Making Sense of Ratios

In this activity, you will represent ratios in different ways.

HABITS OF MIND

- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

The Lanterton Middle School is adopting a new nickname. They have narrowed their search to the following two names: **Tigers** or **Lions**. To choose a nickname, they conducted a school-wide survey and tallied all the votes.

Each homeroom analyzed the results of the school-wide survey and reported the results in a different way.

School-Wide Survey Results

Homeroom 6A The votes for Tigers outnumbered the votes for Lions by a ratio of 240 to 160.	**Homeroom 6B** There were 80 more votes for Tigers than Lions.
Homeroom 7A The votes for Tigers outnumbered votes for Lions by a ratio of 3 to 2.	**Homeroom 7B** 3 out of 5 votes were for Tigers.

1 Describe the meaning of each statement. Then identify which describe ratios, and if so, whether the ratios are part-to-part or part-to-whole ratios.

6A: For every 240 students who prefer Tigers, 160 prefer Lions
part-to-part

6B: Only tells information about how many more Tiger votes
not a ratio

7A: For every 3 students who prefer Tigers; 2 prefer Lions
par-to-part

7B: For every 5 students who voted, 3 voted for Tigers
par-to-whole

WORKED EXAMPLE

Let's consider the results reported by Homeroom 7A: "The votes for Tigers outnumbered votes for Lions by a ratio of 3 to 2."

This comparison is an example of a part-to-part ratio expressed in words. There are two other ways you can express this part-to-part ratio.

With a Colon	In Fractional Form
3 votes for Tigers: 2 votes for Lions	$\frac{\text{3 votes for Tigers}}{\text{2 votes for Lions}}$

TAKE NOTE...

Fractional form simply means writing the relationship in the form $\frac{a}{b}$. Just because a ratio looks like a fraction does not mean it represents a part-to-whole comparison.

Next, let's consider the results of the student vote as reported by Homeroom 7B: "3 out of 5 votes were for Tigers."

2 Complete the part-to-part and part-to-whole ratios written in words. Then write each ratio with a colon and in fractional form. **Label all quantities.**

Part-to-Part Ratio

In Words	With a Colon	In Fractional Form
3 votes for Tigers for every 2 votes for Lions.	3 votes Tigers : 2 votes Lions	$\frac{\text{3 votes Tigers}}{\text{2 votes Lions}}$
2 votes for Lions for every 3 votes for Tigers.	2 votes Lions : 3 votes Tigers	$\frac{\text{2 votes Lions}}{\text{3 votes Tigers}}$

Part-to-Whole Ratio

In Words	With a Colon	In Fractional Form
3 out of 5 votes were for Tigers.	3 votes Tigers : 5 total votes	$\frac{\text{3 votes Tigers}}{\text{5 total votes}}$
2 out of 5 votes were for Lions.	2 votes Lions : 5 total votes	$\frac{\text{2 votes Lions}}{\text{5 total votes}}$

Special Types of Ratios

HABITS OF MIND
- Attend to precision.

› Consider each statement.

- There is an 80 percent chance of rain tomorrow.
- Diego always gives 110%.
- Your battery is 50% charged.
- Joe received a 90% on a 10-question quiz.

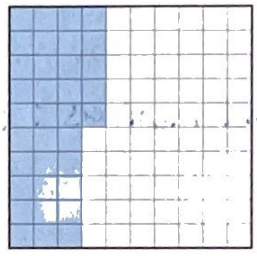
Each situation describes a special type of ratio called a *percent*. A **percent** is a part-to-whole ratio where the whole is equal to 100.

- Percent is another name for hundredths.
- The percent symbol "%" means "per 100," or "out of 100."

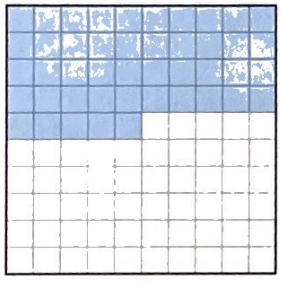
WORKED EXAMPLE

35% means 35 out of 100.

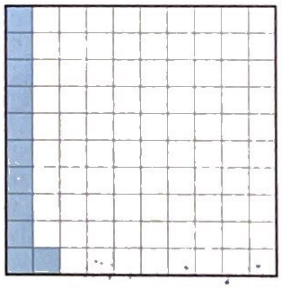
You can shade 35 of the 100 squares on the hundredths grid to represent 35%.



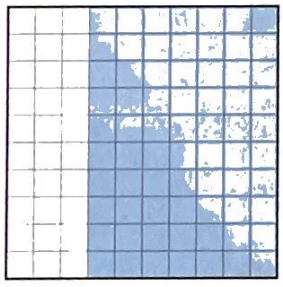
› Write a fraction and a percent to represent the shaded part of each grid. Each hundredths grid represents a whole.

1. 

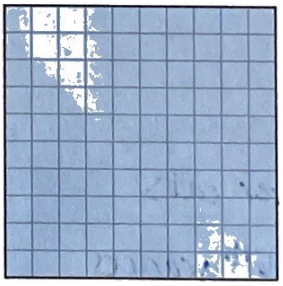
$\frac{45}{100}$; 45%

2. 

$\frac{11}{100}$; 11%

3. 

$\frac{70}{100}$; 70%

4. 

$\frac{100}{100}$; 100%

Writing and Classifying Ratios

There are several ways to compare two quantities and write ratios.

	Ratios	
With a Colon	part : part	part : whole
In Fractional form	$\frac{\text{part}}{\text{part}}$	$\underbrace{\frac{\text{part}}{\text{whole}}}_{\text{Fraction}}$

1 Consider the statement: There are *n* sixth grade band members and *t* total sixth graders.

(a) Write a part-to-whole ratio using colon notation.

n 6th grade band members : t total ~~been~~ sixth graders

(b) Write a part-to-part ratio using colon notation.

n 6th grade band members : (t-n) 6th graders not in band

2 A survey of sixth graders with pets revealed that *c* students prefer cats and *d* students prefer dogs.

(a) How would you compare these two statements using part-to-part ratios?

$$\frac{c \text{ prefer cats}}{d \text{ prefer dogs}}$$

(b) How would you compare these two statements using part-to-whole ratios?

$$\frac{c \text{ prefer cats}}{(c+d) \text{ 6th graders}}$$