

## Indicator 5 Class Notes by Mrs. Joshi

### Ratios

1. Use appropriate notations [ $a/b$ ,  $a$  to  $b$ ,  $a:b$ ] to represent a proportional relationship between quantities and use ratio language to describe the relationship between quantities.

#### **Key Idea**

##### Ratio

**Words** A **ratio** is a comparison of two quantities using division.

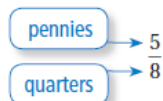
**Numbers** A ratio of 2 red crayons to 5 blue crayons can be written in three ways.

$$\frac{2}{5}, 2 \text{ to } 5, \text{ or } 2:5$$



#### **EXAMPLE 1** Writing a Ratio

Write the ratio of pennies to quarters in three ways.



∴ The ratio of pennies to quarters is  $\frac{5}{8}$ , 5 to 8, or 5:8.

#### **EXAMPLE 2** Writing and Simplifying Ratios

a. Write the ratio of boys to girls at Oak Grove.

Oak Grove Middle School	
Boys	Girls
600	540

boys  $\rightarrow 600$   
girls  $\rightarrow 540$

Write in simplest form.

∴ The ratio of boys to girls is  $\frac{10}{9}$ .

b. Write the ratio of girls to the total number of students at Oak Grove.

girls  $\rightarrow 540$   
total number of students  $\rightarrow 1140$

Write in simplest form.

∴ The ratio of girls to the total number of students is  $\frac{9}{19}$ .

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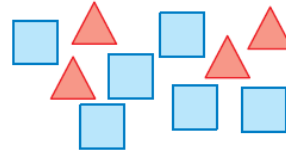
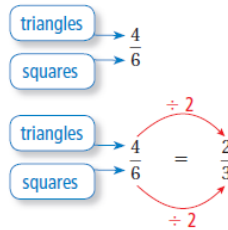
Two ratios that describe the same relationship are **equivalent ratios**.

### EXAMPLE 3 Writing Equivalent Ratios

Write two equivalent ratios for triangles to squares.

#### Reading

The ratio  $\frac{2}{3}$  means that for every 2 triangles, there are 3 squares.



∴ Two equivalent ratios are  $\frac{4}{6}$  and  $\frac{2}{3}$ .

### EXAMPLE 4 Comparing Ratios

You answer 24 out of 30 questions correctly on a quiz. Your friend answers 35 out of 40 questions correctly on a different quiz. Who has the better score?

You:  $\frac{\text{number correct}}{\text{number of questions}} = \frac{24}{30} = \frac{4}{5}$

Write in simplest form.

Your friend:  $\frac{\text{number correct}}{\text{number of questions}} = \frac{35}{40} = \frac{7}{8}$

Write in simplest form.

Use percents to compare the scores.

