

## Part I

1. Simplify  $4 + 3(5 - 3 + 1) - 12 \div 3 \cdot (-2) =$

(a) 5

(b) 21

(c) 11

(d) 9      Correct answer: **B**

2. The difference between two numbers is 12. The sum of the smaller number and twice the larger number is 54. Find the larger number.

(a) 22

(b) 20

(c) 18

(d) 16      Correct answer: **A**

3. Simplify:  $(x - 3y) - (2x - y) =$

(a)  $3x - 4y$

(b)  $3x - 2y$

(c)  $-x - 4y$

(d)  $-x - 2y$       Correct answer: **D**

4. The perimeter of a rectangular carpet is 42 feet. The width is half the length. Find the width of the carpet.

(a) 6 feet

(b) 7 feet

(c) 8 feet

(d) 10 feet      Correct answer: **B**

5. Solve:  $-6(t + 3) + 2(5 - t) = -9$

(a)  $\frac{11}{8}$

(b)  $\frac{17}{8}$

(c)  $\frac{22}{7}$

(d)  $\frac{1}{8}$       Correct answer: **D**

6. When three times a number is subtracted from fifteen, the result is twice the number. Find the number.

(a)  $-2$

(b)  $3$

(c)  $5$

(d)  $1$       Correct answer: **B**

7. Solve the equation  $2(x + 1) - 3(x - 2) = x + 6$

(a)  $-5$

(b)  $-\frac{1}{2}$

(c)  $-3$

(d)  $1$       Correct answer: **D**

8.  $\frac{2}{15} - 1\frac{1}{5} \cdot \frac{2}{3} =$

(a)  $-\frac{32}{45}$

(b)  $-\frac{2}{3}$

(c)  $0$

(d)  $-\frac{4}{15}$       Correct answer: **B**

9. Solve the inequality  $(3 - 2x) - 2(x + 1) \leq -x + 16$ , Solution is:  $[-5, \infty)$

(a)  $x \leq -5$

(b)  $x \leq -3$

(c)  $x \geq -\frac{11}{3}$

(d)  $x \geq -5$       Correct answer: **A**

10. Simplify  $|2 - 3|-2^2 + 1| =$

(a)  $13$

(b)  $7$

(c)  $5$

(d)  $3$       Correct answer: **B**

11. Solve the formula  $2x - 5y = 100$  for  $y$

(a)  $y = \frac{2}{5}x - 20$

(b)  $y = \frac{2}{5}x + 20$

(c)  $y = -\frac{2}{5}x - 20$

(d)  $y = -\frac{2}{5}x + 20$       Correct answer: **A**

## Part II

1. Simplify each of the following. Show all steps.

(a)  $\left|(-3)^3 + 4(5)\right| - \left|-2^2 - 3(-5)\right| = -4$

(b)  $-\left|-2^2 - (-2)^2\right| = -8$

(c)  $\frac{-3(12 - 7 + 1)}{-(-3 + 2)} + \frac{17 - 3^3}{14 - 4^2} = -13$

(d)  $\frac{4 + 3(9 - 2 + 1)}{4^2 - (-3)^2} = 4$

(e)  $\frac{-\left(1\frac{7}{8}\right) + \left(-1\frac{1}{2}\right)^2}{-\frac{1}{6} + \frac{2}{3}} = \frac{3}{4}$

