

Lesson 1.8 Rates Ratios & Proportions

Obj: Write and use ratios, rates and unit rates.

Write and solve proportions.

Vocab: ratio - a comparison of two quantities by division.

rate - ratio of two quantities with different units $\frac{24 \text{ miles}}{3 \text{ gallons}}$

unit rate - a rate where the second ~~rate~~ is 1 unit 12 mi/gal

proportion - a statement that two ratios are equal $\frac{1}{2} = \frac{2}{4}$

Dimensional analysis - process that uses rates to convert measurement from one unit to another.

conversion factor - rate two quantities are equal but use different units (like $\frac{12 \text{ in}}{1 \text{ ft}}$)

Cross-product - $\frac{a}{b} = \frac{c}{d} \Rightarrow a \cdot d = b \cdot c$

in a proportion, cross products are equal $\frac{2}{3} = \frac{4}{6}$

$$2 \cdot 6 = 4 \cdot 3$$

1.8 Rates, ratios, Proportions

Scale - ratio between 2 sets of measurements such as 1in = 5mi

Scale drawing or scale model - uses a scale to represent an object as smaller or larger than the actual object. (like a map.)

video 1

ratio of faculty to students

$$1 : 12 \quad \frac{1}{12} \leftarrow \text{faculty}$$
$$\frac{1}{12} \leftarrow \text{student}$$

There are 1440 students, how many faculty?

Set up proportion $\frac{1}{12} = \frac{F}{1440}$ ← F is #Faculty

one is to 12 as

Now solve for F

multiply both sides by 1440 to isolate F.

$$1440 \cdot \left(\frac{1}{12}\right) = \left(\frac{F}{1440}\right) \cdot 1440$$

$$120 = F$$

faculty.

18.

Video 2 8.5 pounds of compost starter for \$15. What is the unit rate.

Use ratios to
Setup proportion

$$\frac{P}{1} = \frac{15}{8.5}$$

$$\text{Price per one pound} = \frac{\$15}{8.5 \text{ lbs.}}$$

$$\text{Solve - } P = \frac{15}{8.5} = \$1.76 \text{ (dollars per pound)}$$

Video 3. Converting Rates

As you go deeper, earth's temp increases.

Some spots 20°C per km

What is the rate in degrees per meter

$$\text{express rate as a ratio} \Rightarrow \left(\frac{20^\circ\text{C}}{1\text{km}} \right) \cdot \left(\frac{1\text{km}}{1000\text{m}} \right) = \frac{20^\circ\text{C}}{1000\text{m}}$$

$$= \frac{1}{50} ^\circ\text{C/m} = 0.02^\circ\text{C/m}$$

Convert one unit rate to another.