

# Tips for Teachers

## Chapter 1 Solving Linear Equations and Inequalities

### Section 1.3 Applications and Problem Solving

#### The Five Step Problem Solving Process

Students often say that they find it difficult to solve applied problems largely because they don't know how to "get started." The five-step problem-solving process used in this text is a great help in alleviating this difficulty. The five steps are

1. Familiarize yourself with the problem situation.
2. Translate the problem to an equation.
3. Solve the equation.
4. Check the solution in the original wording of the problem.
5. State the answer clearly with appropriate units.

#### A Closer Look at Familiarizing






Although students will often skip or spend very little time on the first step, it is perhaps the most important because it can clarify what is known and what is unknown as well as lead the student to the translation of the problem to an equation. Familiarization with a problem situation can be done in one or more of the following ways. First, reread the problem. Reading it aloud can also be helpful, as can rephrasing the problem yourself. List the given information and restate the question being asked. Select a variable to represent the unknown quantity and clearly state what the variable represents. Organize the given and the unknown information in a table, looking for possible patterns. Make a drawing and label it with the given and unknown information. Find further information, if necessary. This might include looking up a definition or formula or consulting a reference librarian or an expert in the field.

Another useful practice is to guess or estimate the answer and check to see if it is correct. Unfortunately, students are frequently reluctant to make a guess for fear that it will be incorrect. In fact, the guess *is* nearly always incorrect, but the process of checking it will very often give insight into how to translate the problem to an equation. Encourage your students to make guesses and assure them that incorrect guesses are very useful.

#### Checking the Solution

A mistake that students commonly make in solving applied problems is checking the solution in the equation that was used rather than in the original wording of the problem. If the student has translated to an equation incorrectly and has then solved that equation correctly, checking in the equation will not reveal that the translation was incorrect. Furthermore, it is possible that the translation has been done correctly, but the problem has no solution. Again, the solution must be checked in the original problem in order for this to be apparent. Explain and demonstrate to students the difference between checking in the equation and checking in the original wording of the problem.

#### Supplement Key Further Instruction and Practice for Your Students

Video	Audio cassette	MathMax CD-ROM	InterAct Math Online Exercises	Printed Test Bank/Instructor's Resource Guide	
				Exercises	Chapter Review
Tape 3	3A	Section 1.3		p. 776	p. 877

## Section 1.4 Sets, Interval Notation, and Inequalities

### The Principles and Procedures

Some students find inequalities harder to solve than equations. Reassure them that the principles and procedures used in solving inequalities are the same as those used in equation-solving with one exception. The exception is that when we multiply or divide on both sides of an inequality by a negative number, we must reverse the inequality symbol in order to obtain an equivalent inequality. Show as many examples in class as time allows, selecting some in which the inequality symbol is not reversed when the multiplication principle is used and others in which the symbol must be reversed. Carry on a dialogue with your students as you solve inequalities, calling on them to tell you whether the symbol should be reversed and why. Understanding the principles and procedures for solving inequalities is essential for solving inequalities with absolute-value expressions in Section 1.6.

### An Alternate Approach

It is possible to avoid the need to reverse the inequality symbol when solving inequalities. This will appeal to some students. It requires that we add or subtract in such a way that the coefficient of the variable term is positive as illustrated below.





Solve:  $3y - 7 \leq 9y + 5$ .

Note that if we subtract  $9y$  on both sides, the coefficient of the remaining  $y$ -term will be negative. However, we will subtract  $3y$  on both sides so that the  $y$ -term has a positive coefficient.

$$\begin{aligned}
 3y - 7 &\leq 9y + 5 \\
 3y - 7 - 3y &\leq 9y + 5 - 3y \\
 -7 &\leq 6y + 5 \\
 -7 - 5 &\leq 6y + 5 - 5 \\
 -12 &\leq 6y \\
 \frac{-12}{6} &\leq \frac{6y}{6} \\
 -2 &\leq y
 \end{aligned}$$

### Supplement Key

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				Exercises	Chapter Review
Tape 4	3B	Section 1.4		pp. 777-778	p. 877