**Lesson 25 Notes: Ratios, Rates, Proportions and Percents**

**Answer Key**

**What is a Rate?**

A comparison of two numbers by division – quantities are the different units

A to B B to A A:B B:A A/B B/A

**Example Rate:** 40 dollars and 5 tickets

5 tickets and 40 dollars

**What is a Ratio?**

A comparison of two numbers by division – quantities are the same unit

**Example of Ratio:** 8 miles and 2 miles

Since a ratio and rate are expressed as a fraction, it can often be reduced.

For example, 120 miles to 2 hours can be reduced to 60 miles to 1 hour

**Example A:** If there are 5 women and 8 men in the math lab, answer the following.

1. What is the ratio of the number of women to men? 5:8 5/8
2. What is the ratio of the number of men to women? 8:5 8/5
3. What is the ratio of the number of men to the total? 8:13 8/13

\* How do we solve proportions in word problems? CROSS MULTIPLY

**What is a Proportion?**

A statement that two ratios or rates are equal

We use proportions to solve word problems!

**Example of Proportion:** “x is to 4 as 20 is to 16”

“25 miles is to 1 gallon as 50 miles is to 2 gallons”

**Setting up a Proportion:**  

SAME UNITS appear on SAME side (left, right, numerator, denominator)

**Example B:** If the ratio of teachers to students in a school is 1 to 18 and there are 360 students, how many teachers are there?

 x = 20 teachers

**Example C:** The distance between two cities is 150 miles. The scaled distance between the cities on a map is drawn as 1 ½ inches. If the distance between two other cities is 900 miles, what is the scaled distance between them on the map?

 x = 9 inches

**Example D:** A chef knows that he can serve 8 people with 3 pounds of fish. How many pounds of fish does he need to serve 50 people?

 x = 18.75 pounds

**Example E:** If 4.8 pounds of flour costs $1.20, how much will 6 pounds cost?

 x = $1.50

**Practice Converting Fractions to Decimals to Percents:**

**What is a Percent?**

Ratios in which one number is compared to 100

Another way to write a fraction with a denominator of 100

N% = N/100

Changing fractions to decimals to percent and vice versa: Fill in the missing values in the table.

|  |  |  |
| --- | --- | --- |
| FRACTION | Decimal | Percent |
| 42/100 | .42 | 42% |
| 7/100 | .07 | 7% |
| 1/5 | .2 | 20% |
| 68/1000 | .068 | 6.8% |
| 647/1000 | .647 | 64.7% |
| 1/8 | .125 | 12.5% |
| 2175/10000 | .2175 | 21 ¾ % |
| 3 25/100 | 3.25 | 325% |
| 1/3 | .3 | 33.3% |
| 1 | 1 | 100% |
| 5/9 |  | 55.5% |
| 3 1/8 | 3.125 | 312.5% |
| 35/1000 | .035 | 3.5% |

**WORD PROBLEMS with Percents** 

**Example F:** 120 is what percentage of 80?

 x = 150%

**Example G:** What is 65% of 90?

 x = 58.5

**Example H:** 20 is 30% of what number?

 x = 66.67

**Example I:** A survey of football players revealed that 20 percent of 1180 players had knee injuries. How many players had knee injuries?

 x = 236

**Example J:** Natalee correctly answered 123 questions out of 150 questions on an exam. What percent of the questions did she answer correctly?

 x = 82%

**Example K:** This semester, Brayden spent $250 on books. If this amount represents 5% of his student loan, how much is the amount of the loan?

 x = $5000

**Example L:** If $880 of a $2000 loan has been paid off, what percentage is this?

 x = 44%

**Example M:** The school population for the new year in a certain town is 135 percent of the school population for the previous year. If the new population is 378, how many students did the school have for the previous year?

 x = 280

**Example N:** What is the cost of a pair of shoes that is listed for $36.40 with a 15% discount?

 5.46……36.40-5.46

x = $30.94

**Example O:** What is the cost of an item that costs $30.94 with 6% sales tax?

 1.86….30.94+1.86

x = $32.80

**Mental Calculations with PERCENTS**

Calculate mentally!!

**Example P:** 15 percent of 82

8.2 + 4.1 = 12.3

**Example Q:** 20 percent of $31.40

3.14 + 3.14 = 6.28

**Example R:** 25 percent of $30

3 + 3 + 1.5 = 7.50

**Example S:** 25 percent of 88

¼ \* 88 = 22

**Example T:** 20 percent of 55

1/5 \* 55 = 11

**Example U:** 75 percent of 24

¾ \* 24 = 18