

Applications

Ex: Mary sold some cookies and some brownies at a bake sale. She sold each cookie for \$1.00 and each brownie for \$1.50. If she sold 36 items for a total of \$44.00, how many of each did she sell?

$$c + b = 36$$

$$1.00c + 1.50b = 44$$

$$-1.00(c + b) = -1.00(36)$$

$$1.00c + 1.50b = 44$$

$$-1.00c - 1.00b = -36$$

$$\underline{1.00c + 1.50b = 44}$$

$$0.5b = 8$$

$$b = 16$$

$$c + 16 = 36$$

$$c = 20$$

16 brownies and 20 cookies.

1.) A Halloween celebration at an elementary school charges \$5.00 admission for each child and \$3.00 for each adult. If they sold 250 tickets for a total of \$1110, how many of each ticket did they sell?

2.) Maria bought some pants and some blouses for her new job. The pants cost \$48 each and the blouses \$35 each. If she bought 16 items for a total of \$638, how many of each did she buy?

Mixture:

Ex: How many liters of a 12% acid solution should be mixed with a 16% acid solution to create 25 liters of a 14.4% acid solution?

$$x = \text{amount of } 12\%$$

$$y = \text{amount of } 16\%$$

$$x + y = 25$$

$$0.12x + 0.16y = 0.144(25)$$

$$-0.12(x + y) = -0.12(25)$$

$$0.12x + 0.16y = 0.144(25)$$

$$-.12x - 0.12y = -3$$

$$\underline{0.12x + 0.16y = 3.6}$$

$$0.04y = 0.6$$

$$y = 15$$

$$x + 15 = 25$$

$$x = 10$$

10 liters of 12% and 15 liters of 16%

Ex: How many lbs of pistachios that sell for \$8.00 per lb must be mixed with dried cranberries that sell for \$4.00 per lb to create a 20 lb mixture that will sell for \$6.40 per lb?

$$p + c = 20$$

$$8.00p + 4.00c = 6.40(20)$$

$$-4.00(p + c) = -4.00(20)$$

$$8.00p + 4.00c = 6.40(20)$$

$$-4.00p - 4.00c = -80$$

$$\underline{8.00p + 4.00c = 128}$$

$$4.00p = 48$$

$$p = 12$$

$$12 + c = 20$$

$$c = 8$$

12 lbs of pistachios and 8 lbs of cranberries

3.) Cory needs 50 oz of a 13% iodine solution. He only has a 10% and a 15% iodine solutions. How many oz of each should he use to make the desired mixture?

4.) Brian works in a pharmacy and needs to make 10 oz of a cream that is 2.2% in strength. He only has creams that are 1% and 4% in strength. How many oz of each should he mix?

5.) Doria wants to sell trail mix with nuts and chocolate chips. She sells nuts for \$4.50 per lb and chocolate chips for \$2.50 per lb. How many lbs of each should she mix to have 50 lbs of mixture that she will sell for \$3.30 per lb?

Ex: Paige invests a total of \$4000, some at 5% and some at 6.5%. If her annual simple interest was \$237.50, how much is in each account?

$x = \text{amount invested at 5\%}$

$y = \text{amount invested at 6.5\%}$

$$x + y = 4000$$

$$0.05x + 0.065y = 237.50$$

$$-0.05(x + y) = -0.05(4000)$$

$$0.05x + 0.065y = 237.50$$

$$-0.05x - 0.05y = -200$$

$$\underline{0.05x + 0.065y = 237.50}$$

$$0.015y = 37.50$$

$$y = 2500$$

$$x + 2500 = 4000$$

$$x = 1500$$

\$ 1500 at 5% and \$2500 at 6.5%

6.) Paul invests \$12,000 into two accounts. One account pays 3% annual simple interest and the other 4%. If he earned \$400 in interest, how much did he invest in each?

EX: The sum of two numbers is 51. If one number is 6 more than twice the other, find the numbers.

$$x + y = 51$$

$$x = 2y + 6$$

Substitute: $(2y + 6) + y = 51$

$$3y + 6 = 51$$

$$3y = 45$$

$$y = 15$$

$$x = 2(15) + 6$$

$$x = 36$$

- 7.) The sum of two numbers is 14. If one is 4 more than the other, find the numbers.
- 8.) The difference of two numbers is 13. If one is 1 more than twice the other, find the numbers.
- 9.) The sum of two numbers is 58. If one is 2 less than three times the other, find the numbers.

EX: Hazel leaves her house traveling at 45 mph. An hour later, her roommate leaves traveling at 60 mph. How long will it take Hazel's roommate to catch up to her?

$$\text{distance} = \text{rate} \cdot \text{time}$$

$$\text{Hazel's time is } t, \text{ so her distance is } d = 45t$$

$$\text{Roommate's time is } (t - 1), \text{ since she left an hour later.}$$

$$\text{Her distance would be } d = 60(t - 1)$$

$$\text{Substitute: } 45t = 60(t - 1)$$

$$45t = 60t - 60$$

$$-15t = -60$$

$$t = 4$$

4 hours

EX: Dalia was having lunch with her friend and left traveling 60 mph. Her friend left from the same restaurant traveling east at 40 mph. When will they be 150 mi apart?

$$\text{Dalia's distance} = 60t$$

$$\text{Friend's distance} = 40t$$

Since they are traveling in opposite directions, their distances add up to 150 mi.

$$60t + 40t = 150$$

$$100t = 150$$

$$t = 1.5 \text{ hours}$$

EX: A boat travels 2 hours with 3 mph current. The return trip against the same current took 3 hours. What is the speed of the boat?

$x = \text{speed of the boat}$

With the current: $d = (x + 3) \cdot 2$

Against the current: $d = (x - 3) \cdot 3$

Since it is the same distance to go forward and return, substitute for d :

$$(x + 3) \cdot 2 = (x - 3) \cdot 3$$

$$2x + 6 = 3x - 9$$

$$15 = x$$

15 mph

10.) Randy left his house traveling at 25 mph. 2 hours later, his wife left in the same direction traveling at 50 mph. When will she catch up to Randy?

11.) Maya and John left their house at the same time to go to work. They work in opposite directions from each other. Maya has no traffic, so she travels at 55 mph. John hits traffic, so he travels at 30 mph. If their work places are 42.5 mi apart, how long does it take each one of them to go to work?

12.) Brandon can row his boat against 4 mph current and reach his destination in 3 hours. The return trip against the same current takes him 5 hours. What is the speed of the boat?

Answers:

- 1.) 180 children and 70 adults
- 2.) 6 pants and 10 blouses
- 3.) 20 oz of 10% and 30 oz of 15%
- 4.) 6 oz of 1% and 4 oz of 4%
- 5.) 20 lbs of nuts and 30 lbs of chocolate chips
- 6.) \$8000 at 3% and \$4000 at 4%
- 7.) 5 and 9
- 8.) 12 and 25
- 9.) 15 and 43
- 10.) After 2 hours
- 11.) 30 min
- 12.) 16 mph