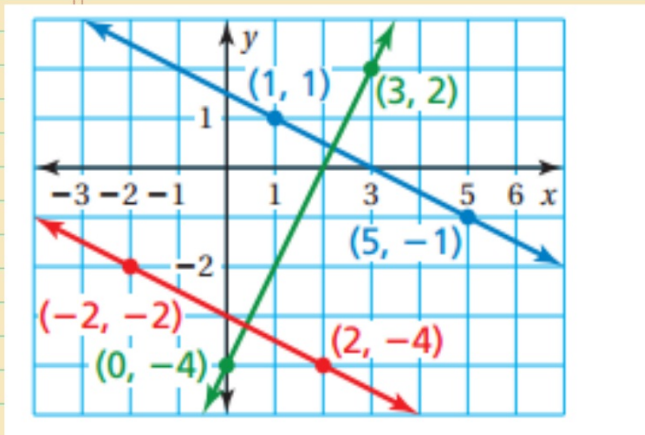


Skill check:

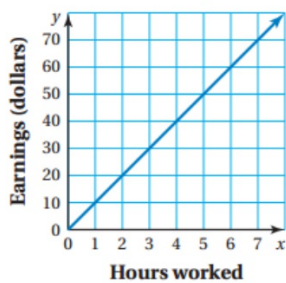


Which lines are perpendicular?

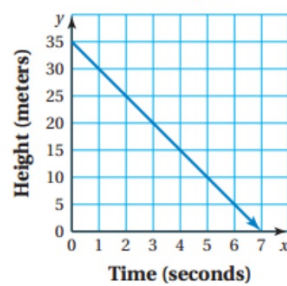
Explain!

## Which graph show a proportional relationship

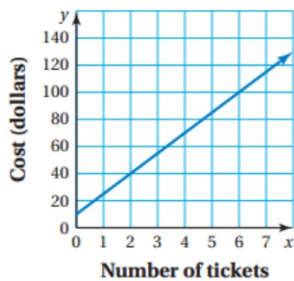
a. Money



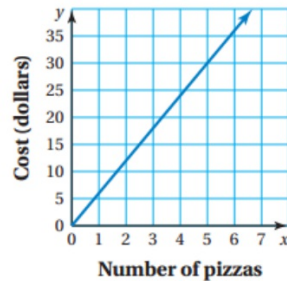
b. Helicopter



c. Tickets



d. Pizzas



e.

Laps, $x$	1	2	3	4
Time (seconds), $y$	90	200	325	480

f.

Cups of Sugar, $x$	$\frac{1}{2}$	1	$1\frac{1}{2}$	2
Cups of Flour, $y$	1	2	3	4

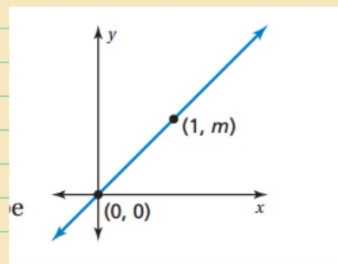
4-3

## Graphing proportional relationship

Vocabulary:

1.) Direct variation

**graph**



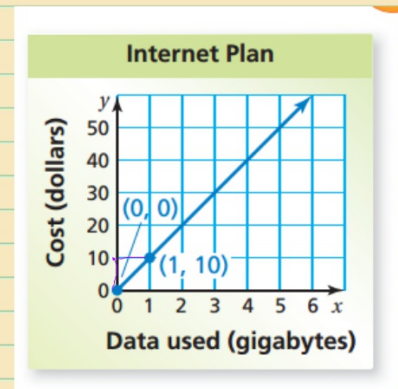
## Defination for Direct Variation:

When two quantities  $x$  and  $y$  are proportional, the relationship can be represented by the direct variation equation  $y = mx$ , where  $m$  is the constant of proportionality.

## Example 1 graphing a proportional relationship



The cost  $y$  (in dollars) for  $x$  gigabytes of data on an Internet plan is represented by  $y = 10x$ . Graph the equation and interpret the slope.



The equation shows that the slope  $m$  is 10. So, the graph passes through  $(0, 0)$  and  $(1, 10)$ .

Plot the points and draw a line through the points. Because negative values of  $x$  do not make sense in this context, graph in the first quadrant only.

❖ The slope indicates that the unit cost is \$10 per gigabyte.

## Example 2

### Writing and using direct variation

---

The weight  $y$  of an object on Titan, one of Saturn's moons, is proportional to the weight  $x$  of the object on Earth. An object that weighs 105 pounds on Earth would weigh 15 pounds on Titan.

a. Write an equation that represents the situation.

b. How much would a chunk of ice that weighs 3.5 pounds on Titan weigh on Earth?

Use the point (105, 15) to find the slope of the line.

$$y = mx \quad \text{Direct variation equation}$$

$$15 = m(105) \quad \text{Substitute 15 for } y \text{ and 105 for } x.$$

$$\frac{1}{7} = m \quad \text{Simplify.}$$

❖ So, an equation that represents the situation is  $y = \frac{1}{7}x$ .

$$3.5 = \frac{1}{7}x \quad \text{Substitute 3.5 for } y.$$

$$24.5 = x \quad \text{Multiply each side by 7.}$$

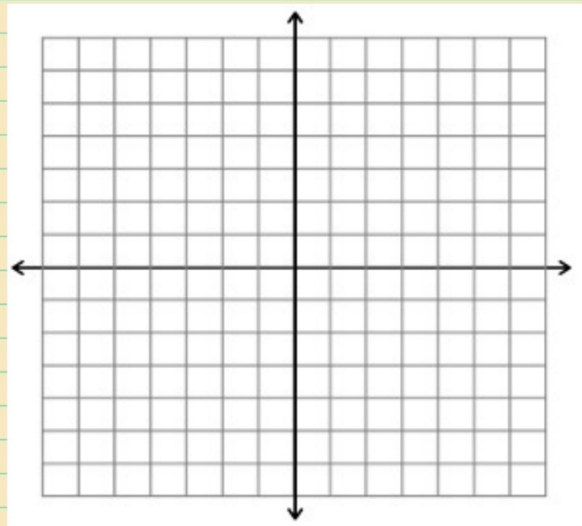
❖ So, the chunk of ice would weigh 24.5 pounds on Earth.



Skill Check:

Graph the linear equation

$$y = -\frac{1}{2}x$$

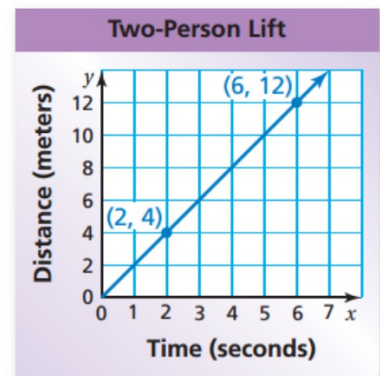


### Example 3

#### Comparing proportional relationships

The distance  $y$  (in meters) that a four-person ski lift travels in  $x$  seconds is represented by the equation  $y = 2.5x$ . The graph shows the distance that a two-person ski lift travels.

a. Which ski lift is faster?



Graph

