

Math 365 Lecture Notes Section 5.4 – Proportional Reasoning

★ Ratios

Definition:

- 1) ratio –

- 2) part-to-part comparisons –

- 3) part-to-whole comparisons –

- 4) whole-to-part comparisons –

- 5) proportional – Two ratios are proportional if, and only if, the fractions representing them are equal.

Examples of ratios in everyday life.

- 1) The following was found in an excerpt from the American Diabetes website:
“In general, if you have type 2 diabetes, the risk of your child getting diabetes is 1 in 7 if you were diagnosed before age 50 and 1 in 13 if you were diagnosed after age 50.” (<http://www.diabetes.org/genetics.jsp>)

Example: The table below shows the grades distribution for a math 365 exam.

Grade	A	B	C	D	F
# students	21	17	20	10	5

- a) What does the ratio 21:17 represent?

- b) What does the ratio 5/68 represent?

- c) Find the ratio of the number of students who passed the exam to the number of students who took the exam.

★ Proportions

For a certain shade of green paint, the ratio of yellow paint to blue paint is 2 pints to 3 pints. Use this information to fill in the different amounts of yellow and blue paint so the same shade of green paint is obtained.

pints of yellow paint	pints of blue paint	pints of green paint
4		
	12	
		30
1		

There are three ways to determine if two ratios, $\frac{a}{b}$ and $\frac{c}{d}$, are equal.

- 1) scaling strategy – Which is a better buy: 12 tickets for \$15.00 or 20 tickets for \$23.00?
- 2) unit-rate strategy – Which is a better buy: 12 tickets for \$15.00 or 20 tickets for \$23.00?
- 3) cross products – Which is a better buy: 12 tickets for \$15.00 or 20 tickets for \$23.00?

CAUTION: Be sure your units for the ratios are the same when setting up the proportion.

Example: A candle is 30 inches long. After burning for 12 minutes, the candle is 1 foot long. How long will it take for the whole candle to burn at the same rate?

Example: In a photograph of a father and his daughter, the daughter's height is 2.3 cm and the father's height is 5.8 cm. If the father and daughter's combined actual height is 526.5 cm,

a) how tall is the father?

b) Set up the three proportions that would solve this problem.

