Sketching and Describing Function Graphs

Apply the skill to decisions and designs

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

QUICK REVIEW

Graphs can model stages of a trip or a changing quantity. On a distance-from-home graph, rising means moving farther away, horizontal means constant distance, and falling means returning. Connect stages at their shared endpoints. State axis units and time intervals; a steeper segment means a greater magnitude of rate, not necessarily a greater output.

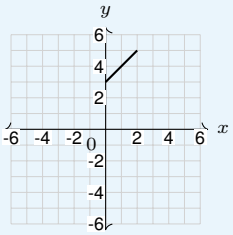
Worked example

Example for form 3: find the rate from $(0, 3)$ to $(2, 5)$.

1. The output change is $5 - 3 = 2$ 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 3, so its rule on the segment is $y = x + 3$.

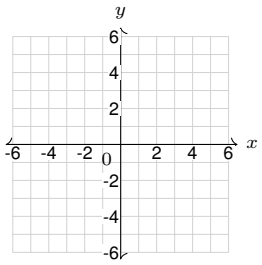
Answer: Rate 1 unit per input unit.



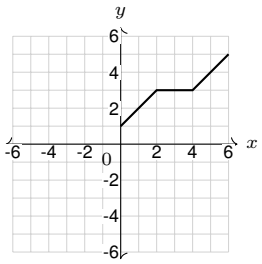
Practice Problems

Show your thinking.

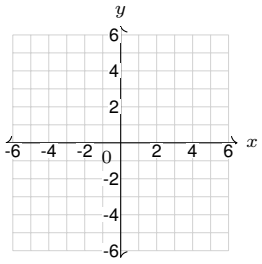
1. Use x in minutes and y in hundreds of meters from home. Sketch a trip from $(0, 0)$ to $(2, 4)$, a stop until minute 4, then a return home at minute 6.



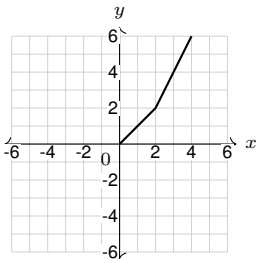
2. The graph uses minutes x and tank depth y in cm. Describe each stage and find the total depth increase.



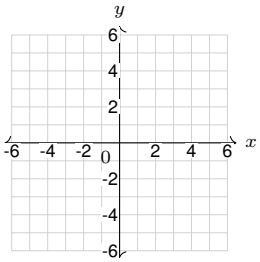
3. Design a continuous graph of height y in cm against time x in minutes: start at 2, rise at 1 cm/min for 2 minutes, then stay constant until minute 5.



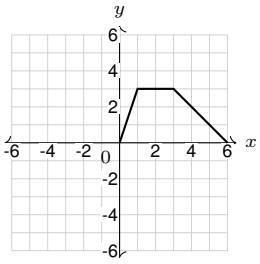
4. A walk uses x in minutes and y in hundreds of meters from home. Which stage has greater speed: minutes 0 to 2 or 2 to 4?



5. Graph a draining tank: depth starts at 6 cm and falls 2 cm each minute until empty. Label the empty-time point; x is minutes and y is cm.



6. This distance-from-home graph uses minutes x and hundreds of meters y. Does the horizontal middle stage mean the walker is at home?



Answer Key

1. Join $(0,0), (2,4), (4,4), (6,0)$.
2. Fill, hold, fill; total increase 4 cm.
3. Join $(0,2), (2,4), (5,4)$.
4. Minutes 2 to 4: 2 hundred m/min versus 1.
5. Connect $(0,6)$ to $(3,0)$; empty at 3 min.
6. No; the walker is 3 hundred meters from home.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. The outward stage gains 4 hundred meters in 2 minutes, rate $4/2 = 2$. During the stop, distance stays 4 until minute 4.

2. The return changes distance by $0 - 4 = -4$ in $6 - 4 = 2$ minutes, rate -2. Connect the four stated endpoints in time order.

Problem 2

1. Depth rises from 1 to 3 over minutes 0 to 2, stays 3 until minute 4, then rises to 5 at minute 6.

2. The stage rates are $1, 0, 1$ cm/min. Overall depth increase is $5 - 1 = 4$ cm; the flat stage adds no depth.

Problem 3

1. The first stage ends at $y = 2 + 1(2) = 4$, so plot $(0,2)$ and $(2,4)$.

2. Constant height means $y = 4$ from $x = 2$ through $x = 5$. Add endpoint $(5,4)$ and connect the stages with no jump.

Problem 4

1. First-stage rate is $(2-0)/(2-0) = 1$ hundred m/min. Second-stage rate is $(6-2)/(4-2) = 4/2 = 2$ hundred m/min.

2. Both are outward motions, so their speeds equal these positive rates. Since $2 > 1$, the second stage is faster even though both last two minutes.

Problem 5

1. The model is $y = 6 - 2x$. Set depth to zero: $0 = 6 - 2x$, giving $x = 3$ minutes.

2. Plot $(0,6)$ and $(3,0)$, then connect for $0 \le x \le 3$. Do not extend into negative depths after the tank is empty.

Problem 6

1. The middle stage runs from $(1,3)$ to $(3,3)$. Its output is 3, while its slope is $(3-3)/(3-1) = 0$.

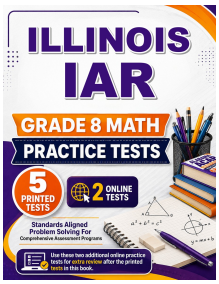
2. Zero slope means distance is unchanged, not zero. The walker is 300 meters from home during that stage and reaches home only at $(6,0)$.

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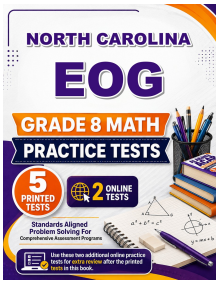
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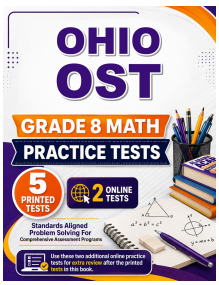
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