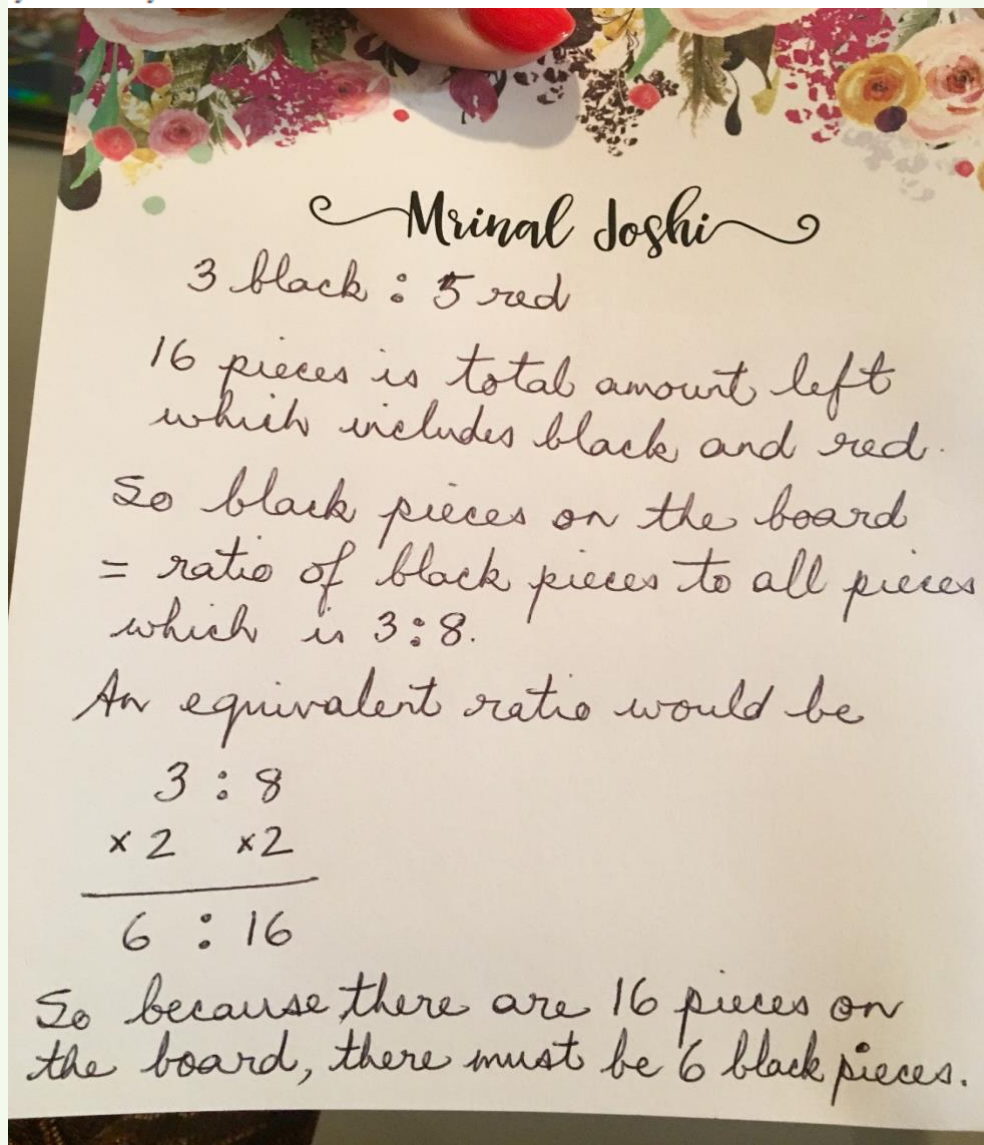
You:  $\frac{4}{5} = 0.8 = 80\%$

Your friend:  $\frac{7}{8} = 0.875 = 87.5\%$

∴ Your friend has the better score.

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**CHECKERS** During a checkers game, there are 16 pieces left. The ratio of black to red is 3 : 5. How many black pieces are on the board? Explain how you found your answer.

