

## Proportional vs Non-proportional Relationships

Proportional - when two quantities have a constant ratio or rate.

This constant is called the **constant of proportionality**.

When graphed, proportional relationships form a straight line that must pass through the origin (0,0)

Non-proportional - no constant ratio or rate between quantities.

When graphed, these relationships also form a straight line, but **DO NOT** pass through the origin (0,0)

x	Number of Spiders	1	2	3	4
y	Number of Legs	8	16	24	32

x	y
Coffee (pounds)	Cost (dollars)
1	3
2	6
3	9
4	12

To determine if proportional

$$\frac{y}{x} \quad \text{or} \quad \frac{y_2 - y_1}{x_2 - x_1}$$

**Both of these tables show proportional relationships.**

Determine whether the data is proportional. If yes, find the constant. Explain your reasoning for yes or no.

$$\text{Constant} = \frac{y}{x}$$

Drinks	1	2	3
Ice Cubes	6	14	22

$$\frac{6}{1} = \frac{6}{1}$$

$$\frac{14}{2} = \frac{7}{1}$$

$$\frac{22}{3} = \frac{7\frac{1}{3}}{1}$$

Not proportional because  
there is no constant r-ship.

Determine whether the data is proportional. If yes, find the constant. Explain your reasoning for yes or no.

