

# Coin Problems

When solving coin problems, it is useful to construct a table showing the following information:

1. The **number** of each type of coin
2. The **values** of each coin
3. The **total value** in dollars of each type of coin

**Example:** Kelly received a play purse from her grandfather that contained 25 coins worth \$2.00. If the purse contains only nickels and dimes, how many of each coin are in the purse?

Let  $x$  = number of nickels.

$25 - x$  = number of dimes.

We use  $25 - x$  for the number of dimes because  $x$  coins out of the total 25 coins are nickels.

Type of coin	Value of coin	Number of coin	Total value
Nickels	.05	$x$	$.05x$
Dimes	.10	$25 - x$	$.10(25 - x)$

## Explanation:

The **total value** in dollars of each type of coin can be obtained by multiplying the value of the coin by the number of that coin present for the problem. We can then form the equation by **adding** the total value of each coin and setting this sum equal to the total value in dollars of the coins.

The total value of the nickels + The total value of the dimes = The total value of the coins

$$.05x + .10(25 - x) = 2.00$$

**Equation:**

$$\begin{aligned}
 .05x + .10(25 - x) &= 2.00 \\
 .05x + 2.50 - .10x &= 2.00 \\
 -.05x &= -.50 \\
 x &= 10
 \end{aligned}$$

$$\begin{aligned}
 5x + 10(25 - x) &= 200 \\
 5x + 250 - 10x &= 200 \\
 -5x &= -50 \\
 x &= 10
 \end{aligned}$$

You can also solve the equation by converting all the values into cents

There are **10 nickels** since  $x$  represents the number of nickels. The number of dimes present is represented by  $25 - x$ . Therefore there are **15 dimes** present.

Comment:  $25 - x = 25 - 10$

**SAMPLE PROBLEMS:**

1. Hania has \$7.70 consisting of dimes and quarters. The number of quarters she has is two more than twice the number of dimes. How many of each kind does she have?

Let  $x$  = number of dimes.

Type of coin	Value of coin	Number of coin	Total value
Dimes	.10	$x$	$.10x$
Quarters	.25	$2x + 2$	$.25(2x + 2)$

**Equation:**

$$.10x + .25(2x + 2) = 7.70$$

$$.10x + .50x + .50 = 7.70$$

$$.60x = 7.20$$

$$x = 12$$

Hania has **12 dimes** and **26 quarters**.  $\longrightarrow$  **Comment:**  $2x + 2 = 2(12) + 2$

2. The Georgia Perimeter College Music Department sold tickets for a concert recital. Tickets cost \$1 if purchased in advance and \$2.50 if purchased at the door. If the total number of tickets sold was 488, and the amount of money received was \$800, how many tickets of each kind were sold?

Let  $x$  = advance tickets purchased.

Ticket	Ticket cost (\$)	Number of tickets	Total cost
Advance Tickets	1	$x$	$1x$
Door	2.50	$488 - x$	$2.50(488 - x)$

**Equation:**

$$1x + 2.50(488 - x) = 800$$

$$x + 1220 - 2.50x = 800$$

$$-1.50x + 1220 = 800$$

$$-1.50x = -420$$

$$x = 280$$

There were **280 advance tickets** sold and **208 tickets sold at the door**.

**Comment:**  $488 - x = 488 - 280$

3. Mark, the meter bandit, broke open a parking meter. He organized the coins and found that the number of nickels was 5 times the number of dimes. He also found that there were 15 more quarters than dimes? If the total amount of money taken from the meter was \$19.95, how many of each coin were there?

Let  $x$  = number of dimes.

Type of coin	Value of coin	Number of coin	Total value
Dimes	.10	$x$	$.10x$
Nickels	.05	$5x$	$.05(5x)$
Quarters	.25	$x + 15$	$.25(x + 15)$

**Equation:**

$$.10x + .05(5x) + .25(x + 15) = 19.95$$

$$.10x + .25x + .25x + 3.75 = 19.95$$

$$.60x + 3.75 = 19.95$$

$$.60x = 16.20$$

$$x = 27$$

There are **27 dimes**, **135 nickels**, **42 quarters**.

**Comment:** nickels:  $5x = 5(27) = 135$   
quarters:  $x + 15 = 27 + 15 = 42$

4. Gary, the postal clerk, sold 80 stamps for \$19.10. Some were 20 cent stamps and some were 30 cent air grams. How many of each kind did he sell?

Let  $x$  = number of 20 cent stamps.

Type of stamp	Value of stamp	Number of stamp	Total value
20 cent stamp	.20	$x$	$.20x$
30 cent stamp	.30	$80 - x$	$.30(80 - x)$

**Equation:**

$$\begin{aligned}
 .20x + .30(80 - x) &= 19.10 \\
 .20x + 24 - .30x &= 19.10 \\
 -.10x + 24 &= 19.10 \\
 -.10x &= -4.9 \\
 x &= 49
 \end{aligned}$$

He sold **49 twenty cent stamps** and **31 thirty cent stamps**.  $\longrightarrow$  Comment:  $80 - x = 80 - 49$