Trigonometry

If $\sin\theta = \frac{1}{3}$, then find the value of $(2\cot^2\theta + 2)$. **CBSE2009-1M**

If $\sec^2\theta(1+\sin\theta)(1-\sin\theta) = k$, find the value of k. **CBSE2009-1M**

If $3x=\text{cosec}\,\theta$ and $\frac{3}{x} = \cot\theta$, find the value of $3(x^2 - \frac{1}{x^2})$. **CBSE2010-1M**

If $6x=\sec\theta$ and $\frac{6}{x} = \tan\theta$, find the value of $9(x^2 - \frac{1}{x^2})$. **CBSE2010-1M**

The angle of elevation of a top of a tower from a point on the ground which is 30 m away from the foot of the tower is 45^0. Find the height of the tower. **CBSE2011-1M**

At some time of the day, the length of the shadow of the tower is equal to its height. Find the suns altitude at that time. **CBSE2011-1M**

A kite is flying at a height of 30 m from the ground. The length of the string from the kite to the ground is 60 m. Assuming that there is no slack in the string; find the angle of elevation of the kite at the ground. **CBSE2012-1M**

The length of the shadow of a tower on the plane ground is $\sqrt{3}$ time the height of the tower. Find the angle of elevation of the sun. **CBSE2012-1M**

The angle of depression of a car, standing on the ground, from the top of a 75 m high tower is 30^0. Find the distance of the car from the base of the tower. **CBSE2013-1M**

A ladder makes an angle of 60^0 with the ground when placed against a wall. If the foot of the ladder is 2 m away from the wall, find the length of the ladder. **CBSE2014-1M**

The angle of depression of a car parked on the road from the top of a 150 m high tower is 30^0. Find the distance of the car from the tower. **CBSE2014-1M**

The tops of two towers of height x and y, standing on level ground, subtend angles of 300 and 600 respectively at the centre of line joining their feet, then find $\frac{x}{y}$. **CBSE2015-1M**

A tower AB is 20 m high and BC, its shadow on the ground, is 20 3 m long. Find the Sun's altitude. **CBSE2015-1M**

AB is a 6 m high pole and CD is a ladder inclined at an angle of 60° to the horizontal and reaches up to a point D of pole. If AD = 2.54 m, find the length of the ladder. (use $\sqrt{3}$ = 1.73) **CBSE2016-1M**

An observer, 1.7 m tall, is $20\sqrt{3}$ m away from a tower. The angle of elevation from the eye of observer to the top of tower is 30°. Find the height of tower. **CBSE2016-1M**

If a tower 30 m high, casts a shadow $10\sqrt{3}$ m long on the ground, then what is the angle of elevation of the sun? **CBSE2017-1M**

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 ? **CBSE2017-1M**

What is the value of ($\cos^2 67° - \sin^2 23°$)? **CBSE2018-1M**

If $\sin\theta + \cos\theta = \sqrt{2}\cos(90^0 - \theta)$ find value of $\cot\theta$. **CBSE2018-1M**

If $\sqrt{3}\tan\theta = 3\sin\theta$, find the value of $\sin\theta$. **CBSE2018-1M**

Evaluate without using trigonometric tables. **CBSE2018-2M**

$$\frac{\sin 18^0}{\cos 72^0} + \sqrt{3}(\tan 10^0 \times \tan 30^0 \times \tan 40^0 \times \tan 50^0 \times \tan 80^0)$$

If cot θ = $\frac{15}{8}$, then find the value of $\frac{(2+2\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(2-2\cos\theta)}$ **CBSE2009-2M**

Find the value of $\tan 30^0$ geometrically. **CBSE2009-2M**

Simplify: $\frac{\sin^3\theta + \cos^3\theta}{\sin\theta + \cos\theta} + \sin\theta\cos\theta$ **CBSE2009-2M**

Find the value of $\text{cosec } 30^0$ geometrically. **CBSE2010-2M**

Find the value of $\sec 45^0$ geometrically. **CBSE2010-2M**

Evaluate without using trigonometric tables. **CBSE2010-2M**

$$\frac{\sin(90^0 - \theta) \times \text{cosec}\theta - \tan(90^0 - \theta) \times \cot\theta + \cos^2 25^0 + \cos^2 65^0}{3\tan 27^0 \times \tan 63^0}$$

