Sketching and Describing Function Graphs

Explore ideas and representations

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

QUICK REVIEW

Read a function graph from left to right. Rising segments have positive rate, falling segments have negative rate, and horizontal segments have rate 0. A point $(2, 5)$ means input 2 has output 5. To sketch $y = 2x - 1$, plot $(0, -1)$ and $(2, 3)$ and connect them with a straight line. Each grid square here represents one unit.

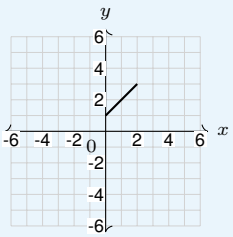
Worked example

Example for form 1: find the rate from $(0, 1)$ to $(2, 3)$.

1. The output change is $3 - 1 = 2$ 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 1, so its rule on the segment is $y = x + 1$.

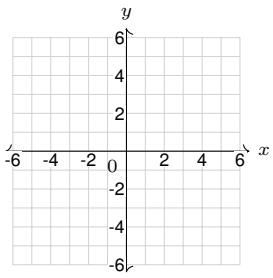
Answer: Rate 1 unit per input unit.



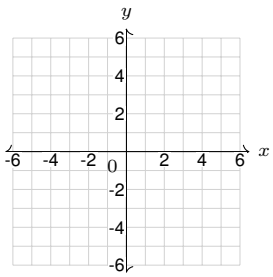
Practice Problems

Show your thinking.

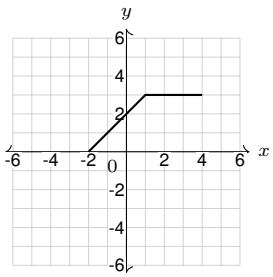
1. Sketch $y = x + 1$ for $-3 \le x \le 3$. Use at least three points.



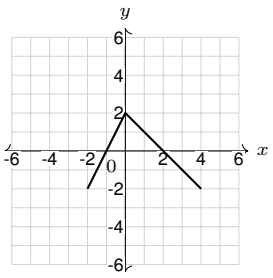
2. Sketch $y = -x + 2$ for $-2 \le x \le 4$.



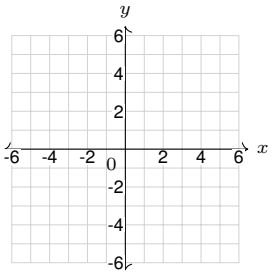
3. Read the shown graph. On what input interval is it constant, and what is that output?



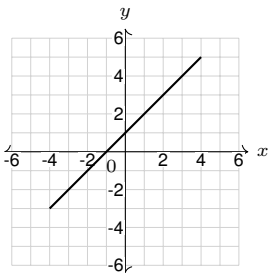
4. Find the rate on each segment and describe the graph.



5. Sketch $y = x^2$ for $-2 \le x \le 2$. Use five integer-input points and a smooth curve.



6. Read the output at $x = -2$ and at $x = 2$, then find their difference $y(2) - y(-2)$.



Answer Key

1. Line segment from $(-3, -2)$ through $(0, 1)$ to $(3, 4)$.
2. Line segment from $(-2, 4)$ through $(0, 2)$ to $(4, -2)$.
3. Constant for $1 \le x \le 4$ at $y = 3$.
4. Rates 2 and -1; rises then falls.
5. Curve through $(-2, 4), (-1, 1), (0, 0), (1, 1), (2, 4)$.
6. $-1, 3$; difference 4.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. At $x = -3, 0, 3$, the outputs are $-3 + 1 = -2$, $0 + 1 = 1$, and $3 + 1 = 4$.

2. Plot $(-3, -2), (0, 1), (3, 4)$ and connect them with a straight segment. The graph rises one unit per unit of input.

Problem 2

1. Substitute the endpoint inputs: $-(-2) + 2 = 4$ and $-(4) + 2 = -2$. At zero, $y = 2$.

2. Plot $(-2, 4), (0, 2), (4, -2)$ and join them. The segment decreases because its slope is -1.

Problem 3

1. The segment from $(1, 3)$ to $(4, 3)$ has change $\Delta y = 3 - 3 = 0$ while $\Delta x = 4 - 1 = 3$.

2. Its slope is $0/3 = 0$, so the output stays 3 on $[1, 4]$. The preceding segment rises instead.

Problem 4

1. From $(-2, -2)$ to $(0, 2)$, slope is $(2 - (-2))/(0 - (-2)) = 4/2 = 2$.

2. From $(0, 2)$ to $(4, -2)$, slope is $(-2 - 2)/(4 - 0) = -4/4 = -1$. Thus it rises to $x = 0$ and then falls.

Problem 5

1. For inputs $-2, -1, 0, 1, 2$, squaring gives $4, 1, 0, 1, 4$, respectively. The lowest point is $(0, 0)$.

2. Plot all five points and draw a smooth U-shaped curve. Do not use one straight segment; successive output changes are not constant.

Problem 6

1. The graph passes through $(-2, -1)$ and $(2, 3)$, so the requested outputs are -1 and 3.

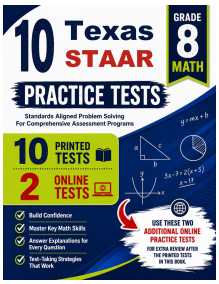
2. Subtract in order: $y(2) - y(-2) = 3 - (-1) = 4$. This is an output change, not the slope; the input change is also 4.

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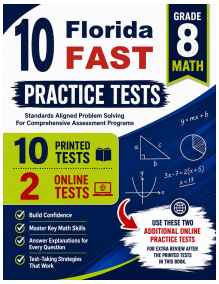
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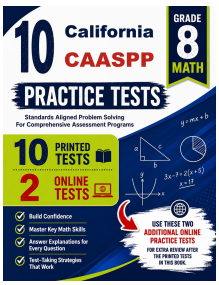
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