Study Guide

6th Grade Number Sense Practice
05/24/2016

**Compare Whole Number Equations - A**Students are asked to place an ordering symbol (<, >, or =) in a number sentence to make the sentence true.

It may be helpful to review the ordering symbols with the student.



**Example 1:** 20,253 + 1,000 ? 20,042 + 1,211

 (1) 20,253 + 1,000 = 21,253
 (2) 20,042 + 1,211 = 21,253
 (3) 21,253 ? 21,253

Step 1: Simplify the expression on the left.
Step 2: Simplify the expression on the right.
Step 3: Rewrite the mathematical sentence with the new numbers and determine which symbol to place between the two numbers.

The answer is: 20,253 + 1,000 = 20,042 + 1,211.

**Example 2:** 8,640 + 936 ? 7,851 + 1,460

 (1) 8,640 + 936 = 9,576
 (2) 7,851 + 1,460 = 9,311
 (3) 9,576? 9,311

Step 1: Simplify the expression on the left.
Step 2: Simplify the expression on the right.
Step 3: Rewrite the mathematical sentence with the new numbers and determine which symbol to place between the two numbers.

The answer is: 8,640 + 936 > 7,851 + 1,460.

**Multiple Operations: Whole Numbers - A**Students are assessed on the ability to add and subtract multiple-digit numbers (237 + 56) where regrouping (carrying, borrowing, or renaming) is required. Regrouping is necessary when the sum of the numbers in a specific column position is equal to or greater than ten.

When performing multiple operations on expressions, it is important to remember that operations inside parentheses are completed first. If there are two sets of parentheses, then the set that comes first when reading from left to right is completed first. Once the operations in all sets of parentheses are completed, addition or subtraction may be completed in order from left to right.

**Example 1:** (38 + 15) - (42 + 3) = ?

 (1) 38 + 15 = 53
 (2) 42 + 3 = 45
 (3) 53 - 45 = 8

Step 1: Since there are two sets of parentheses in this problem, we will complete the operations in the set on the left first. 38 + 15 = 53.
Step 2: Complete the operations in the second set of parentheses. 42 + 3 = 45.
Step 3: The final step is to subtract the answer to the second set of parentheses from the answer to the first set of parentheses. 53 - 45 = 8.

Answer: 8

**Example 2:** 21,368 + (56,435 - 24,789) = ?

 (1) 56,435 - 24,789 = 31,646
 (2) 21,368 + 31,646 = 53,014

Step 1: Subtract the numbers inside the parentheses.
Step 2: Add the difference of the numbers inside the parentheses to 21,368.

Answer: 53,014

**Adding Integers**Integers are the set of positive and negative whole numbers, including zero. To add integers, students must understand how integers appear on a number line. Numbers to the right of 0 on a number line are positive and numbers to the left of 0 are negative. The number -3 is a negative integer and the number 3 is a positive integer. The number zero is neither positive nor negative, it is neutral.

It may be beneficial to verify that the student understands integers by having him or her create a number line. Label points to the left of 0 "negative," and points to the right of the 0 "positive." The following is an example of a number line:


Confirm that the student understands that -4 is less than 4. Once he or she is comfortable with the concept of integers, introduce adding and subtracting. For example, -4 + 2. Start at -4 and move 2 places to the right (because we are adding). The answer is -2.

When adding two integers with the same sign, add their absolute values. Then give the sum (answer) the sign of the integers.

 -3 + -2 = ?
 |-3| + |-2| = ?
 3 +2 = 5, then make the result negative.

Answer: -5

When adding integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value, and give the result the sign of the integer with the greater absolute value.

 -7 + 3 = ?
 |-7| = 7 and |3| = 3 (find the absolute values)
 7 - 3 = ? (subtract the lesser from the greater)
 7 - 3 = 4
 -7 + 3 = -4 (The result is given the sign of the greater integer.)

**Understanding Integers**Integers are the set of positive and negative whole numbers, including zero. Numbers to the right of 0 on a number line are positive and numbers to the left of 0 are negative. The number -3 is a negative integer and the number 3 is a positive integer. The number zero is neither positive nor negative, it is neutral.

Each point on the number line below represents an integer.


Confirm that the student understands that -4 is less than 4, 0 is greater than -5, and -5 is less than -3.

The following list provides the definitions for the commonly used ordering symbols.