Evaluate without using trigonometric tables. **CBSE2010-2M**

$$\tan(90^0 - \theta) \times \cot\theta - \sec(90^0 - \theta) \times \text{cosec}\theta + \sqrt{3}\tan 12^0 \times \tan 60^0 \times \tan 78^0$$

A, B, C are interior angles of triangle ABC. Prove that $\text{cosec}\left(\frac{A+B}{2}\right) = \sec\frac{C}{2}$. **CBSE2018-2M**

Prove that $\frac{\cos A}{1-\tan A} + \frac{\sin A}{1-\cot A} = \sin A + \cos A$. **CBSE2007-3M**

Evaluate without using trigonometric tables. **CBSE2007-3M**

$$\frac{3\cos 55^0}{7\sin 35^0} - \frac{4(\cos 70^0 \times \text{cosec}\, 20^0)}{7(\tan 25^0 \times \tan 5^0 \times \tan 45^0 \times \tan 65^0 \times \tan 85^0)}$$

Prove that $\frac{\cot A-\cos A}{\cot A+\cos A}=\frac{\operatorname{cosec} A-1}{\operatorname{cosec} A+1}$. **CBSE2008-3M**

Prove that $(1+\cot A-\operatorname{cosec} A)(1+\tan A+\sec A)=2$. **CBSE2008-3M**

Find the value of $\sin 30^0$ geometrically. **CBSE2009-3M**

Evaluate:**CBSE2009-3M**

$$\frac{2}{3}\operatorname{cosec}^2 58^0-\frac{2}{3}\cot 58^0\tan 52^0-\frac{5}{3}\tan 13^0\times\tan 37^0\times\tan 45^0\times\tan 53^0\times\tan 77^0$$

Evaluate without using trigonometric tables. **CBSE2009-3M**

$$\frac{\cos 58^0}{\sin 32^0}+\frac{\sin 22^0}{\cos 68^0}-\frac{\cos 38^0\times\operatorname{cosec} 52^0}{\tan 18^0\times\tan 35^0\times\tan 60^0\times\tan 72^0\times\tan 55^0}$$

Prove that $\frac{\tan A}{1-\cot A}+\frac{\cot A}{1-\tan A}=1+\tan A+\cot A$. **CBSE2010-3M**

Prove that $(\operatorname{cosec} A-\sin A)(\sec A-\cos A)=\frac{1}{\tan A+\cot A}$. **CBSE2010-3M**

If $\tan\theta+\sin\theta=m$ & $\tan\theta-\sin\theta=n$ then show that $m^2-n^2=4\sqrt{mn}$. **CBSE2010-3M**

Show that: $(1+\frac{1}{\tan^2\theta})+(1+\frac{1}{\cot^2\theta})=\frac{1}{\sin^2\theta-\sin^4\theta}$. **CBSE2010-3M**

From the top of a tower 100 m high, a man observes two cars on the opposite sides of the tower with angle of depression as 30^0 and 45^0 respectively. Find the distance between the cars. (use $\sqrt{3}$ = 1.73) **CBSE2011- 3M**

A ladder of length 6 m makes an angle of 45^0 with the floor while leaning against a wall of a room. If the foot of the ladder is kept fixed on the floor and it is made to lean against the opposite wall of the room, it make an angle of 60^0 with the floor. Find the distance between the two walls of the room. **CBSE2011- 3M**

The angles of depression of the top and bottom of a tower as seen from the top of cliff of a high $60\sqrt{3}m$ are 45^0 and 60^0 respectively. Find the height of the tower. **CBSE2012- 3M**

The angles of depression of two ships from the top of a light house and on the same side of it are found to be 45^0 and 30^0.If the ships are 200 m apart, find the height of the light house. **CBSE2012- 3M**

The horizontal distance between two poles is 15 m. The angle of depression of the top of fist pole as seen from the top of second pole is 30^0. If the height of second pole is 24 m, find the height of the first pole. (use $\sqrt{3}$ = 1.73) **CBSE2013- 3M**

