Section 1-1 & 1-2

Symbols and sets of numbers
Homework

- YOU DO NOT HAVE TO DO Section 1-1 Homework!!
- Question 1: What is your instructors name??
- Only do Section 1-2, pgs. 15-18, odds 1-87 for Tuesday!
Section 1-1

- Pretty much a repeat of Math Study Skills
- Keep in mind each example in the book has a Practice Problem associated with it
- Each chapter ends with Chapter Highlights, Reviews, Practice tests, and Cumulative Reviews – good for studying for Chapter tests!
Section 1.2 – Symbols and sets of numbers

- Define the meaning of the symbols of equality and inequality
- Translate sentences into mathematical statements
- Identify integers, rational numbers, irrational numbers, and real numbers
- Find the absolute value of a real number
- Vocabulary: set; member, element; number line; integers; rational numbers; irrational numbers; real numbers; absolute value
Integers, natural and whole numbers

- An *integer* is any number that is not a fraction or decimal.
- Examples of integers are: -16, 0, 24, 2087
- A *whole number* is any integer that is not negative
  - Whole numbers: \{0, 1, 2, 3, 4, 5,...\}
- A *natural number* is any integer greater than 0
  - Natural numbers: \{1, 2, 3, 4, 5,...\}
- We are going to be most concerned with *integers*
Equality and inequality symbols

- Letters are used to represent variables: $a$ and $b$
- The phrase $a = b$ means $a$ is equal to $b$
- And, $a \neq b$ means $a$ is not equal to $b$
- Also, $a < b$ means $a$ is less than $b$
- Also, $a > b$ means $a$ is greater than $b$
- Also, $a \leq b$ means $a$ is less than or equal to $b$
- Finally, $a \geq b$ means $a$ is greater than or equal to $b$
Some examples of equality and inequality symbols

- $2 = 2$
- $2 \neq 6$
- $2 < 6$
- Also, $6 > 2$
- $2 < 6$ and $6 > 2$ have the same meaning
- $2 \leq 6$

- How about $8 \leq 8$? Is that true?
- Equality and inequality symbols are valid for integers, decimals, and fractions
Insert <, >, or = in the space provided

- 2 ___ 8
- 41 ___ 14
- 2.12 ___ -2.12
- 3/7 ____ 9/21
Determine each statement is true or false

- $15 \leq 20$
- $3.002 \geq 3.202$
- $\frac{14}{18} \neq \frac{7}{9}$
- $\frac{6}{7} \geq \frac{11}{14}$
Translating sentences into mathematical statements

- Nine is less than or equal to eleven:
  
  First write the 9
  
  Then the ‘less than or equal to’ symbol: ≤
  
  Then finish by writing the 11
  
  $9 \leq 11$

- Eight is greater than one
  
  $8 > 1$

- Three is not equal to four
  
  $3 \neq 4$
Translate each sentence into a mathematical statement

- Negative eleven is less than or equal to negative four
- Fourteen is greater than one
- Six is not equal to seven
Identifying common sets of numbers

- Recall that integers are non-decimal numbers
- There are positive integers, zero, and negative integers
- Number line:

Many students visualize the concepts of numbers better using the number line
Rational numbers

- Not all numbers are integers. Some lie between the integer points.
- Number line:

- The quantities between integers can be represented as a quotient of integers.
- The point exactly between the 0 and 1 is represented as ½. ½ is a quotient of integers, or a rational number.
- Rational numbers: \( \{a/b \mid a \text{ and } b \text{ are integers } \& b \neq 0\} \)
- By what other name do we know rational numbers as?
Irrational numbers

- We’ve known some irrational people; irrational numbers are a little different
- We know that $\frac{3}{4} = 0.75$, and that $\frac{2}{3} = 0.666…$
- These decimals either end cleanly or repeat in a pattern
- An *irrational number* is a number that exists, but it doesn’t fit neatly on a number line
- The square root of 2 is an irrational number: $\sqrt{2}$
- Another type of irrational number is “pi” $\pi$
- The actual value of $\sqrt{2}$ is around 1.41; for $\pi$ it is around 3.14, but they don’t end cleanly or repeat in a pattern
Real numbers

- *Real numbers* are all numbers that are on the number line: integers, rational numbers, and irrational numbers.
- All integers are also rational numbers.
- Which sets of numbers do the following belong to (real, integer, rational, irrational):
  - 5
  - -3
  - 8/3
  - $\sqrt{5}$
  - 0
Absolute value of a number

- The *absolute value* of a number, $|a|$, is its difference from 0
- Or, its distance away from 0 on the number line:

- Both -3 and 3 are the same distance away from 0 on the line, so 3 and -3 have the same absolute value
- $|3| = 3$; also, $|-3| = 3$
- For positive numbers, the absolute value is itself
- For negative numbers, just drop the negative part
- Absolute values are *never* negative!
Absolute values are important when dealing with anything that needs calibrating

- Find each absolute value:
  - $|6.2|$  
  - $|-14|$  
  - $|-\frac{2}{9}|$  
  - $|0.03|$  
  - $|0|$