4. a) Give the name applied to the 3 in each of the following and explain its meaning in each case:
   \[ 3a, \ a^3, \ \sqrt{a}, \ \frac{a}{3} \]  
   [4]

   b) Write in symbols: The square of twice a number diminished by twice the square of the same number.  
   \[ (2x)^2 - 2(x^2) \]  
   [2]

   c) If the width of a rectangle is represented by \( w \) feet, represent the width of a rectangle (1) 5 feet shorter, (2) 5 feet longer, (3) 5 times as long, (4) one fifth as long.  
   \[ w - 5, w + 5, 5w, \frac{w}{5} \]  
   [4]

5. Solve the following for \( x \) and \( y \), correctly group your answers and check either set:
   \[ \begin{align*}
   3xy - 10x &= y \\
   2 - y &= -x
   \end{align*} \]  
   First solution [6], second solution [2], check [2]

6. A stream flows at the rate of 2 miles per hour; a launch can go at the rate of 8 miles per hour in still water. How far down the stream can the launch go and return if the complete trip can take only 6 hours? Equation [7], solution [3]

7. If the list price of an article is represented by \( L \), and the discount a merchant offers from the list price is represented by \( d\% \), how would you represent the selling price in terms of \( L \) and \( d \)? Representing the selling price by \( S \), make a formula for the selling price. [10]

8. In sending a telegram there is a fixed rate for the first 10 words and a fixed rate for each additional word; if a message of 31 words costs 98 cents and a message of 45 words costs $1.40, what are these two fixed rates? Equations [7], first solution [2], second solution [1]

9. Solve for \( x \):
   \[ \frac{ax}{2b} - 4b^2 = \frac{2bx}{a} - a^2 \]  
   [10]

10. A cubic foot of water weighs 62.5 pounds. The weight of water may therefore be expressed by the formula \( W = 62.5V \), when \( W \) represents the weight in pounds and \( V \) represents the volume in cubic feet.

   a) Complete the following table and make a graph of it; i.e., make a graph of the formula \( W = 62.5V \):  
   \[
   \begin{array}{cccccc}
   V (\text{in cu. ft}) & 1 & 2 & 4 & 6 & 8 & 10 \\
   \end{array}
   \]  
   [8]

   b) Show from the graph what the weight of 7 cubic feet should be. (Leave all work on the paper.) [2]
DIRECTIONS FOR RATING—concluded

3 10 credits
   a 5 credits. Allow no partial credit.
   b 5 credits

4 10 credits
   a 4 credits. Allow 1 credit each.
   b 2 credits
   c 4 credits. Allow 1 credit each.

5 10 credits
   Allow 6 credits for first solution, 2 credits for second solution and 2 credits for correct check.

6 10 credits
   Allow 7 credits for correct equation and 3 credits for correct solution.

7 10 credits
   Allow 8 credits for representing the selling price in terms of $L$ and $a$. Allow 2 credits for correct formula.

8 10 credits
   Allow 7 credits for correct equations, 2 credits for the first solution and 1 credit for the second solution.

9 10 credits
   Allow 7 credits if the answer is not in its simplest form.

10 10 credits
   a 8 credits
   b 2 credits

2 10 credits
Allow 5 credits for correct equation and 5 credits for correct solution.