

Part I

1. Find the equation of the straight line passing through the points $(2, -5)$ and $(5, 4)$.

(a) $y = -3x + 1$

(b) $y = 3x - 11$

(c) $y = \frac{1}{3}x - \frac{17}{3}$

(d) $y = -\frac{1}{3}x - \frac{13}{3}$

Solution: **b)**

2. Perform the operation and simplify. $\frac{x^2 - 5x + 78}{18x + x^2 - 208} - \frac{x}{x + 26}$

(a) $\frac{8}{x + 26}$

(b) $\frac{-2x}{x - 26}$

(c) $\frac{x}{x - 8}$

(d) $\frac{3}{x - 8}$

Solution: **d)**

3. Solve the system of linear equations shown below.

$$\frac{1}{2}x - \frac{2}{3}y = 25$$

$$\frac{1}{3}x + \frac{1}{6}y = 2$$

(a) $(18, -24)$

(b) $(-18, -51)$

(c) $(24, -36)$

(d) $(-6, -42)$

Solution: **a).**

4. Simplify $\frac{2ax + 6ay - bx - 3by}{6ax - 2ay - 3bx + by}$

(a) $\frac{x + 3y}{3x - y}$

(b) $\frac{x - 3y}{3x + y}$

(c) $\frac{x+y}{x-y}$

(d) $\frac{x-y}{x+y}$

Solution: **a**).

5. Find the equation of the straight line that passes through the point $(3, 3)$ and is perpendicular to the line $2x + y = 7$.

(a) $y = -2x + 9$

(b) $y = \frac{1}{2}x + \frac{13}{2}$

(c) $y = -2x - \frac{7}{2}$

(d) $y = \frac{1}{2}x + \frac{3}{2}$

Solution: **d**).

6. Simplify $1 - \frac{1}{1 - \frac{1}{x-3}}$.

(a) $\frac{1}{x-2}$

(b) $\frac{2x-7}{x-4}$

(c) $-\frac{1}{x-4}$

(d) $-\frac{1}{x+2}$

Solution: **c**).

7. The solution set of the equation $x^3 = 24x^2 + 217x$

(a) $\{-7, 0, 7\}$

(b) $\{-31, 31\}$

(c) $\{-7, 0, 31\}$

(d) there is no solution, the solution set is \emptyset .Solution: **c**).

8. Perform the operation and simplify. $\frac{(2p)^3 - 27}{x^2 - 49} \div \frac{6p + 4p^2 + 9}{14p - 3x + 2px - 21}$

(a) $\frac{1}{x+7}$

(b) $\frac{(2p-3)^2}{x-7}$

(c) $2p - 3$

(d) $x - 7$

Solution: b)

Part II

1. Simplify each of the following expressions.

(a) $\frac{5 - \frac{1}{a}}{\frac{1}{a^2} - 25} = -\frac{a}{5a + 1}$

(b) $\frac{30ax^2 - 2ax - 4a}{4b - 22bx + 30bx^2} = 3(x - y)$

2. Completely factor each of the following.

(a) $ax^4 - 9ay^2 + 18by^2 - 2bx^4 = (a - 2b)(x^2 + 3y)(x^2 - 3y)$

(b) $5p^4t^2 - 5q^4t^2 = 5t^2(p^2 + q^2)(p + q)(p - q)$

(c) $3a^3m - a^3n + 3b^3m - b^3n = (a + b)(a^2 - ab + b^2)(3m - n)$

(d) $15a^2cd - 33abcd + 6b^2cd = 3cd(a - 2b)(5a - b)$

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

(a) $35x^3 - 65x^2 = 10x \quad 2, 0, -\frac{1}{7}$

(b) $\frac{3 - x}{4} - \frac{10 - 3x}{5} = x + 2 \quad -5$

(c) $|3x + 1| - 7 = 1 \quad -3, \frac{7}{3}$

(d) $|3x + 1| - 1 = -11 \quad \text{no solution.}$

(e) $(x + 4)(1 - 2x) = 3x - 2(x - 3)^2 \quad 1$

(f) $3(x - 5) - 5(x - 1) = -2x + 1 \quad \text{no solution}$

(g) $\left| \frac{1}{2}x - 3 \right| - 2 = -23 \quad \text{no solution}$

(h) $\left| \frac{1}{2}x - 3 \right| - 2 = 23 \quad -44, 56$

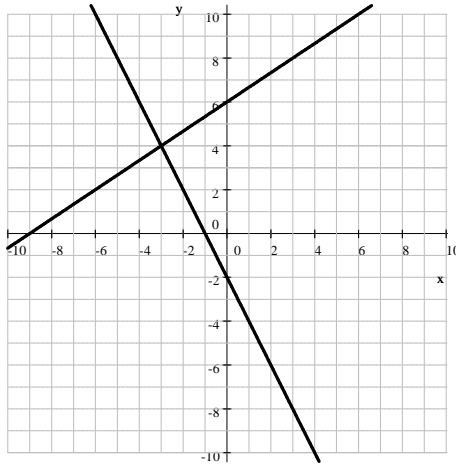
4. Solve each of the following inequalities.

(a) $-3 < -\frac{1}{2}x + 7 \leq 5 \quad [4, 20).$

(b) $-7 > -2x - 11 \geq -31$ $(-2, 10]$.

5. Graph the straight lines $2x - 3y = -18$ and $2x + y = -2$ in the same coordinate system.

(a) Use your graph to find the coordinates of the point where the lines intersect. $(-3, 4)$



(b) Use algebraic methods to check your solution.

$$2(-3) - 3(4) = -6 - 12 = -18 \implies \text{the point } (-3, 4) \text{ is on the first line}$$

$$2(-3) + (4) = -6 + 4 = -2 \implies \text{the point } (-3, 4) \text{ is on the second line}$$

6. Solve the system of linear equations. Make sure to check your solution. $(-2, 5)$.