Proportional Relationships in Graphs

Constant of Proportionality

A Constant of Proportionality exists when the ratio of two quantities in a table, graph, or ordered pairs simplify to the same unit rate.

$\frac{y}{x}$

To check if there is a constant of proportionality:

- From Ordered Pairs/Tables: Find the unit rate for all ordered pairs (**y divided by x**). The unit rate must be the same for all pairs.
- From a Graph: Create a table of ordered pairs, then check all ordered pairs by dividing y by x.

Find the Constant of Proportionality (if it exists)

a. (2, 53), (4, 108), (0.5, 13.25)

(x,y)

$\frac{y}{x}$ $\frac{53}{2}$ $\frac{108}{4}$

26.5 27

No

b. (15, 9), (78, 46.8)

(x,y)

$\frac{y}{x}$ $\frac{9}{15}$ $\frac{46.8}{78}$

.6 .6

Yes $\frac{.6}{1}$

Find the Constant of Proportionality (if it exists)

x	y
0	0
1	5
2	10
3	15
4	20

$\frac{5}{1}=5$ $\frac{10}{2}=5$ $\frac{15}{3}=5$ $\frac{20}{4}=5$

C.O.P = $\frac{5}{1}$ or 5

x

Days	0	1	2	3
Hours of Homework	0	4	6	9

y

C.O.P = No $\frac{4}{1}$ $\frac{6}{2}$ 3

x	y
0	0
4	11.2
6	16.8
8	22.4
10	2.8

$\frac{11.2}{4}=2.8$ 2.8 2.8 .28

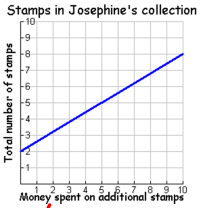
C.O.P = No

Proportionality in Graphs

A graph is proportional if:

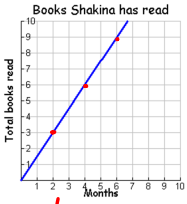
- It is linear (a straight line).
- It goes through the origin (0,0)

Stamps in Josephine's collection



✓ Linear
X Origin
X Is it proportional?

Books Shakina has read



✓ Linear
✓ Origin
✓ Is it proportional?

Baseball thrown in the air

X Linear
✓ Origin
X Is it proportional?

Hot Dog Eating Contest

Does the graph represent a proportional relationship?

How do you know?

Yes, it's linear & went through the origin. (0,0)

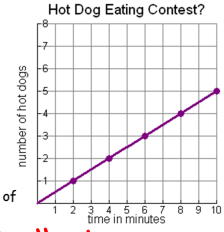
What is the constant of proportionality?

x y

(2,1)(4,2)(6,3)(8,4)(10,5)

$\frac{1}{2}$ $\frac{2}{4}=\frac{1}{2}$ $\frac{3}{6}=\frac{1}{2}$ $\frac{4}{8}=\frac{1}{2}$ $\frac{5}{10}=\frac{1}{2}$

Hot Dog Eating Contest?



What is an ordered pair on the graph makes the constant of proportionality easy to determine?

The first coordinate (2,1) = $\frac{y}{x}=\frac{1}{2}$

What does the ordered pair (0,0) represent in this graph?

The starting point

What is an equation that would represent the relationship shown in the graph?

$.5x=y$ $\frac{y}{5}=x$

Multiplication Problems

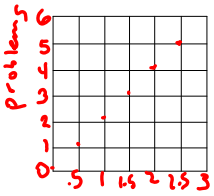
Joe can do 10 multiplication problems in 5 seconds.

1. At this rate, how long should it take Joe to do 2 multiplication problems?

$\frac{10 \text{ problems}}{5 \text{ sec}}$ $\frac{2 \text{ problems}}{1 \text{ sec.}}$

2. Create a table of values showing how long should it take him to do from 0 to 5 multiplication problems. Then graph the points on the coordinate plane.

x	Seconds	0	.5	1	1.5	2	2.5
y	Problems	0	1	2	3	4	5



yes, linear + (0,0)

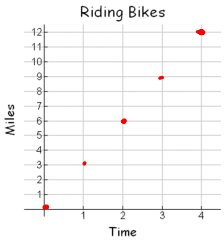
3. Is the graph proportional? Explain why or why not.

Grandma Betty

Grandma Betty rode her bike on the Tobacco Trail. It took her 4 hours to ride 12 miles. Assume she rode at a constant rate of speed during her exercise.

Fill in the table below and draw the corresponding graph to the right.

Time in hours (x)	4	2	0	3	1
Miles Ridden (y)	12	6	0	9	3



What is the constant of proportionality?

$\frac{12 \text{ miles}}{4 \text{ hours}} = \frac{3 \text{ miles}}{1 \text{ hour}}$

What is the ordered pair where x=1? (1, 3)

$3x = y$ or $\frac{y}{3} = x$

Write an equation relating miles ridden (y) and time in hours (x)

Grandma Betty

Grandma Betty doesn't always ride 12 miles, but she always goes the same pace.

$\frac{12}{4} = \frac{3}{1}$

Use your equation to find the missing information based on the given information of different exercise sessions.

a. Grandma Betty rode for 6 hours and 30 minutes. How far did she go?

6.5 hours x 3 = 19.5 miles

b. Grandma Betty rode her bike for 15.75 miles. How long did it take her?

$\frac{15.75 \text{ miles}}{3} = 5.25 \text{ hours}$

Salt Water Taffy

You want to buy some candy for your birthday party. You go to two different grocery stores and see the following special offers.

OFFER 1: 3 lbs for $4.50 **OFFER 2**: $1.75 / lb

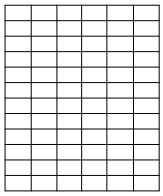
Complete the table for each offer. Graph each offer on the coordinate plane.

OFFER 1

Pounds (x)	Dollars (y)
1	1.50
2	3.00
3	4.50

OFFER 2

Pounds (x)	Dollars (y)
1	1.75
2	3.50
3	5.25



Offer 1's constant of proportionality: $\frac{1.50}{1}$

Offer 2's constant of proportionality: $\frac{1.75}{1}$

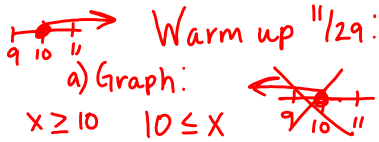
Which is the better deal for Salt Water Taffy? How do you know?

Offer 1, cheaper per lb.

Warm up 11/29:

a) Graph:

$x \geq 10$ $10 \leq x$



Solution Set:

b) $-8+(-5g)+12 \leq -2-3g$

$-8-5g+12 \leq -2-3g$

$-5g+4 \leq -2-3g$ $-5g+4 \leq -2-3g$

$+3g$ $+3g$ $+5g$ $+5g$

$-2g+4 \leq -2$ $4 \leq -2+2g$

-4 -4 $+2$ $+2$

$\frac{-2g}{-2} \leq \frac{-6}{-2}$ $\frac{6}{2} \leq \frac{2g}{2}$

$g \geq 3$ $3 \leq g$

$g \geq 3$

Attachments

mental math division.ppt