Class Notes

Ratio:

a comparison of two numbers by division

3:9 1:3

3 to 9 1 to 3

$\frac{3}{9}$ $\frac{1}{3}$

pennies:dimes

Rate:

a ratio that compares two quantities with different kinds of units

$$\frac{120 \text{ miles}}{2 \text{ hours}}$$

Unit Rate:

a rate that is simplified so that it has a denominator of 1 unit

$$\frac{120 \text{ miles}}{2 \text{ hours}} = \frac{60 \text{ miles}}{1 \text{ hours}}$$ 60 mph

Class Notes

Complex Fractions:

Fractions with a numerator, denominator, or both that are also fractions

Simplify $\dfrac{\frac{1}{4}}{\frac{2}{1}}$

$$\frac{\frac{1}{4}}{\frac{2}{1}} = \frac{1}{4} \cdot \frac{1}{2} = \frac{\frac{1}{8}}{1} = \frac{1}{8}$$

Josiah can jog $1\frac{1}{3}$ miles in $\frac{1}{4}$ hour. Find his average speed in miles per hour.

$$\frac{1\frac{1}{3}\text{ mi} \cdot \frac{4}{1}}{\frac{1}{4}\text{ hr} \cdot \frac{4}{1}} = \frac{\frac{4}{3} \cdot \frac{4}{1}\text{ mi}}{1\text{ hr}} = \frac{\frac{16}{3}\text{ mi}}{1\text{ hr}}$$

$$5\tfrac{1}{3}\text{ mph}$$

Class Notes

Dimensional Analysis:

using conversion factors to move from one unit of measurement to a different unit of measurement

A swordfish can swim at a rate of 60 miles per hour. How many feet per hour is this?

$$\frac{60\text{mi}}{1\text{hr}} \cdot \frac{5280\text{ft}}{1\text{mi}} = \frac{316{,}800\text{ft}}{1\text{hr}}$$

26 cm/s = ____ m/min

$$\frac{26\text{cm}}{1\text{s}} \cdot \frac{1\text{ m}}{100\text{cm}} = \frac{26\text{m}}{100\text{s}}$$

$$\frac{26\text{m}}{100\text{s}} \cdot \frac{60\text{s}}{1\text{min}} = \frac{1560\text{m}}{100\text{min}}$$

$$\frac{15.6\text{m}}{1\text{min}}$$

Class Notes 1-8

Proportional:

two quantities are proportional if they have a constant ratio or unit rate

Non-Proportional:

relationships in which the ratio is not constant

Andrew earns $18 per hour for mowing lawns. Is the amount of money he earns proportional to the number of hours he spends mowing? Explain.

	1	2	3	4
Earnings ($)	18	36	54	72
Time (h)	1	2	3	4

Ratio 1: $\frac{18}{1}$

Ratio 2 ✓ $\frac{36 \div 2}{2 \div 2} = \frac{18}{1}$

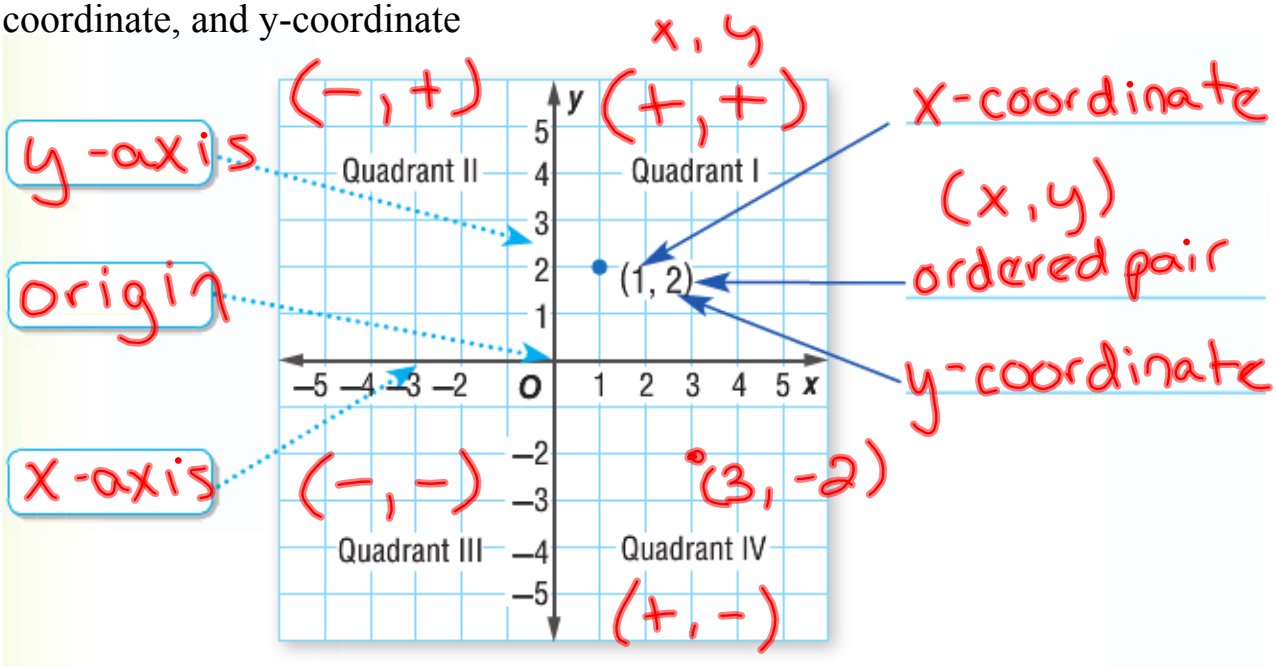
Ratio 3: ✓ $\frac{54 \div 3}{3 \div 3} = \frac{18}{1}$

