M9

# **Equivalent Ratios**

6.1 and 6.2

- A ratio describes the relationship between different amounts. A ratio can describe the relationship between two (or more) parts of a group = part-to-part ratio, or between one part and the whole group = part-to-whole ratio.
- A ratio can be described as a sentence, expression, or a fraction

Example 1a): There are 5 puppies, 3 kittens, 2 bunnies and 20 fish in a pet store.

To describe the relationship between bunnies and puppies we can write a sentence: The ratio of bunnies to puppies is 2 to 5. OR The ratio of puppies to bunnies is 5 to 2.

We can write an expression:  $2 \cdot 5$  OR  $5 \cdot 2$ We can write a fraction: C OR C

- It is very important to write the numbers in the same orders as the words.
- It is necessary to reduce the ratio to its lowest terms.

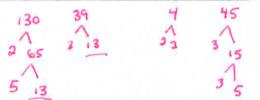
### Ratios in the Simplest Form

- > Find the GCF (= the greatest common factor) for all parts of the ratio.
- Divide each part of the ratio by the GCF.

Evample: Evaross each ratio in its simplest form

3: 24	15: 40	130:39	4: 45
1:8	3:8	10:3	4:45

15 113



# **Equivalent Ratios**

- Multiply each part of the ratio by the same natural number (= positive integer).
- > Or divide each part of the ratio by a factor that is common to every part of the ratio.

Example 1: Determine three other ratios that are equivalent to the given ratio.

3:4	6:8	9:12	30:40
5: 10	10:20	15:3∅	50:100
1:3	2:6	3:9	10:30
7:9	14:18	21: 27	70: 90

### Example 2: Fill in the missing information that ensures that all ratios in a row are equivalent.

3:7	6: <u>14</u>	15: <u>35</u>	;21
_5_:3	25: <u>    5</u>	50:30	10:
1:3	25: <u>75</u>	:9	: 24

## **Problem Solving with Ratios**

Examples:

1. There are 120 seeds in a packet. The ratio of fireweed to lupine is 5:3. How many lupine seeds are in the packet?

1. 5:3 -> Total number of parts (5+3=8)

- 2. 120 " Total = 15 -> 1 part is 15 seeds
- 3 Lupine has 3 parts => 3 x 15 = 45 Seeds

.. There are 45 Seeds in the Packets

2. There are 3000 seats in the stadium. The ratio of local fans to out-of-town fans is 13:2. How many guests are present at the game if the stadium is sold out. What assumptions do you make?

13:2 -> Total parts (13+2= 15)

- 2 3000 -> Total Seats = 200 => 200 Seats per part
- 3) number of quests: 2 x 200 = 400

.. There are 400 quests at the Stadium

Assumption: because the game is Soldout, I assume every person who Purchased went to the game.

#### **Unit Ratios**

- A unit ratio has the second part equal to 1.
- o To convert a ratio to unit ratio, divide both parts in the ratio by the second number.

Example: Express each ratio as a unit ratio.

<sup>2</sup> 3: 24 ≠ <sup>24</sup>	15:5	10:2	5:3
8:1	3:1	5:1	1.6:1

#### **Part-to-Whole Ratios**

 When the second number in a ratio represents the size of the entire group we can represent the ratio as a percent. A percent is a special type of a part-to-whole ratio when the second part is represented by a hundred.

Example:

a) There are 2 puppies for every 5 pets in a store:

Puppies: all pets = 2:5 =  $\frac{2}{5}$  and as a percent:  $\frac{2 \cdot 20}{5 \cdot 100} = \frac{40}{100} = \frac{40}{100}$ 

b) There are 4 containers of strawberry yogurt, 1 container of vanilla yogurt, and 5 containers of mixed-berry yogurt in the fridge. What is the ratio of strawberry yogurt to all yogurt in the fridge? Express this ratio as a fraction, expression, and a percent.

4:10, 40% -> reduced = 2:5, \frac{2}{5}, 40%.

#### **Three-Part Ratios**

- Three-part and multiple-part ratios cannot be expressed as a fraction.
- Three-part and multiple-part ratios can be expressed in their simplest form by dividing by the GCF of every part.
- o Three-part and multiple-part ratios are not usually expressed as unit ratios.