

Line Feature Lab

Graph linear functions and read what the graph tells you.

HIGH SCHOOL • MA.912.AR.2.4

MA.912.AR.2.4 "Given a table, equation or written description of a linear function, graph that function, and determine and interpret its key features."

NAME _____

DATE _____

GRAPH FROM A RULE

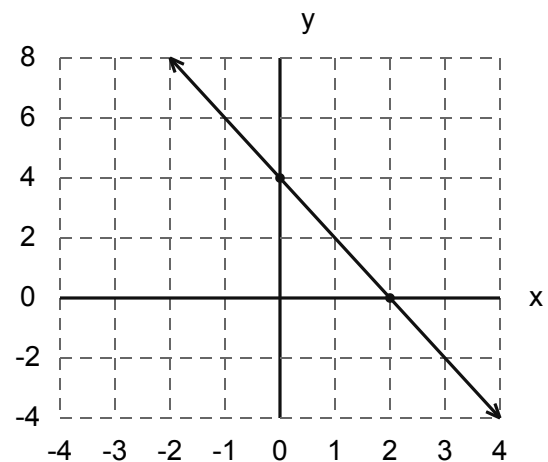
For a linear function, slope is its rate of change. Find intercepts by setting $x = 0$ or $y = 0$. Plot two points and use a ruler. Arrows mean the line continues beyond the window. State domain and range for the function, not just the visible grid. Use inequalities or set notation; R means all real numbers.

WORKED EXAMPLE

Graph $y = -2x + 4$. Identify its intercepts, rate, domain and range.

1. Plot $(0,4)$ and $(2,0)$; draw the line through them with arrows.
2. Its rate is -2 . Intercepts: $x = 2$ and $y = 4$.
3. The unrestricted nonconstant line has domain R and range R.

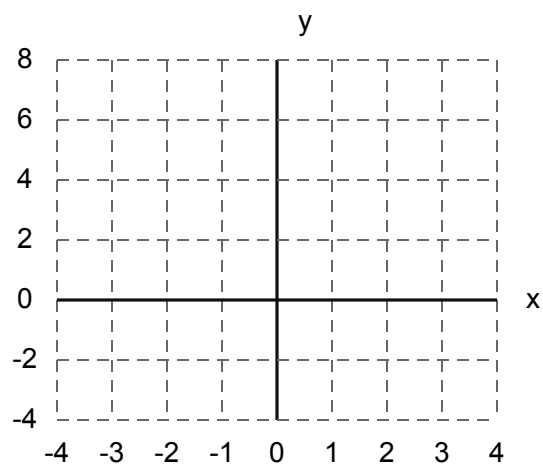
Answer: x-intercept $(2,0)$; y-intercept $(0,4)$; rate -2 ; domain R, range R.



PRACTICE 4 problems

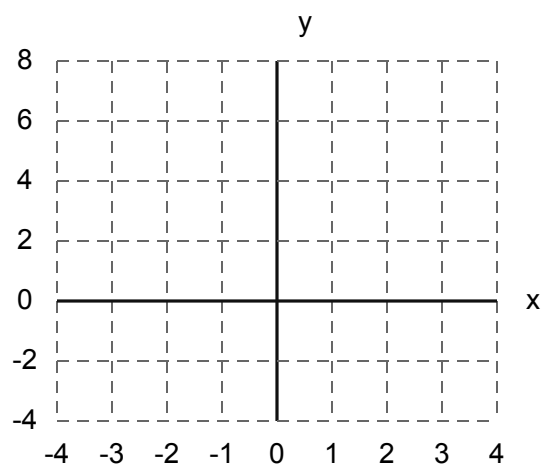
- 1** Graph the function. State intercepts (or none), rate, domain and range. $y = 2x - 2$.

