

# Using Known Mathematical Relationships

<p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>• Students will understand common known relationships: 52 weeks in a year, 12 months in a year.</li> <li>• Students will write mathematical expressions involving multiplication, division, and known relationships.</li> <li>• Students will compute weekly and annual amounts.</li> <li>• Students will be able to explain how known relationships are used to calculate salary and budget money.</li> </ul>	<p><b>Time frame to Complete</b></p> <p>1 hour</p>
<p><b>Standard(s) Addressed in Lesson</b></p>	<p>Using Math to Solve Problems and Communicate</p>
<p><b>Benchmark(s) Addressed in Lesson</b></p>	<p>M.4.1; M.4.2; M.4.15; M 4.27; M.4.29</p>
<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>• Worksheet: Understanding Known Relationships</li> <li>• Calculators</li> </ul>	
<p><b>Activities</b></p> <p><u>Warm –up:</u> Use a twelve month calendar as a visual aid to help student visualize the known relationship of twelve months in a year. Explain that a known relationship is a relationship they could be expected to know to solve a problem on a test. We agree that these are common relationships that are constant and not variable. Variable quantities must be provided in the math problem. We do not all agree on a constant amount for variable quantities. Ask students to think of other <b>known relationships</b> related to time. (60 minutes in an hour, 24 hours in a day, 7 days in a week) Have them think of variable time relationships. Consider the number of days in a month. How do they remember how many days in each month?</p> <p><b>Define annual:</b> in a year</p> <p><b>Relate the concept to career awareness by discussing salary and wages.</b> Salary is often expressed annually. We can use known relationships to determine monthly and weekly earnings. . Employees need to calculate weekly and monthly earnings to budget money for housing and transportation and extra expenses. Discuss how division would be used to convert an annual salary to monthly or weekly earnings. Wages are often hourly. Discuss how the number of hours per week people work can vary. It is not a known relationship. A common number is 40 hours per week, but it can vary by employee. An employee must use how many hours a week he or she works to make weekly or annual calculations of earnings. What mathematical operation would be used to convert hourly wages to weekly earnings?</p> <p><u>Step 1:</u> Pass out the worksheets. Explain the two common relationships to the class. There are 52 weeks in a year. There are 12 months in a year.</p>	

Step 2: Have the class practice writing mathematical expressions for multiplication and division. Write simple sentences on the board and have students write them different ways.

Five times four equals twenty.  $5 \times 4 = 20$   $(5)(4)=20$

Twenty divided by 5 equals 4.  $20/5=4$

Have students use the known relationships to write an expression for how many weeks there are in two years:  
 $(52)(2) = 104$   $52 \times 2 = 104$

How many years are there in 260 weeks?  $260/52=5$

Step 3: Lead the students through the practice problems.

1.  $(525)(12)=\$6,300$
2.  $(8)(2)(12)= \$192$
3.  $28,600/52=\$550$

Step 4: Have students work independently to write expressions and solve the last three problems.

1.  $3,6000/52=\$700$
2.  $(12)(12)=\$144$
3.  $(2.50)(52)=\$130.$

Step 5: Go over the problems with the students. Are they comfortable expressing multiplication and division algebraically?

### **Assessment/Evidence**

Completed worksheet for students' portfolios documents using known relationships to write multiplication and division mathematical expressions.

### **Adaptations for Beginning Students**

Students can work in groups to complete the last three problems.

### **Adaptations for Advanced Students**

Have students write a math problem using each known relationship. Trade problems with a classmate. Have students write the mathematical expressions and solve their classmate's problems.

# Using Known Mathematical Relationships

## Writing Mathematical Expressions

**Purpose:** To understand how to use “known relationships” to solve math problems; to write mathematical expressions using known relationships

**Here are two examples of known relationships:**

- 52 weeks in a year
- 12 months in a year

**Practice:** Use a known relationship to write a mathematical expression and solve these practice problems.

1. Ann rents an apartment for \$525.00 per month. How much is her rent for one year? Write a mathematical expression, and solve the problem.
2. Geo makes a monthly trip to a doctor in another city. The bus ticket costs \$8.00 one way. How much does Geo spend each month on transportation to the doctor? How much does Geo spend annually on transportation to the doctor?
3. Andy signs an employment contract for his new job. The contract states that his annual salary is \$28,600.00. He will receive a weekly pay check. How much is his weekly paycheck?

**Use a known relationship to write a mathematical expression and solve these problems.**

1. Lee signs an employment contract for a new job. The contract states his annual salary is \$36,400.00. He will receive a weekly pay check. How much is his weekly pay?
2. Hillary brings snacks to work once a month to share with co-workers. She spends \$12 on the snacks every month. How much does she spend annually on snacks for her coworkers?
3. She subscribes to a weekly magazine that costs \$2.50 per week. How much does this magazine subscription cost per year?

# Answer Key: Using Known Mathematical Relationships

## Writing Mathematical Expressions

**Practice:** Use a known relationship to write a mathematical expression and solve these practice problems.

1. Ann rents an apartment for \$525.00 per month. How much is her rent for one year? Write a mathematical expression, and solve the problem.

$$\$525 \times 12 = \$6300 \text{ per year}$$

2. Geo makes a monthly trip to a doctor in another city. The bus ticket costs \$8.00 one way. How much does Geo spend each month on transportation to the doctor? How much does Geo spend annually on transportation to the doctor?

$$\$8 \times 2 = \$16 \text{ per month}$$

$$\$16 \times 12 = \$192 \text{ per year}$$

3. Andy signs an employment contract for his new job. The contract states that his annual salary is \$28,600.00. He will receive a weekly pay check. How much is his weekly paycheck?

$$\$28,600/52 = \$550 \text{ per week}$$

**Use a known relationship to write a mathematical expression and solve these problems.**

1. Lee signs an employment contract for a new job. The contract states his annual salary is \$36,400.00. He will receive a weekly pay check. How much is his weekly pay?

$$\$36,400/52 = \$700 \text{ per week}$$

2. Hillary brings snacks to work once a month to share with co-workers. She spends \$12 on the snacks every month. How much does she spend annually on snacks for her coworkers?

$$\$12 \times 12 = \$144 \text{ per year}$$

3. Shey subscribes to a weekly magazine that costs \$2.50 per week. How much does this magazine subscription cost per year?

$$\$2.50 \times 52 = \$130 \text{ per year}$$