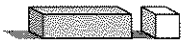
LESSON 6.2

Which is Greater?

You will need:

the Lab Gear 

Exploration For each problem, if possible, give one value of x that

a. makes the right side greater;
b. makes the left side greater;
c. makes the two sides equal.

Describe the method you used for each problem.

1. x **?** $2x + 3$

2 $y - 2$ **?** $-y - 2$

3. $6x$ **?** $7x^2 + 6x - 7$

USING THE LAB GEAR

For each problem:

a. Simplify each expression.
b. Compare the two expressions. It may help to build them with the Lab Gear, one on each side of the workmat.
c. Is one side greater, or are they equal? Write the correct symbol: $>$, $<$, or $=$. If it is impossible to tell, write **?**. Remember that x is not necessarily a positive integer.

4. $x(x + 2) - 4$ $(x + 1)(x + 1)$

5. $(x + 1)(x + 2)$ $2 + 3x - x^2$

6. $3x^2 + 9 - (x^2 + 2)$ $3x^2 + 9 - x^2 + 2$

7. $3x^2 + 9 - (x^2 + 2x)$ $3x^2 + 9 - x^2 + 2x$

8. If you did not get at least one **?** as an answer in problems 4-7, check your work.

USING TABLES

For which values of x is $14x - [4x - (2 - 3x)]$ greater than $5x - 2[x - (3x + 2)]$?

These two expressions are too complicated to build with the Lab Gear. It is easier to compare them if they are simplified first. Both expressions have two sets of grouping symbols, *parentheses* and *brackets*. Brackets mean exactly the same thing as parentheses.

Rule: Simplify from the inside out, removing the parentheses first.

9. Removing parentheses, the first expression is $14x - [4x - 2 + 3x]$. Continue simplifying.

10. Removing parentheses, the second expression is $5x - 2[x - 3x - 2]$. Continue simplifying.

The table below compares the expressions $9x + 4$ and $7x + 2$ for some values of x.

x	$9x + 4$	$7x + 2$
10	94	72
5	49	37
0.1	4.9	2.7

11. Copy and extend the table.
a. Find some values of x for which $9x + 4$ is less than $7x + 2$.
b. Try to find a value of x for which the two expressions are equal.
c. Describe any patterns you see in your table.

Lea and Earl were trying to compare these expressions:

Expression A: $5 - [x - (3x + 1)]$

Expression B: $5 - 3[x - (3x + 1)]$

They got different results when they simplified Expression B.

Simplifying Expression B

	Lea's work	Earl's work
Step 1	$5 - 3[x - 3x - 1]$	$5 - 3[x - 3x - 1]$
Step 2	$5 - 3[-2x - 1]$	$5 - 3[-2x - 1]$
Step 3	$5 + 6x - 3$	$2[-2x - 1]$
Step 4	$2 + 6x$	$-4x - 2$

Lea and Earl wanted to know which one of them had made a mistake. They asked their teacher, Mr. Martin. "You can't both be right," he said, "but you could both be wrong."

12. Are Lea and Earl both wrong, or is only one of them wrong? Is Mr. Martin wrong? Look for mistakes in their work. When you find a mistake, explain what the student did wrong.

13. Look at Expressions A and B again. Simplify both expressions correctly.

14. Using the simplified form of each expression, compare Expressions A and B by making a table of values.

15. Summarize the information in your table by telling when Expression A is greater, when Expression B is greater, and when the two expressions are equal.

16. Simplify each pair of expressions.

a. $4x - 2x[3 - 6(x + 1)]$
$4 - x[x - 6(2x + 1)]$

b. $4 - 2[y - 6(y + 1)]$
$4 - [y - 6(y + 1)]$

17. Compare each pair of expressions in problem 16. Make a table of values and summarize your findings in each case, telling when the first expression is greater, when the second expression is greater, and when they are equal.

SOLVING INEQUALITIES

18. Use a table of values to show that $2x + 6 > 8$ for all values of x greater than 1.

We say that the *solution* to the inequality $2x + 6 > 8$ is "all numbers greater than 1" because this describes *all* the values for which the inequality is true. Using mathematical symbols, we say that the solution is $x > 1$.

Find the solution of each inequality. That is, describe all the numbers for which the inequality is true.

19. $x + 5 > 1$ **20.** $n - 5 > 1$

21. $y + 5 > 0$ **22.** $r - 5 > 0$

23. $x - 5 > -1$ **24.** $x + 5 > -1$

25. $-x > 6$ **26.** $-x > -6$

27. Many students get problems 25 and 26 wrong. Check your answers to them by substituting specific values of x. What makes them more difficult than the other ones?

DISCOVERY *SQUARES ON A CHESSBOARD*

28. How many squares of any size are there on an 8-by-8 chessboard? Explain how you get your answer. (Hint: First analyze smaller boards.)