**Grade 6 Math
Unit 8: Ratios and Percentages**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 1: Expressing ratios in numbers and words**

As you learned in the previous unit, the same expression can be represented in a variety of different ways. For example, the decimal .50 can be expressed as $\frac{5}{10}$. Ratios are yet another way to express numbers. Ratios are used to compare the relationship between two numbers.

The fraction $\frac{2}{3}$ can be written as 2:3 which should be read as “two to three” or “2 \_\_\_\_\_\_\_ for every 3 \_\_\_\_\_\_\_.”

In the example below, the ratio of bees to butterflies is 2:5 (for every two bees, there are five butterflies). You could make many other comparisons using ratios. For example, the ratio of butterflies to bees (5:2) or the ratio of bees to insects (2:7).



1A) What is the ratio of Marios to Luigis?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1B) What is the ratio of Luigis to Marios?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1C) What is the ratio of Super Mario Bros. characters to Luigis?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



2A) What is the ratio of Pikachus to Squirtles?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2B) What is the ratio of Squirtles to Pokemon characters?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2C) What is the ratio of Pikachus to Pokemon characters?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



3A) What is the ratio of Homers to Marges?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3B) What is the ratio of Marges to Homers?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3C) What is the ratio of Homers to Simpsons characters?

In numbers: \_\_\_\_\_\_\_\_\_\_

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



4) Make a drawing to represent the following ratios.

A) 4:2

|  |
| --- |
|  |

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B) 1:3

|  |
| --- |
|  |

In words: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C) Two \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for every three \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |
| --- |
|  |

In numbers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D) Three \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for every five \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |
| --- |
|  |

In numbers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 2: Understanding equivalent ratios**

The information provided by a ratio can be applied to a variety of situations. Imagine a classroom that has a boy to girl ratio of 2:1 (for every two boys, there is one girl). That means if there were three students, two would be boys and one would be a girl. However, this ratio can be used for the entire class. For example, if the class has 30 students, there would be 20 boys and 10 girls, which could be expressed as 20:10. Therefore, 2:1 and 20:10 are equivalent ratios.

Look at the example below. The ratio of dogmen to friendly whales is 3:2.



In this example, the images have been multiplied by 2. Now, there are 6 dogmen and 4 friendly whales, which can be represented as a ratio of 6:4. However, the ratio of 3:2 still applies to this situation.



1) Determine whether or not the following ratios are equivalent to one another. Write “equivalent” or “not equivalent” on the line.

A) 1:2 and 4:5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B) 3:2 and 9:6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C) 2:5 and 20:50 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D) 7:6 and 14:12 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E) 1:5 and 6:30 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) Find the equivalent ratios in the table below and write them in the spaces below.

|  |  |  |  |
| --- | --- | --- | --- |
| 1:3 | 6:5 | 9:12 | 2:5 |
| 10:15 | 5:3 | 3:9 | 4:16 |
| 1:4 | 4:10 | 20:12 | 18:15 |
| 9:2 | 3:4 | 2:3 | 18:4 |

1) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 4) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 6) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 8) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 3: Equivalent ratios and fractions**

Ratios can be expressed as fractions and vice versa. For example, the fraction $\frac{2}{5}$ can be expressed as a ratio of 2:5. Likewise, the ratio 3:2 can be expressed as the fraction $\frac{3}{2}$.

1) Express the following ratios as fractions.

|  |  |
| --- | --- |
| 2:3 |  |
| 5:2 |  |
| 1:6 |  |
| 3:4 |  |
| 7:5 |  |

2) Express the following fractions as ratios.

|  |  |
| --- | --- |
| $$\frac{1}{4}$$ |  |
| $$\frac{3}{5}$$ |  |
| $$\frac{7}{2}$$ |  |
| $$\frac{2}{7}$$ |  |
| $$\frac{11}{5}$$ |  |

3) Give an equivalent ratio and fraction to describe the following groupings.

A)  (ghosts to total images)

Ratio: \_\_\_\_\_\_\_\_\_\_ Fraction: \_\_\_\_\_\_\_\_\_\_

B)  (narwhals to total images)

Ratio: \_\_\_\_\_\_\_\_\_\_ Fraction: \_\_\_\_\_\_\_\_\_\_

C)  (dabs to total images)

Ratio: \_\_\_\_\_\_\_\_\_\_ Fraction: \_\_\_\_\_\_\_\_\_\_

**Lesson 4: Equivalent fractions, ratios, percentages and decimals**

1) Complete the chart below.

|  |  |  |  |
| --- | --- | --- | --- |
| Fraction | Ratio | Percentage | Decimal |
| $$\frac{42}{100}$$ | 42:100 | 42% | .42 |
|  | 13:100 |  |  |
|  |  | 89% |  |
| $$\frac{19}{100}$$ |  |  |  |
|  |  |  | 0.51 |
|  |  | 9% |  |
|  |  |  | 0.9 |
|  | 5:100 |  |  |
| $$\frac{35}{100}$$ |  |  |  |

2) Complete the chart below.

|  |  |  |  |
| --- | --- | --- | --- |
| Fraction | Ratio | Percentage | Decimal |
| $$\frac{42}{100}$$ | 42:100 | 42% | .42 |
|  |  | 56% |  |
|  |  |  | .07 |
|  | 76:100 |  |  |
| $$\frac{125}{100}$$ |  |  |  |
|  |  | 150% |  |
|  | 30:100 |  |  |
| $$\frac{3}{100}$$ |  |  |  |
|  |  | 70% |  |

3) Place the following sets of numbers on the number line.

A)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 31% | $$\frac{75}{100}$$ | 57:100 | .9 | 120:100 |



B)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 85:100 | $$\frac{28}{100}$$ | .05 | 1.3 | 62% |



C)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 8% | $$\frac{140}{100}$$ | 89:100 | .8 | 1:100 |



**Lesson 5: Problem-solving (Bringing it all together)**

1. Logan, Katelyn, Ella and Brandon order a pizza that costs $24 altogether. Each agrees to pay ¼ of the cost. How much will each pay?

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2. Mr. Field and Mr. Power are driving 400km to Gander. Mr. Field drives 70% of the way. How far does he drive?

|  |
| --- |
|  |

3. The girl to boy ratio of the choir is 3:1. If there are 40 students in the choir, how many girls are there?

|  |
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4. Peter is buying a birthday gift for Joseph. The gift costs $38 and his parents agree to pay half. How much will Peter have to pay?

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|  |

5. The school raised $800 for sports equipment. 50% was spent on basketball equipment, 30% was spent on volleyball equipment and 20% was used on badminton equipment. How much money was spent on each sport?

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6) Ms. Tucker’s class is painting wall tiles for an art project. There are 20 tiles altogether. Fill in the tiles below using the information provided.

1:10 are blue.
.4 are red.
20% green.
The rest are yellow.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |
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7) There are 28 students in Mr. Bartlett’s class. 10 of the students are boys and 18 are girls.
Mr. Bartlett says the ratio of boys to girls is 5:9. Is he correct?

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8) The ratio of girls to boys in Ms. Collins’ class is 2:3. If there are 10 girls, how many boys are there?

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|  |