

A Rate Becomes Slope

Name: _____

Date: _____

Use **changes, not one coordinate**. Through $(0, 2)$ and $(4, 5)$, $m = \frac{5 - 2}{4 - 0} = \frac{3}{4}$. The equation is $y = \frac{3}{4}x + 2$. The intercept is 2; the slope is not $5/4$.

Explore and explain

1. Find the slope through $(2, 5)$ and $(6, 11)$. Write an equation for the line.

2. Complete: in $y = \frac{2}{3}x + 4$, a change of 6 in x gives a change of _____ in y . Explain why adding 4 does not change the slope.

3. A student says the slope of $y = 2x + 3$ is $7/2$ because $(2, 7)$ is on the line. Repair the reasoning with two points.

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Apply and transfer

4. A tank starts with 10 liters and loses $\frac{1}{2}$ liter per minute. Write a model and a physically meaningful domain. Find the volume after 6 minutes.

5. Compare $y = \frac{3}{2}x$ and $y = \frac{3}{2}x + 5$. Which is proportional? What do they share, and what differs?

6. Two delivery plans cost $A(x) = 4 + 2x$ and $B(x) = 10 + x$, for distance $x \geq 0$ km. When are costs equal? Which is cheaper on each side?

Think Like a Mathematician

Optional extension. Choose a strategy and justify why it works. Try a diagram, organized cases, a simpler example, or an equation.

7. A line passes through $(2, a)$ and $(8, a + 9)$. Find its slope for every value of a . Which value makes it proportional? Justify without drawing every possible line.

8. Two tanks have $A(t) = 12 - \frac{1}{2}t$ and $B(t) = 3 + \frac{1}{4}t$ liters. Find when they hold equal volumes and what that volume is. Restrict to times before Tank A empties. Explain how the difference between volumes changes each minute.