$$\begin{aligned}\text{Constant} &= \frac{y}{x} \\ &= \frac{2}{1}\end{aligned}$$

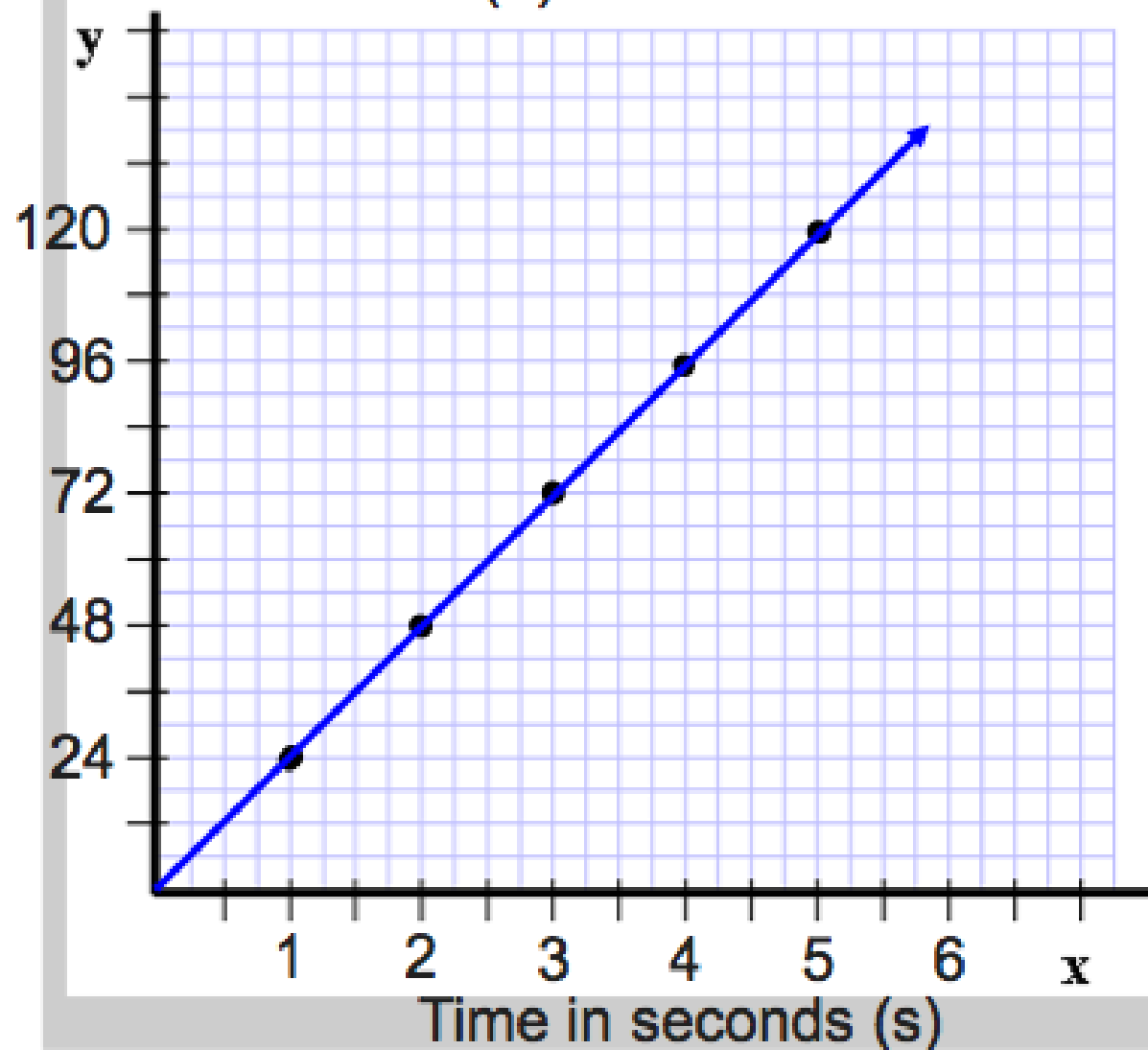
x  
y

Ice Tea Mix (cups)	1	2	3	4
Sugar (cups)	2	4	6	8

This is proportional because the constant is  $\frac{2}{1}$  for the data.

Determine the constant of proportionality from the graph.

Distance in meters (d)



$$\text{Constant} = \frac{y}{x}$$
$$= \frac{24}{1}$$

24 mps

Nina charges \$34.50 for 6 days of pet sitting. Find the constant of proportionality. Then write an equation relating the cost of pet sitting to the number of days. What would be the cost of pet sitting for 4 days?