Two ships are there in the sea on both side of the light house in such a way that two ships and the light house are in a straight line. The angles of depression of two ships as observed from the top of the light house are 60^0 and 45^0. If the height of light house

is 200 m, find the distance between two ships. (use $\sqrt{3}$ = 1.73) **CBSE2014- 3M**

The angle of elevation of an aeroplane from a point on the ground is 60^0. After a flight of 30 seconds the angle of elevation becomes 30^0. If the aeroplane is flying at a constant height of $3000\sqrt{3}\,m$, find the speed of the aeroplane. **CBSE2014- 3M**

The angle of elevation of the top of a building from the foot of the tower is 30^0 and the angle of elevation of the top of the tower from the foot of the building is 45^0. If the tower is 30 m high, find the height of the building. **CBSE2015-3M**

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. **CBSE2015-3M**

The angles of depression of the top and bottom of a 50 m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (use $\sqrt{3}$ = 1.73) **CBSE2016- 3M**

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) **CBSE2016- 3M**

On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower. **CBSE2017- 3M**

A moving boat is observed from the top of a 150 m 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/h. **CBSE2017- 3M**

If 4 tan θ = 3, evaluate $\left(\frac{4\sin\theta-\cos\theta+1}{4\sin\theta+\cos\theta-1}\right)$. **CBSE2018- 3M**

If tan 2A = cot (A – 18°), where 2A is an acute angle, find the value of A. **CBSE2018- 3M**

Prove that $\frac{1}{\operatorname{cosec}\theta+\cot\theta}-\frac{1}{\sin\theta}=\frac{1}{\sin\theta}-\frac{1}{\operatorname{cosec}\theta-\cot\theta}$. **CBSE2018- 3M**

If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$. **CBSE2018- 3M**

Prove that $\left(\frac{1+\tan^2 A}{1+\cot^2 A}\right)=\left(\frac{1-\tan A}{1-\cot A}\right)^2=\tan^2 A$ **CBSE2018- 3M**

Evaluate $\frac{\cos 58^0}{\sin 32^0}+\frac{\sin 22^0}{\cos 68^0}-\frac{\cos 38^0\operatorname{cosec}52^0}{\sqrt{3}(\tan 18^0\tan 35^0\tan 60^0\tan 72^0\tan 55^0)}$ **CBSE2018- 3M**

Prove that $\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\,cosec\theta$ **CBSE2018- 3M**

If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, show that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$. **CBSE2018- 3M**

A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of 30°. A girl standing on the roof of 20 metre high building finds the angle of elevation of the same bird to be 45°. Both the boy and the girl are on opposite sides of the bird. Find the distance of bird from the girl. **CBSE2007- 4M**

A state 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 60^0 and from the same point, the angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal.
(use $\sqrt{3}$ = 1.73) **CBSE2008- 4M**

An aeroplane when flying at a height of 3125 m 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. **CBSE2009- 4M**

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. 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. **CBSE2009- 4M**

From the top of a 7 m high building, the angle of elevation of top of tower is 60^0 and angle of depression of foot of the tower is 30^0. Find the height of the tower. **CBSE2010- 4M**

From a window (9m 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 30^0 and 60^0 respectively. Find the height of the opposite house and width of the street. (use $\sqrt{3}$ = 1.732) **CBSE2010- 4M**

A vertical pedestal stands on the ground and is surmounted by a vertical flag staff of height 5 m. At a point on the ground the angles of elevation of the bottom and top of the flag staff are 30^0 and 60^0 respectively. Find the height of the pedestal. **CBSE2010- 4M**
Two poles of equal height are standing opposite to each other on either side of the road, which is 100 m wide. From a point between them on road, the angles of elevation of the top of the poles are 60^0 and 30^0, respectively. Find the height of the poles. **CBSE2011- 4M**

The shadow of a tower standing on a level ground is found to be 30 m longer when the suns altitude is 30^0 than when it is 60^0. Find the height of the tower. **CBSE2011- 4M**

The angles of elevation and depression of the top and bottom of a light-house from the top of a 60 m building are 30^0 and 60^0 respectively. Find **CBSE2012- 4M**
(a) the difference between heights of light-house and building.
(b) the distance between the light-house and building.

