Comparing Two Functions

Spot mistakes, reason, and work backward

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

QUICK REVIEW

A steepness claim and an output claim are different. For $A = 2x + 10$ and $B = 5x + 1$, B has the greater rate but $A(0) > B(0)$. To locate a change in which output is greater, solve $A(x) = B(x)$, then substitute the resulting input. Always use signed slopes when comparing rates, including decreasing functions.

Worked example

Example for form 2: compare outputs. $A(x) = 2x + 2$ and $B(x) = 3x + 6$. Use $x = 2$.

1. Substitute the same input into both functions: $A(2) = 2(2) + 2 = 6$ and $B(2) = 3(2) + 6 = 12$.

2. The output difference is $A - B = 6 - (12) = -6$. B is greater at this input.

Answer: $A = 6$, $B = 12$; b is greater.

Practice Problems

Show your thinking.

1. A learner uses the intercept as the rate. Find the actual greater rate. $A(x) = 2x + 20$ and $B(x) = 6x + 1$.

2. A learner claims the greater slope means the greater starting value. Check the starts. $A(x) = 7x + 2$ and $B(x) = 3x + 9$.

3. Test the claim that A is always greater by comparing at this input. $A(x) = 1x + 10$ and $B(x) = 4x + 1$. Use $x = 5$.

4. Work backward to the crossing input. $A(x) = 3x + 8$ and $B(x) = 5x + 0$.

5. The table rises by 8 per two inputs, not per one. Compare rates. $A(x) = 3x + 5$; the table defines linear function B.

x	y
0	-1
2	7
4	15

6. Check a claim that both functions start together. $A(x) = 4x + 6$; the table defines linear function B.

x	y
0	6
2	10
4	14

7. Compare signed rates, not their absolute values. $A(x) = -4x + 16$ and $B(x) = -1x + 7$.

8. Determine exactly when equal outputs occur. $A(x) = 5x - 3$ and $B(x) = 2x + 9$.

9. A learner says equal intercepts mean identical functions. Compare at this input. $A(x) = 2x + 4$ and $B(x) = 5x + 4$. Use $x = 3$.

10. Check a claimed tie at the requested input. $A(x) = 4x + 2$ and $B(x) = 2x + 10$. Use $x = 4$.

Answer Key

1. B; rates 2 and 6.
2. B; initial values 2 and 9.
3. $A = 15$, $B = 21$; b is greater.
4. $x = 4$, output 20.
5. B; rates 3 and 4.
6. Equal initial values; initial values 6 and 6.
7. B; rates -4 and -1.
8. $x = 4$, output 17.
9. $A = 10$, $B = 19$; b is greater.
10. $A = 18$, $B = 18$; neither is greater (a tie).

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, $\Delta y/\Delta x = (13 - (1))/(2 - 0) = 6$.

2. Compare the signed rates 2 and 6. $6 > 2$, so B has the greater rate of change.

Problem 2

1. Evaluate at input zero: $A(0) = 7(0) + 2 = 2$ and $B(0) = 3(0) + 9 = 9$.

2. These are the initial values, not the slopes. Comparing 2 with 9 shows B starts higher.

Problem 3

1. Substitute the same input into both functions: $A(5) = 1(5) + 10 = 15$ and $B(5) = 4(5) + 1 = 21$.

2. The output difference is $A - B = 15 - (21) = -6$. B is greater at this input.

Problem 4

1. Set the outputs equal: $3x + 8 = 5x + 0$. Collect terms: $-2x = -8$.

2. Divide to get $x = 4$. Substitution gives $A(4) = 20 = B(4)$, so this input is the meeting point.

Problem 5

1. For A, a one-unit input increase changes the output by 3. For B, $\Delta y/\Delta x = (7 - (-1))/(2 - 0) = 4$.

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

Problem 6

1. Evaluate at input zero: $A(0) = 4(0) + 6 = 6$ and $B(0) = 2(0) + 6 = 6$.

2. These are the initial values, not the slopes. Comparing 6 with 6 shows that both functions start at the same value.

Problem 7

1. For A, a one-unit input increase changes the output by -4. For B, $\Delta y/\Delta x = (5 - (7))/(2 - 0) = -1$.

2. Compare the signed rates -4 and -1. $-1 > -4$, so B has the greater rate of change.

Problem 8

1. Set the outputs equal: $5x - 3 = 2x + 9$. Collect terms: $3x = 12$.

2. Divide to get $x = 4$. Substitution gives $A(4) = 17 = B(4)$, so this input is the meeting point.

Problem 9

1. Substitute the same input into both functions: $A(3) = 2(3) + 4 = 10$ and $B(3) = 5(3) + 4 = 19$.

2. The output difference is $A - B = 10 - (19) = -9$. B is greater at this input.

Problem 10

1. Substitute the same input into both functions: $A(4) = 4(4) + 2 = 18$ and $B(4) = 2(4) + 10 = 18$.

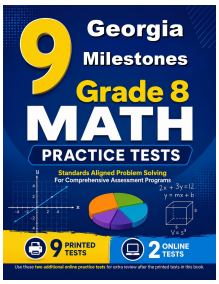
2. The output difference is $A - B = 18 - (18) = 0$. The zero difference means the outputs are equal at this input.

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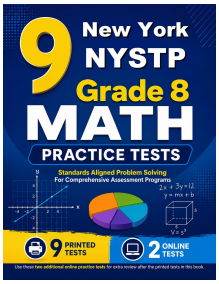
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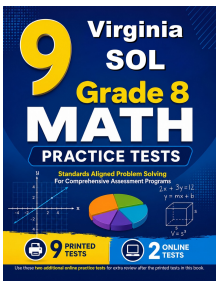
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