



MATHS

BOOKS - BHARATI BHAWAN MATHS (HINGLISH)

Heights and Distances

Example

1. A ladder rests against a wall at an angle α to the horizontal, its foot is pulled away from the

wall through a distance a , so that it slides a distance b down the wall making an angle β with the horizontal. Show that

$$a = b \frac{\tan 1}{2} (\alpha + \beta).$$



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2. A two metre long object is fired vertically upwards from the mid point of two locations A and B, 8m apart. The speed of the object after t second is given by $\frac{ds}{dt} = 2t + 1 \frac{m}{s}$. Let α and β be the angle subtended by the object

at A and B, respectively after one and two seconds. Find the value $\cos(\alpha - \beta)$



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3. A vertical tower 50ft high stands on a sloping ground. The foot of the tower is at the same level as the middle point of a vertical flag pole. From the top of the tower the angle of depression of the top and the bottom of the pole are 15° and 45° respectively. Find the length of the pole.



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4. A flagstaff stands on the top of a vertical tower. It is found that the flagstaff subtends the same angle α at two points, $2d$ apart, on a straight line through the base of the tower on the horizontal plane. Also the flagstaff subtends an angle β at the midpoint of these two points find the value of



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5. A person standing by the side of a road observes a row of equidistant telephone poles of equal height. Neglecting the height of the person's eye, the 10th and 17th poles subtend the same angle that they would do if they were in the position of the first pole and were respectively $\frac{1}{2}$ and $\frac{1}{3}$ of their height. Find correct to one place of decimal, the secant of the angle between the base lines of the poles and the line drawn from the person's eye to the base of the first pole.



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6. An observer at an anti air craft post A identifies an enemy aircraft due East of his post at an angle of elevation of 60° . At the same instant a detection post D 4kms south of A reports the aircraft at an elevation of 30° . Calculate the altitude at which the plane is flying.



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7. PQ is a vertical tower having P as the foot. A,B,C are three points in the horizontal plane through P. The angles of elevation of Q from A,B,C are equal and each is equal to θ . The sides of the triangle ABC are a,b,c, and area of the triangle ABC is Δ . Then prove that the height of the tower is $(abc) \frac{\tan \theta}{4}$.



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8. A person standing on the ground observes the angle of elevation of the top of a tower to be 30° . On walking a distance a in a certain direction, he finds the elevation of the top to be same as before. He then walks a distance $\frac{5}{3}a$ at right angles to his former direction, and finds that the elevation of the top has doubled. The height of the tower is



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9. ABC is a triangular park with $AB = AC = 100m$. A Television tower stands at the mid point of BC . The angles of elevations of the top of tower at A, B, C are $45^\circ, 60^\circ, 60^\circ$ respectively Then the height of tower is



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Exercise

1. A 10 meters high tower is standing at the centre of an equilateral triangle and each side of the triangle subtends an angle of 60° at the top of the tower. Then the length of each side of the triangle is.



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2. An electric pole stands at the vertex A of the equilateral triangular field and subtends an angle 60° at either of the remaining vertices.

If the altitude of the field is 50 meters, the height of the pole is



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3. A pole on the ground leans 60° to the vertical. At a point a meters away from the base of the pole on the ground, the two halves of the pole subtend the same angle. If the pole and the point are in the same vertical plane, the length of the pole is



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