

109 Laboratory Exercises 3

1. Sunshine Energy manufactures and sells solar collector cells. They find that they can sell x cells per day if the price in dollars per cell is given by

$$p = 100 - 0.05x$$

a) At what price will they be able to sell 1600 cells per day?

b) If $p = \$100$, then show that $x = 0$. What does this mean?

c) If $p > 100$, then $x < 0$. Discuss in your groups some possible interpretations of this.

d) Let R be the revenue if x units are sold per day. Find a formula for the revenue in terms of the number of units.

e) Suppose that company expenses are \$4000 per day, plus $60 - 0.01x$ for each cell made. Find a formula for the expense per day. Also, give an explanation of what the $60 - 0.01x$ means.

f) Using the formulas for expenses and revenue, find a formula for the profit. Then use your formula to solve for how many units need to be sold to generate a profit of \$6000 per day.

2. Solve the problems below.

a $x - \sqrt{x + 11} = 1$

b $(x - 4)^{3/2} = 8$

c $2x^{2/3} + 7x^{1/3} - 15 = 0$

d $(3y + 1)^{-3/5} = -\frac{1}{8}$

3. A box is in the shape of a cube. If the width is increased by 9 inches and the length is decreased by 4 inches, the volume of the new box is 180 cubic inches. What are the dimensions of the original box?

4. Solve the following inequalities.

a $5(3 - x) \leq 3x - 1$

b $8x - 2 \geq 14$

c $7 < x + 5 < 11$

d $-8 < 2 - 3x < 10$

e $|x + 3| \geq 4$

f $|x + 3| \leq 4$

5. Which of the following statements are true?

a) The first step in solving $|x - 1| < 7$ is to rewrite the inequality as $-7 < x - 1 < 7$.

b) If your age is 32 and the difference between my age x and yours is at least 12 years, then a correct model for this statement is $|x - 32| \geq 12$.

c) The first step in solving the inequality $|2x + 3| \geq 5$ is to rewrite the inequality as $2x + 3 \geq 5$ or $2x + 3 \leq -5$.

6. Solve the following inequalities.

a $x^2 - 3x - 10 > 0$

b $(x + 1)(x - 3) \leq 0$

c $(x + 1)(x - 3) \leq 1$

d $(x - 2)^3 \geq 0$

e $\frac{x + 3}{x - 7} > 0$

f $\frac{x + 3}{x - 2} \leq 2$

7. Which of the following statements are true?

a) The solution set to $x^2 > 25$ is $(5, \infty)$.

b) The inequality $\frac{x - 2}{x + 3} < 2$ can be solved by multiplying both sides by $x + 3$, resulting in the inequality $x - 2 < 2(x + 3)$.

c) $(x + 3)(x - 1) > 0$ and $\frac{x + 3}{x - 1} > 0$ have the same solution set.