ANSWER _____



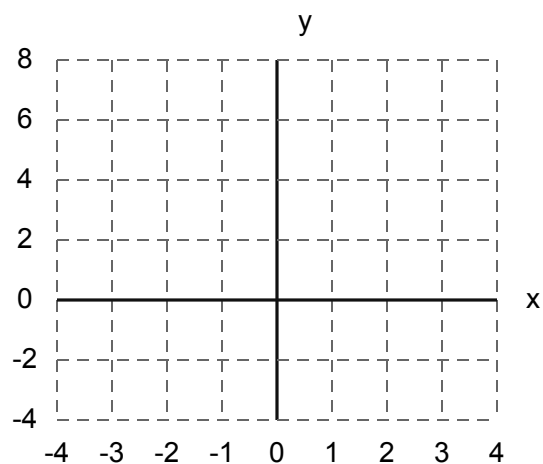
- 2** Graph the function. State intercepts (or none), rate, domain and range. Standard form: $x + 2y = 4$.

ANSWER _____



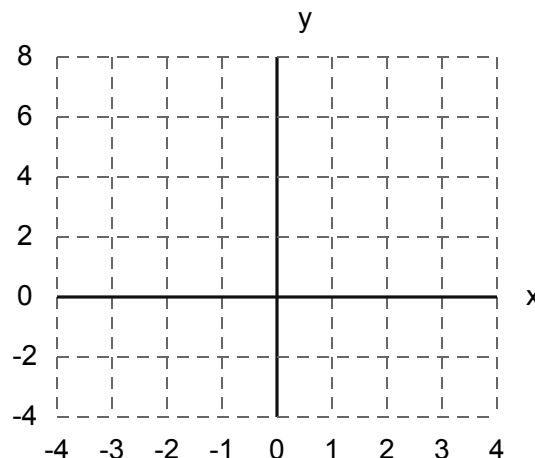
- 3** Graph the function. State intercepts (or none), rate, domain and range. Point-slope form: $y - 2 = -(x - 1)$.

ANSWER _____



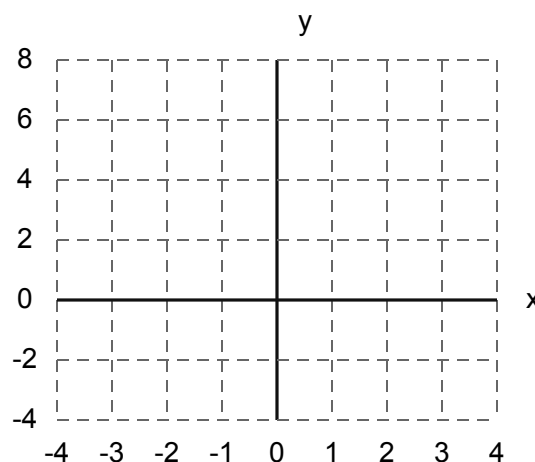
- 4** Graph the function. State intercepts (or none), rate, domain and range. A constant function outputs 4 for every real input.

ANSWER _____



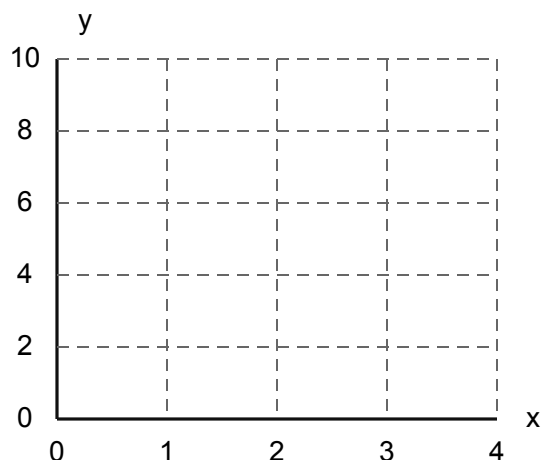
APPLY IT Show your work

- 1** These values lie on an unrestricted linear function: $x = -2, 0, 2$; $y = 5, 3, 1$. Write its equation and graph it. State intercepts, rate, domain and range.



