

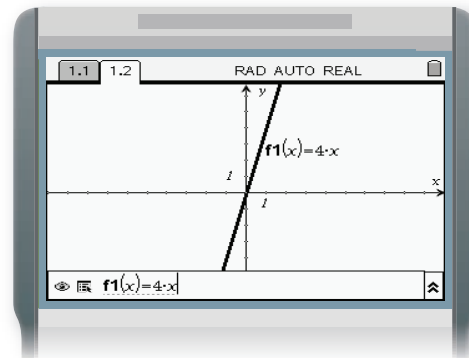
Graphing Technology Lab

Direct Variation

An equation of a direct variation is a special case of a linear equation. A **direct variation** can be expressed in the form $y = kx$. This means that y is a multiple of x . The k in this equation is a constant and is called the **constant of variation**.

Notice that the graph of $y = 4x$ is a straight line through the origin. An equation of a direct variation is a special case of an equation written in slope-intercept form, $y = mx + b$. When $m = k$ and $b = 0$, $y = mx + b$ becomes $y = kx$. So the slope of a direct variation equation is its constant of variation.

To express a direct variation, we say that y varies directly as x . In other words, as x increases, y increases or decreases at a constant rate.



Key Concept

Direct Variation

For Your

FOLDABLE

y varies directly as x if there is some nonzero constant k such that $y = kx$. k is called the *constant of variation*.

ACTIVITY

GOLD The karat rating r of a gold object varies directly as the percentage p of gold in the object. A 14-karat ring is 58.25% gold.

a. Write and graph a direct variation equation relating r and p .

Use the point (0.5825, 14) to find the constant of variation.

$$y = kx$$

$$14 = k(0.5825)$$

$$24.03 \approx k$$

Direct variation equation

$$x = 0.5825, y = 14$$

Divide each side by 0.5825.

The direct variation equation is $r = 24.03p$.

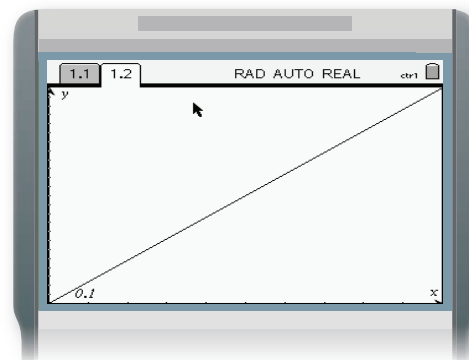
Press 6: New Document 2: Add Graphs & Geometry to access the graphing feature.

Press to place the cursor in the entry line next to $f1(x)$.

Then type 24.03 and press .

Make sure that the window is set so that the horizontal axis has a minimum of 0 and a maximum of 1. And that the vertical axis has a minimum of 0 and maximum of 25.

KEYSTROKES: 4: Window 1: Window Settings 0 1 0 25



b. Find the karat rating of a ring that is 75% gold.

Use the calculator to find the karat rating.

Use the **Trace** feature to find the karat value of a ring that is 75% gold.

KEYSTROKES:  5: Trace 1: Graph Trace

Type 0.75 and press  to move the trace cursor to that x -value on the function's graph.

The karat rating of a ring that is 75% gold is 18 karats.

Exercises

- 1. SWIMMING** When you swim underwater, the pressure on your ears varies directly with the depth at which you are swimming. If you are swimming in 8 feet of water, the pressure on your ears is 3.44 pounds per square inch. Write and graph a direct variation equation relating pressure and depth. Then find the pressure at a depth of 65 feet.
- 2.** Graph the direct variation equations $y = -4x$, $y = -2x$, $y = 4x$, and $y = 2x$. Compare and contrast the graphs of the equations.