20. If the height of a cone is tripled, will the volume of the cone be tripled? Explain.

21. If the radius of a cone is tripled, will the volume of the cone be tripled? Explain.

22. There are 250 toothpicks in a standard-size box. If the height remains constant and each of the base edges is doubled, how many toothpicks will this new size box hold?

23. A marble paperweight shaped like a pyramid weighs 2 oz. How much would the paperweight weigh if the height is tripled and the base is unchanged?

24. A cylinder has a height of 12 in. and a radius of 4 in. How can you change the radius of the cylinder so that the volume of the new cylinder will be four times the volume of the original cylinder?

Relationships Among Sine, Cosine, and Tangent (Chapter 8)

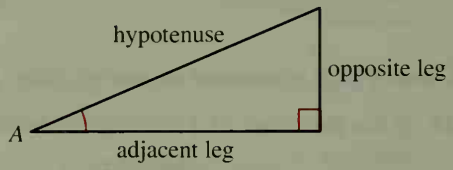
Objective: Understand and use relationships among trigonometric ratios.

The three trigonometric ratios, sine, cosine, and tangent are related in many different ways. You know that:

$$\sin A = \frac{\text{leg opposite } \angle A}{\text{hypotenuse}}$$

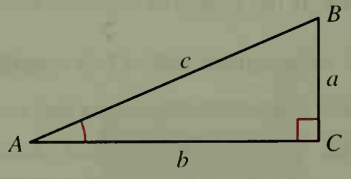
$$\cos A = \frac{\text{leg adjacent to } \angle A}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{leg opposite } \angle A}{\text{leg adjacent to } \angle A}$$



We will explore other relationships between the sine, cosine, and tangent ratios. Look at the diagram of $\triangle ABC$ with right angle C. By the definitions of the sine, cosine, and tangent ratios:

$$\sin A = \frac{a}{c}, \cos A = \frac{b}{c}, \text{ and } \tan A = \frac{a}{b}.$$



Suppose you divide $\sin A$ by $\cos A$.

$$\frac{\sin A}{\cos A} = \frac{\frac{a}{c}}{\frac{b}{c}} = \frac{a}{c} \div \frac{b}{c} = \frac{a}{c} \cdot \frac{c}{b} = \frac{a}{b} = \tan A.$$

For any acute $\angle A$, $\dfrac{\sin A}{\cos A} = \tan A$.