

1. **Terminology.** Review the terminology at the end of each section. In addition, you should know *and understand* the following distinctions:

abstract vs. concrete,  
expressions vs. equations,  
equivalence vs. equals,  
imperative vs. declarative,  
identities vs. conditional equalities,  
unknowns vs. placeholders.

2. **Testing Generalizations.** Be able to determine whether a generalization is true or false, and be able to provide counterexamples to false generalizations. For instance, each of the following is false. Why?

- (a)  $x^2 = 4$  is equivalent to  $x = 2$   
 (b)  $a(x + 1) = a(2x - 1) \iff (x + 1) = (2x - 1)$   
 (c)  $\sqrt{x} = 4$  iff  $x = 16$   
*(Actually, 2(c) is TRUE, so don't bother looking for counter examples!)*  
 (d) If  $b < c$  then  $ab < ac$ .  
 (e)  $\frac{a}{b+c} = \frac{a}{b} + \frac{a}{c}$   
 (f)  $\sqrt{a^2 + b^2} = a + b$   
 (g)  $\frac{a}{b} = x$  if and only if  $a = bx$   
 (h) Your text has many more examples on pgs. 32, 43, 56, 71-73

3. **Pronunciation.** Be able to properly “read” mathematical sentences, such as:

- (a)  $2(x + 2) = 15$  (“2 times the quantity x plus 2 equals 15”)  
 (b) Your text has many more examples on pgs. 14, 31, 42.

4. **Grammar.** Be able to recognize and write grammatically correct mathematical statements, and be able to identify incorrect grammatical usage of symbols such as “=”, “ $\iff$ ”, if...then..., etc. For example,

- (a)  $a^2 = 4 = a = \pm 2$  is incorrect. Why?  
 (b) Write an abstract fact corresponding to the process used to solve  $2 - x = 5$ .  
 (c) Your text has many more examples in the homework on pgs. 32, 42, 55, etc.

5. **Creating Generalizations.** Be able to generalize from a list of examples to state an abstract mathematical fact that corresponds to the examples. For instance, examples such as  $\frac{5/6}{7/8} = \frac{40}{42}$  and  $\frac{1/2}{6/5} = \frac{5}{12}$  would lead us to generalize

$$\frac{a/b}{c/d} = \frac{ad}{bc}$$

(provided  $b$ ,  $c$ , and  $d$  are all nonzero). There are many more examples in your text on pgs. 15, 33, 56.

6. **Order of Operations.** Know the order of operations and correctly use it to evaluate expressions. You may wish to review the “Diagnostic Quiz” to help identify areas you need to work on. For example, if  $a = 2$ ,  $b = -1$ , and  $c = -3$ , evaluate

$$\frac{a + b}{c}, c(a + b)^2, ac^2, \text{ etc}$$

7. **Inequalities and Absolute Values.** Be able to work effectively with inequalities and absolute values, including both their “number-line interpretations” (directed distance, location, etc) and their symbolic properties (solution techniques, transitivity, etc). See Section 1.5 for many examples.