

1. In the design of a new building, a doorway is 4.8 ft above the ground. A ramp for the disabled, at an angle of 6° with the ground, is to be built up to the doorway. How long will the ramp be? Round your answer to 3 decimal places.

2. A straight 123-meters culvert is built down a hillside that makes an angle of 0.633 rad. with the horizontal. Find the height of the hill. Round your answer to 3 decimal places.

3. The headlights of an automobile are set such that the beam drops 4in for each 31ft in front of the car. What is the angle between the beam and the road? Round your answer to 3 decimal places.

4. The angle of inclination of a road is often expressed as percent grade, which is the vertical rise divided by the horizontal run (expressed as a percent). A 5% grade corresponds to a road that rises $5ft$ for every $100ft$ along the horizontal. Find the angle of inclination that corresponds to a 5% grade. Round your answer to the nearest **minute**.

5. The straight arm of a robot is 2-feet long and makes an angle of 57.5° above a horizontal conveyor belt. How high above the belt is the end of the arm? Give your answer to 3 decimal places.

6. A robot is on the surface of Mars. The angle of depression from a camera on the robot to a rock on the surface of Mars is 11.9° . The camera is 199 cm above the surface of the planet. How far from the camera is the rock? Express your answer in **meters** to three decimal places. (distance = _____ meters)

7. On a test flight, during the landing of the space shuttle, the ship was 360 ft above the beginning of the landing strip. It then came in on a constant angle of 6° with the landing strip. How far from the beginning of the landing strip did it first touch the ground? Round your answer to 3 decimal places.

8. When the elevation of the sun is 38° a tree has a shadow 26.336 *ft* long. How tall is the tree?

9. A surveyor standing on a hill 12 feet high looks at a building across a river. The surveyor determines that the angle of depression to the base of the building is $21^\circ 23'$ and the angle of elevation to the top of the building to be $38^\circ 7'$. Calculate the height of the building in feet to two decimal places.

10. The angle of elevation from a point on the ground to the top of a tree is 36.4° . The angle of elevation from a point 22 ft farther back to the top of the tree is 28.9° . Find the height of the tree to 2 decimal places.

11. A driver in a car traveling along a straight level road at 54 miles per hour sees a mountain in the distance. The driver determines that the angle of elevation to the top of mountain to be $16^{\circ}24'$. After 10 minutes, the driver determines the angle of elevation to the top of the mountain to be $26^{\circ}32'$. Calculate the height of the mountain to the nearest foot.