# 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: _____ OR _____

We can write a fraction: _____ OR _____

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

1b) Use a fraction to express the ratio of fish to bunnies: _____

1c) Use an expression to write the ratio of kittens to all pets: _____

**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.

Example: Express each ratio in its simplest form.

| $3:24$ | $15:40$ | $130:39$ | $4:45$ |
|---|---|---|---|
| | | | |

## 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.

| $3:4$ | | | |
|---|---|---|---|
| $5:10$ | | | |
| $1:3$ | | | |
| $7:9$ | | | |

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

| $3:7$ | $6:$ _____ | $15:$ _____ | _____ $:21$ |
|---|---|---|---|
| _____ $:3$ | $25:$ _____ | $50:30$ | $10:$ _____ |
| $1:3$ | $25:$ _____ | _____ $:9$ | _____ $:24$ |

## 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?

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?

## Unit Ratios

- o 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.

| $3:24$ | $15:5$ | $10:2$ | $5:3$ |
|--------|--------|--------|-------|
|        |        |        |       |

## Part-to-Whole Ratios

- o 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: _____ =_____

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.

## Three-Part Ratios

- o Three-part and multiple-part ratios cannot be expressed as a fraction.
- o 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.