2

A phone has 1 GB stored and each new video adds 2 GB. Let x be new videos, y be total GB; allow exactly $x = 0, 1, 2, 3, 4$. Write and graph the model. Give domain, range, rate and meaning of its y -intercept.

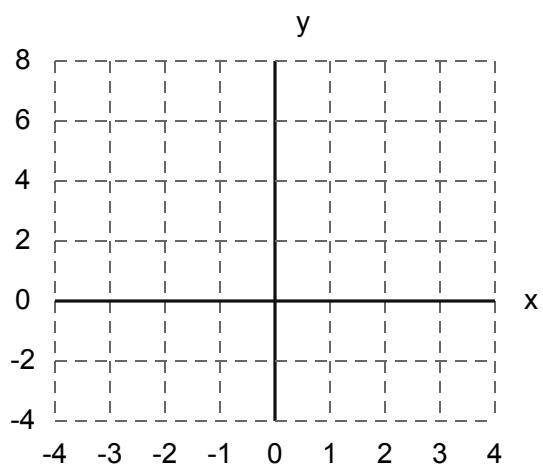


CHALLENGE

One step up

Graph $y = -x + 2$. A student says its domain is $-4 \leq x \leq 4$ because that is the grid window. Explain the error and state the actual domain and range.

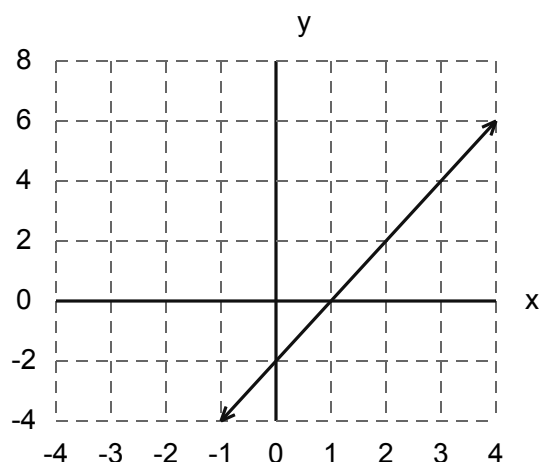
WORK SPACE AND ANSWER



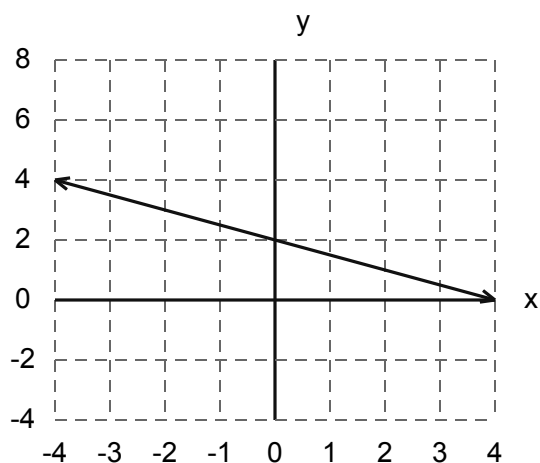
Require actual graphs plus named features. R means all real numbers. A horizontal line has a singleton range and may have no x-intercept. For videos, accept set-builder equivalents with integer restrictions; do not join the five points. An unrestricted line continues beyond the window.

PRACTICE 1

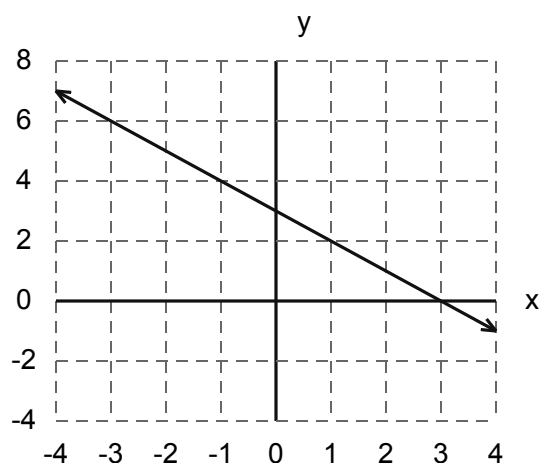
(1,0) and (0,-2); rate 2; domain R, range R.

