

**2.4.D2(B) – MODELING WITH SYSTEMS OF LINEAR EQUATIONS**

Write and solve the system of equations described.

1. A shoe company invests \$300,000 in equipment to produce a new line of athletic footwear. Each pair of shoes costs \$5 to produce and is sold for \$65.

Write two equations: one for the cost,  $C$ , and one for the revenue,  $R$ , where  $x$  represents the pairs of shoes.

How many shoes must the company sell in order to break-even?

2. A manager at a candy stand at a large multiplex cinema has a popular candy that sells for \$1.60 per pound. The manager notices a different candy worth \$2.10 per pound that is not selling well. The manager decides to form a mixture of both candies to help clear the inventory. How many pounds of each candy should be used to create a 75-pound mixture selling for \$1.90 per pound?

Let  $x$  = pounds of the popular candy and  $y$  = pounds of the unpopular candy.

How many pounds of each candy should be sold?

3. The Rocket roller-coaster has 10 cars, some that hold 4 people and some that hold 8 people. There is room for 56 people altogether.

Let  $x$  = the number of 4-passenger cars and  $y$  = the number of 8-passenger cars.

How many of the roller-coaster cars can hold 8 passengers?

4. Two cheeseburgers and one small order of French fries from a fast-food restaurant contain a total of 850 calories. Three cheeseburgers and two small orders of French fries contain a total of 1390 calories.

Let  $x$  = the calories in a cheeseburger and  $y$  = the calories in an order of French fries.

How many calories is in one small order of French fries?

5. Russ worked a total of 135 hours during the month of September. He earned a total of \$3600. Russ earns \$25 per hour each weekday and \$40 per hour each Saturday that he worked.  
Let  $x$  = the number of weekday hours he worked and  $y$  = the number of Saturday hours worked.  
How long did Russ work on Saturdays during the month of September?
6. A hotel has 200 rooms. Those with kitchen facilities rent for \$100 per night and those without kitchen facilities rent for \$80 per night. On a night when the hotel was completely occupied, revenues were \$17,000.  
Let  $x$  = the number of rooms with kitchen facilities and  $y$  = the number of rooms without.  
How many of the hotel rooms have kitchen facilities?
7. A total of \$12,000 is invested in two funds paying 5% and 3% simple interest. The yearly interest earned is \$500.  
Let  $x$  = the amount invested at 5% and  $y$  = the amount invested at 3%. (*Interest = amount  $\times$  rate  $\times$  time*)  
How much money was invested in the fund paying 5% interest?
8. Twelve liters of a 30% acid solution is obtained by mixing a 20% solution with a 50% solution.  
Let  $x$  = the amount of 20% solution and  $y$  = the amount of 50% solution.  
How many liters of the 50% solution were used?