$$c = \text{cost}$$

$$d = \text{days}$$

$$c = 5.75d$$

$$c = 5.75(4)$$

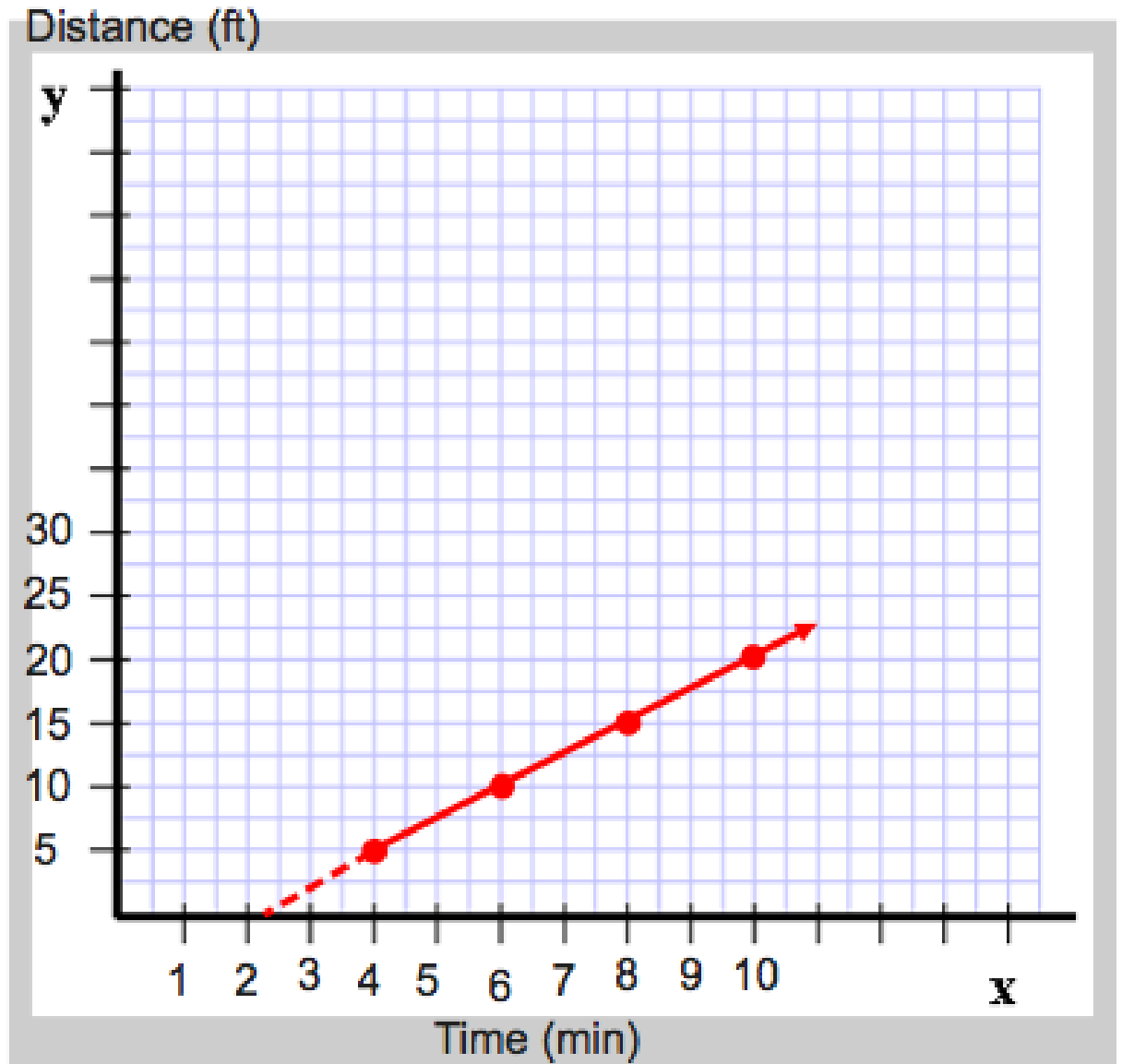
$$c = \downarrow 23.00$$

$$\begin{aligned} \text{constant} &= \frac{34.50}{6} \\ &= 5.75 \\ &= \frac{\quad \times 4}{\quad} \\ &\quad \downarrow 23.00 \end{aligned}$$

Determine if the relationship is proportional by graphing. Explain.