**PRACTICE 2**

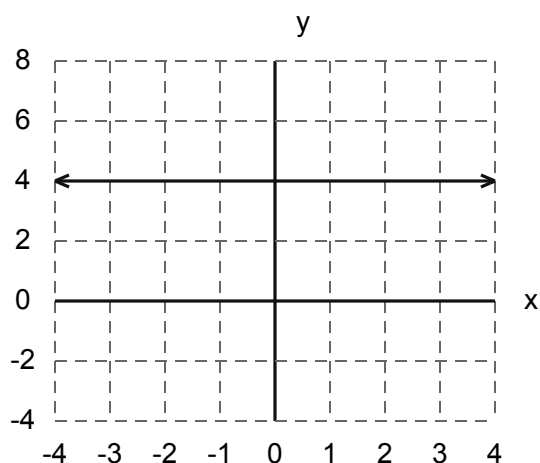
$y = -x/2 + 2$; intercepts (4,0), (0,2); rate -1/2; domain R, range R.

**PRACTICE 3**

$y = -x + 3$; intercepts (3,0), (0,3); rate -1; domain R, range R.

**PRACTICE 4**

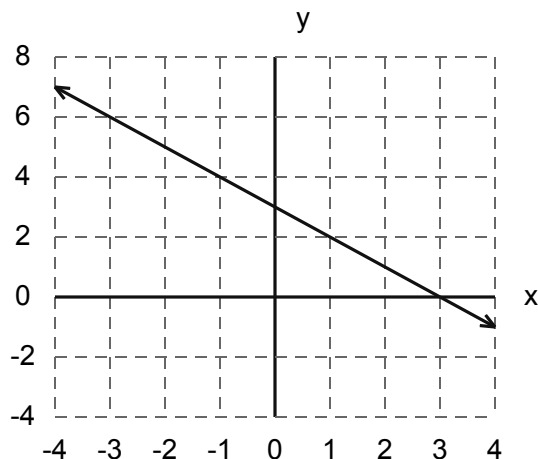
$y = 4$; no x-intercept; y-intercept (0,4); rate 0; domain R, range {4}.



APPLY IT 1

$y = -x + 3$. Intercepts (3,0), (0,3); rate -1; domain $\mathbb{R}$, range $\mathbb{R}$.

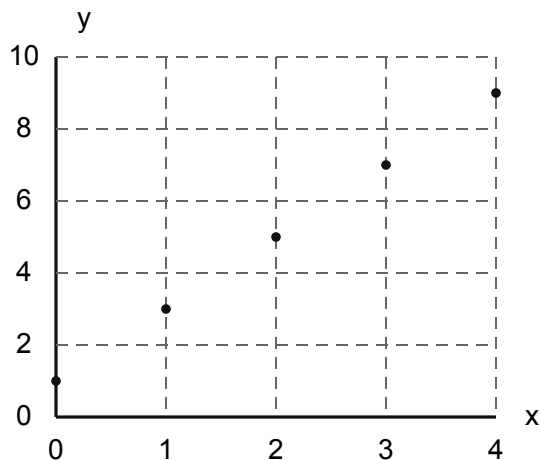
Each increase of 2 in x decreases y by 2.



APPLY IT 2

$y = 2x + 1$. $D = \{0, 1, 2, 3, 4\}$; $R = \{1, 3, 5, 7, 9\}$. Rate 2 GB/video; (0,1) means 1 GB initially.

Plot five isolated points because partial videos are excluded.



CHALLENGE

The arrows continue beyond the window. Domain $\mathbb{R}$ and range $\mathbb{R}$; the displayed window does not restrict this function.

