Homework is normally odd numbered problems. Many times I do not feel it necessary to do every odd numbered problem. I use the notation ", … n + 4 …," to show that you are do every fourth problem. Thus, "25, 29, … n + 4 …, 45" means to do 25, 29, 33, 37, 41 and 45. You start with the first number in the list and end with the last number in the list and do "every fourth" problem. Had I used n + 6 you would have done 25, 31, 37, … etc.

The area that causes trouble for many students is how to properly work with "signed numbers".

The book introduces "absolute value" as the "the distance from zero". Distance is never negative. The distance from zero to 3 is three. The distance from negative 4 to negative 1 is also three.

The reason the book introduces this so early in the book is to support their version of handling signed numbers.

I think an easier version is more useful.

In algebra we can either add or we can multiply. ONLY. In arithmetic, we can add, subtract, multiply, and divide. Any reference to "subtract" below means, *"subtract as in arithmetic"*.*

The algebra rules for "signed numbers":

If we are adding:

Same sign: **Add. Use the *common* sign.**

$3+5=8$ $-3-5=-\ 8$ $(3)+5=8$

Consider: $-3-(5)=-\ 8$. Here we really have $-3+(-5)=-\ 8$. That is, we are ADDing a negative three and a negative 5. We know this because "in algebra we only add **or** multiply". Since $-3+(-5)=-\ 8$ is *not* a multiply problem so it *must* be an addition problem.

Different signs: **Subtract* the smaller from the larger and use the sign of the larger.**

$-3+5$ 3 is smaller than 5 so 5 − 3 is 2. 5 is positive so our sum is +2.

$3-5$ 3 is smaller than 5 so 5 − 3 is 2. 5 is negative so our sum is -2

If we are multiplying:

Same sign: **Multiply. The product is positive.**

$3*5=15$ $(-3)(-5)=15$ $3\cdot 5=15$

Different signs: **Multiply. The product is negative.**

$3*(-5)=-15$ $(-3)(5)=-15$ $(-3)\cdot 5=-15$

How do we know if we are adding or multiplying? Usually we have a "times sign" or we have parentheses around items if we are multiplying otherwise we are adding.

The symbol $\div$ is an arithmetic symbol that means "divide by". In algebra we use a "fraction bar". A fraction bar is horizontal. "Slash bar fractions" such as ¾ are not allowed.

$(x+y)\div(a-b)$ is written in algebraic form as $\dfrac{(x+y)}{(a+b)}$.

When we are solving equations, we "add equal quantities to both sides thus maintaining equality". Our objective is to end up with $x =$ something. All x will be on only ONE side and everything else will be on the other side. This "everything else" can be numbers and/or letters (variables) other than the objective "x".

For us "Evaluate" means to simplify. We substitute known values for variables and add or multiply as necessary.

$$\begin{cases} 7x + y & x = 3, \quad y = 4 \\ 7(3) + 4 \\ 21 + 4 \\ 25 \end{cases}$$

Remember to follow the "Order of Operations" when you simplify expressions.

In the above example, we would NOT add the 3 and the 4 before multiplying by the 7.

Order of Operations tells us to first clear exponents. Then do all work within parentheses. Next multiply (divide is a form of multiplication so division is included in this step). Finally, add (as described above). All work is done in a "Left to Right" manner.

We had a multiply of 7 and 3 to do before we could add the 4.

The reason for "Order of Operations" is so that we all do our manipulations in exactly the same way thus we all end up with the same final answer.

$$\begin{cases} 2a^3b - 2b^2 & a = 3 \quad b = 7 \\ 2(3)^3(7) - 2(7)^2 \\ 2(27)(7) - 2(49) \\ 54(7) - 98 \\ 378 - 98 \\ 280 \end{cases}$$

Notice that the 3 cubed is computed and the 7 is squared. Then we multiply and finally we add.

Pg 18 Example 11

Notice the 6 is divided by the 2 BEFORE being multiplied by the 25 because we do the operations in a "left to right" manner.

