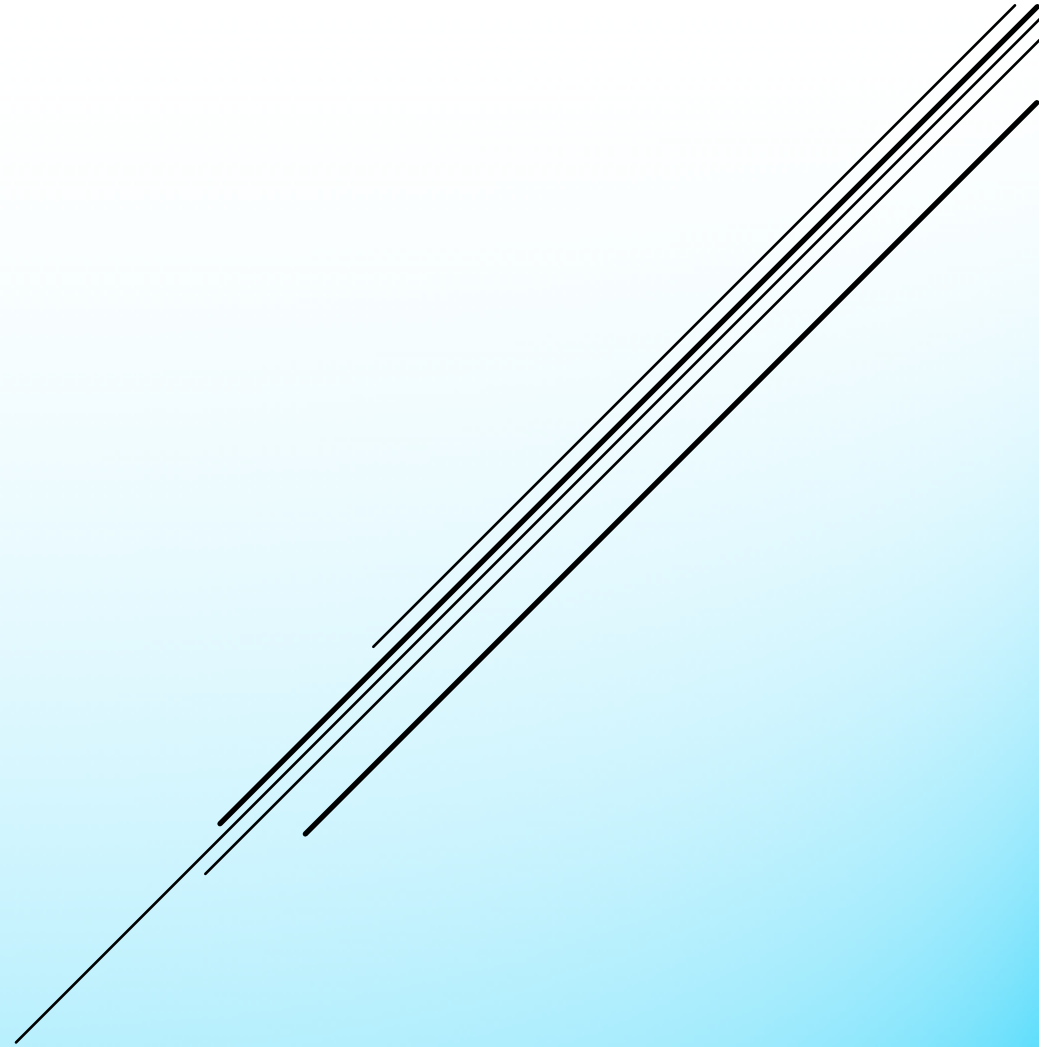


FIXED & VARIABLE EXPENSES

Unit 4



WHAT EXPENSES ARE INVOLVED IN THE MANUFACTURING PROCESS?

There are two kinds of expenses in any kind of business

- Variable expenses: exact amount is unknown. Variable expenses depend on the number of items produced.
 - Examples: raw materials needed to make the product (cloth, paint, etc.), office supplies, labor expenses
- Fixed expenses: exact amount is known and does not rely on the number of items produced.
 - Examples: rent, property tax, internet



TOTAL EXPENSES

The total expenses is the sum of the fixed expenses and the variable expenses.

Expense equation:

Total Expenses = Fixed Expenses + Variable Expenses

$$T = F + V$$



REVENUE

The revenue is the income a business receives from selling its product.

Revenue equation:

Revenue = price of the product x quantity of products sold

$$R = pq$$



WHAT IS REVENUE?

revenue \neq profit



Once you have your revenue amount, you must then subtract the expenses from it to see how much you're left with.

If

Revenue – Expenses = **Positive** Number

You made a **PROFIT!** 😊

WHAT IS REVENUE?

revenue \neq profit



Once you have your revenue amount, you must then subtract the expenses from it to see how much you're left with.

