Graduationg class of 2020!

Chapter 8:
Proportional Reasoning

8.1 Comparing and Interpreting Rates

Learning targets:

1. Demonstrate understanding of new terminology pertaining to rates.
2. Convert quantities from one unit of measurement to a different unit of measurement.
3. Calculate unit rates and fuel efficiency.
4. Compare unit rates to find the better deal.

Terminology

Rate: a comparison of two amounts that are measured in different units.

Ex. Keying 240 words/8 minutes

Unit Rate: a rate in which the numerical value of the second term is 1.

Ex. Keying 240 words in 8 minutes would have a unit rate of 30 words/min.

Units of Measurement:

Liquid volume:

mL = millilitres	L = litres

Mass:

mg = milligrams	g = grams	kg = kilograms
lb = pounds		

Length:

mm = millimetres	cm = centimetres	m = metres
km = kilometres		

Time:

h = hours	min = minutes	s = seconds

Unit Conversions:

Liquid volume:

1 L = 1000 mL

Mass:

1 kg = 1000 g 1 g = 1000 mg

1 kg = 2.2 lb *(approx)*

Length:

1 m = 1000 mm 1 m = 100 cm 1 km = 1000 m

1 mile = 1.6 km *(approx)*

Time:

1 h = 60 min 1 min = 60 s 1 h = 3600 s

Example #1: Finding a unit rate

A 12-pound turkey costs $22.50. What is the unit rate to the nearest penny?

$\frac{\$22.50}{12 \text{ pound}} = \$1.88/\text{lb}$

You Try:

Ian is training to run a half-marathon, which is about 21.1 km. He can run this distance in 2.2 h. What is his speed in kilometres per hour? Answer to the nearest tenth.

$$\frac{21.1\ \text{km}}{2.2\ \text{h}} = 9.6\ \frac{\text{km}}{\text{h}}$$

$$9.6\ \frac{\text{km}}{\text{hr}}\ \frac{1000\ \text{m}}{1\ \text{km}}\ \frac{1\ \text{hr}}{3600\ \text{s}} = 2.7\ \text{m/s}$$

Example #2: Comparing unit rates

Orange juice is sold in 1.5 L cartons and 250 mL boxes.

A 1.5 L carton sells for $3.75 and ten 250 mL boxes sell for $7.39.

Which size costs less per millilitre?

$\frac{1.5\text{ L}}{}$

$1.5\text{ L} = 1500\text{ mL}$

$\frac{\$3.75}{1500\text{ mL}} = 0.0025/\text{mL}$

Cost less

$(250\text{ mL})(10)$

$= 2500\text{ mL}$

$\frac{\$7.39}{2500}$

$= 0.002956/\text{mL}$

Example #3: Fuel efficiency

Fuel efficiency in Canada is reported in **L/100 km**

(how many litres it takes to travel 100 km)

The **lower** the top number, the better fuel efficiency the vehicle has.

Jasmine drove for 510 km and used 46.7 L of gas. What is her car's fuel efficiency to the nearest hundredth? L/100km

$$\frac{46.7\text{ L}}{510\text{ km}} = \frac{x}{100\text{ km}}$$

$$x = 9.16$$

$$\frac{(510\text{ km})x}{510\text{ km}} = \frac{(46.7\text{ L})(100\text{ km})}{510\text{ km}}$$

You Try:

Jake's car will get 875 km using 55.3 L of gas.

Amanda's car will get 515 km using 33.7 L of gas.

Whose car has better fuel efficiency?

Jakes *

$\frac{55.3\,L}{875\,km} = \frac{x}{100\,km}$

$x = 6.32\,L / 100\,km$

$\frac{33.7\,L}{515\,km} = \frac{x}{100\,km}$

$x = 6.54\,L / 100\,km$

Example #4: Comparing unit rates involving unit conversions

A 5 kg bag of potatoes costs $8.15. A 10 lb bag of potatoes costs $7.10.
Which is a better buy for the consumer?

$$(5\,\text{kg})\left(\frac{2.2\,\text{lbs}}{1\,\text{kg}}\right) = 11\,\text{lbs}$$

$$\frac{\$8.15}{11\,\text{lbs}} = 0.74/\text{lb}$$

$$\frac{\$7.10}{10\,\text{lbs}} = 0.71/\text{lbs}$$

You Try:

A peregrine falcon can fly at a top speed of 16 km in 3 min. A cheetah can run at a top speed of 112 km/h.

Which animal can travel faster?

Assignment

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