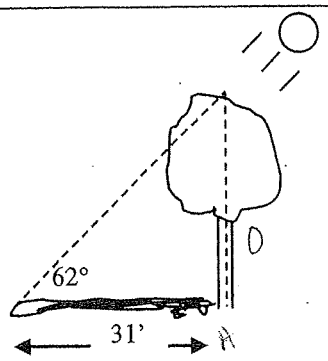
Solve Word Problems using Trigonometric Ratio

Angle of Depression / Angle of Elevation

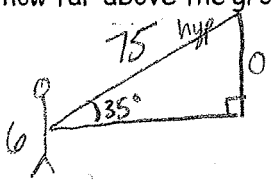
1. How tall is the tree?



$\tan(62) = \frac{x}{31}$

$58.3 = x$

2. A man who is 6 feet tall is flying a kite. The kite string is 75 feet long. If the angle that the kite string makes with the line horizontal to the ground is 35°, how far above the ground is the kite?

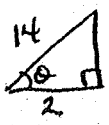


$\sin 35 = \frac{O}{75}$

$O = 43$

$43 + 6 = 49$

3. A ladder 14 feet long rests against the side of a building. The base of the ladder rests on level ground 2 feet from the side of the building. What angle does the ladder form with the ground?

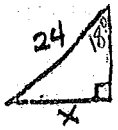


$\cos\theta = \frac{2}{14}$

$\cos^{-1}\frac{2}{14} = \theta$

$\theta = 81.8°$

4. A 24-foot ladder leaning against a building forms an 18° angle with the side of the building. How far is the base of the ladder from the base of the building?



$\sin 18° = \frac{x}{24}$

$7.4 = x$

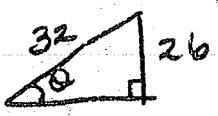
5. A road rises 10 feet for every 400 feet along the pavement (not the horizontal). What is the measurement of the angle the road forms with the horizontal?

$\sin\theta = \frac{10}{400}$

$\sin^{-1}\frac{10}{400} = \theta$

$\theta = 1.4$

6. A 32-foot ladder leaning against a building touches the side of the building 26 feet above the ground. What is the measurement of the angle formed by the ladder and the ground?

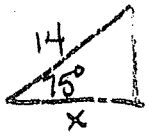


$\sin\theta = \frac{26}{32}$

$\sin^{-1}\frac{26}{32} = \theta$

$54.3 = \theta$

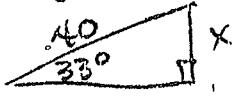
7. The directions for the use of a ladder recommend that for maximum safety, the ladder should be placed against a wall at a 75° angle with the ground. If the ladder is 14 feet long, how far from the wall should the base of the ladder be placed?



$\cos 75° = \frac{x}{14}$

$x = 3.6$

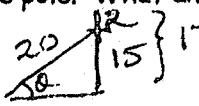
8. A kite is held by a taut string pegged to the ground. The string is 40 feet long and makes a 33° angle with the ground. Supposing that the ground is level, find the vertical distance from the ground to the kite.



$\sin 33° = \frac{x}{40}$

$21.8 = x$

9. A wire anchored to the ground braces a 17-foot pole. The wire is 20 feet long and is attached to the pole 2 feet from the top of the pole. What angle does the wire make with the ground?

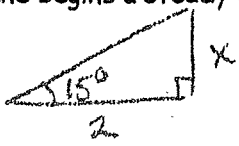


$\sin\theta = \frac{15}{20}$

$\sin^{-1}\frac{15}{20} = \theta$

$\theta = 48.6$

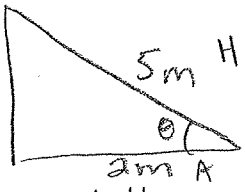
10 A jet airplane begins a steady climb of 15° and flies for two ground miles. What was its change in altitude?



$\tan 15^\circ = \frac{x}{2}$

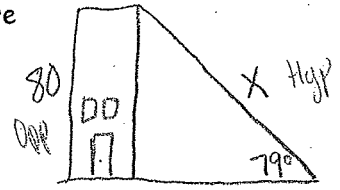
$.5 = x$

11. 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 doesthe base of the ladder make with the ground? Express your answer to the nearest tenth of a degree.



$\cos^{-1}(2/5) = 66.4^\circ$

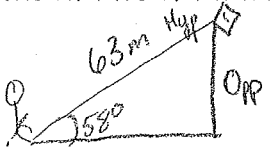
12. An 80-m tower is supported by a guy wire attached to the top of the tower. If the wire forms an angle of elevation of 79°, how long is it? Express your answer to the nearest tenth of a meter. Note: guy wires are used to add stability to the structure



$\sin 79 = 80/x$

$x = 81.5$ m

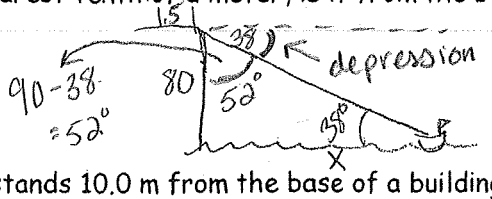
13. Bob is flying his kite. He lets out 63 m of string and the wind takes his kite up to a point where the angle of elevation of the kite is 58°. Find the altitude of the kite to the nearest meter.



$\sin(58) = \frac{Opp}{63}$

53 m

14. 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 meter, is it from the boat to the base of the cliff?



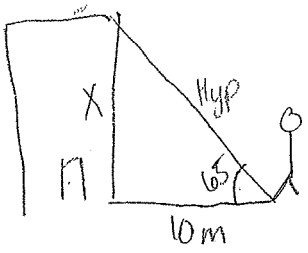
$\tan(38) = \frac{80+1.5}{x}$

$x = 104.3$

104.3 m

15. 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 65.0°. Michael's measurement was made from 1.5 m above the ground. Determine the height of the building to the nearest meter.

23 m



$\tan(65) = \frac{x}{10}$

$x = 21.4$

$+ 1.5$ that was above ground

22.9