Time (min)	4	6	8	10
Distance (ft)	5	10	15	20

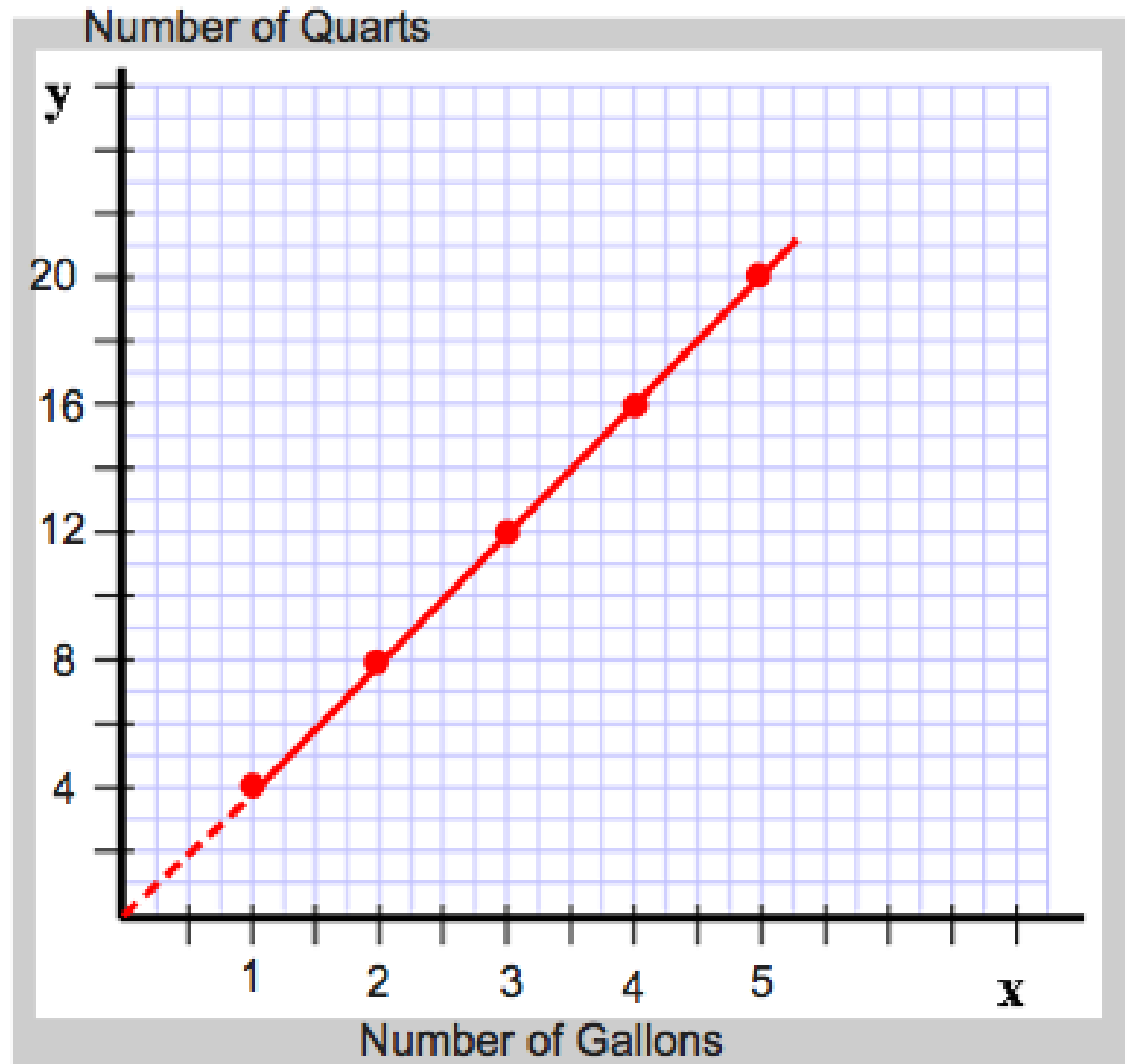
The data is not proportional because the line does not pass through the origin (0,0).



Determine if the relationship is proportional by graphing. Explain.

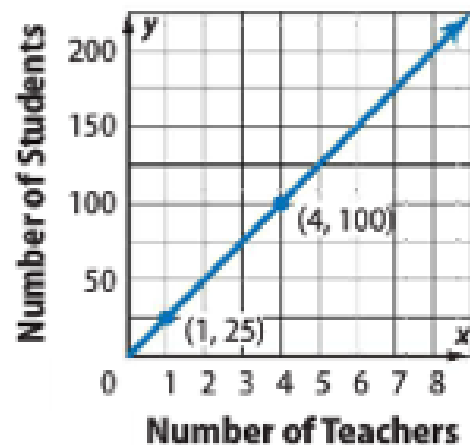
Number of Gallons	1	2	3	4
Number of Quarts	4	8	12	16

The data is proportional because the line is straight and passes through the origin (0,0)



The number of students on a school trip is proportional to the number of teachers as shown in the graph. (Example 2)

- Find and interpret the constant of proportionality.
- Explain what the points  $(0, 0)$ ,  $(1, 25)$  and  $(4, 100)$  represent.



- The constant is 25 to 1. This means for every 25 students there is 1 teacher.
- If 100 students attend the field trip, there needs to be 4 teachers.