

# Comparing Two Functions

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / 24

## Q Quick Review

To compare two linear functions, find each one's **slope** (rate of change) and **y-intercept** (the output when  $x = 0$ ). From  $y = mx + b$ , the slope is  $m$  and the intercept is  $b$ ; from a table or points, slope is  $\frac{\text{change in } y}{\text{change in } x}$ . The function with the bigger slope grows faster.

◇ **Example:** Function A is  $y = 3x + 2$ . Function B passes through  $(0, 5)$  and  $(2, 9)$ . Which has the greater rate of change?  
 ⇒ Function A is in  $y = mx + b$  form, so its rate of change is the slope  $m = 3$ . For Function B, use the two points:  $y$  goes from 5 to 9 (change of 4) while  $x$  goes from 0 to 2 (change of 2), so B's slope is  $\frac{4}{2} = 2$ . Since  $3 > 2$ , Function A has the greater rate of change.

**Answer:** A (slope  $3 > 2$ )

## PRACTICE

Compare the two linear functions as directed.

- A:  $y = 4x + 1$ . B:  $y = 2x + 1$ . Which has the greater slope? \_\_\_\_\_
- A:  $y = x + 9$ . B:  $y = 6x + 9$ . Which has the greater slope? \_\_\_\_\_
- A:  $y = 5x$ . B:  $y = 5x + 3$ . Which has the greater y-intercept? \_\_\_\_\_
- A:  $y = 2x + 7$ . B:  $y = 2x - 1$ . Which has the greater y-intercept? \_\_\_\_\_
- A:  $y = 3x + 4$ . B passes  $(0, 4), (1, 7)$ . Greater slope? \_\_\_\_\_
- A:  $y = 6x - 2$ . B passes  $(0, 1), (2, 5)$ . Greater slope? \_\_\_\_\_
- A passes  $(0, 2), (3, 11)$ . B:  $y = 2x + 2$ . Greater slope? \_\_\_\_\_
- A passes  $(0, 0), (4, 8)$ . B passes  $(0, 0), (2, 10)$ . Greater slope? \_\_\_\_\_
- A:  $y = 7x + 5$ . B:  $y = 7x + 5$ . Are they the same function? \_\_\_\_\_
- A:  $y = x + 10$ . B passes  $(0, 10), (5, 15)$ . Same function? \_\_\_\_\_
- A:  $y = -2x + 8$ . B:  $y = 3x + 8$ . Greater slope? \_\_\_\_\_
- A:  $y = -x + 1$ . B:  $y = -4x + 1$ . Greater slope? \_\_\_\_\_
- A passes  $(0, 6), (2, 2)$ . B:  $y = -3x + 6$ . Greater slope? \_\_\_\_\_
- A:  $y = 4x + 3$ . B passes  $(0, 1), (3, 13)$ . Greater y-intercept? \_\_\_\_\_
- A:  $y = 2x + 12$ . B:  $y = 9x + 4$ . Greater slope? \_\_\_\_\_
- A passes  $(0, 3), (1, 8)$ . B passes  $(0, 3), (1, 5)$ . Greater slope? \_\_\_\_\_
- A:  $y = 8x$ . B passes  $(0, 0), (1, 8)$ . Same function? \_\_\_\_\_
- A:  $y = 5x + 2$ . B:  $y = 5x + 9$ . Greater slope? \_\_\_\_\_
- A passes  $(0, 4), (2, 14)$ . B:  $y = 6x + 4$ . Greater slope? \_\_\_\_\_
- A:  $y = 10x - 5$ . B passes  $(0, -5), (1, 5)$ . Same function? \_\_\_\_\_

## ◆ Word Problems

- Pool A fills at  $y = 8x + 10$  gallons after  $x$  minutes. Pool B holds 10 gal at 0 min and 35 gal at 5 min. Which fills faster? \_\_\_\_\_
- Runner A's distance is  $d = 7t$  meters after  $t$  seconds. Runner B passes  $(0, 0)$  and  $(4, 32)$ . Who runs faster? \_\_\_\_\_
- Plan A charges  $C = 3n + 15$  dollars for  $n$  items. Plan B charges \$25 for 0 items and \$40 for 5 items. Which has the higher starting fee? \_\_\_\_\_
- Account A grows by  $y = 6x + 50$  dollars after  $x$  weeks. Account B grows from \$50 to \$74 over 4 weeks. Which grows faster, and by how much more per week? \_\_\_\_\_



