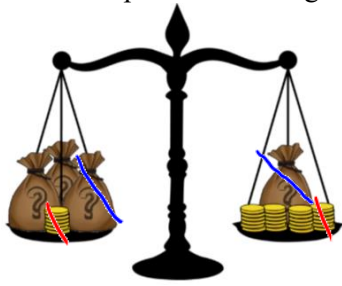


WARM UP

Each bag contains the **same number** of gold coins. **Determine** how many coins are in each bag algebraically. Let "x" represent each bag and each coin will have a value of one.



bag + bag + bag + 6 coins = bag + 4 stacks of 6 coins

$$x + x + x + 6 = x + 6 + 6 + 6 + 6$$

$$3x + 6 = x + 24$$

$$-x \quad -x$$

$$2x + 6 = 24$$

$$-6 \quad -6$$

$$\frac{2x}{2} = \frac{18}{2}$$

$$x = 9$$

collect like terms on both sides

∴ 9 coins in each bag.

SOLVING EQUATIONS WITH VARIABLES ON BOTH SIDES

Steps:

1. Apply distributive law
2. Simplify each side by collecting like terms
3. Eliminate variables from right side or left side by adding or subtracting
4. solve for x

Teacher	Your Turn	
$8x + 8 = 2x - 4$ $-2x \quad -2x$ <i>* eliminate 2x from RS</i> $6x + 8 = -4$ $-8 \quad -8$ $\frac{6x}{6} = \frac{-12}{6}$ $x = -2$	<p>a) $5x + 3 = 2x + 33$ <i>* eliminate 2x from RS</i></p> $-2x \quad -2x$ $3x + 3 = 33$ $-3 \quad -3$ $3x = 30$ $x = 10$	<p>b) $7x^2 - 15 = 29 - 4x^2$ <i>eliminate -4x^2</i></p> $+4x^2 \quad +4x^2$ <i>from RS</i> $11x^2 - 15 = 29$ $+15 \quad +15$ $\frac{11x^2}{11} = \frac{44}{11}$ $\sqrt{x^2} = \sqrt{4}$ $x = 2$
$2(5x + 4) = 3(x - 2)$ <i>* distributive law</i> $10x + 8 = 3x - 6$ <i>* eliminate 3x from RS</i> $-3x \quad -3x$ $7x + 8 = -6$ $-8 \quad -8$ $\frac{7x}{7} = \frac{-14}{7}$ $x = -2$	<p>a) $4(2x + 1) = 3(2x + 2)$</p> $8x + 4 = 6x + 6$ $-6x \quad -6x$ $2x + 4 = 6$ $-4 \quad -4$ $\frac{2x}{2} = \frac{2}{2}$ $x = 1$	<p>b) $5(x - 8) = 2(x - 1) + (4x + 5)$</p> $5x - 40 = 2x - 2 + 4x + 5$ $5x - 40 = 2x + 4x - 2 + 5$ $5x - 40 = 6x + 3$ $-6x \quad -6x$ $-1x - 40 = 3$ $+40 \quad +40$ $\frac{-1x}{-1} = \frac{43}{-1}$ $x = -43$