If

Revenue – Expenses = **Negative** Number

You have a **LOSS** 😞

WHAT IS REVENUE?

revenue \neq profit



Once you have your revenue amount, you must then subtract the expenses from it to see how much you're left with.

If

$$\text{Revenue} - \text{Expenses} = 0$$

You don't have a profit or a loss.

This is called the **breakeven point**.

EXAMPLE 1

The art students have researched all of their potential expenses for their assigned projects. The fixed expenses are \$17,600. The labor and materials required for each item produced costs \$7.53. Represent the total expenses as a function of the quantity produced, q .

total expenses = variable expenses + fixed expenses

total expenses = variable expenses + \$17,600

total expenses = $(\$7.53 \times q) + \$17,600$



EXAMPLE 2

Raymond Ski Supply manufactures hand warmers for skiers. Their expense function is $E = 1.18q + 12,000$.

a) Find the cost of producing 50,000 pairs of hand warmers if 50,000 hand warmers.

$$E = 1.18q + 12,000$$

$$E = 1.18(50,000) + 12,000$$

$$E = 59,000 + 12,000$$

$$E = \$71,000$$



EXAMPLE 2

Raymond Ski Supply manufactures hand warmers for skiers. Their expense function is $E = 1.18q + 12,000$.

b) Find the average cost of producing one pair of hand warmers.

$$\begin{aligned}\text{cost PER pair} &= \frac{\text{cost}}{\text{pair}} \\ &= \frac{\$71,000}{50,000} \\ &= \$1.42\end{aligned}$$



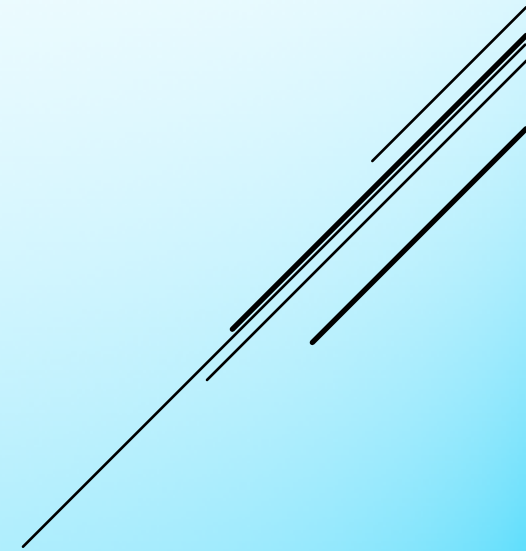
EXAMPLE 3

Wally's Widget World created a monthly expense equation, $E = 1.10q + 4,200$. Wally's Widget World plans to sell its widgets to retailers at a wholesale price of \$2.50 each.

a) What is its revenue function?

Revenue = price x quantity

$$R = 2.50q$$



EXAMPLE 3

Wally's Widget World created a monthly expense equation, $E = 1.10q + 4,200$. Wally's Widget World plans to sell its widgets to retailers at a wholesale price of \$2.50 each.

b) How many widgets must be sold to reach the breakeven point?

* The breakeven point is when expenses = revenue

$$E = R$$

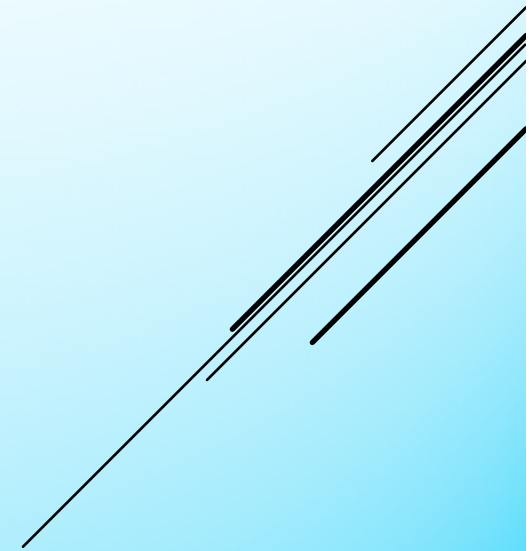
$$1.10q + 4,200 = 2.50q$$

$$-1.10q \quad -1.10q$$

$$4,200 = 1.40q$$

$$\div 1.40 \quad \div 1.40$$

$$\boxed{3,000 = q}$$

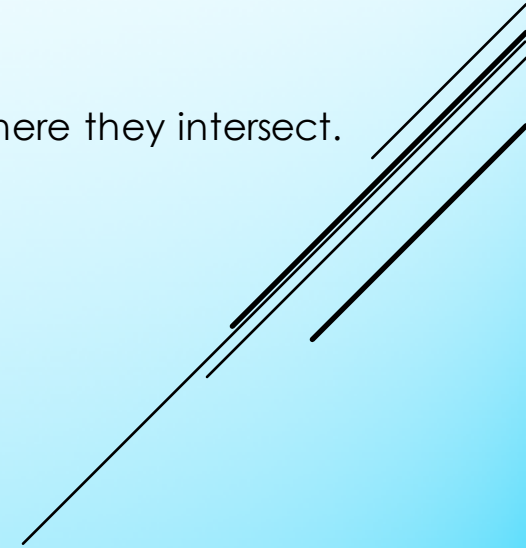


EXAMPLE 3

Wally's Widget World created a monthly expense equation, $E = 1.10q + 4,200$. Wally's Widget World plans to sell its widgets to retailers at a wholesale price of \$2.50 each.

