Name: _____ Date: _____

Student Exploration: Part-to-part and Part-to-whole Ratios

Vocabulary: decimal, equivalent, fraction, percent, proportion, ratio

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
One out of every 4 students in a club is a girl. There are 20 students in the club.
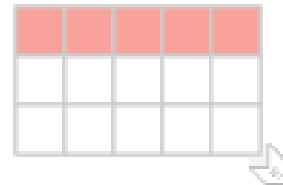
1. How many girls are in the club? _____ Explain how you know. _____

   _____

2. How many boys are in the club? _____ Explain how you know. _____

   _____

Gizmo Warm-up
A **ratio** is a comparison between two things by division. There are three main ways to express ratios – as **fractions**, as **decimals**, and as **percents**. In the *Part-to-part and Part-to-whole Ratios* Gizmo, you can model ratios by shading an area model.

The grid in the Gizmo can be adjusted to contain from 1 to 300 squares by dragging the handle at the bottom-right corner. Each square can be shaded or unshaded by clicking in it. You can also click and drag to shade multiple squares.

1. In the Gizmo, select **Show part:part ratios**. Create a grid that is 5 squares wide and 3 squares tall. Shade 5 squares, as shown above.

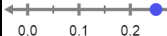   A. How many shaded squares are there? _____

   B. How many unshaded squares are there? _____

   C. How many total squares are there? _____

2. Each row of the table in the Gizmo shows **equivalent** (equal) ratios. Look at the **shaded:unshaded** row. Fill in the equation to show the four equivalent numbers in that row.

$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \underline{\hspace{2cm}} = \underline{\hspace{2cm}}\%$$

Activity A: **Using ratios**	<u>Get the Gizmo ready</u>: • Click **Clear**. • Select **Show part:whole ratios**.	shaded : total unshaded : total 0.0 0.1 0.2

1. One out of every 4 students in a club with 20 members is a girl. To model the club, create a grid with 20 squares and shade 5 squares.

    A. What do the 20 squares in the grid represent? _____

    B. What do the 5 shaded squares represent? _____

    C. How many squares are unshaded? _____   What do they represent? _____

2. The table in the Gizmo shows two different ratios – **shaded:total** and **unshaded:total**. Fill in the table below to show the four equivalent numbers modeled by each ratio.

	Fraction	Simplified fraction	Decimal	Percent
shaded:total				
unshaded:total				

3. Each ratio in the table can be described in terms of girls, boys, and total members.

    A. Fill in the blanks with girls, boys, or total members to describe the **shaded:total** and **unshaded: total** ratios.

    shaded:total _____ : _____

    unshaded:total _____ : _____

    B. The first fraction shown in each row is unsimplified and the second is simplified. What does the unsimplified fraction tell you that the simplified fraction does not?

    _____

    _____

    C. Can either of these ratios ever be greater than 1? _____   Explain. _____

    _____

    _____

(Activity A continued on next page)

Activity A (continued from previous page)

4. Five more girls join the club. There are now 25 members and 10 girls. Model the new club membership in the Gizmo. Select **Show part:part ratios**. Fill in the table below to show the four equivalent numbers modeled by each ratio.

	Fraction	Simplified fraction	Decimal	Percent
shaded:unshaded				
unshaded:shaded				

5. Each ratio in the table above can be described in terms of girls, boys, and total members.

   A. Fill in the blanks with words to describe the **shaded:unshaded** ratio.

   _____ : _____

   B. How does the **shaded:unshaded** ratio compare to 1? _____

   What does this tell you? _____

   C. Fill in the blanks with words to describe the **unshaded:shaded** ratio.

   _____ : _____

   D. How does the **unshaded:shaded** ratio compare to 1? _____

   What does this tell you? _____

6. Try to figure out how many boys and girls are in each club. Then check your answers in the Gizmo. (Note: The last one cannot be modeled in the Gizmo.)

   A. Total students = 100; boys:total students = $\frac{1}{4}$ boys = _____   girls = _____
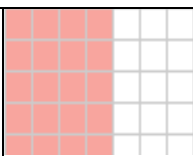
   B. Total students = 27; girls:total students = 2:3   boys = _____   girls = _____

   C. Total students = 12; boys:girls = 1:1   boys = _____   girls = _____

   D. Total students = 16; girls:boys = $\frac{3}{1}$ boys = _____   girls = _____

   E. Total students = 350; boys:total students = $\frac{4}{5}$ boys = _____   girls = _____

Activity B:	Get the Gizmo ready:	
Proportions	• Click **Clear**.	

1. There are 15 girls and 10 boys in a club. Use the Gizmo to model this club.

   A. How many total squares did you use? _____

   B. How many squares did you shade? _____

   C. How many squares are unshaded? _____

2. Select **Show part:whole ratios**. Each equation shown in the **Fraction** column shows two equivalent ratios and is called a **proportion**.

   A. Write a proportion that describes the girls:total students ratio. $\dfrac{\boxed{}}{\boxed{}} = \dfrac{\boxed{}}{\boxed{}}$

   B. The simplified fraction tells us that there are 3 girls for every 5 students. How many

   boys are there for every 5 students? _____ How do you know? _____

   _____

   C. Suppose the club is split into groups of 5. The girls:boys ratio for each group is the same as it is for the entire club. How many girls and boys are in each group?

   girls = _____ boys = _____

3. Another club has the same girls:total students ratio. There are 15 students in this club.

   A. You can find the number of girls in this club by using this proportion: $\dfrac{3}{5} = \dfrac{?}{15}$.

   What is the missing number? _____ How did you find it? _____

   _____

   B. Write a proportion you can use to find the number of boys. $\dfrac{\boxed{}}{\boxed{}} = \dfrac{\boxed{}}{\boxed{}}$

   C. How many boys are in the club? _____ Check your answer in the Gizmo.

(Activity B continued on next page)

Activity B (continued from previous page)

4. Two other clubs have a girls:total students ratio of 3:5. One club is smaller than the club in question 3 and one is larger.

    A. What is a possible total member count for the smaller club? _____

    B. How many girls and boys are in the smaller club?   boys = _____   girls = _____

       Check your answer in the Gizmo. Then explain how you found your answer. _____

       _____

    C. What is a possible total member count for the larger club? _____

    D. How many girls and boys are in the larger club?   boys = _____   girls = _____

       Check your answer in the Gizmo. Then explain how you found your answer. _____

       _____

5. Two new clubs are formed. The ratio of boys:girls for both clubs is 3:7. Answer the questions below on your own first. Then check your answers in the Gizmo.

    A. One club has more than 20 students total. How many boys and girls could this club

       have? (There is more than one possible answer.)   boys = _____   girls = _____

    B. The other club is larger than the club in part A. How many boys and girls could this

       club have?   boys = _____   girls = _____

6. Write a proportion for each question, using a question mark in place of the missing number. Use the proportion to find the missing number. Then check your answers in the Gizmo. (Note: The last one cannot be modeled in the Gizmo.)

    A. girls:total students= 3:7, girls = 12, boys = _____

$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

    B. boys:total students = 2:9, girls = 21, boys = _____

$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$

    C. girls:boys = 2:3, boys = 225, total students = _____

$$\frac{\boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}}$$