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| Direct Variation | Lesson 1-9 |
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A direct variation is a linear relationship in which two quantities have a constant ratio. As one variable increases the other increases, as one decreases the other variable decreases. We say that y varies directly with x .

⇒ Real life examples of Direct Variation:

1) If you take a taxi, the amount of miles you travel varies to the amount of money you would pay.

(more miles = more money)

*Think of another real life example of direct variation and write it below:

Student Answer

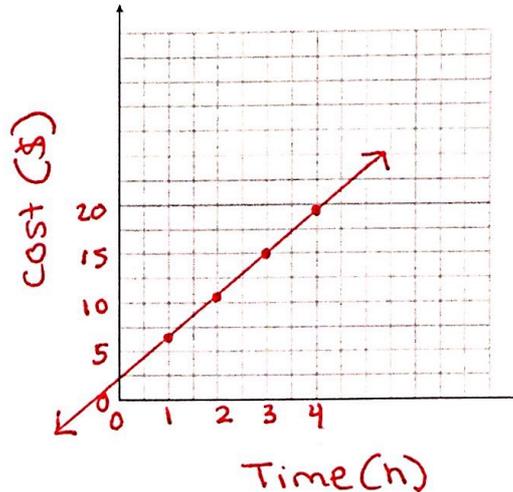
Examples:

| <u>Formula/Equation</u> | <u>Writing a Direct Variation Equation</u> |
|--|---|
| <p>Direct variation equations uses the formula:</p> $y=kx$ <p>Where k is the constant ratio or the constant of proportionality/constant of variation/constant rate of change/slope.</p> <p>x and y will always be variables that are changing.</p> <p>Ex) The equation $y = 2x$ represents the amount of money y Valentina has to pay for x miles of her taxi trip. Identify the constant of proportionality. Explain what it represents in this situation.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> $y = kx$ \downarrow $y = 2x$ </div> <div style="text-align: center;"> k <p>constant of proportionality!</p> </div> </div> <p>The constant of proportionality is <u>2</u>. So, Valentina pays <u>\$2</u> for every mile she travels.</p> | <p>If y varies directly with x, write an equation for the direct variation. Then find the value.</p> <p>If $y = -2$ when $x = 8$, find y when $x = 7$.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> $y = kx$ $y = k \cdot x$ $-2 = k \cdot 8$ $\frac{-2}{8} = \frac{8k}{8}$ $\frac{-2}{8} = k$ $\frac{-1}{4} = k$ </div> <div style="width: 45%;"> $y = kx$ $y = k \cdot x$ $y = \frac{-1}{4} \cdot 7$ $y = \frac{-1}{4} \cdot \frac{7}{1}$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $y = \frac{-7}{4}$ </div> <p>↑ leave as an improper fraction!</p> </div> </div> <p style="text-align: center;"><u>Equation</u></p> $y = \frac{-1}{4}x$ |

Graph

Skate Land charges \$4 per hour plus \$3 for a quad skate rental. Make a table and graph to show the cost for 1, 2, 3, and 4 hours of skating at skate land.

| Time (h) | Cost (\$) |
|----------|-----------|
| 1 | \$ 7 |
| 2 | \$ 11 |
| 3 | \$ 15 |
| 4 | \$ 19 |



Cost/time $\rightarrow \frac{7}{1} \neq \frac{11}{2} \neq \frac{15}{3} \neq \frac{19}{4}$

Is there a direct variation? No. There is no constant ratio and the line does not go through the origin.

♦ For a graph to show a direct variation, it must go through the origin (0,0).

Table

The table of a direct variation has a constant rate of change.

Two packs of pokémon card packs cost \$3.00. Show the cost of 1, 2, 3, and 4 packs of pokémon cards. Is there a direct variation? Explain.

| Number of Packs | Cost (\$) |
|-----------------|-----------|
| 1 | \$ 1.50 |
| 2 | \$ 3.00 |
| 3 | \$ 4.50 |
| 4 | \$ 6.00 |

$\frac{\text{change in cost}}{\text{change in packs}} \rightarrow \frac{\$ 1.50}{1}$

+1
+1
+1

+1.50
+1.50
+1.50

There is a direct variation because

there is a common ratio.