Algebra 1 3.6 $y = k \cdot x$

Write an equation for a proportional relationship

Write an equation for a nonproportional relationship

linear $y = mx + B$ (linear) $y = mx + 0$ (proportional)

slope

constant of variation $y = mx$

y-intercept

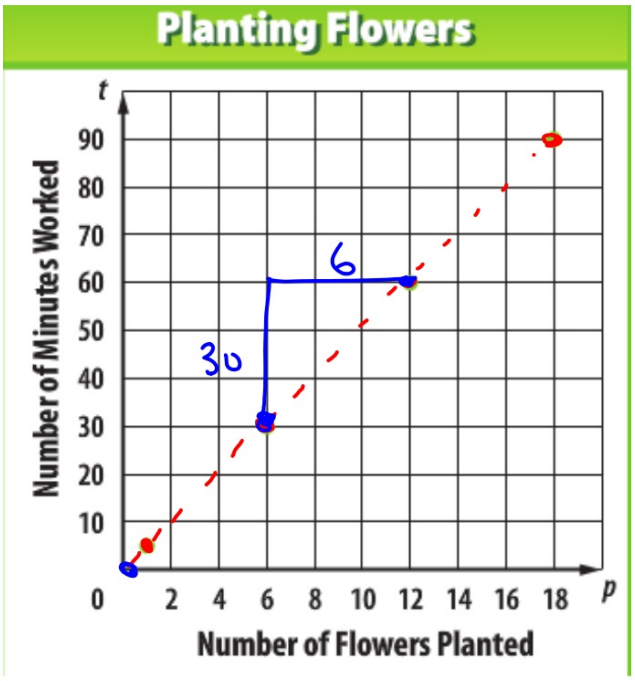
directly proportional

(direct variation)

nonproportional

Heather is planting flats of flowers. The table shows the number of flowers that she has planted and the amount of time that she has been working in the garden.

Number of flowers planted (p)	1	6	12	18
Number of minutes working (t)	5	30	60	90



propor.

$y = kx$

$m = \frac{30}{6} = \frac{5}{1}$

$y = 5x$

KeyConcept Proportional Relationship

Words A relationship is proportional if its equation is of the form $y = kx$, $k \neq 0$. The graph passes through (0, 0).

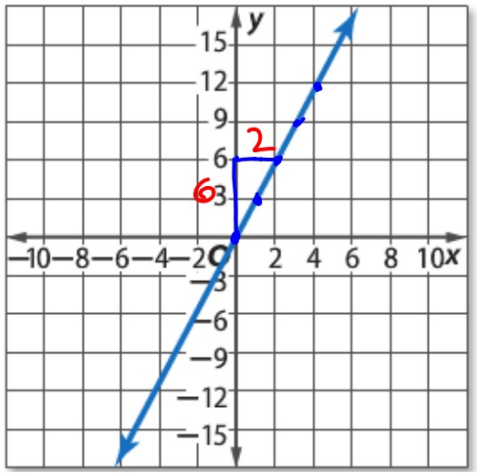
$y = mx$ $y = 0 \cdot x$ $y = 0$

Example $y = 3x$

x	0	1	2	3	4
y	0	3	6	9	12

The ratio of the value of x to the value of y is constant when $x \neq 0$.

$m = \frac{6}{2} = \frac{3}{1} = 3$ $y = 3x$



Linear and passing through (0,0)

Real-World Example 1 Proportional Relationships

BONUS PAY Marcos is a personal trainer at a gym. In addition to his salary, he receives a bonus for each client he sees.

Bonus

Number of Clients	1	2	3	4	5
Bonus Pay ($)	45	90	135	180	225

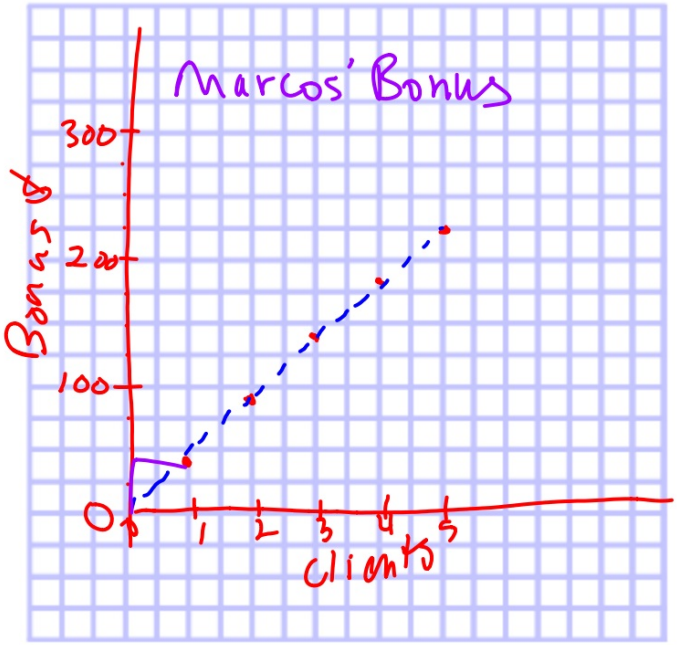
Graph the data. What can you deduce from the pattern about the relationship between the number of clients and the bonus pay?

