Solving Trig Ratios Notes

EXAMPLE 1 ~ FINDING A SIDE

Find the height h of the lamppost to the nearest inch.

$$\tan 70^\circ = \frac{\text{opp.}}{\text{adj.}}$$ **Write ratio for tangent of 70°.**

$$\tan 70^\circ = \frac{h}{40}$$ **Substitute.** (cross multiply)

$$40 \cdot \tan 70^\circ = h$$ **Multiply each side by 40.**

$$109.9 \approx h$$ **Use a calculator to simplify.**

ANSWER

The lamppost is about 110 inches tall.

EXAMPLE 2 ~ FINDING AN ANGLE

Suppose your school is building a *raked stage*. The stage will be 30 feet long from front to back, with a total rise of 2 feet. A rake (angle of elevation) of 5° or less is generally preferred for the safety and comfort of the actors. Is the raked stage you are building within the range suggested?

$$\sin x^\circ = \frac{\text{opp.}}{\text{hyp}} = \frac{2}{30} \approx 0.0667$$

$$x \approx \sin^{-1} 0.0667 \approx 3.842$$

Use the inverse trig function when solving for an angle. ($sin^{-1}, cos^{-1}, or\ tan^{-1}$)

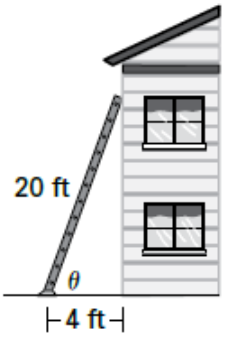
ANSWER

The rake is about 3.8°, so it is within the suggested range of 5° or less.

PRACTICE

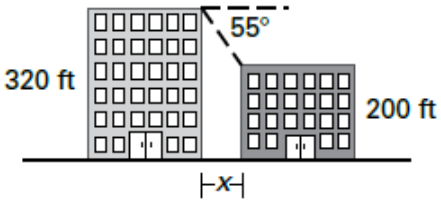
1.

Ladder You lean a 20 foot ladder against a wall. The base of the ladder is 4 feet from the wall. What angle θ does the ladder make with the ground?



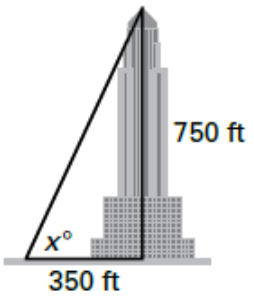
2.

Office Buildings The angle of depression from the top of a 320 foot office building to the top of a 200 foot office building is 55°. How far apart are the buildings?



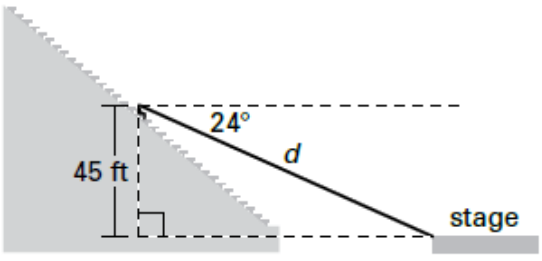
3.

Skyscraper You are standing 350 feet away from a skyscraper that is 750 feet tall. What is the angle of elevation from you to the top of the building?



4.

Concert You attend a music concert with some friends and sit halfway up the bleachers in the arena. The angle of depression from your horizontal line of sight to the stage is 24°. If your seat is 45 feet above stage level, what is your actual distance d from the stage? Round to the nearest foot.



5.

Multiple Choice Using the diagram to the right, for what value of x does $\sin A = \cos A$?

A. 30° **B.** 45°

C. 60° **D.** none