# Sketching and Describing Function Graphs

Spot mistakes, reason, and work backward

**Name** _____ **Date** _____ **Score** _____ / 6

### QUICK REVIEW

The height of a graph is an output, while its slope is a rate. A horizontal segment at $y = 4$ has output $4$ but rate $0$. Calculate a segment rate with $(y_2 - y_1)/(x_2 - x_1)$. Check proposed sketches by substituting coordinates. A vertical segment cannot belong to a function of $x$ because one input would have many outputs.

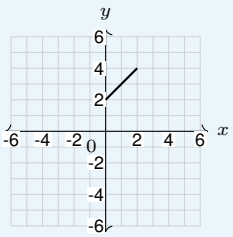
**Worked example**

Example for form 2: find the rate from $(0, 2)$ to $(2, 4)$.

**1.** The output change is $4 - 2 = 2$ and the input change is $2 - 0 = 2$. Divide to get $m = 2/2 = 1$.

**2.** The line rises one unit for each unit to the right. Its starting output is $2$, so its rule on the segment is $y = x + 2$.

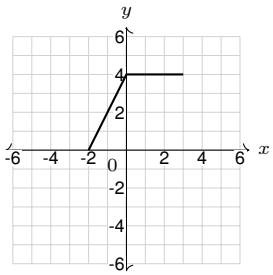
**Answer:** Rate $1$ unit per input unit.



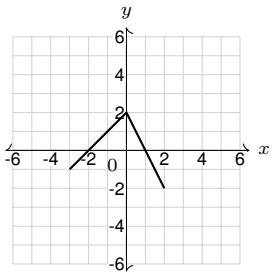

## Practice Problems

Show your thinking.

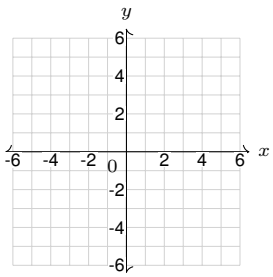
**1.** A learner calls the flat segment rate 4. Correct the rate and state the output.



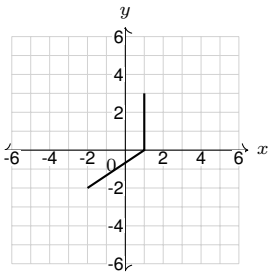

**2.** A learner claims this entire graph has slope 1. Check both segments.



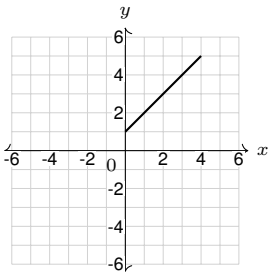

**3.** Repair a sketch of $y = 2x - 1$: a learner used $(0, 1)$ and $(2, 5)$. Draw the correct segment for $0 \le x \le 2$.



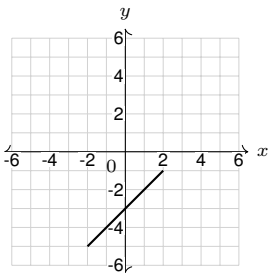

**4.** Does the shown path represent a function of $x$? Identify a specific conflict.




**5.** This graph joins $(0, 1)$ and $(4, 5)$. Recover its rule and verify the output at $x = 2$.




**6.** A learner says a graph below the x-axis must decrease. Use this graph to correct the claim.



# Answer Key

1. Rate $0$; output $4$.
2. First slope $1$; second slope $-2$.
3. Connect $(0, -1)$ and $(2, 3)$.
4. No: $x = 1$ has outputs $0$ and $3$.
5. $y = x + 1$; $y(2) = 3$.
6. It increases with slope $1$ while outputs stay negative.

## Step-by-Step Solutions

Follow each calculation, then check your own work.

### Problem 1

**1.** The flat segment joins $(0, 4)$ and $(3, 4)$. Its slope is $(4 - 4)/(3 - 0) = 0/3 = 0$.

**2.** The number $4$ is the common height, not the rate. The output remains $4$ as the input increases from $0$ to $3$.

### Problem 2

**1.** From $(-3, -1)$ to $(0, 2)$, the slope is $(2 - (-1))/(0 - (-3)) = 3/3 = 1$.

**2.** From $(0, 2)$ to $(2, -2)$, slope is $(-2 - 2)/(2 - 0) = -4/2 = -2$. The changed rate disproves the whole-graph claim.

### Problem 3

**1.** The correct outputs are $2(0) - 1 = -1$ and $2(2) - 1 = 3$. The claimed points both use an incorrect intercept of $+1$.

**2.** Plot $(0, -1)$ and $(2, 3)$ and connect them. The corrected segment has slope $(3 - (-1))/2 = 2$ and intercept $-1$.

### Problem 4

**1.** The vertical segment contains $(1, 0)$ and $(1, 3)$, so a vertical line at $x = 1$ meets the path more than once.

**2.** Since $0 \neq 3$, input $1$ has two different outputs. This fails the function rule despite the other sloping segment.

### Problem 5

**1.** Calculate $m = (5 - 1)/(4 - 0) = 1$. The point $(0, 1)$ gives intercept $b = 1$, so $y = x + 1$.

**2.** At input $2$, the rule gives $y = 2 + 1 = 3$. The point $(2, 3)$ lies on the shown segment, confirming the reading.

### Problem 6

**1.** The endpoints are $(-2, -5)$ and $(2, -1)$. The rate is $(-1 - (-5))/(2 - (-2)) = 4/4 = 1$.

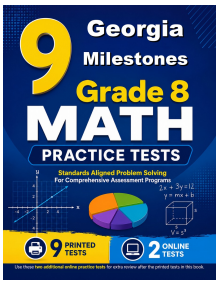
**2.** The positive slope means increasing output. Both endpoint outputs, $-5$ and $-1$, are negative; location below the axis does not determine direction of change.

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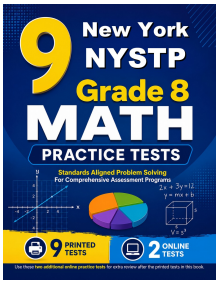

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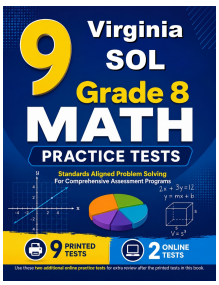

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