**Percent of a Number**Percent means "per one hundred." For example, if 7 out of 100 students ate pizza for lunch, then 7% (7 percent) of the students ate pizza for lunch.

The student should understand how to determine the percent of a number.

**Example:** Find 25% of 48.


Step 1: Change the percent amount to a fraction (remember percent means "per one hundred").
Step 2: Multiply 25/100 by 48. Change 48 into a fraction by making its denominator 1. Multiply numerator by numerator (25 x 48 = 1,200). Multiply denominator by denominator (100 x 1 = 100).
Step 3: Reduce the product to its lowest terms (1,200 ÷ 100 = 12).

Answer: 12

**Story Problems Percents - A**Percent means "per one hundred." For example, if 7 out of 100 students ate pizza for lunch, then 7% (7 percent) of the students ate pizza for lunch. Students must be able to find percentages when given a story problem.

A discount is the amount the price is reduced when an item goes on sale. A store might reduce its original price by a percentage. There are two ways to determine the sale price of an item. We can find the amount of the discount and subtract that from the original price to find the sale price, or we can multiply the regular price by the percentage that will be paid to find the sale price.

**Example 1:** Jordan works at a bookstore. He gets a 25% discount on any book he buys. He wants to buy a book in which the regular price is $35.50. How much will the book cost Jordan?

**Method 1**

 (1) 25% x $35.50 = 0.25 x $35.50 = 8.875 ~ $8.88
 (2) $35.50 - $8.88 = $26.62

Step 1: Find the amount of discount by multiplying the percent of Jordan's discount by the price of the book. You must convert the percent into a decimal number before multiplying it by the price of the book. This can be accomplished by moving the decimal point of the percentage to the left two places. Round your answer to the nearest cent.
Step 2: Subtract the discount from the original amount.

**Method 2**

 (1) 100% - 25% = 75%
 (2) $35.50 x 75% = $35.50 x 0.75 = 26.625
 (3) 26.625 approximately equals $26.63

Step 1: Determine the percentage Jordan will pay for the book by subtracting his discount from 100%. Jordan will pay 75% of the price.
Step 2: Multiply the original price by the percentage Jordan will pay. You must convert the percent into a decimal number before multiplying it by the price of the book. This can be accomplished by moving the decimal point of the percent to the left two places.
Step 3: Round 26.625 to the nearest hundredth to determine the price of the book.

It does not matter which method you use, Jordan will pay $26.63 for the book.

NOTE: The answers for method 1 and method 2 do not match because they were rounded in different places.

**Expanded Notation - E**Expanded notation is the format for writing numbers so that each digit shows a place value. For example, 753 = 700 + 50 + 3. Students with an understanding of expanded notation will have a strong foundation for learning exponential notation.

It may be helpful to discuss the concept of expanded notation with the student. Once he or she understands the theory, develop a series of numbers and help the student create expanded notation for each number. The following samples may be helpful:

 Number Expanded Notation
 5,672 5,000 + 600 + 70 + 2
 113 100 + 10 + 3
 289 200 + 80 + 9
 19 10 + 9
 3 3

**Example:** Find the expanded form: 36,971.

 A. 30,000 + 6,000 + 900 + 71
 B. 30,000 + 600 + 900 + 70 + 1
 C. 3,000 + 6,000 + 900 + 70 + 1
 D. 30,000 + 6,000 + 900 + 70 + 1

Solution: Line up the numbers and add to get 36,971.

Answer: D

**Rounding and Estimation - D**Rounding and estimation are used to express numbers to the nearest tenth, hundredth, thousandth, and so forth. In many real world applications for mathematics, rounding and estimation are used to make numbers more manageable and understandable. For instance, television producers often round large numbers so that they can be stated by reporters in a simple manner. If the United States produced 134,995,659 ounces of gold, a reporter might state, "The United States' gold production this year was 135,000,000 ounces."

An interesting method for improving the student's rounding and estimation skills is to create a list of numbers. Help the student round each number. Remember, numbers less than 5 are rounded down, while numbers 5 or greater are rounded up (in both cases, you are looking one place to the right of the place value you wish to round).
EXAMPLES:

 **34 rounded to the nearest ten is 30.**
 **37 rounded to the nearest ten is 40.**

To help the student round decimal numbers, review decimal places with him or her. For example, in the number 6,879.342

 6 = thousands
 8 = hundreds
 7 = tens
 9 = ones
 3 = tenths
 4 = hundredths
 2 = thousandths

When the student understands decimal places, ask him or her to round 6,879.342 to the nearest tenth. Look at the first digit to the right of the tenths place. Since the hundredths place is less than 5, the tenths place will remain unchanged. 6,879.342 rounded to the tenth place is 6,879.3

**Comparison**Comparisons at this grade level involve whole numbers, fractions, decimals, percents, and integers. Students must compare the value of given equations.

