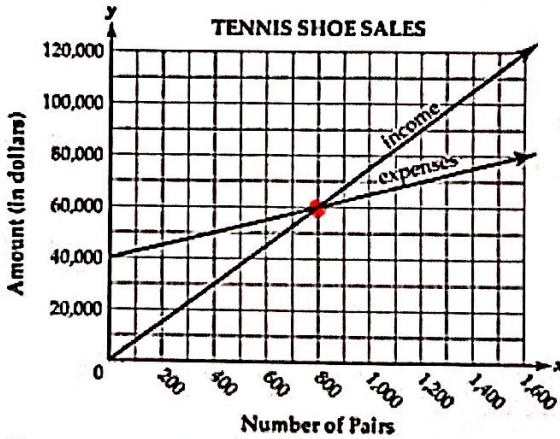


Day 7 - Real World Applications of Systems - ~~Notes~~ Practice

1. The graph below compares the income and expenses involved in the production and sales of tennis shoes at a shoe factory.



a. How many pairs of tennis shoes must be sold for the income and expenses to be the same?

At 800 shoes, they will break even.

b. When is the company losing money on tennis shoes?

Before 800 shoes

c. When is the company making money on tennis shoes?

After 800 shoes

2. The graph below shows the cost (c), in dollars, to rent a boat for h hours at two different boat companies.

a. At what number of hours will the cost to rent a boat be the same at both companies? What will be the cost?

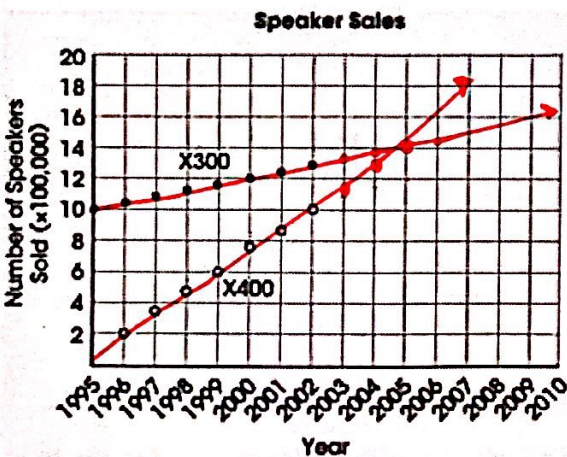
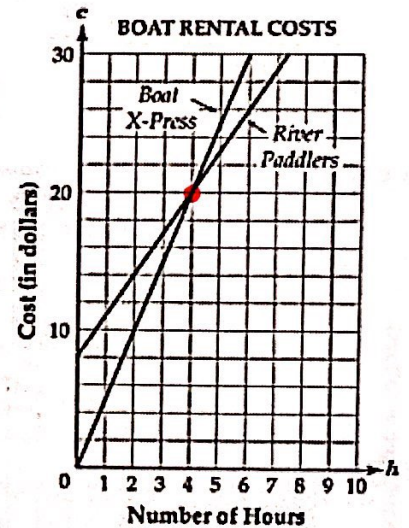
At 4 hours, both will cost \$20

b. When is Boat X-Press is the better deal?

Before 4 hours

c. When is River Paddles the better deal?

After 4 hours



3. The graph shows the total sales per year for the X300 and X400 speakers produced by an audio manufacturing company.

The manufacturer plans to discontinue the X300 speaker when the total sales for the X400 speaker are greater than the total sales for the X300 speaker.

Based on the trend in the graph, what is the earliest year that the sales of the X400 speaker will be greater than the sales of the X300 speaker?

After 2005

4. Susan has \$65 in her savings account and plans to add \$23 per week to her account. Cici has \$119 in her account and plans to add \$14 per week. When will both friends have the same amount in their savings account? How much money will they both have?

$$\begin{aligned} \text{Susan: } y &= 23x + 65 \\ \text{Cici: } y &= 14x + 119 \end{aligned}$$

$$\begin{aligned} 23x + 65 &= 14x + 119 \\ 9x &= 54 \\ x &= 6 \text{ weeks} \end{aligned}$$

$$\begin{aligned} y &= 14(6) + 119 \\ y &= 203 \end{aligned}$$

At 6 weeks, they both will have \$203.

5. Kevin downloaded 8 songs and 3 movies from a website on Friday and was charged \$30.10. The next day he downloaded 12 songs and 1 movie and was charged \$18.90. How much does the website charge for song and movie downloads?

$$\begin{aligned} \text{1st: } 8x + 3y &= 30.10 \\ \text{2nd: } -3(12x + y) &= -3(18.90) \\ &= -36x - 3y = -56.70 \\ \hline -28x &= -26.6 \\ -28 & \quad -28 \\ \hline x &= 0.95 \text{ per song} \end{aligned}$$

$$\begin{aligned} 8(0.95) + 3y &= 30.10 \\ 7.60 + 3y &= 30.10 \\ 3y &= 22.50 \\ y &= 7.50 \text{ per movie} \end{aligned}$$

Each song costs \$0.95 and each movie costs \$7.50.

6. Otto Wash car wash charges \$3 for their basic wash and \$2 for each additional service, such as vacuuming, hand drying, or waxing. Kleen Kars car wash charges \$6 for their basic wash and \$1 for each additional service. How many extra services can you get for the same price at both Otto Wash and Kleen Kars? What is that price?

$$\begin{aligned} \text{Otto Wash: } y &= 2x + 3 \\ \text{Kleen Kars: } y &= 1x + 6 \\ 2x + 3 &= 1x + 6 \\ x &= 3 \\ y &= 2(3) + 3 \\ y &= 9 \end{aligned}$$

For 3 additional services, both places will cost \$9.

7. Marc sold 461 tickets for the school play. Student tickets cost \$3 and adult tickets cost \$4. Marc's sales totaled \$1624. How many adult and student tickets did Marc sell?

$$\begin{array}{r} 3x + 4y = 1624 \\ -3(x + y) = -461 \\ \hline y = 241 \end{array}$$

$$\begin{array}{r} 3x + 4y = 1624 \\ + -3x - 3y = -1383 \\ \hline y = 241 \end{array}$$

$$\begin{array}{r} x + 241 = 461 \\ x = 220 \end{array}$$

Marc sold 220 student tickets
and 241 adult tickets.

8. Casey wants to buy a gym membership. One gym has a \$150 joining fee and costs \$35 per month. Another gym has a no joining fee and costs \$60 per month.

$$y = 35x + 150 \quad y = 60x$$

a. In how many months will both gym memberships cost the same? What will that cost be?

$$\begin{array}{r} 35x + 150 = 60x \\ 150 = 25x \\ x = 6 \end{array}$$

$$\begin{array}{r} y = 60(6) \\ y = 360 \end{array}$$

At 6 months, both gyms will cost \$360.

b. If Casey plans to cancel in 5 months, which is the better option for him? Explain or show why.

$$\begin{array}{r} y = 35(5) + 150 \\ y = 325 \end{array}$$

$$\begin{array}{r} y = 60(5) \\ y = 300 \end{array}$$

He should go with the 2nd gym
as it is \$25 cheaper at 5 months.