PRACTICE

<p>a. $5(x+4) = 3x + 14$ $5x + 20 = 3x + 14$ $-3x \quad -3x$ $2x + 20 = 14$ $-20 \quad -20$ $2x = -6$ $\frac{2x}{2} = \frac{-6}{2}$ $x = -3$</p>	<p>b. $5q - 6 = 2(q + 3)$ $5q - 6 = 2q + 6$ $-2q \quad -2q$ $3q - 6 = 6$ $+6 \quad +6$ $3q = 12$ $\frac{3q}{3} = \frac{12}{3}$ $q = 4$</p>	<p>c. $4t + 3(2 - t) = 13$ $4t + 6 - 3t = 13$ $4t - 3t + 6 = 13$ $t + 6 = 13$ $-6 \quad -6$ $t = 7$</p>
<p>d. $u = 3(5 - u) + 1$ $u = 15 - 3u + 1$ $u = 16 - 3u$ $+3u \quad +3u$ $4u = 16$ $\frac{4u}{4} = \frac{16}{4}$ $u = 4$</p>	<p>e. $3(r + 4) + 2(r + 5) = 32$ $3r + 12 + 2r + 10 = 32$ $5r + 22 = 32$ $-22 \quad -22$ $5r = 10$ $\frac{5r}{5} = \frac{10}{5}$ $r = 2$</p>	<p>f. $5(y - 3) - 3(y - 4) = 12$ $5y - 15 - 3y + 12 = 12$ $5y - 3y - 15 + 12 = 12$ $2y - 3 = 12$ $+3 \quad +3$ $2y = 15$ $\frac{2y}{2} = \frac{15}{2}$ $y = 7.5$</p>
<p>g. $4(v + 3) = 2(v + 6) - 8$ $4v + 12 = 2v + 12 - 8$ $4v + 12 = 2v + 4$ $-2v \quad -2v$ $2v + 12 = 4$ $-12 \quad -12$ $2v = -8$ $\frac{2v}{2} = \frac{-8}{2}$ $v = -4$</p>	<p>h. $2(y - 4) = -3(y + 2) + 8$ $2y - 8 = -3y - 6 + 8$ $2y - 8 = -3y + 2$ $+3y \quad +3y$ $5y - 8 = 2$ $+8 \quad +8$ $5y = 10$ $\frac{5y}{5} = \frac{10}{5}$ $y = 2$</p>	<p>i. $6(3w + 4) = 10(2w - 1)$ $18w + 24 = 20w - 10$ $-18w \quad -18w$ $24 = 2w - 10$ $+10 \quad +10$ $34 = 2w$ $\frac{34}{2} = \frac{2w}{2}$ $17 = w$ $w = 17$</p> <p>let's eliminate 18w from LS</p>
<p>j. $4(m + 3) + 2(m - 3) = 3(m - 2)$ $4m + 12 + 2m - 6 = 3m - 6$ $6m + 6 = 3m - 6$ $-3m \quad -3m$ $3m + 6 = -6$ $-6 \quad -6$ $3m = -12$ $\frac{3m}{3} = \frac{-12}{3}$ $m = -4$</p>		<p>k. $p - 7(4p + 3) = -3(p + 2) - 1(2p + 3)$ $p - 4p - 3 = -3p - 6 - 2p - 3$ $-3p - 3 = -5p - 9$ $+5p \quad +5p$ $2p - 3 = -9$ $+3 \quad +3$ $2p = -6$ $\frac{2p}{2} = \frac{-6}{2}$ $p = -3$</p>

1. Bilbo solved the following equation. He is incorrect. Circle two mistakes and explain why he is incorrect.

$$3(x+5) - (x+4) = 3$$

$$3x + 5 - x + 4 = 3$$

$$3x - x + 5 + 4 = 3$$

$$2x + 9 = 3$$

$$3 + 9 + 9$$

$$2x = 12$$

$$\div 2 \quad \div 2$$

$$x = 6$$

Error #1: Bilbo applied the distributed law incorrectly. He had to multiply 5 by 3 as well.
 $3(x+5) = 3x + 15$

Error #2: When we subtract a polynomial, we add the opposite. He only negated x but did not switch the sign of +4.
 $-(x+4) = -x - 4$

Error #3: Bilbo tried to eliminate +9 by adding 9. He was supposed to do inverse operation, subtract 9 from both sides.
 $2x + 9 = 3$
 $-9 \quad -9$

ANSWERS: a) x=-3, b) q=4, c) t=7, d) u=4, e) r=2, f) y=7.5, g) v=-4, h) y=2, i) w=17, j) m=-4, k) p=-2, l) 2nd line: just dropped the brackets for both polynomials. Should have 3x+15 - x - 4, AND 5th line + 9 (should have subtracted 9).