The text spends time describing the various “Laws”. We focus on only the “Distributive Law”. I call this “Clearing Parentheses” because that is what we are doing when we apply the Distributive Law.

$$5x(y+4)$$
$$5xy+20x$$

We know to multiply the 5x times BOTH the y and the 4 because if we were meant to multiply the 5x times only the y the expressions would have been written as $5xy+4$. The parentheses is the algebraic way of telling us that the item on the outside of the parentheses is to be multiplied times each term within the parentheses.

Page 23 example 3 is the first of the textbook examples that does shows an **poor** method for solving an equation. Compare the textbook’s method with the method that follows.

$$\begin{array}{cccc} y & -\ 4.7 & = & 13.9 \\ & +\ 4.7 & = & 4.7 \\ \hline y & & = & 18.6 \end{array}$$

I added 4.7 to both sides. This is an example of “adding equal quantities to both sides of an equation”. We had an equation so when we added the same to both sides, the equation resulting is still a true equality.

The text shows adding the 4.7 “in line on both sides”. While this is not incorrect, it does increase the chances of making a mistake. We will **NOT** add “in line on both sides”.

Page 23 Example 4 shows another **poor** algebraic method.

The text shows multiplying the fraction $\frac{5}{2}$ by $\frac{9}{10}$ and getting $\frac{45}{20}$.

I am ignoring the fact that the $\frac{9}{10}$ is negative because the important concept here is how to multiply fractions and not the fact that the product will be negative.

The proper method of multiplying fractions involves “**reducing before you multiply**.”

The 5 can “reduce” with the 10 to give: $\frac{1}{2}\cdot\frac{9}{2}$ and then the fractions are multiplied to yield $\frac{9}{4}$.

While the final answers in these examples are the same, the methods shown in the text are poor.

We will NOT add “in line on both sides” and we always “reduce before multiplying”.

Mr. Mumaugh
Math 104
Interval #1

Question: Is this true or false: $4 \ge 4$

Answer: It is true because 4 is, in fact, ***greater than or equal*** to 4. The key word is *or* and it implies a choice. Certainly 4 is not greater than **and** equal to 4.

The ability to use number lines to organize solutions or to aid in solving equations is an easily learned skill that is often overlooked in many algebra classrooms. Closely associated with this is the use of the words *or* and *and*. Our text (and many others) use *intersection* to mean the same as *and*. The word *union* is the same as *or.*

In example #1 below, x is greater than -3 *and* less than or equal to 4. Both the greater than -3 and the less than or equal 4 occur at the same time and could be written: $-3 < x$ and $x \le 4$.

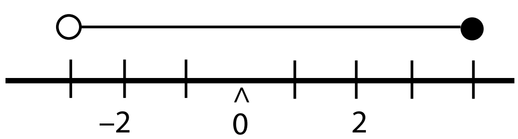
In example #2 below, x is less than -3 *or* x is greater than 4. The word *or* implies a choice. One *or* the other is a true statement. There is no shorthand way of writing this expression without the "or".

Notice the filled circle in example #1. This tells the reader that 4 is included in the interval. The open circles in example #2 tell the reader that -3 and 4 are *not* included in the intervals.

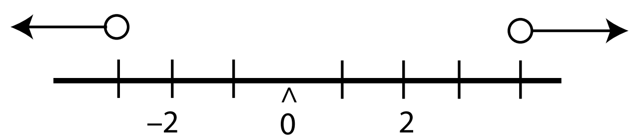
Some of the problems contain parentheses. The contents of the set of parenthesis must occur at the same time. In problem 10 (in part) x must be less than -2 or less than -4. That part can be restated $x < -4$.

Draw numberlines showing the intervals described.

Example 1: $-3 < x \le 4$



Example 2 $x < -3$ or $x > 4$



1) $2 \le x < 8$

2) $-3 \le x \le -\frac{1}{2}$

3) $x < 3$ or $x > 5$

4) $-3 \le x < 1$ or $x \ge 2$

5) $x < -1$ or $1 \le x < 5$

6) $-2 \le x < 2$ or $3 < x \le 5$

7) $x = -3$ or $x = -1$ or $x = 4$

8) $-3 \le x < 4$ or $4 < x \le 6$

9) $(x < -2$ and $x < -4)$ or $(x > 2$ and $x > 4)$

10) $(x < -2$ or $x < -4)$ or $(x > 2$ or $x > 4)$