

Math 7H - Unit 3

Day 8 - Equations of Proportional Relationships

Lesson Objectives:

- I can represent proportional relationships by equations.
- I can identify the constant of proportionality (unit rate) in an equation.

So far, we know of two different models for representing proportional relationships.

TABLE

Time (hours)	Distance (miles)
2	130
3	195
4	260

Is the distance the car travels proportional to the time it travels?

Yes

How do you know?

There is a constant ratio.

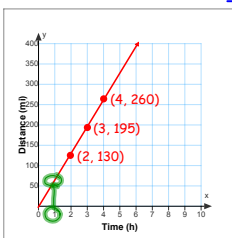
If so, what is the constant ratio (unit rate)?

$$k = 65$$

$$\frac{260}{4} = 65 \quad \frac{195}{3} = 65 \quad \frac{130}{2} = 65$$



GRAPH



Is the distance the car travels proportional to the time it travels?

Yes

How do you know?

Straight line through origin

If so, what is the constant rate of change (unit rate)?

$$k = 65$$

$$(1, k)$$

$$\frac{y}{x} = k$$

$$\frac{130}{2} = 65$$

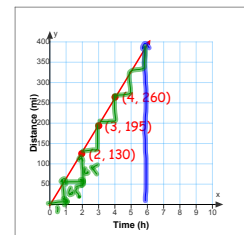


Time (hours)	Distance (miles)
2	130
3	195
4	260

$$\begin{array}{l} \leftarrow +65 \\ \leftarrow +65 \\ \leftarrow +65 \\ \leftarrow +65 \\ \leftarrow +65 \end{array}$$

$$\text{multiply unit rate by } 5$$

$$65 \cdot 5$$



$$65x$$

When two variable quantities have a constant ratio (unit rate), their relationship is called a direct variation. A **direct variation** is a proportional relationship in which the ratio of y to x is a constant, k. We say "y varies directly with x" or "x and y are directly proportional".

$$\frac{y}{x} = k \text{ or } y = kx, \text{ where } k \neq 0$$

The constant ratio is called the **constant of variation** or the **constant of proportionality**. In a direct variation equation, the constant rate of change is assigned a special variable, k.

EQUATION

Is the distance the car travels proportional to the time it travels?

Yes

How do you know?

It's in the format $y = kx$.

If so, what is the constant of proportionality (unit rate)?

$$k = 65$$

$$y = 65x$$



Tell whether x and y show direct variation (form a proportional relationship). If so, what is the constant of proportionality?

- No.

- yes, $k=4$
 $y=4x$

- No

- yes $K=1$
 $y = 1x$ $y = x$

$$y=kx$$

- yes
 $k=7$

- $$\begin{array}{r} y+1=2x \\ -1 \quad -1 \\ \hline y = 2x-1 \end{array}$$

8. $\frac{1}{x} = 3$
 $y = \frac{3}{x}$ No

10. $y+1=x$
 \uparrow
 NO
 $y=x-1$

3.7 pg 140 #1-23, 30, 33-40

(#4-#21, if direct variation, what is the constant of proportionality?)

* Individual Think Time *



What to do if you get stuck...

1. Reread the problem. Did you write it down correctly?
2. Reread your notes. Is there a problem similar that we did together in class?
3. Find a problem similar in your book. Try this one to see if it helps.
4. Skip the problem until the end of Individual Think Time. Then ask an "educated" question of a neighbor or Mrs. Call.

Today we're working by...

