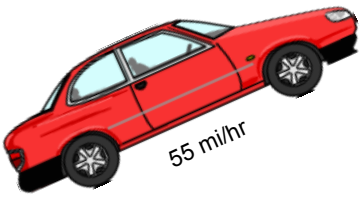
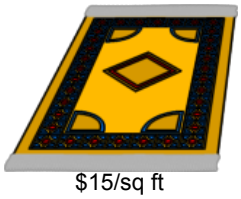
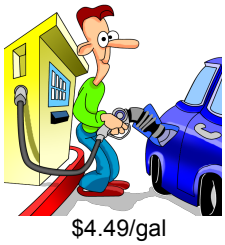
Aim: Proportional Relationships

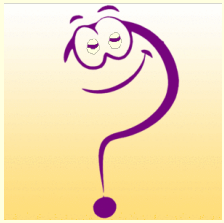


$1.22/lb


$15/sq ft


$4.49/gal

Essential Questions



1. What is a proportion?

2. How can we recognize a proportional relationship?

PROPORTIONAL RELATIONSHIPS

Proportions are NOT some odd way-out mathematical stuff

You use them every day, constantly, whether you realize it or not. Do you ever talk about going 55 miles per hour? Or figure how long it takes to travel somewhere with such and such a speed? Have you ever seen prices such as $1.22 per pound, $4 per foot, $2.50 per gallon ? Have you ever figured how much something costs given the price per pound or per gallon etc.? Ever figured your daily or monthly pay if given the hourly rate?

Consider the problem: if car travels this much in 3 hours, how long could it travel in 4 hours? 6 hours? 7 hours?

In proportion problems you have **two things** that both change at the same rate

What is a proportion?

Two quantities are proportional, when every pair have a constant ratio:

$$\frac{a}{b} = \frac{c}{d} = k$$

This says that one number is a constant multiple of the other.

k is the constant multiple

Other names for **k** is the **constant of proportionality** or the **constant of variation.**

If a **constant of proportionality, k,** exists, then we have **proportional relationship.**

Example: Is this a proportional relationship?

$$\frac{6}{2} = \frac{12}{4}$$

3 = 3 Yes!

Is this a proportional relationship? Why or why not? What is the unit rate?

Number of Days (x)	Money Earned (y)
1	$3
2	$6
3	$9
4	$12

In this example we can see that each day the amount of money earned increases by $3.
This is a proportion.

The Money Earned divided by the Number of Days gives you the proportional constant or unit rate.

Is this a proportional relationship? Why or why not? What is the unit rate?

Number of Days (x)	Money Earned (y)
1	$1
2	$2
3	$4
4	$8

In this example we can see that each day the amount of money earned doubles from the previous day.
This is NOT a proportion.

The Money Earned divided by the Number of Days does not give you a proportional constant or unit rate.

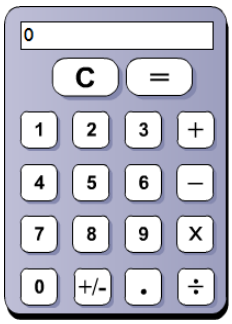
PROPORTIONAL RELATIONSHIPS

Is this a proportional relationship? Why or why not? What is the unit rate?

1) After one hour, the car has traveled 76 miles. After three hours, the car has traveled 228 miles.

$$\frac{76 \text{ miles}}{1 \text{ Hours}} = \frac{228 \text{ miles}}{3 \text{ Hours}}$$

$$76 = 76$$



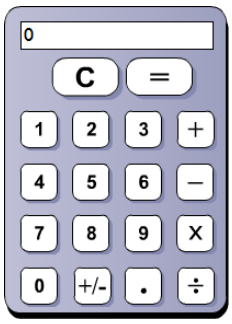
Is there a constant of proportionality? Yes

Is this a proportional relationship? Why or why not? What is the unit rate?

2) Mrs. Peacock's car traveled 85.5 miles on three gallons of gas. Then she filled the tank up with 13 gallons of gas and traveled 370.5 miles.

$$\frac{85.5 \text{ miles}}{3 \text{ gallons}} = \frac{370.5 \text{ miles}}{13 \text{ gallons}}$$

$$28.5 = 28.5$$



Is there a constant of proportionality? Yes

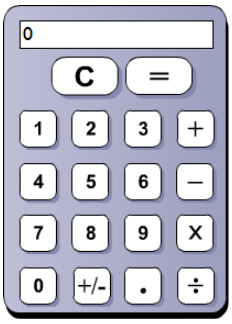
PROPORTIONAL RELATIONSHIPS

Is this a proportional relationship? Why or why not? What is the unit rate?

3) One dozen eggs costs $1.29. Three dozen eggs cost $2.45.

$$\frac{\$1.29}{12} \stackrel{?}{=} \frac{\$2.45}{36}$$

$.1075 \neq .0681$



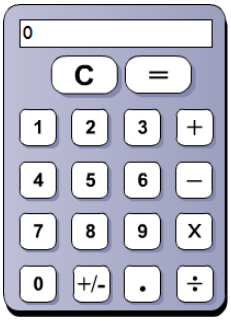
Is there a constant of proportionality? No

Is this a proportional relationship? Why or why not? What is the unit rate?

4) It takes 42 minutes to vacuum 3 rooms in a house and 112 minutes to vacuum 8 rooms.

$$\frac{42}{3} \stackrel{?}{=} \frac{112}{8}$$

$14 = 14$



Is there a constant of proportionality? Yes

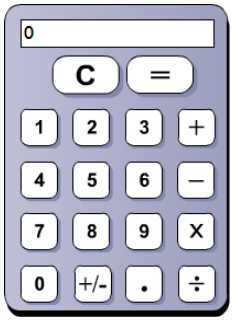
PROPORTIONAL RELATIONSHIPS

Is this a proportional relationship? Why or why not? What is the unit rate?

5) Mrs. Peacock went out for a 53 minute run and she ran 4.5 miles. Mr. Peacock went for a run and he ran 3 miles in 43 minutes.

$$\frac{4.5}{53} \stackrel{?}{=} \frac{3}{43}$$

$$.085 \neq .069$$



Is there a constant of proportionality? No

6) Use the proportions to fill out the following tables:

a) Lindsey can run 1 mile in 8 minutes.

Miles	Minutes
0	0
1	8
2	16
3	24

6) Use the proportions to fill out the following table:

b) Hunter can read 35 pages in one hour.

Hours	Pages
0	0
1	35
2	70
3	105

6) Use the proportions to fill out the following table:

A plant grows 1/2 inch every 3 days

Days	Growth
0	0
3	1/2
6	1
9	1.5

6) Use the proportions to fill out the following table:

d) Ian walks 2 miles in 1/4 hour.

Hour	Miles
0	0
1/4	2
1/2	4
3/4	6