HOMEWORK: 1 – 47 odd, 59, 63, 65, 69, 71, 73

OBJECTIVES:

- ❖ State the closure property of whole numbers
- ❖ Classify and use whole number operations

Definitions:

1. **Multiplication**: (As repeated addition)
   For any whole numbers a and b where $a \neq 0$, $a \times b = \underbrace{b + b + \ldots + b}_{a \text{ terms}}$,

   If a = 0, then 0 x b = 0. In a x b = c, a and b are called **factors** and c is called the **product.**

2. **The closure property of multiplication of whole numbers:**
   If a and b are whole numbers, then a □ b is a unique whole number.

3. **Division**: If x, y, and q are whole numbers and $y \neq 0$,
   then $x \div y = q$ if and only if x = y □ q.

4. In $x \div y = q$, x is called the **dividend**, y is called the **divisor**, and q is called the **quotient.**

5. Sometimes a division problem is approached as a missing factor problem.
   That is $18 \div 6 = 3$ can be viewed as 6 □ q = 18.

6. **The Division Algorithm**

   If a and b are whole numbers with $b \neq 0$, then there exist unique whole numbers a and r such that a = bq + r, where $0 \leq r < b$.

7. **Division and zero:** You can divide into zero but you can't divide by zero.

8. **Classifying Arithmetic Applications**: See entire list in on page 129 and samples on the next sheet.

9. **Order of Operations:** See box and use memory aid PEMDAS.

Order of Operations
Work within the innermost parentheses or brackets, **1.** Evaluate all exponents. **2.** Multiply and divide, working from left to right, **3.** Add and subtract, working from left to right. Repeat this process until all calculations in parentheses and brackets are done. **4.** Follow rules 1 – 3 for the remaining computations.

10. Use the correct order of operations to compute the following:

A. $10 \times 2 - 6 \div 2 + 1$ B. $18 - 2 \times (4 + 1)$ C. $8^2 - (2 + 4 \times 3)$

D. $9 \times 3 \div 3 \div 3 + 4$ E. $[7^2 + (3 + 5)^2 - (4 - 9) + 3\{5(2 + 9) - 1\}]^5$

11. Types of problems: (Multiplication)

i. **Equal Groups** Find the total number of objects, given a certain number of groups, each with the same number of objects.

ii. **Equal Measures** Find the total measure that results from repeating a given measure a certain number of times.

iii. **Array (Group)** Find the total number of objects needed to occupy a given number of rows and columns.

iv. **Area (Measures)** Find the total measure in square units, given the width and length.

v. **Counting principle (Pairings)** Find the total number of different pairs formed by pairing any object from one set with any object from a second set.

12. Types of problems: (Division)

i. **Equal Groups** Find how many groups of a certain size can be made from a group of objects.

ii. **Repeated Measures** Find how many measurements of a certain size equal a given measurement.

ii. **Partition (Share) a Group** Find how many are in each group when you divide a set of objects equally into a given number of groups.

iv. **Partition (share) a Measure** Find the measure of each part when you divide a given measurement into a given number of equal parts.

v. **Array** Find the number of rows (or columns), given an array of objects and the number of columns (or rows).

vi. **Area** Find the length (or width) of a rectangle, given its area and its width (or length).