(f)  $|-2 - |7|| = 9$

(g)  $|-2|-7|| = 14$

2. Evaluate the expression  $\frac{-t + 15 - 2t^2}{-2t + 5}$  if

(a)  $t = 0$     **3**

(b)  $t = 1$     **4**

(c)  $t = 7$     **10**

(d)  $t = -3$    **0**

(e)  $t = 2\frac{1}{2}$    **undefined**

(f)  $t = -\frac{1}{2}$     **$\frac{5}{2}$**

3. Solve each of the following equations. Make sure to check your solutions.

(a)  $\frac{2x+1}{3} - \frac{1-5x}{7} = 2x-6$  **10**

(b)  $5(2x-1) - 3(4x-7) = -2x+1$  **no solution**

(c)  $\frac{2}{3}x - \frac{3}{5} = 3\frac{2}{5}$  **6**

(d)  $3 - \frac{x+1}{5} = -x-6$  **6**

(e)  $-x+5(x-2) = 4(x-3)+2$  **identity, all numbers are solution**

4. Solve each of the following inequalities.

(a)  $7 - 6(2x-1) > 2(2x+7) - 17$   **$x < 1$**

(b)  $3 - (x+1) \leq 17$   **$x \geq -15$**

(c)  $6 - \frac{5x-1}{7} < x+1$   **$x > 3$**

5. Solve each of the formulas.

(a)  $3a+2b=24$  for  $a$ .  **$a = -\frac{2}{3}b+8$**

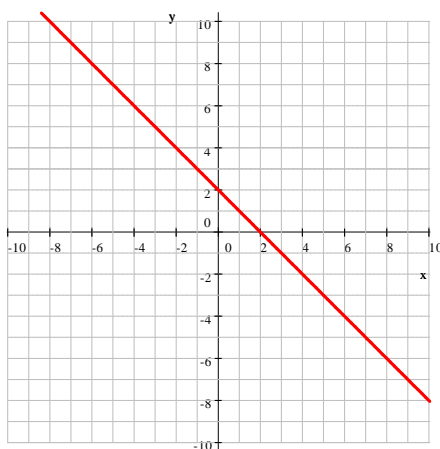
(b)  $3a+2b=24$  for  $b$ .  **$b = -\frac{3}{2}a+12$**

(c)  $3(x-1) - (y+3) = x-2y$  for  $x$ .  **$x = -\frac{1}{2}y+3$**

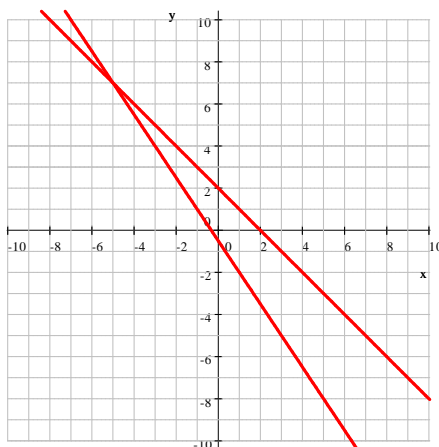
(d)  $3(x-1) - (y+3) = x-2y$  for  $y$ .  **$y = -2x+6$**

6. Graphing.

(a) Graph the straight line determined by the equation  $y = -x + 2$ .



- (b) Graph the straight line determined by the equation  $3x + 2y = -1$ , in the same coordinate system.



- (c) Use your graph to determine the points where these lines intersect.  $(-5, 7)$   
 (d) Use algebraic methods to check your solution.

Solution: The point  $(-5, 7)$  is on the line  $y = -x + 2$  if its coordinates are a solution of the equation. We check:

$$\begin{aligned} \text{LHS} &= 7 \\ \text{RHS} &= -(-5) + 2 = 5 + 2 = 7 \end{aligned}$$

Thus  $(-5, 7)$  is on the line  $y = -x + 2$ .

The point  $(-5, 7)$  is on the line  $3x + 2y = -1$  if its coordinates are a solution of the equation. We check:

$$\begin{aligned} \text{LHS} &= 3(-5) + 2(7) = -15 + 14 = -1 \\ \text{RHS} &= -1 \end{aligned}$$

Thus  $(-5, 7)$  is on the line  $3x + 2y = -1$ .

Since this point is on both lines, it must be the point of intersection.

#### 7. Word problems.

- (a) The difference between two numbers is 31, their sum is 23. Find these numbers.  $-4$  and  $27$   
 (b) One side of a rectangle is 7 in shorter than twice the other side. Find the length of the sides if the perimeter of the rectangle is 52 in.  $11$  in and  $15$  in  
 (c) The age of a father is 5 more than three times his son's age. The sum of their ages is 49. How old are they?  $11$  and  $38$