## Section 8.2 (Like chapter 3 except includes negative whole numbers)
## Multiplication and Division of Integers

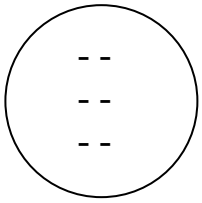
The set of integers is the set of whole numbers and their negatives:

$I = \{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$

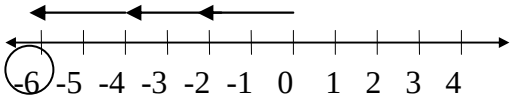
Illustrations can be done using:

1. Set Model
2. Measurement model (number line)
3. Patterns
4. Word Problems

**Set Model:**
(3)(-2) = (- 6)




**Number Line:**




**Pattern:** Notice that as the 2nd column decreases by 1, the 3rd column decreases by 3.

3 (2) = 6
3 (1) = 3
3 (0) = 0
3 (-1) = -3
3 (-2) = -6

**Word Problem:** For each of 3 hours the temperature decreases 2 degrees. What is the total change in the temperature?

### The Properties of Integer Multiplication:

1. Closure – When two integers are multiplied the answer is always an integer.
2. Commutative – Integers can be multiplied in any order: (a) (b) = (b) (a)
3. Associative – Multiplication of Integers can be regrouped: [(a)(b)] c = a [(b)(c)]
4. Identity is one – An integer's identity is preserved when multiplied by 1: a (1) = a
5. Distributive Property of Multiplication over addition: a (b + c) = a(b) + a(c)

### Definition of division in terms of multiplication:

Recall the definition from chapter 3 section 2.

Let *a, b and c* be any integers, where $b \neq 0$. $a \div b = c$ if and only if $c \times b = a$.

Thus $(-8) \div (-2) = +4$ since $(+4)(-2) = (-8)$

### Negative Exponents:

Recall rules of exponents from chapter 3, section 3.

When you divide numbers raised to powers, you subtract the exponents. Note the special cases when the exponents are equal or the numerator has a smaller power.

$$\frac{x^n}{x^n} = x^{n-n} = x^0 = 1 \qquad \frac{x^4}{x^7} = x^{4-7} = x^{-3} = \frac{1}{x^3}$$

See the examples for Scientific Notation, which uses powers of ten to express very large or very small numbers. Do Section 8.2 homework problems that use scientific notation.