The angle of elevation of the top of a hill at the foot of tower is 60^0 and angle of depression from the top of the tower of the foot of the hill is 30^0. If the tower height is 50 m, find the height of the hill. **CBSE2012- 4M**

The angle of elevation of the top of a building from the foot of the tower is 30^0 and the angle of elevation of the top of a tower from the foot of the building is 60^0. If the tower is 60 m height, find the height of the building. **CBSE2013- 4M**

The angles of elevation and depression of the top and bottom of a tower from the top of a 60 m building are 30^0 and 60^0 respectively. Find the difference between the heights of building and the tower and also the distance between them. **CBSE2014- 4M**

The angle of elevation of the top of a tower at a distance of 120 m from a point A on the ground is 45^0. If the angle of elevation of the top of a flagstaff fixed at the top of the tower, at A is 60^0, then find the height of the flagstaff. (use $\sqrt{3}$ = 1.732)**CBSE2014- 4M**

From a point P on the ground the angle of elevation of the top of the tower is 30^0 and that of the top of a staff flag fixed on the top of tower is 60^0. If the length of the flag staff is 5 m, find the height of the tower. **CBSE2015- 4M**

At a point A, 20 metres above the level of water in a lake, the angle of elevation of a cloud is 30^0. The angle of depression of the reflection of the cloud in the lake, at A is 60^0. Find the distance of the cloud from A. **CBSE2015- 4M**

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. (use $\sqrt{3}$ = 1.732) **CBSE2016- 4M**

A vertical tower stands on a horizontal plane and is surmounted by a flagstaff of height 5 m. From a point on the ground the angles of elevation of the top and bottom of the Flag staff are 60° and 30° respectively. Find the height of the tower and the distance of the point from the tower. (use $\sqrt{3}$ = 1.732) **CBSE2016- 4M**

An aeroplane is flying at a height of 300 m above the ground. Flying at this height, the angles of depression from the aeroplane of two points on both banks of a river in opposite directions are 45^0 and 60^0 respectively. Find the width of the river. (use $\sqrt{3}$ = 1.732) **CBSE2017- 4M**

The angle of elevation of a cloud from a point 60 m 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. **CBSE2017- 4M**

As observed from the top of a 100 m high light house from the sea-level, the angles of depression of two ships are 30^0 and 45^0. If one ship is exactly behind the other on the same side of the light house, find the distance between the two ships. **CBSE2018- 4M**

A statue, 1.46 m tall, stands on a pedestal. From a point on the ground the angle of elevation of the top of the statue is 60^0 and from the same point angle of elevation of the top of the pedestal is 45^0. Find the height of the pedestal. **CBSE2018- 4M**

Prove that $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$ **CBSE2018- 4M**

Prove that $(\frac{\sin A}{1-\cos A} - \frac{1-\cos A}{\sin A})(\frac{\cos A}{1-\sin A} - \frac{1-\sin A}{\cos A}) = 4$ **CBSE2018- 4M**

The angle of elevation of the top of a hill at the foot of a tower is 60º and the angle of depression from the top of tower to the foot of hill is 30º. If tower is 50 metre high, find the height of the hill. **CBSE2018- 4M**

Two poles of equal heights are standing opposite to each other on either side of theroad which is 80 m wide. From a point in between them on the road, the angles of elevation of the top of poles are 60º and 30º respectively. Find the height of the poles and the distances of the point from the poles. **CBSE2018- 4M**

On a horizontal plane there is a vertical tower with a flag pole on the top of the tower. From a point 9 m away from the foot of the tower, the angles of elevation of the top and foot of the flag pole are 60º and 30º respectively. Find the heights of the tower and the flag pole mounted on it. **CBSE2018- 4M**

Show that $n(m^2-1) = 2m$, if $m = \sin\theta + \cos\theta$ and $n = \sec\theta + \text{cosec}\,\theta$. **CBSE2018- 4M**