Comparing Two Functions

Name: _____	Date: _____	Score: _____ / 24

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.

1. A: $y = 4x + 1$. B: $y = 2x + 1$. Which has the greater slope? _____

2. A: $y = x + 9$. B: $y = 6x + 9$. Which has the greater slope? _____

3. A: $y = 5x$. B: $y = 5x + 3$. Which has the greater y-intercept? _____

4. A: $y = 2x + 7$. B: $y = 2x - 1$. Which has the greater y-intercept? _____

5. A: $y = 3x + 4$. B passes $(0, 4), (1, 7)$. Greater slope? _____

6. A: $y = 6x - 2$. B passes $(0, 1), (2, 5)$. Greater slope? _____

7. A passes $(0, 2), (3, 11)$. B: $y = 2x + 2$. Greater slope? _____

8. A passes $(0, 0), (4, 8)$. B passes $(0, 0), (2, 10)$. Greater slope? _____

9. A: $y = 7x + 5$. B: $y = 7x + 5$. Are they the same function? _____

10. A: $y = x + 10$. B passes $(0, 10), (5, 15)$. Same function? _____

11. A: $y = -2x + 8$. B: $y = 3x + 8$. Greater slope? _____

12. A: $y = -x + 1$. B: $y = -4x + 1$. Greater slope? _____

13. A passes $(0, 6), (2, 2)$. B: $y = -3x + 6$. Greater slope? _____

14. A: $y = 4x + 3$. B passes $(0, 1), (3, 13)$. Greater y-intercept? _____

15. A: $y = 2x + 12$. B: $y = 9x + 4$. Greater slope? _____

16. A passes $(0, 3), (1, 8)$. B passes $(0, 3), (1, 5)$. Greater slope? _____

17. A: $y = 8x$. B passes $(0, 0), (1, 8)$. Same function? _____

18. A: $y = 5x + 2$. B: $y = 5x + 9$. Greater slope? _____

19. A passes $(0, 4), (2, 14)$. B: $y = 6x + 4$. Greater slope? _____

20. A: $y = 10x - 5$. B passes $(0, -5), (1, 5)$. Same function? _____

♦ Word Problems

21. 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? _____

22. Runner A's distance is $d = 7t$ meters after t seconds. Runner B passes $(0, 0)$ and $(4, 32)$. Who runs faster? _____

23. 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? _____

24. 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? _____

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Answer Keys

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

Step-by-Step Explanations

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

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