Math 8 Unit 3 worksheet: Equations with variables on both sides

Name _____ Date _____ Period _____

1. Solve each equation. Move the variable term with the smaller coefficient, then finish as a two-step equation.

(a) $6x + 5 = 2x + 29$ (b) $3k - 7 = 8k + 18$ (c) $15 - 2n = 4n - 9$ (d) $9p = 4p - 30$

(e) $-5w + 2 = -8w - 13$ (f) $1.4y + 6 = 0.6y + 10$ (g) $2z - 5 = 7z + 3$ (h) $0.5v - 4 = 2v + 2$

2. Solve each equation. Tidy each side first, then collect the unknown on one side.

(a) $3(x - 4) = 5x + 6$ (b) $2(a + 7) = 6(a - 3)$ (c) $4 - (b + 6) = 2(b - 7)$

(d) $6(c - 1) - 2c = 3(c + 2)$ (e) $\frac{5}{6}x - 3 = \frac{1}{3}x + 2$ (f) $\frac{1}{2}(8y - 6) = 5y + 9$

3. Kofi solved $7x + 4 = 3x - 8$ like this:

$7x + 4 = 3x - 8 \;\Rightarrow\; 4x + 4 = -8 \;\Rightarrow\; 4x = -4 \;\Rightarrow\; x = -1$

Find the step with the mistake and say what went wrong. Then give the correct solution and check it by substitution.

4. Hannah thinks of a number. Multiplying it by 2 and then adding 30 gives the same result as multiplying it by 5 and then subtracting 6. Write an equation, and find the number.

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5. A rectangle has length $(3x - 4)$ cm and width $(x + 6)$ cm.

(a) For what value of x is the rectangle a square? What is its area then?

(b) For what value of x is the length exactly twice the width? Give the length and width for that x.

6. To solve $12 - 5x = 3 - 2x$, Sofia says the term to move is $-2x$, "because 2 is smaller than 5."

(a) Which x term has the smaller coefficient? Explain.

(b) Solve the equation by moving that term, and check your answer.

7. Two candles are lit at the same moment. The first is 16 cm tall and burns down 3 cm each hour. The second is 8 cm tall and burns down 1 cm each hour. After how many hours are the two candles the same height, and what is that height?

8. An equilateral triangle has sides of length $(2x + 3)$ cm. A square has sides of length $(x + 4)$ cm. The two shapes have the same perimeter. Find x, the side length of each shape, and the common perimeter.

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