What's the rate of change?
What's the rate of change?

Answer:

\[ m = \frac{\text{Change in } y}{\text{Change in } x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-1)}{-2 - (-3)} = \frac{4 + 1}{-2 + 3} = \frac{5}{1} = 5. \]
Answer:

\[ m = \frac{\text{Change in } y}{\text{Change in } x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 4}{2 - (-3)} = \frac{-6}{5} = -\frac{6}{5}. \]
Writing an Equation for a Line in Point-Slope Form

\[ y - y_1 = m(x - x_1) \]

This is "point-slope" form.

- It only pertains to linear equations.
- When you know the slope of a line, and any single point on the line, you can plug those values into what you see above.
- Ideally, you will want to simplify it into "slope-intercept" form \( y = mx + b \)

**Check Point 2** Write an equation in point-slope form for the line with slope 6 that passes through the point \((2, -5)\). Then solve the equation for \( y \).
Parallel and Perpendicular lines

- parallel lines run side-by-side and never intersect
- perpendicular lines intersect forming a 90° angle

**parallel** = same slope

**perpendicular** = slopes are opposite reciprocals

examples: 2 and $-\frac{1}{2}$ or -4 and $\frac{1}{4}$
Let's look at example 5

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Helpful message:

The average rate of change of any curve is just the slope of a line drawn between the 2 given points.

Finding Average Velocity

The average velocity of an object is its change in position divided by the change in time between the starting and ending positions. If a function expresses an object’s position in terms of time, the function’s average rate of change describes the object’s average velocity.

In my words:

The average velocity (speed) is the same thing as the average rate of change, which is just the slope between 2 specified points.

**It's the change in y over the change in x**

\[
\frac{\Delta x}{\Delta y}
\]
Let's look at example 6

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Transformations

Have you seen *Terminator 2*, *The Mask*, or *The Matrix*? These were among the first films to use spectacular effects in which a character or object having one shape was transformed in a fluid fashion into a quite different shape. The name for such a transformation is **morphing**. The effect allows a real actor to be seamlessly transformed into a computer-generated animation. The animation can be made to perform impossible feats before it is morphed back to the conventionally filmed image.

Like transformed movie images, the graph of one function can be turned into the graph of a different function. To do this, we need to rely on a function's equation. Knowing that a graph is a transformation of a familiar graph makes graphing easier.
The previous page showed the "parent functions" of many commonly used algebraic functions. Notice the equations that go with the graphs. They’re basic. Any changes made to the original equation will result in a transformation.

**Types of transformations:**
- **vertical shift** - something add/sub at the end
- **horizontal shift** - something add/sub with $x$
- **flip** - when $x$ is made negative
- **stretch or shrink** - when $x$ is given a coefficient

**Additional clarification:**
chart at the bottom of pg. 224
Practice with transformations:

- First, graph the parent quadratic function $y = x^2$
- Next, on the same coordinate grid, graph #'s 53, 55, 57 from pg. 228