The Language of Mathematics Name _____
Exam 2, on Chapter 2. Spring 2006.

#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	tot
pt	2	2	4	2	3	2	2	4	2	3	2	2	5	5	5	5	50

1. Pronunciation. Write out, in English, how you would say these aloud.
a) $\{x \mid x < 2\}$ b) $f(g(x))$

2. Give the interval notation for
a) $\{x \mid x < 3\}$ b) $\{x \mid 2 \le x < 7\}$

3. Give a simplified notation for the given set
a) $(-3,5.4] \cap (2,8.3]$

b) $(-5,7] \cup (3.2, 9)$

c) $(3, 5.6]^c$

d) $(3, 6) \cap [6, 10]$

4. Here are three sets: $R = (4, 6)$, $S = [4, 6]$, and $T = \{4, 6\}$.
Which are subsets of which?

5. True or false?
T F For any set S, $\varnothing \subset S$.
T F $\{3\} \subset (0,3)$
T F $\varnothing \in \{3,4,5\}$
T F Cue words are words that tell you what to do to solve an indirect word problem.
T F In the theorem "$x - a = b$ iff $x = b + a$", the letter x is a placeholder.
T F If $a = b$, then $ca = cb$.

6. State the definition of set *union*. (State it formally, like the definitions in the text.)

7. Sketch a Venn diagram (like the ones in the text) for $(S \cup T)^c$. [Be sure to make the final region clear.]

8. Let $f(x) = 2x - 3$.

a) (1 pt) Give $f(x^2) =$

b) (3 pts) Solve for x: $f(5x + 1) = 21$. Show all the steps, but do not bother to explain them.

9. Let $f(x) = 5(x - 4)$. Find simpler g and h such that $f(x) = g(h(x))$.

$g(x) =$ $h(x) =$

10. a) Make two equations that appear similar, one in which "x" is used as a placeholder, and one in which it is not. Make clear which is which.
b) Explain the essential difference. (Knowing the difference is not enough, you must explain it so someone who does not know will find it illuminating.)

11. Which of the following processes applied to both sides of an equation always produce an *equivalent* equation? (Circle the ones that do.)
a) divide by 4 b) add x+2 c) square d) cancel a common factor of x

12. Create a specific example that shows "$a = b$ iff $ca = cb$" is false.

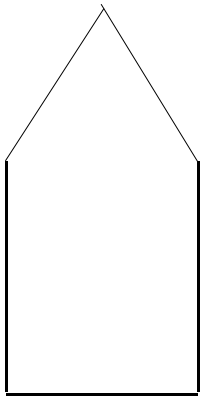
^^^^^^^ The upcoming algebra problems must be done step-by-step. Do not skip steps! At each step, state (name) the reason (Rule) which justifies the step and give the connective for each step. [We are grading the justification and connectives, not just the solution!]

13. Solve for x, step-by-step: $x(x - 6) = 16$

14. Solve for x, step-by-step: $\sqrt{3x + 12} = x - 2$

^^^^^ **Use algebra to set up and solve these two word problems. The correct answer with little or no supporting algebra will get little or no credit.**

15. A side of a playhouse is shaped like a rectangle with a triangle on top (see the picture). The base is 8 feet and the overall height is 13 feet. If the area of the side is 90 square feet, how tall is the rectangle? Build the relevant formula, set up the equation, and solve it. [For these two word problems you do not need to state the justifying rules as required in the previous algebra problems.]



16. In the State Lottery half the money bet is returned to the betters and 1/10 the money bet goes to the firm running the lottery. The state gets the rest. If the state gets $2,000,000 one week, how much was bet that week? Build the relevant formula, set up the equation, and solve it. [For these two word problems you do not need to state the justifying rules as required in the previous algebra problems.]