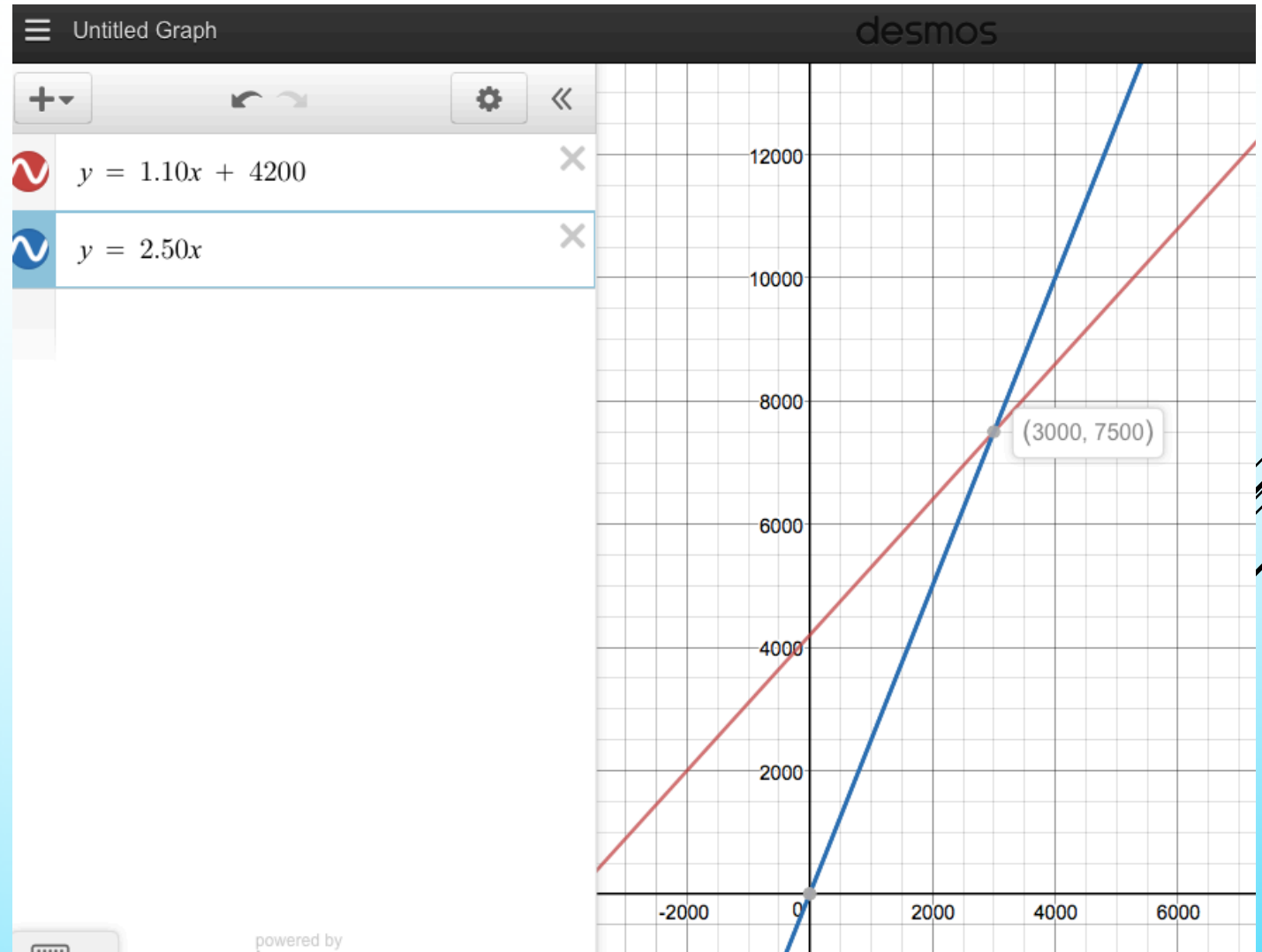
b) How many widgets must be sold to reach the breakeven point?

* You can also solve this by graphing both equations and seeing where they intersect.



EXAMPLE 3

Use desmos or a graphing calculator to graph each equation and see what their intersection point is.



EXAMPLE 4

Find the breakeven point for the expense function, $E = 5.00q + 60,000$, and the revenue function, $R = 7.00q$.

$$E = R$$

$$5.00q + 60,000 = 7.00q$$

$$-5.00q \quad -5.00q$$

$$60,000 = 2.00q$$

$$\div 2.00 \quad \div 2.00$$

$$30,000 = q$$

