

§ 1.1 - Applications of Equations

1 Manufacturing Firms

Notation:

• Fixed cost = cost that are independent of the level of production (must be paid in all cases and it is fixed).
(rent, insurance, ...)

• Variable cost = cost that dependent on the level of production.
(labor charge, material, electricity, ...).

$$\text{Total cost} = \text{fixed cost} + \text{variable cost}$$

• Total revenue = money received for selling the output
 $= (\text{price per unit}) \times (\text{number of units sold})$

$$\text{profit} = \text{total revenue} - \text{total cost}$$

Example 1:

A bakery shop produces a cake which has variable cost per unit is 6 BD and fixed cost is 800 BD. Each cake is sold for 10 BD. Find the number of cakes that must be sold to earn a profit of 600 BD.

Let the number of units that we are looking for is x

$$\text{Profit} = \text{total revenue} - \text{total cost}$$

$$600 = 10X - (800 + 6X)$$

$$600 = 10X - 800 - 6X$$

$$800 + 600 = 4X \rightarrow 1400 = 4X \rightarrow X = 350 \text{ cars}$$

$$\text{total cost} = \text{Fixed cost} + \text{variable cost} = 800 + 6X$$

$$\text{total revenue} = (\text{Price per unit}) \times (\text{number of unit}) = 10X$$

Exercise 1:

A company produces gears at a variable cost of 82 per ton and the fixed cost is 120,000 BD and each unit is sold for 134 per ton. How many must be sold to get a profit of 580,000 BD?

Example 2:

10,000 BD has been invested into two accounts, saving and super saving. The saving account pays 6% interest annually and the super saving pays 5% annually. At the end of the year, the account has 10,570 BD. How much was invested in the saving account and how much was invested in the super saving?

Solution:

$$\frac{6}{100} X + \frac{5}{100} (10,000 - X) = 10,570$$

So
$$\frac{6}{100} X + \frac{5}{100} (10,000 - X) = 10,570$$

$$6X + 5(10,000 - X) = 1057000$$

$$6X + 50000 - 5X = 1057000$$

$$X + 50000 = 1057000$$

$$X = 7000 \text{ BD.}$$

Exercise 2: Solve exercise 12, 13.

