Conditions

In a small Town it has been discovered that the relationship between the number of radius demanded varies linearly with its price. When the price per radio was $15, 1000 radious were demanded; when the price was 30$, 700 radious was demanded. a) Determine the price per radio when 500 radios were demanded? b) above what price will the demand be zero? I only know the answers, but I need someone to explain me. a) $40 b) $65
Please explain how did you come up with the answer.

Solution

The linear dependence means that all the points which coordinates are (price, amount) are lying on some straight line. As we know, 2 points define the one and only straight line. The equation of this line is:

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1}$$

For our case:

$$\frac{x - 15}{30 - 15} = \frac{y - 1000}{700 - 1000}$$

$$\frac{x - 15}{15} = \frac{1000 - y}{300}$$

$$x - 15 = 50 - \frac{y}{20}$$

$$y = -20x + 1300$$

Let's calculate the value of price, when the demand is 500:

$$500 = -20x + 1300$$

$$x = \frac{800}{20} = 40\$$$

The demand will be zero at:

$$0 = -20x + 1300$$

$$x = \frac{1300}{20} = 65\$$$