

## ALGEBRA

Name: \_\_\_\_\_

1) Write an equation for each sentence: (2 points)

- a. Five subtracted from four times a number is equal to nine.
- b. Twenty-two is twice a number increased by eight.
- c. The difference between a number and eleven is equal to five squared.
- d. Half a number minus six is equal to thirteen.

2) Collect like terms: (1 point)

- a.  $(3x - 2) - (5x - 4) =$
- b.  $11a - 2b - (a - b) - 7a =$
- c.  $3x - 5 - 2(4 + 3x) =$
- d.  $(a + b) - (-3a + 2b) =$

3) Work out and simplify: (2 points)

- a)  $\frac{8}{5} - \frac{1}{2} \times \frac{4}{5} + \frac{3}{10} =$
- b)  $\frac{3}{11} - \left( \frac{5}{11} - \frac{3}{4} \right) + \frac{3}{2} \div \frac{11}{3} =$

4) Solve each equation and check: ( 4 points)

- a.  $5x - 6 = 3x - 8$
- b.  $\frac{8+x}{5} = 7$
- c.  $2x - 3(x+1) = 9 + 5x$
- d.  $3x - (1 - 4x) - 2x = 3 + x$
- e.  $-x - 2(1 - x) = 10 + 5x$
- f.  $x - (2x + 5) + (x - 3) = 2x - 10$

## SOLUTIONS

1) Write an equation for each sentence:

a. Five subtracted from four times a number is equal to nine.  $4x - 5 = 9$

b. Twenty-two is twice a number increased by eight.  $22 = 2x + 8$

c. The difference between a number and eleven is equal to five squared.

$$x - 11 = 5^2 \rightarrow x - 11 = 25$$

d. Half a number minus six is equal to thirteen.  $\frac{x}{2} - 6 = 13$

2) Collect like terms:

a.  $(3x - 2) - (5x - 4) = 3x - 2 - 5x + 4 = -2x + 2$

b.  $11a - 2b - (a - b) - 7a = 11a - 2b - a + b - 7a = 3a - b$

c.  $3x - 5 - 2(4 + 3x) = 3x - 5 - 8 - 6x = -3x - 13$

d.  $(a + b) - (-3a + 2b) = a + b + 3a - 2b = 4a - b$

3) Work out and simplify:

a)  $\frac{8}{5} - \frac{1}{2} \times \frac{4}{5} + \frac{3}{10} = \frac{8}{5} - \frac{4}{10} + \frac{3}{10} = \frac{16 - 4 + 3}{10} = \frac{15}{10} = \frac{3}{2}$

b)  $\frac{3}{11} - \left( \frac{5}{11} - \frac{3}{4} \right) + \frac{3}{2} \div \frac{11}{3} = \frac{3}{11} - \frac{20 - 33}{44} + \frac{9}{22} = \frac{3}{11} + \frac{13}{44} + \frac{9}{22} =$   
 $= \frac{12}{44} + \frac{13}{44} + \frac{18}{44} = \frac{43}{44}$

4) Solve each equation and check:

a.  $5x - 6 = 3x - 8 \rightarrow 5x - 3x = -8 + 6 \rightarrow 2x = -2 \rightarrow x = -1$

Checking:  $5 \cdot (-1) - 6 = 3 \cdot (-1) - 8 \rightarrow -5 - 6 = -3 - 8 \rightarrow -11 = -11$

b.  $\frac{8+x}{5} = 7 \rightarrow 8+x = 35 \rightarrow x = 35-8 \rightarrow x = 27$

Checking:  $\frac{8+27}{5} = 7 \rightarrow \frac{35}{5} = 7 \rightarrow 7 = 7$

c.  $2x - 3(x+1) = 9 + 5x \rightarrow 2x - 3x - 3 = 9 + 5x \rightarrow 2x - 3x - 5x = 9 + 3$

$$-6x = 12 \rightarrow x = \frac{12}{-6} \rightarrow x = -2$$

$$\text{Checking: } 2 \cdot (-2) - 3(-2 + 1) = 9 + 5 \cdot (-2) \rightarrow -4 - 3 \cdot (-1) = 9 - 10$$

$$-4 + 3 = 9 - 10 \rightarrow -1 = -1$$

$$\text{d. } 3x - (1 - 4x) - 2x = 3 + x \rightarrow 3x + 4x - 5 - 2x = 3 + x \rightarrow 3x + 4x - 2x - x = 3 + 1$$

$$4x = 4 \rightarrow x = 1$$

$$\text{Checking: } 3 \cdot 1 - (1 - 4 \cdot 1) - 2 \cdot 1 = 3 + 1 \rightarrow 3 - (1 - 4) - 2 = 4$$

$$\text{e. } -x - 2(1 - x) = 10 + 5x \rightarrow -x - 2 + 2x = 10 + 5x \rightarrow -2 - 10 = 5x + x - 2x$$

$$-12 = 4x \rightarrow x = -\frac{12}{4} \rightarrow x = -3$$

$$\text{Checking: } -(-3) - 2 \cdot (1 - (-3)) = 10 + 5 \cdot (-3) \rightarrow 3 - 2 \cdot (1 + 3) = 10 - 15$$

$$3 - 2 \cdot 4 = -5 \rightarrow 3 - 8 = -5 \rightarrow -5 = -5$$

$$\text{f. } x - (2x + 5) + (x - 3) = 2x - 10 \rightarrow x - 2x - 5 + x - 3 = 2x - 10$$

$$x - 2x + x - 2x = -10 + 5 + 3 \rightarrow -2x = -2 \rightarrow x = \frac{-2}{-2} \rightarrow x = 1$$

$$\text{Checking: } 1 - (2 \cdot 1 + 5) + (1 - 3) = 2 \cdot 1 - 10 \rightarrow 1 - 7 - 2 = 2 - 10 \rightarrow -8 = -8$$