

WARM UP: Each bag contains the same number of gold coins. Determine how many coins are in each bag.



3 bags and 1 stack of 6 coins 1 bag and 4 stacks of 6 coins

Step 1: Remove 1 bag from BOTH SIDES
Step 2: Remove 1 stack of coins from BOTH SIDES
Step 3: Divide coins between both bags EVENLY.

$$2 \text{ bags} = 18 \text{ coins}$$

$$1 \text{ bag} = \frac{18}{2} = 9 \text{ coins}$$

SOLVING THE UNKNOWN ALGEBRAICALLY

Determine how many coins are in the bag.

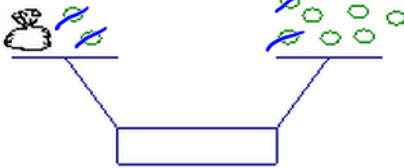
Let 'x' represent each bag and each coin will have a value of one.

1 bag and 2 coins

7 coins

LEFT SIDE

RIGHT SIDE



1 bag and 2 coins equal to 7 coins

$$x + 2 = 7$$

equation

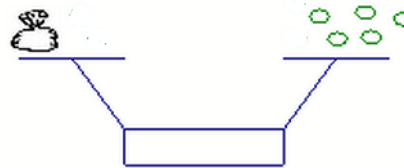
$$x + 2 = 7$$

$$-2 \quad -2$$

to isolate x (bag)
 subtract (remove) 2 (coins) from BOTH SIDES

$$x = 5$$

∴ The solution to this equation is 5.



GOLDEN RULE OF ALGEBRA

PERFORM THE SAME OPERATION(S) TO BOTH SIDES

SOLVING ONE-STEP EQUATIONS

JUST perform the inverse (opposite) operation.

Solve each of the following equations:

Addition	Subtraction	Multiplication	Division	Square
$x + 5 = 9$ $-5 \quad -5$ $x = 4$	$x - 1 = 3$ $+1 \quad +1$ $x = 4$	$2x = 10$ $\frac{2x}{2} = \frac{10}{2}$ $x = 5$	$\frac{x}{2} = 6$ $x \div 2 \times 2 = 6 \times 2$ $x = 12$	$\sqrt{x^2} = \sqrt{9}$ $x = 3$
$x + 10 = 31$ $-10 \quad -10$ $x = 21$	$x - 8 = 2$ $+8 \quad +8$ $x = 10$	$5x = 40$ $\frac{5x}{5} = \frac{40}{5}$ $x = 8$	$3 \cdot \frac{x}{3} = -2 \cdot 3$ $x = -6$	$\sqrt{x^2} = \sqrt{36}$ $x = 6$

SOLVING TWO-STEP EQUATIONS

Use Reverse Order of Operations

S or *A* / *M* or *D* / *E* / *B*

Solve the following equations:

1) Teacher	Your Turn	
$2x + 8 = 20$ $\begin{array}{r} -8 \quad -8 \\ \hline 2x = 12 \end{array}$ $\begin{array}{r} \frac{2x}{2} = \frac{12}{2} \\ \hline x = 6 \end{array}$ <i>1) Subtract 8 from both sides</i> <i>2) divide both sides by 2</i>	a) $3x - 10 = 11$	b) $25 = 5 + 5x$
2) Teacher	Your Turn	
$5 - x = 11$	a) $10 - x = 22$	b) $-22 = -x - 11$
3) Teacher	Your Turn	
$7 - 3x = 19$	a) $-2x - 8 = 10$	b) $131 = 11 - 5x$
4) Teacher	Your Turn	
$\frac{x}{3} - 2 = -4$	a) $9 + \frac{x}{5} = 11$	b) $110 = 2 - \frac{x}{2}$
5) Teacher	Your Turn	
$x^2 - 5 = 44$	a) $12 + x^2 = 21$	b) $165 = -4 + x^2$
6) Teacher	Your Turn	
$2x^2 - 5 = 13$	a) $4x^2 - 10 = 26$	b) $-306 = -6 - 3x^2$

PRACTICE

1. Mr. Forster solved the following equation. Explain, using full sentences, what he did to get each line of his solution.

Mr. Forster's Work	What He Did
$15 - 5x = 10$	<i>Original Question</i>
$-5x = -5$	
$x = 1$	

2. Make up an equation with two operations that has a solution of $x = 5$.

3. Mike is currently 8 years older than Janet. Mike's age can be calculated by using the equation below where m represents Mike's age. Calculate their ages.

$$2m - 8 = 30$$

THINKING

4. A triangle has a perimeter of 250 cm. The three side lengths are x , $2x + 40$ and $x + 60$. What are the side lengths of this triangle?