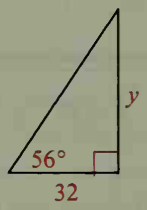
Since the tangent of an angle depends only on the measure of the angle, we can write tan 10°, for example, to stand for the tangent of any angle with a degree measure of 10. The table on page 311 lists the values of the tangents of some angles with measures between 0 and 90. Most of the values are approximations, rounded to four decimal places. Suppose you want the approximate value of tan 33°. Locate 33° in the angle column. Go across to the tangent column. Read .6494. You write tan 33° ≈ 0.6494, where the symbol ≈ means "is approximately equal to." You can also use a scientific calculator to find tan 33° ≈ 0.649407593. Your calculator may give more or fewer decimal places than the nine that are shown.

Example 2 Find the value of y to the nearest tenth.

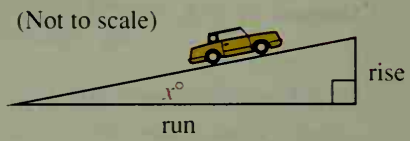


Solution

$$\tan 56° = \frac{y}{32}$$
$$y = 32(\tan 56°)$$
$$y \approx 32(1.4826)$$
$$y \approx 47.4432, \text{ or } 47.4$$

You can find the approximate degree measure of an angle with a given tangent by reading the table from the tangent column across to the angle column, or by using the inverse tangent key(s) of a calculator.

Example 3 The grade of a road is the ratio of its rise to its run and is usually given as a decimal or percent. Find the angle that the road makes with the horizontal if its grade is 4% ($\frac{4}{100}$ or 0.04).



Solution

$$\tan x° = 0.0400$$
$$x° \approx 2°$$

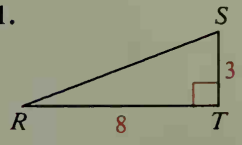
$$\text{grade} = \frac{\text{rise}}{\text{run}}$$

If you use the table on page 311, notice that 0.0400 falls between two values in the tangent column: tan 2° ≈ 0.0349 and tan 3° ≈ 0.0524. Since 0.0349 is closer to 0.0400, we use 2° as an approximate value for $x°$.

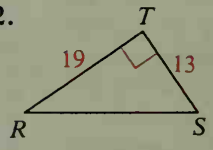
Classroom Exercises

In Exercises 1–3 express tan R as a ratio.

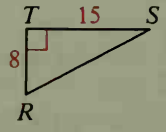
1.



2.



3.



4–6. Express tan S as a ratio for each triangle above.

7. Use the table on page 311 to complete the statements.

a. tan 24° ≈ ___?___ **b.** tan 41° ≈ ___?___ **c.** tan 88° ≈ ___?___

d. tan ___?___ ≈ 2.4751 **e.** tan ___?___ ≈ 0.3057 **f.** tan ___?___ ≈ 0.8098