System of Equations (Word Problems)

1. A farm raises cows and chickens. The farmer has a total of 42 animals. One day he counts the legs of all of his animals and realizes he has a total of 114. How many cows does the farmer have? How many chickens?

2. The length of a rectangle is 4 times the width. The perimeter of the rectangle is 45 inches. What is the area of the rectangle?

System of Equations (Word Problems)

1. A farm raises cows and chickens. The farmer has a total of 42 animals. One day he counts the legs of all of his animals and realizes he has a total of 114. How many cows does the farmer have? How many chickens?

Let x represent the number of cows and y represent the number of chickens. Then:

$$\begin{cases} x + y = 42 \\ 4x + 2y = 114 \end{cases}$$

$$-2(x + y = 42)$$

$$-2x - 2y = -84$$

$$\begin{cases} -2x - 2y = -84 \\ 4x + 2y = 114 \end{cases}$$

$$-2x - 2y + 4x + 2y = -84 + 114$$

$$-2x + 4x = 30$$

$$2x = 30$$

$$x = 15$$

$$15 + y = 42$$

$$y = 27$$

The solution is $(15, 27)$.

$$4(15) + 2(27) = 114$$

$$60 + 54 = 114$$

$$114 = 114$$

The farmer has 15 *cows and* 27 *chickens.*

2. The length of a rectangle is 4 times the width. The perimeter of the rectangle is 45 inches. What is the area of the rectangle?

Let x represent the length and y represent the width. Then:

$$\begin{cases} x = 4y \\ 2x + 2y = 45 \end{cases}$$

$$2(4y) + 2y = 45$$

$$8y + 2y = 45$$

$$10y = 45$$

$$y = 4.5$$

$$x = 4(4.5)$$

$$x = 18$$

The solution is $(18, 4.5)$.

$$2(18) + 2(4.5) = 45$$

$$36 + 9 = 45$$

$$45 = 45$$

Since $18 \times 4.5 = 81$, *the area of the rectangle is* $81 \ in^2$.

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