

Name(s): KEY  
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Work with partners in groups of 2-4. This is required.

1. Betsey, a recent retiree, requires \$7,000 per year in extra income. She has \$50,000 to invest and can invest in B-rated bonds paying 15% per year or in certificate of deposit (CD) paying 7% per year. How much should be invested in each in order to realize exactly \$7,000 in interest per year?

Let  $x$  = amt invested in bonds.

$$0.15x + 0.07(50,000 - x) = 7000$$

$$15x + 7(50,000 - x) = 700000$$

$$15x + 350000 - 7x = 700000$$

$$8x = 350000$$

$$x = 43750$$

∴ she should invest \$43750 in bonds and \$6250 in CDs

2. A coffee manufacturer wants to market a new blend of coffee that sells for \$3.90 per pound by mixing two coffees that sell for \$2.75 and \$5 per pound, respectively. What amounts of each coffee should be blended to obtain the desired mixture?

Hint: Assume the total weight of the desired mixture is 100 lbs.

Let  $x$  be the amount of the coffee that sells for \$2.75/lb

$$2.75x + 5(100 - x) = 390$$

$$2.75x + 500 - 5x = 390$$

$$-2.25x = -110$$

$$x = 48.9$$

∴ approximately 49 lbs of the first coffee and 51 lbs of the second coffee should be used

3. A candy store sells boxes of candy containing caramels and cremes. Each box sells for \$12.50 and holds 30 pieces of candy. If caramels cost \$0.25 to produce and the cremes cost \$0.45 to produce, how many of each should be in a box to make a profit of \$3?

Let  $x$  be the number of caramels in the box.  
Since we want to sell the box for 12.50 but make a \$3 profit, it must cost \$9.50 to produce.

$$0.25x + 0.45(30 - x) = 9.50$$

$$0.25x + 13.5 - 0.45x = 9.50$$

$$-0.2x = -4$$

$$x = 20$$

∴ there should be 20 caramels and 10 cremes

4. Two cars enter the Florida Turnpike at Commercial Boulevard at 8:00 am, each heading for Wildwood. One car's average speed is 10 miles per hour more than the other car's. The faster car arrives at Wildwood at 11:00 am,  $\frac{1}{2}$  hour before the other car. What was the average speed of each car?

	Rate	Time	Dist
Slower Car	$r$	3.5	$3.5r$
Faster Car	$r+10$	3	$3(r+10)$

Since the cars travel the same distance, we set these equal:

$$3.5r = 3(r+10)$$

$$3.5r = 3r + 30$$

$$0.5r = 30$$

$$r = 60$$

$\therefore$  the slower car travels at 60 mph and the faster at 70 mph

5. A regulation doubles tennis court has an area of 2808 square feet. If it is 6 feet longer than twice its width, determine the dimensions of the court.

Let  $w$  be the width. Then  $l = 2w + 6$  is the length.

$$lw = 2808$$

$$(2w+6)w = 2808$$

$$2w^2 + 6w = 2808$$

$$w^2 + 3w - 1404 = 0$$

$$(w+39)(w-36) = 0$$

$$w = -39, w = 36$$

discard neg.

$\therefore$  The width is 36 ft and the length is 78 ft

6. How much water must be evaporated from 32 ounces of a 4% salt solution to make a 6% salt solution?

Let  $x$  be the amount of water to be evaporated.

$$0.04(32) = 0.06(32-x)$$

$$1.28 = 1.92 - 0.06x$$

$$0.06x = 0.04$$

$$x = 10.67$$

$\therefore$  10.67 oz should be evaporated

7. In the 1984 Olympics, C. Lewis of the United States won the gold medal in the 100-meter race with a time of 9.99 seconds. In the 1896 Olympics, Thomas Burke, also of the United States, won the gold medal to the 100-meter race in 12.0 seconds. If Lewis and Burke ran in the same race repeating their respective times, by how many meters would Lewis beat Burke?

Burke's rate is  $\frac{100}{12}$  m/s. In 9.99 seconds, Burke will travel

$$\frac{100}{12}(9.99) = 83.25 \text{ m.}$$

$\therefore$  Lewis would win by 16.75 meters