ANGLES OF ELEVATION & DEPRESSION



APPLICATION PROBLEMS

Ste	eps to solving problems using trigonometric ratios
1)	what needs to be calculated (or)
2)	the problem with a triangle (draw a picture)
3)	Label the relevant sides associated with the
4)	an equation using the ratios
5)	Substitute values
6)	Solve for the unknown measure, and write statement.

Example 1: While walking to school you pass a barn with a silo. Looking up to the top of the silo you estimate the angle of elevation to be about 14°. You continue walking and find that you were 40 m from the silo. Using this information and our knowledge of trigonometric ratios, calculate the height of the silo. (10m)

tonly = $\frac{h}{40}$ $40 m_{A}$ $h = 40 \cdot tonly$ h = 10 mh = 10 m **Example 2:** A helicopter sights a campfire at an angle of 40° from the horizontal. The helicopter is hovering 400 m above the ground. What is the horizontal distance between the helicopter and the campfire? (476.7m)



Example 3: A sailboat that is 2 km due East of a lighthouse sends a signal to the lighthouse that it is in distress. The lighthouse quickly signals the coast guard that is due South of the lighthouse and 7 km Southwest of the sailboat. What heading from due north should the coast guard take in order to intercept the troubled sailboat? (16.6°)



Example 4: Safety by-laws state that for a ladder to be stable, the angle the base of the ladder makes with the ground should be between 70° and 80° . A safety inspector at a construction site notices a painter on a 10 m ladder that is leaning against a wall. The base of the ladder is 1.5 m away from the wall. Does the inspector have cause to be concerned? Explain. (81.4°)



.". The engle between the lodder and the ground is 66.4"

Primary Trigonometry Ratio Application Practice

1) A 5-m ladder is resting against a wall. The base of the ladder is 2 m along the ground from the base of the wall. What angle does the base of the ladder make with the ground? Express your answer to the nearest tenth of a degree.



2) An 80-m tower is supported by a guy wire attached to the top of the tower. If the wire forms an angle of elevation of 79°, how long is it? Express your answer to the nearest tenth of a metre.



3) The highest point along a cliff is 80 m above the lakeshore. A surveyor stands on the top of the cliff, looking through a 1.5 m tall transit instrument. He spots a boat out on the lake, at an angle of depression of 38°. How far, to the nearest tenth of a metre, is it from the boat to the base of the cliff?



4) Michael stands 10.0 m from the base of a building. He measures the angle of elevation to the top of the building to be 65°. Michael's measurement was made from 1.5 m above the ground. Determine the height of the building to the nearest metre.

The height of the building is
$$x+1.5$$

The height of the building is $x+1.5$
The height is 21.4+15
 $x = 10 \tan 65$
 $x = 10 \tan 65$
 $22.9 \sim 23m$.
 $x = 21.4$

5) Two buildings are 60 m apart. The angle of depression from the top of the taller building to the top of the shorter building is 15°. The height of the shorter building is 30.4 m. What is the height of taller building? Express your answer to the nearest tenth of a metre.



6) From the top of a 150 m high cliff, the angles of depression of two boats on the water are 20° and 25°. How far apart are the boats?



7) Two buildings are 20 m apart. The angle from the top of the shorter building to the top of the taller building is 20°. The angle from the top of the shorter building to the base of the taller building is 45°. What is the height of the taller building?



8) The CN Tower is 553.33 m high. Lina looks up at the top of the tower at a 15° angle of elevation. She calculates the distance, d, from the base of the tower as follows:

