

Math 9 – Unit 4: Word Problems

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Lesson #3: Solving Word Problems Involving Cost

Learning Goal: We are learning to solve word problems involving cost.

To solve a word problem involving cost, we will use a chart instead of a "LET" statement.

a) Matthew has \$0.85 in nickels and dimes. He has 2 more nickels than dimes. How many of each coin does he have?

| coin   | \$   | Amount | Total Value |
|--------|------|--------|-------------|
| nickel | 0.05 | $x+2$  | $0.05(x+2)$ |
| dimes  | 0.10 | $x$    | $0.1(x)$    |

Equation:

$$0.05(x+2) + 0.1(x) = 0.85$$

$$0.05x + 0.1 + 0.1x = 0.85$$

$$0.15x + 0.1 = 0.85$$

$$\begin{array}{r} 0.15x = 0.75 \\ \underline{0.15} \quad \underline{0.15} \end{array}$$

$$x = 5$$

∴ Matthew has 5 dimes and 7 nickels.

b) A jar contains \$18.50 in dimes and quarters. If there are 110 coins in the jar, determine the number of dimes and the number of quarters.

| coins   | \$   | Amount    | Total Value     |
|---------|------|-----------|-----------------|
| dimes   | 0.10 | $x$       | $0.1(x)$        |
| quarter | 0.25 | $110 - x$ | $0.25(110 - x)$ |

dimes and quarters = 110

Equation:  $0.1x + 0.25(110 - x) = 18.50$

$$0.1x + 27.5 - 0.25x = 18.5$$

$$\begin{array}{r} -0.15x + 27.5 = 18.5 \\ \underline{-27.5} \quad \underline{-27.5} \end{array}$$

$$\begin{array}{r} -0.15x = -9 \\ \underline{-0.15} \quad \underline{-0.15} \end{array}$$

$$x = 60$$

∴ There are 60 dimes and 50 quarters

c) Tickets to a concert cost \$9.00 for adults and \$6.50 for students. A total of 950 people paid \$7675.00 to attend. How many students attended the concert?

| Tickets  | \$   | Amount    | Total Value  |
|----------|------|-----------|--------------|
| Students | 6.50 | $x$       | $6.5(x)$     |
| Adults   | 9.00 | $950 - x$ | $9(950 - x)$ |

Equation:  $6.5(x) + 9(950 - x) = 7675$

$$\begin{aligned} 6.5x + 8550 - 9x &= 7675 \\ -2.5x + 8550 &= 7675 \\ -2.5x &= -875 \end{aligned}$$

$$\frac{-2.5x}{-2.5} = \frac{-875}{-2.5}$$

$$x = 350$$

$\therefore$  350 students came to the concert.

d) Timothy needed to do some Christmas shopping, so he took a hammer to his piggy bank and smashed it open. Timothy noticed that he has 4 times the amount of dimes than nickels, 8 more quarters than nickels, half the number of toonies than nickels, and twice the number of loonies as quarters. Timothy counted a total of \$55. How many of each coin does he have? (After doing this, Timothy added "Piggy Bank" to his Christmas list).

| Coin     | \$   | Amount        | Total Value      |
|----------|------|---------------|------------------|
| nickel   | 0.05 | $x$           | $0.05(x)$        |
| dimes    | 0.10 | $4x$          | $0.1(4x)$        |
| quarters | 0.25 | $x + 8$       | $0.25(x + 8)$    |
| loonies  | 1    | $2(x + 8)$    | $2(x + 8)$       |
| toonies  | 2    | $\frac{x}{2}$ | $2(\frac{x}{2})$ |

$\therefore$  Timothy has 10 nickels, 40 dimes, 18 quarters, 36 loonies and 5 toonies

Equation:  $0.05x + 0.1(4x) + 0.25(x + 8) + 2(x + 8) + 2(\frac{x}{2}) = 55$

$$0.05x + 0.4x + 0.25x + 2 + 2x + 16 + x = 55$$

$$3.7x + 18 = 55$$

$$\frac{3.7x}{3.7} = \frac{37}{3.7} \Rightarrow x = 10$$

#### Success Criteria:

- I can write the value of common coins as a decimal (Quarter = 0.25, etc...)
- I can set up a chart to represent the given information and unknowns