Ratio 4: ✓ $\frac{72 \div 4}{4 \div 4} = \frac{18}{1}$

* All the ratios from the table simplify to 18:1 so it is proportional

Class Notes: Graphing Proportional Relationships

Label the Coordinate Plane with: y-axis, x-axis, origin, ordered pair, x-coordinate, and y-coordinate



Graph the points (2,3) and (-2, -3)

We can tell if a relationship on a graph is proportional if it:

1. It forms a straight line (linear)
2. It passes through the origin

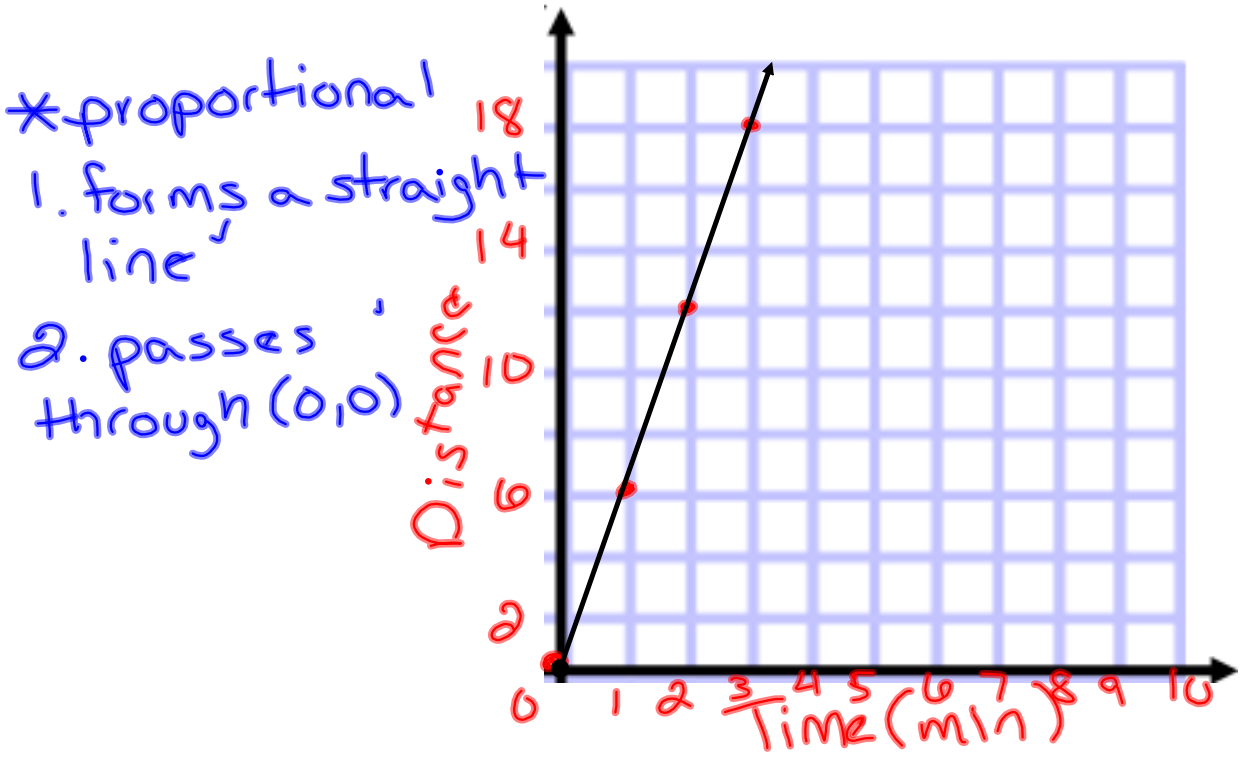
Example:

The slowest mammal on Earth is the tree sloth. It moves at a speed of 6 feet per minute. Determine whether the number of feet the sloth moves is proportional to the number of minutes it moves by graphing on the coordinate plane. Explain your reasoning.

Step 1: Make a table

Time (minutes)	0	1	2	3
Distance (Ft)	0	6	12	18

Step 2: Graph the Ordered Pairs



Class Notes:

Proportion:

an equation stating that two ratios or rates are equivalent

$\frac{6}{8} = \frac{3}{4}$ $\qquad$ $\frac{a}{b} = \frac{c}{d}$

$6 \cdot 4 = 8 \cdot 3$

$24 = 24$ $\qquad$ $ad = bc$

Cross Products:

the products of ad and bc

Proportion:

an equation stating that two ratios or rates are equivalent

Solving Proportions

$\frac{x}{4} = \frac{9}{10}$

$4 \cdot 9 = 10x$

$\frac{45}{10} = \frac{10x}{10}$

$x = 4.5$

a. $\frac{2}{34} = \frac{5}{y}$

$2y = 34 \cdot 5$

$\frac{2y}{2} = \frac{170}{2}$

$y = 85$

b. $\frac{7}{3} = \frac{n}{21}$ (×7 / ÷7)

$n = 7 \cdot 7 = 49$

Class Notes:

Rate of change:

a rate that describes how one quantity changes in relation to another

Constant Rate of Change:

the rate of change in a linear relationship

The table shows the amount of money a booster club makes washing cars for a fundraiser. Use the information to find the constant rate of change in dollars per car.

Cars Washed	
Number	Money ($)
5	40
10	80
15	120
20	160

+5 +40
+5 +40
+5 +40

Unit Rate:

$$\frac{\text{change in money}}{\text{change in \# of cars}} = \frac{\$40 \div 5}{5 \text{ cars} \div 5} = \frac{\$8}{1 \text{ car}}$$

The number of $ increases by 8 for each car washed