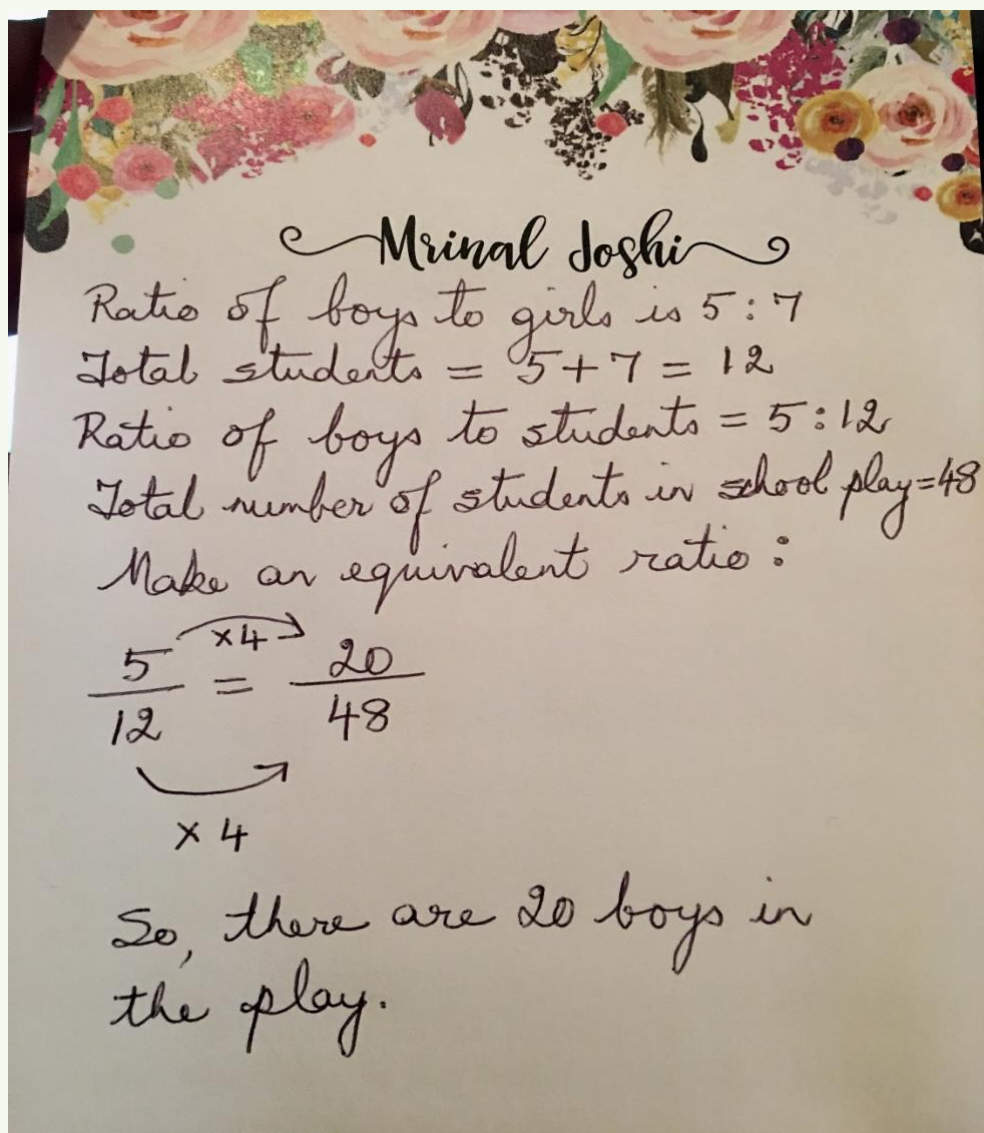


Using the 3 : 5 ratio of black pieces to red pieces, you could write the ratio of black pieces to all pieces as 3 : 8. An equivalent ratio is 6 : 16. So, because there are 16 pieces on the board, there must be 6 black pieces.



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**SCHOOL PLAY** There are 48 students in a school play. The ratio of boys to girls is 5 : 7. How many boys are in the school play? Explain how you found your answer.



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Ratio of boys to girls is 5 : 7  
Total students =  $5 + 7 = 12$   
Ratio of boys to students = 5 : 12  
Total number of students in school play = 48  
Make an equivalent ratio :  
 $\frac{5}{12} = \frac{20}{48}$   
 $\times 4$

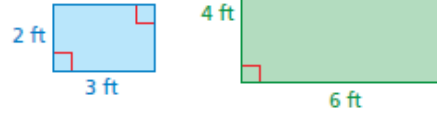
So, there are 20 boys in the play.

Using the 5 : 7 ratio of boys to girls, the ratio of boys to students is 5 : 12. An equivalent ratio is 20 : 48. So, there are 20 boys in the play.

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**GEOMETRY** Use the blue and green rectangles.

- a. Find the ratio of the length of the blue rectangle to the length of the green rectangle. Repeat this for width, perimeter, and area.



- b. Compare and contrast your ratios in part (a).

a. Length ratio:  $\frac{\text{blue}}{\text{green}} = \frac{3}{6} = \frac{1}{2}$

Width ratio:  $\frac{\text{blue}}{\text{green}} = \frac{2}{4} = \frac{1}{2}$

Perimeter ratio:

$$\frac{\text{blue}}{\text{green}} = \frac{2\ell + 2w}{2\ell + 2w} = \frac{6 + 4}{12 + 8} = \frac{10}{20} = \frac{1}{2}$$

$$\text{Area ratio: } \frac{\text{blue}}{\text{green}} = \frac{\ell w}{\ell w} = \frac{3 \cdot 2}{6 \cdot 4} = \frac{6}{24} = \frac{1}{4}$$

- b. The ratios for length, width, and perimeter are  $\frac{1}{2}$ .

The ratio for area is the square of this ratio, or  $\frac{1}{4}$ .