $\tan\theta = \frac{1}{\sqrt{7}}$, then show that $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} = \frac{3}{4}$. **2 Mark**

Q137. If $\tan\theta = \frac{3}{4}$, find the value of $\left(\frac{1-\cos^2\theta}{1+\cos^2\theta}\right)$ **2 Mark**

Q138. The tops of two towers of height x and y, standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find $x : y$. **1 Mark**

Q139. Write the value of $\sin^2 30^\circ + \cos^2 60^\circ$. **1 Mark**

Q140. In Figure, a tightly stretched rope of length 20m is tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground is 30°. **1 Mark**



Q141. Evaluate: **1 Mark**

$$\frac{2\tan 45^\circ \times 2\cos 60^\circ}{\sin 30^\circ}$$

Q142. If $\sin\theta = \frac{1}{3}$, then find the value of $\left(2\cot^2\theta + 2\right)$. **1 Mark**

Q143. The ratio of the height of a tower and the length of its shadow on the ground is $\sqrt{3} : 1$. What is the angle of elevation of the sun? **1 Mark**

Q144. A ladder 15 m long just reaches the top f a vertical wall. If the ladder makes an angle of 60^0 with the wall, then calculate the height of the wall. **1 Mark**

Q145. A ladder, leaning against a wall, makes an angle of 60°. with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder.

Q146. Find the value of $\sec 60^\circ$ geometrically.

Q147. The tops of two towers of height x and y, standing on level ground, subtend angles of 30° and 60° respectively at the centre of the line joining their feet, then find x : y.

Q148. A ladder 15 m long makes an angle of 60° with the wall. Find the height of the point where the ladder touches the wall.