Real World Applications of Systems

Scenario 1: The admission fee for the county fair includes parking, amusement rides, and admission to all commercial, agricultural, and judging exhibits. The cost for general admission is $7 and the price for children is $4. There were 449 people who attended the fair on Thursday. The admission fees collected amounted to $2768. How many children and adults attended the fair?

Equation 1: $c + a = 449$

Equation 2: $7a + 4c = 2768$

$$c + a = 449$$
$$\underline{-a \quad -a}$$
$$c = \boxed{449 - a}$$

$$7a + 4(449 - a) = 2768$$
$$7a + 1796 - 4a = 2768$$
$$3a + 1796 = 2768$$
$$\frac{3a}{3} = \frac{972}{3}$$
$$a = \boxed{324} \text{ adults}$$

$$c = 449 - a$$
$$c = 449 - 324$$
$$c = 125 \text{ children}$$

Scenario 2: Jenna is deciding between two cell phone plans. The first plan has a $50 signup fee and costs $20 per month. The second plan has a $40 signup fee and costs $25 per month.

Equation 1: $y = 50 + 20m$ – Plan 1

Equation 2: $y = 40 + 25m$ – Plan 2

a. After how many months will the total costs be the same? What will the cost be?

$$50 + 20m = 40 + 25m$$
$$\underline{-20m \qquad -20m}$$
$$50 = 40 + 5m$$
$$\underline{-40 \quad -40}$$
$$\frac{10}{5} = \frac{5m}{5} \quad \boxed{2} = m \text{ months}$$

$$y = 50 + 20m \quad \text{OR} \quad y = 40 + 25m$$
$$y = 50 + 20(2) \qquad y = 40 + 25(2)$$
$$y = 50 + 40 \qquad\quad y = 40 + 50$$
$$y = \$90 \qquad\qquad\quad y = \$90$$

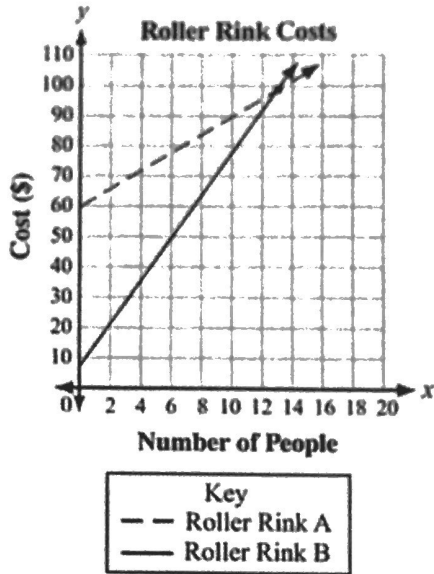b. If Jenna has to sign a one year contract, which plan will be cheaper?

12 months   Plan 1

$$y = 50 + 20(12) \qquad y = 40 + 25(12)$$
$$y = 50 + 240 \qquad\quad y = 40 + 300$$
$$\boxed{y = \$290} \qquad\qquad y = \$340$$

Scenario 3: The following graph shows the cost for going to two different skating rinks.

Roller Rink Costs

Cost ($) — y-axis: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110

x-axis: 2 4 6 8 10 12 14 16 18 20

Number of People

Key
- - Roller Rink A
— Roller Rink B

a. When is it cheaper to go to Roller Rink A?

over 13 people

b. When it is cheaper to go to Roller Rink B?

below 13 people

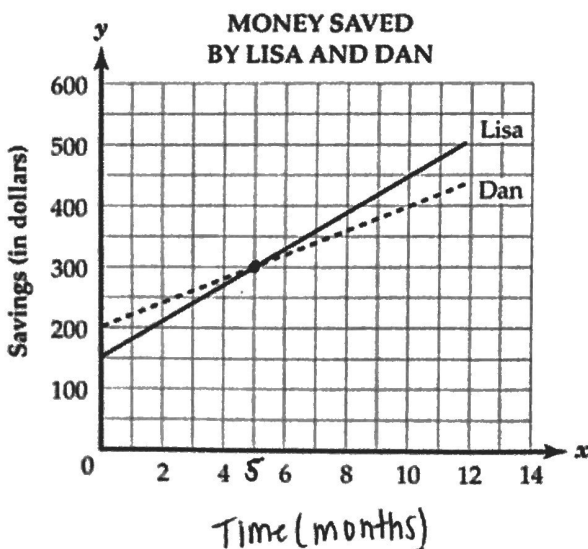where the graph intersects

c. When does it cost the same to go to either roller rink?

13 people

Scenario 4: The graph below shows the money saved by Lisa and Dan over the summer. where the graph intersects

MONEY SAVED BY LISA AND DAN

Savings (in dollars) — y-axis: 100, 200, 300, 400, 500, 600

Lisa
Dan

x-axis: 2 4 5 6 8 10 12 14

Time (months)

a. How long did it take for them to save the same amount of money? How much money did they both save?

solution: (5, 300)
5 months; $300

b. When did Lisa have more money saved?

after 5 months

c. When did Dan have more money saved?

before 5 months