2.2-2.4 - Linear Equation Word Problems

2.2 - Coin, Stamp, and Integer Problems

4. A collection of 22 coins has a value of $4.45. The collection contains dimes and quarters. Find the number of quarters in the collection.

Type of coin	# of coins	Value per coin	Total value
Dimes	$22-x$	$\$0.10$	$0.10(22-x)$
Quarters	x	$\$0.25$	$0.25x$

$$0.1(22-x)+0.25x=4.45$$

$$2.2-0.1x+0.25x=4.45$$

$$0.15x=2.25$$

$$x=\frac{2.25}{0.15}=15 \text{ quarters}$$

14. A stamp collection consists of 3¢, 12¢, and 15¢ stamps. The number of 3¢ stamps is five times the number of 12¢ stamps. The number of 15¢ stamps is four less than the number of 12¢ stamps. The total value of the stamps in the collection is $3.18. Find the number of 15¢ stamps in the collection.

Type of stamp	# of stamps	Value per stamp	Total value
3¢	$5x$	0.03	$0.03(5x)$
12¢	x	0.12	$0.12x$
15¢	$x-4$	0.15	$0.15(x-4)$

$$0.03(5x)+0.12x+0.15(x-4)=3.18$$

$$0.15x+0.12x+0.15x-0.6=3.18$$

$$0.42x=3.78$$

$$x=\frac{3.78}{0.42}$$

$$42\overline{)378}\quad 9,\ 378$$

$$=9$$

$$9-4=5 \text{ 15¢ stamps}$$

20. One integer is four more than another integer. The sum of the integers is twenty-six. Find the integers.

$x+4$ x

$x+4+x=26$

$2x=22$

$x=11$

11 & 15

22. The sum of three numbers is forty-two. The second number is twice the first number, and the third number is three less than the second number. Find the three numbers.

$2x$ x $2x-3$

$2x+x+2x-3=42$

$5x=45$

$x=9$

9, 18, 15

28. Find three consecutive even integers such that four times the sum of the first and third integers is twenty less than six times the middle integer.

$x, x+2, x+4$

$4(x+x+4) = 6(x+2) - 20$

$8x + 16 = 6x + 12 - 20$

$2x = -24$

$x = -12$

$-12, -10, -8$

2.3 Value Mixture and Motion Problems

4. A coffee merchant combines coffee costing $5.50 per pound with coffee costing $3.00 per pound. How many pounds of each should be used to make 40 pounds of a blend costing $4.00 per pound?

Type of coffee	Weight	Cost per pound	Total cost
$5.50	x	5.5	$5.5x$
$3.00	$40-x$	3	$3(40-x)$
$4.00 blend	40	4	$4(40)$

$5.5x + 3(40-x) = 4(40)$

$5.5x + 120 - 3x = 160$

$2.5x = 40$

$x = \frac{400}{25} = 16$

16 lb of $5.50
24 lb of $3

10. A silversmith combined pure silver that costs $5.20 an ounce with 50 ounces of a silver alloy that costs $2.80 an ounce. How many ounces of the pure silver were used to make an alloy of silver that costs $4.40 an ounce?

+2.8, 50, 140.0 ; 2 4.1, 50, 220.0

Type of metal	Weight	Cost per ounce	Total cost
Pure silver	x	5.2	$5.2x$
$2.80 alloy	50	2.8	$2.8(50)$
$4.40 alloy	$x+50$	4.4	$4.4(x+50)$

5.2, 4.4, 0.8

$$5.2x + 2.8(50) = 4.4(x+50)$$

$$5.2x + 140 = 4.4x + 220$$

$$0.8x = 80$$

$$x = \frac{80}{0.8} = \boxed{100 \text{ oz}}$$

18. Two jet skiers leave the same dock at the same time and travel in opposite directions. One skier is traveling 14 mph slower than the other skier. In half an hour the skiers are 48 miles apart. Find the rate of the slower skier. rate x time = distance

Skier	Rate	Time	Distance
Slower	x	$\frac{1}{2}$	$\frac{1}{2}x$
Faster	$x+14$	$\frac{1}{2}$	$\frac{1}{2}(x+14)$

$$\frac{1}{2}x + \frac{1}{2}(x+14) = 48$$

$$\frac{1}{2}x + \frac{1}{2}x + 7 = 48$$

$$x = \boxed{41 \text{ mph}}$$

26. A plane leaves an airport at 3 p.m. At 4 p.m. another plane leaves the same airport traveling in the same direction at a speed 150 mph faster than that of the first plane. Four hours after the first plane takes off, the second plane is 250 mi ahead of the first plane. How far did the second plane travel?

Plane	Rate	Time	Distance
1	x	4	$4x$
2	$150+x$	3	$3(150+x)$

$$3(150+x) = 4x+250$$
$$450+3x = 4x+250$$
$$200 = x$$
$$3(150+200) = 350$$
$$3$$

1050 miles