It may be necessary to review integers, decimals, fractions, and percents with the student. Help the student understand that integers include whole numbers, their opposites, and zero. Practice integers using a number line by plotting points such as -5, -1, 0, and 2.

As the student practices comparisons, remind him or her that fractions, percentages, and decimals represent portions or parts and that for every fraction, percentage, or decimal, there is a corresponding portion. The fraction 1/2 communicates a specific portion of something, but this specific portion can also be communicated by the percentage 50%. Decimals are portions communicated in columns (place values) which represent an underwritten denominator of 10 or a power of 10. 3.23 expresses 3 wholes and 23 hundredths of a whole.

To compare fractions, percentages, and decimals, they must be converted to the same form. The fraction 3/4 can be compared to the percentage 60% by converting the percentage to fraction form. Percentage means "per one hundred," so 60% = 60/100. Find a common denominator between 60/100 and 3/4. 100 can be divided by 4, so the fractions become: 60/100 compared to 75/100. From this comparison we can see that 75/100 or 3/4 represents a greater portion than 60/100 or 60%.

To compare the decimal 0.74 to the fraction 3/4, convert the decimal to fraction form. 0.74 becomes 74 hundredths or 74/100. We already know that 3/4 = 75/100. Therefore, 3/4 represents a greater portion than 0.74 or 74/100.

**Prime/Composite Numbers - A**A prime number is a whole number greater than 1 that has only two factors: 1 and itself. For example, 13 is a prime number.

A composite number is a whole number greater than 1 that has more than two factors. For example, 12 is a composite number because it has 6 factors: 1, 2, 3, 4, 6, and 12.

Review these definitions with the student. To ensure he or she understands the difference between prime and composite numbers, discuss with the student these two scenarios:

1. There are 10 people at a seminar. The chairs must be arranged in rows. How many choices for making rows are there? 10 is divisible by 1, 2, 5, and itself,10. Therefore, the chairs can be arranged in 4 ways: 10 rows (with 1 chair in each row), 1 row (with 10 chairs in that row), 5 rows (with 2 chairs in each row), and 2 rows (with 5 chairs in each row). Because there are more than 2 choices, we call 15 a composite number.

 
2. There are 7 people at a seminar. How many choices are there for arranging the chairs in rows? 7 can only be divided by 1 and itself, 7, so there are only 2 choices: 7 rows (with 1 chair in each row) and 1 row (with 7 chairs in that row). Because 7 has only 2 choices, 7 is a prime number.

 

**Subtracting Integers**Integers are the set of positive and negative whole numbers, including zero. To subtract integers, students must understand how integers appear on a number line. Numbers to the right of 0 on a number line are positive and numbers to the left of 0 are negative. The number -3 is a negative integer and the number 3 is a positive integer.

It may be beneficial to verify that the student understands integers by having him or her create a number line. Label points to the left of 0 "negative," and points to the right of the 0 "positive." The following is an example of a number line.


Subtracting integers is the same as adding the opposite.

 3 - -7 = ?
 3 + +7 = 10 (add the opposite)
 3 + 7 = 10

**Example 1:** 25 - -10 = ?

Solution: Subtracting a negative number creates a positive, so the problem can be rewritten as:
 25 + 10 = ?
 25 + 10 = 35

Answer: 35

**Example 2:** -48 - -18 = ?

Step 1: Rewrite the problem as:
 -48 + 18 = ?
Step 2: Remember the rules for adding integers: To add two integers with different signs, first find their absolute values. Then subtract the lesser absolute value from the greater absolute value. Give the result the sign of the integer with the greater absolute value. So we first find the absolute values.
 |-48| = 48
 |18| = 18
Step 3: Subtract the lesser absolute value from the greater value. 48 - 18 = 30
Step 4: Give the result the sign of the integer with the greater absolute value. Since 48 is the greater absolute value, we give the result a negative sign.
 -48 + 18 = -30

Answer: -30