1	45
2	90
3	135

$45 per client

$y = \frac{45}{1}x$

$y = 45x$



GuidedPractice

1. CHARITY A professional soccer team is donating money to a local charity for each goal they score.

Number of Goals	1	2	3	4	5
Donation ($)	75	150	225	300	375

A. Graph the data. What can you deduce from the pattern about the relationship between the number of goals and the money donated?

B. Write an equation to describe this relationship. $y = 75x$

C. Use this equation to predict how much money will be donated for 12 goals.

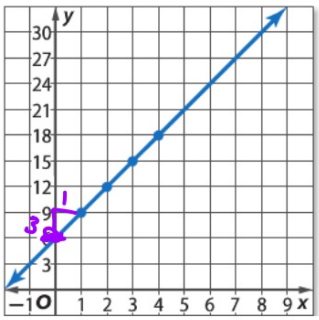
$y = 75(12)$
$= 900$

2 Nonproportional Relationships Some linear equations can represent a nonproportional relationship. If the ratio of the value of x to the value of y is different for select ordered pairs that are on the line, the equation is nonproportional and the graph will not pass through $(0, 0)$.

Can still be linear...but nonproportional...
(Does it go through origin?)

Example 2 Nonproportional Relationships

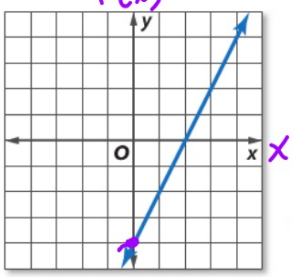
Write an equation in function notation for the graph.



- $y = 3x + 6$
- $f(x) = 3x + 6$

y=mx+b
graph
slope
y-intercept
Nonproportional: It can still be a line; it just doesn't pass through (0,0).

B. Write an equation in function notation for the graph.



$f(x)$

$m = \frac{4}{2} = \frac{2}{1} = 2$

$y = 2x - 4$

$f(x) = 2x + -4$

y=mx+b

GuidedPractice

graph
slope
y-intercept

2. Write an equation in function notation for the relation shown in the table.

A.

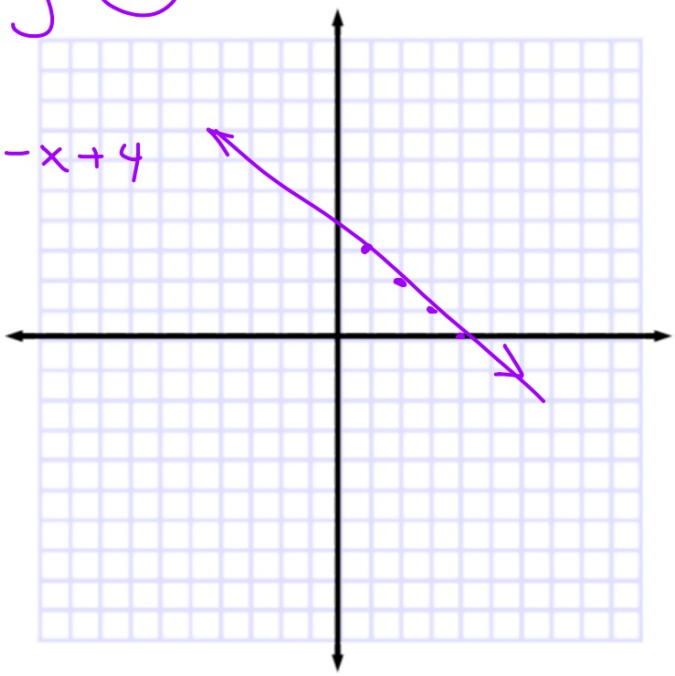
x	1	2	3	4
y	3	2	1	0

$y = (-1x) + 4$

$y = (-x) + 4$

1	3
2	2
3	1
4	0

$f(x) = -x + 4$



p. 200

3.6

3, 7, 9-13 19-35 odd

due FR: EOD