LESSON MAKER PRO

# Function Face-Off

*Compare how functions start and change.*

**GRADE 8 · 8.AF.D**

**8.AF.D** "Explain, evaluate, and compare functions."

NAME _____ DATE _____

## START AND CHANGE

A function's starting value is its output when x = 0. Its rate of change is how much the output changes for each increase of 1 in x. In an equation like y = mx + b, m is the rate of change and b is the starting value. In a table or graph, divide the change in output by the change in x to find the rate.

## WORKED EXAMPLE

Function P is y = 7x + 19. Function Q is y = 13x + 29. Which function has the greater rate of change, and by how much? Which has the greater starting value, and by how much?

1. The rates of change are 7 for P and 13 for Q.
2. 13 - 7 = 6, so Q's rate is 6 greater.
3. The starting values are 19 for P and 29 for Q. Since 29 - 19 = 10, Q's starting value is 10 greater.

**Answer: Q has a rate of change that is 6 greater and a starting value that is 10 greater.**

## PRACTICE 6 problems

**1** Function A is y = 2x + 8. Function B is y = 5x + 9. Which function has the greater rate of change?

**ANSWER** _____

**2** Function A is y = 3x + 12. Function B is shown in the table. How much greater is A's starting value than B's?

**FUNCTION B**

| x | y |
|---|---|
| 0 | 6 |
| 2 | 14 |
| 4 | 22 |

**ANSWER** _____

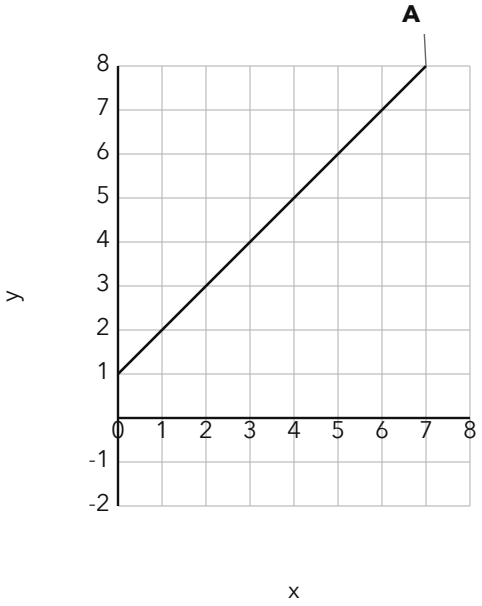
**3** Function A is shown in the table. Function B is y = 8x + 2. Which function has the greater rate of change, and by how much?

**FUNCTION A**

| x | y |
|---|---|
| 0 | 1 |
| 2 | 11 |
| 4 | 21 |

**ANSWER** _____

**4** Function A is shown on the graph. Function B is y = 3x - 2. Which function has the greater rate of change, and by how much?




**ANSWER** _____

**5** Use the table. Which function starts higher? Which function has the greater rate of change?

**TWO FUNCTIONS**

| x | Function A | Function B |
|---|---|---|
| 0 | 8 | 2 |
| 2 | 14 | 12 |
| 4 | 20 | 22 |

**ANSWER** _____

**6** Function A is y = 2x + 16. Function B is y = 4x + 8. At x = 2, how much greater is A's output than B's?

**ANSWER** _____

## APPLY IT Show your work

**1** Talia has $12 saved for a skateboard and adds $3 each week. Niko has $2 saved and adds $5 each week. After 4 weeks, who has more saved, and how much more?

WORK SPACE

**ANSWER** _____

**2** Two phone plans charge by the gigabyte (GB) of data used. Plan A costs $8 plus $2 per GB. Plan B costs $2 plus $4 per GB. At how many GB do the plans cost the same?

WORK SPACE

**ANSWER** _____

## CHALLENGE One step up

Function A is shown in the table. Function B is y = 5x + 8. For whole-number values of x starting at 0, what is the first x at which B's output is greater than A's? Explain how you know.

**FUNCTION A**

| x | y |
|---|---|
| 0 | 16 |
| 2 | 22 |
| 4 | 28 |

WORK SPACE AND ANSWER

**ANSWER KEY**

# Function Face-Off

**GRADE 8 · 8.AF.D**

## PART 1 · PRACTICE

| # | PROBLEM | ANSWER |
|---|---|---|
| 1 | Function A is y = 2x + 8. Function B is y = 5x + 9. Which function has the greater rate of change? | **Function B** |
| 2 | Function A is y = 3x + 12. Function B is shown in the table. How much greater is A's starting value than B's? | **6** |
| 3 | Function A is shown in the table. Function B is y = 8x + 2. Which function has the greater rate of change, and by how much? | **Function B, by 3 per unit of x** |
| 4 | Function A is shown on the graph. Function B is y = 3x - 2. Which function has the greater rate of change, and by how much? | **Function B, by 2 per unit of x** |
| 5 | Use the table. Which function starts higher? Which function has the greater rate of change? | **Function A starts higher. Function B has the greater rate of change.** |
| 6 | Function A is y = 2x + 16. Function B is y = 4x + 8. At x = 2, how much greater is A's output than B's? | **4** |

## PART 2 · APPLY IT

1. **Talia has $2 more.** Talia has 12 + 3(4) = 24 dollars. Niko has 2 + 5(4) = 22 dollars.
2. **3 GB** Set 8 + 2x = 2 + 4x and solve to get x = 3. Both plans cost $14 at 3 GB.

## CHALLENGE

**x = 5. Function A is y = 3x + 16, so A and B both output 28 at x = 4. B increases faster, making x = 5 the first whole-number value when B is greater.**

Accept equivalent wording for rate-of-change comparisons. In the challenge, an algebraic explanation or a check of the whole-number values through x = 5 is sufficient.