Comparing Two Functions

Explore ideas and representations

Name _____ **Date** _____ **Score** _____ / 10

QUICK REVIEW

Compare functions using the same feature and input. In $y = mx + b$, m is the signed rate of change and b is the output at $x = 0$. From two table rows, compute $m = (y_2 - y_1)/(x_2 - x_1)$. A greater initial value does not guarantee greater later outputs; evaluate both rules at the same x.

Worked example

Example for form 1: compare outputs. $A(x) = 2x + 1$ and $B(x) = 3x + 5$. Use $x = 2$.

1. Substitute the same input into both functions: $A(2) = 2(2) + 1 = 5$ and $B(2) = 3(2) + 5 = 11$.

2. The output difference is $A - B = 5 - (11) = -6$. B is greater at this input.

Answer: $A = 5$, $B = 11$; b is greater.

Practice Problems

Show your thinking.

1. Which function has the greater rate? $A(x) = 2x + 7$ and $B(x) = 4x + 1$.

2. Which function has the higher initial value? $A(x) = 5x - 2$ and $B(x) = 1x + 6$.

3. Compare the outputs at the requested input. $A(x) = 3x + 1$ and $B(x) = 2x + 6$. Use $x = 4$.

4. Compare the rate of a rule with a linear table. $A(x) = 4x + 0$; the table defines linear function B.

x	y
0	2
2	8
4	14

5. Read initial values from two representations. $A(x) = 2x + 8$; the table defines linear function B.

x	y
0	3
2	13
4	23

6. Compare two decreasing rates. $A(x) = -2x + 12$ and $B(x) = -5x + 20$.

7. Find which output is greater at a negative input. $A(x) = 2x + 3$ and $B(x) = -1x + 5$. Use $x = -2$.

8. Compare equal-rate functions. $A(x) = 3x + 4$ and $B(x) = 3x - 2$.

9. Find the shared output input. $A(x) = 2x + 1$ and $B(x) = 1x + 5$.

10. Compare a table output with a formula output. $A(x) = 1x + 9$; the table defines linear function B. Use $x = 4$.

x	y
0	2
2	6
4	10

Answer Key

1. B; rates 2 and 4.
2. B; initial values -2 and 6.
3. $A = 13$, $B = 14$; b is greater.
4. A; rates 4 and 3.
5. A; initial values 8 and 3.
6. A; rates -2 and -5.
7. $A = -1$, $B = 7$; b is greater.
8. Equal rates; rates 3 and 3.
9. $x = 4$, output 9.
10. $A = 13$, $B = 10$; a is greater.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. For A, a one-unit input increase changes the output by 2. For B, $\Delta y/\Delta x = (9 - (1))/(2 - 0) = 4$.

2. Compare the signed rates 2 and 4. $4 > 2$, so B has the greater rate of change.

Problem 2

1. Evaluate at input zero: $A(0) = 5(0) - 2 = -2$ and $B(0) = 1(0) + 6 = 6$.

2. These are the initial values, not the slopes. Comparing -2 with 6 shows B starts higher.

Problem 3

1. Substitute the same input into both functions: $A(4) = 3(4) + 1 = 13$ and $B(4) = 2(4) + 6 = 14$.

2. The output difference is $A - B = 13 - (14) = -1$. B is greater at this input.

Problem 4

1. For A, a one-unit input increase changes the output by 4. For B, $\Delta y/\Delta x = (8 - (2))/(2 - 0) = 3$.

2. Compare the signed rates 4 and 3. $4 > 3$, so A has the greater rate of change.

Problem 5

1. Evaluate at input zero: $A(0) = 2(0) + 8 = 8$ and $B(0) = 5(0) + 3 = 3$.

2. These are the initial values, not the slopes. Comparing 8 with 3 shows A starts higher.

Problem 6

1. For A, a one-unit input increase changes the output by -2. For B, $\Delta y/\Delta x = (10 - (20))/(2 - 0) = -5$.

2. Compare the signed rates -2 and -5. $-2 > -5$, so A has the greater rate of change.

Problem 7

1. Substitute the same input into both functions: $A(-2) = 2(-2) + 3 = -1$ and $B(-2) = -1(-2) + 5 = 7$.

2. The output difference is $A - B = -1 - (7) = -8$. B is greater at this input.

Problem 8

1. For A, a one-unit input increase changes the output by 3. For B, $\Delta y/\Delta x = (4 - (-2))/(2 - 0) = 3$.

2. Compare the signed rates 3 and 3. They are equal, even if the initial values differ.

Problem 9

1. Set the outputs equal: $2x + 1 = 1x + 5$. Collect terms: $1x = 4$.

2. Divide to get $x = 4$. Substitution gives $A(4) = 9 = B(4)$, so this input is the meeting point.

Problem 10

1. Substitute the same input into both functions: $A(4) = 1(4) + 9 = 13$ and $B(4) = 2(4) + 2 = 10$.

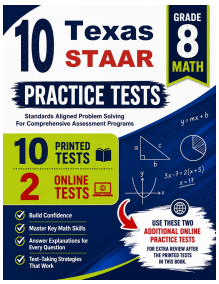
2. The output difference is $A - B = 13 - (10) = 3$. A is greater at this input.

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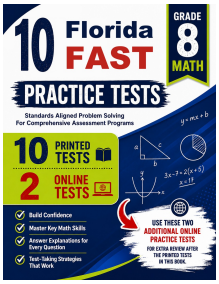
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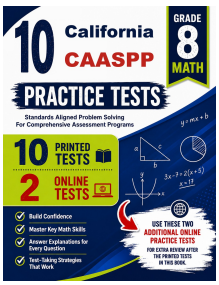
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