

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

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

3. Solve the system of linear equations shown below.

$$\begin{aligned}\frac{1}{2}x - \frac{2}{3}y &= 25 \\ \frac{1}{3}x + \frac{1}{6}y &= 2\end{aligned}$$

(a) $(18, -24)$

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

(c) $(24, -36)$

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

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

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

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

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 .

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) $x - 7$

Part II

1. Simplify each of the following expressions.

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

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

2. Completely factor each of the following.

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

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

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

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

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

$$(a) 35x^3 - 65x^2 = 10x$$

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

$$(c) |3x+1| - 7 = 1$$

$$(d) |3x+1| - 1 = -11$$

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

$$(f) 3(x-5) - 5(x-1) = -2x+1$$

$$(g) \left| \frac{1}{2}x - 3 \right| - 2 = -23$$

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

4. Solve each of the following inequalities.

$$(a) -3 < -\frac{1}{2}x + 7 \leq 5$$

$$(b) -7 > -2x - 11 \geq -31$$

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.

(b) Use algebraic methods to check your solution.

6. Solve the system of linear equations. Make sure to check your solution.