## Answer Keys

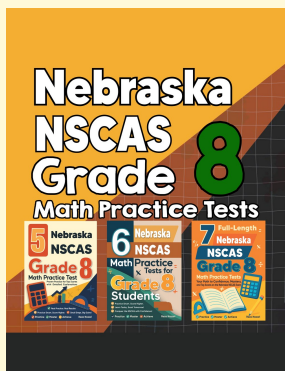
- |                                       |   |
|---------------------------------------|---|
| 1. <input type="radio"/> A            | 13. <input type="radio"/> A   |
| 2. <input type="radio"/> B            | 14. <input type="radio"/> A   |
| 3. <input type="radio"/> B            | 15. <input type="radio"/> B   |
| 4. <input type="radio"/> A            | 16. <input type="radio"/> A   |
| 5. <input type="text" value="equal"/> | 17. <input type="text" value="yes"/>  |
| 6. <input type="radio"/> A            | 18. <input type="text" value="equal"/>  |
| 7. <input type="radio"/> A            | 19. <input type="radio"/> B   |
| 8. <input type="radio"/> B            | 20. <input type="text" value="yes"/>  |
| 9. <input type="text" value="yes"/>   | 21. <input type="text" value="Pool A (8 gal/min &gt; 5 gal/min)"/>                    |
| 10. <input type="text" value="yes"/>  | 22. <input type="text" value="Runner B (8 m/s &gt; 7 m/s)"/>                          |
| 11. <input type="radio"/> B           | 23. <input type="text" value="Plan B (\$25 &gt; \$15)"/>                              |
| 12. <input type="radio"/> A           | 24. <input type="text" value="Account A; \$6 - 6 = 0... they grow at the same rate"/> |

### Step-by-Step Explanations

- |  |   |
|--|---|
| <p>1. A's slope is 4 and B's slope is 2. Since <math>4 &gt; 2</math>, Function A has the greater slope.</p> <p>2. A's slope is 1, B's slope is 6. Since <math>6 &gt; 1</math>, Function B has the greater slope.</p> <p>3. A's <math>y</math>-intercept is 0; B's is 3. So B starts higher.</p> <p>4. Both have slope 2, but A's intercept is 7 and B's is <math>-1</math>. A starts higher.</p> <p>5. A's slope is 3. B rises <math>7 - 4 = 3</math> over a run of 1, so B's slope is <math>\frac{3}{1} = 3</math> too — their slopes are equal.</p> <p>6. A's slope is 6. B rises <math>5 - 1 = 4</math> over a run of 2, so B's slope is <math>\frac{4}{2} = 2</math>. Since <math>6 &gt; 2</math>, A is steeper.</p> <p>7. A rises <math>11 - 2 = 9</math> over a run of 3, so A's slope is <math>\frac{9}{3} = 3</math>. B's slope is 2, so A is steeper.</p> <p>8. A's slope is <math>\frac{8}{4} = 2</math>; B's slope is <math>\frac{10}{2} = 5</math>. Since <math>5 &gt; 2</math>, B is steeper.</p> <p>9. Both have slope 7 and intercept 5, so they are the exact same line.</p> <p>10. B has intercept 10 and slope <math>\frac{15-10}{5} = 1</math>, matching A's slope 1 and intercept 10.</p> <p>11. A's slope is <math>-2</math> and B's slope is 3. Since <math>3 &gt; -2</math>, B has the greater slope.</p> <p>12. A's slope is <math>-1</math> and B's slope is <math>-4</math>. Since <math>-1 &gt; -4</math>, A has the greater slope.</p> | <p>13. A's slope is <math>\frac{2-6}{2} = -2</math>. B's slope is <math>-3</math>. Since <math>-2 &gt; -3</math>, A has the greater slope.</p> <p>14. A's intercept is 3; B's intercept (output at <math>x = 0</math>) is 1. So A starts higher.</p> <p>15. A's slope is 2 and B's slope is 9. Since <math>9 &gt; 2</math>, B has the greater slope.</p> <p>16. A's slope is <math>\frac{8-3}{1} = 5</math>; B's slope is <math>\frac{5-3}{1} = 2</math>. Since <math>5 &gt; 2</math>, A is steeper.</p> <p>17. B has intercept 0 and slope <math>\frac{8}{1} = 8</math>, exactly matching <math>y = 8x</math>.</p> <p>18. Both functions have slope 5, so neither is steeper — their slopes are equal.</p> <p>19. A's slope is <math>\frac{14-4}{2} = 5</math> and B's slope is 6. Since <math>6 &gt; 5</math>, B is steeper.</p> <p>20. B has intercept <math>-5</math> and slope <math>\frac{5-(-5)}{1} = 10</math>, matching <math>y = 10x - 5</math>.</p> <p>21. Pool A's rate is the slope 8 gallons per minute. Pool B goes from 10 to 35 gallons in 5 minutes, a rate of <math>\frac{25}{5} = 5</math> gal/min. Since <math>8 &gt; 5</math>, Pool A fills faster.</p> <p>22. Runner A's speed is the slope 7 m/s. Runner B covers 32 meters in 4 seconds, a speed of <math>\frac{32}{4} = 8</math> m/s. Since <math>8 &gt; 7</math>, Runner B is faster.</p> <p>23. The starting fee is the cost when <math>n = 0</math>. Plan A's is \$15. Plan B charges \$25 at 0 items, so Plan B's starting fee of \$25 is higher.</p> <p>24. Account A grows \$6 per week (the slope). Account B grows <math>\frac{74-50}{4} = \frac{24}{4} = 6</math> dollars per week too. The accounts grow at the same rate — \$6 per week.</p> |
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