

Part I

1. The equation of the line passing through the points $(0, 4)$ and $(1, 6)$ is

- (a) $y = 2x + 4$
- (b) $y = -\frac{1}{2}x + 4$
- (c) $y = \frac{1}{2}x + 4$
- (d) $y = -2x + 8$ **A**

2. Perform the operation(s) and simplify.

$$\frac{a^2x^2 - a^2y^2 - 25b^2x^2 + 25b^2y^2}{ax + ay - 5bx - 5by} \div \frac{ax - ay + 5bx - 5by}{3x - y}$$

- (a) $\frac{(y - 3x)(5b - a)}{a + 5b}$
- (b) $\frac{(y - 3x)(x + y)}{y - x}$
- (c) $5b - a$
- (d) $3x - y$ **D**

3. If the point (x, y) is the solution of the system

$$\begin{aligned} 5x + 6y &= 15 \\ 4x - 3y &= -27 \end{aligned}$$

then x is equal to

- (a) 3
- (b) 5
- (c) -3
- (d) -5 **C**

4. Simplify $\frac{1 - \frac{1}{x-1}}{1 + \frac{1}{x-1}}$

- (a) $\frac{x-2}{x}$
- (b) 1
- (c) -1
- (d) $\frac{x^2 - x - 1}{x^2 - x + 1}$ **A**

5. Simplify

$$\frac{1}{a-2} - \frac{9-a}{3a+a^2-10}$$

(a) $-\frac{4}{a^2+3a-10}$

(b) $\frac{2}{a+5}$

(c) $\frac{-8-a}{(a-2)(a^2+3a-10)}$

(d) $2(a-2)^2$ **B**

6. Solve $|2x-3|-7=-2$

(a) -3 and 6

(b) -1 and 4

(c) -4 and 1

(d) No solution **B**

7. Simplify

$$\frac{2abx^2-2ab}{4ax-7a+3ax^2}$$

(a) $\frac{2abx}{x-3}$

(b) $\frac{2b(x-1)}{3x-7}$

(c) $\frac{2b(x+1)}{3x+7}$

(d) $\frac{-2ab}{3a+x}$ **C**

8. Completely factor

$$8p^3+1$$

(a) $(2p-1)(4p^2+2p+1)$

(b) $(2p+1)^3$

(c) $(2p-1)(2p+1)(2p-1)$

(d) $(2p+1)(4p^2-2p+1)$ **D**

9. Solve the formula $\frac{3c}{b-2} = \frac{2}{a} - \frac{c}{b}$ for a .

(a) $\frac{2b(b-2)}{c(2b+1)}$

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

(c) $\frac{2b^2 - 4b + 6c^2}{c(b-2)}$

(d) $\frac{b}{c(2b+1)}$ **B**

10. Find the domain of the function $f(x) = \frac{x-2}{5x^2-14x-3}$

(a) all real numbers, except $x \neq 3$ and $x \neq -\frac{1}{5}$

(b) all real numbers

(c) all real numbers, except $x \neq 3$ and $x \neq -\frac{1}{5}$ and $x \neq 2$

(d) all real numbers, except $x \neq -3$ and $x \neq \frac{1}{5}$ **A**

Part II

1. Simplify each of the following expressions.

$$(a) \frac{ax^2 - 18b - 9a + 2bx^2}{ax - 6b - 3a + 2bx} = x + 3$$

$$(b) \frac{2 - \frac{3}{x+1}}{3 - \frac{2x}{x+1}} = \frac{2x-1}{x+3}$$

$$(c) \frac{x}{x-5} - \frac{x-2}{5-x} = \frac{2(x-1)}{x-5}$$

$$(d) \frac{64x^3 - 1}{19x + 4x^2 - 5} \div \frac{4x + 16x^2 + 1}{x^2 - 6x - 55} = x - 11$$

$$(e) \frac{10b + 10}{2b + b^2 - 3} - \frac{2 - b}{b + 3} = \frac{b + 4}{b - 1}$$

2. Completely factor each of the following.

$$(a) ax^2 - 4ay^2 + 2bx^2 - 8by^2 = (x - 2y)(x + 2y)(a + 2b)$$

$$(b) 30a^3b - 6ab^3 - 3a^2b^2 = 3ab(2a - b)(5a + 2b)$$

$$(c) 16q^3t^2 - 2t^2 = 2t^2(2q - 1)(4q^2 + 2q + 1)$$

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

$$(a) \frac{2x-4}{7} - \frac{3-x}{2} = 2x+4 \quad -5$$

$$(b) \frac{8}{x-3} - \frac{10}{x+3} = 1 \quad -9, 7$$

$$(c) 1 - \frac{1}{x-3} = \frac{x-4}{x+2} \quad 4$$

$$(d) 15x^2 + 6x^3 = 9x \quad \frac{1}{2}, 0, -3$$

$$(e) \left| \frac{3}{4}x - 2 \right| - 1 = 7 \quad -8, \frac{40}{3}$$

$$(f) |2x - 1| - 5 = 30 \quad -17, 18$$

$$(g) |2x - 1| - 5 = -30 \quad \text{No solution}$$

4. Solve each of the following formulas.

$$(a) y = \frac{x-2}{3x+4} \quad \text{for } x. \quad x = \frac{4x+2}{-3x+1}$$

$$(b) \frac{1}{a} = \frac{1}{b-1} + \frac{1}{b+1} \quad \text{for } a. \quad a = \frac{b^2-1}{2b}$$

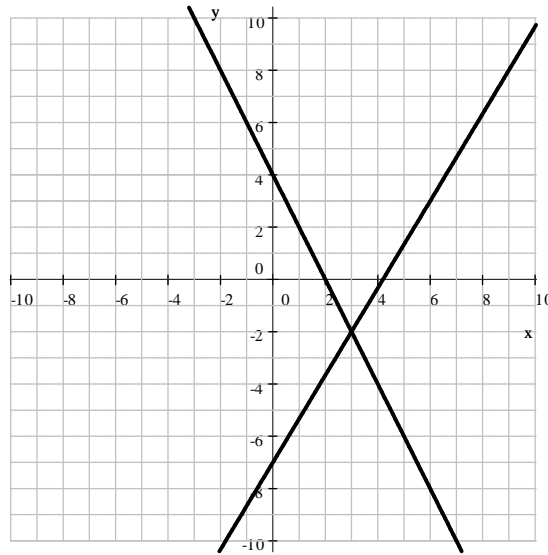
$$(c) C = \frac{5F-160}{9} \quad \text{for } F. \quad F = \frac{9}{5}C + 32$$

5. Solve each of the following inequalities

(a) $-8 \leq 2x + 12 \leq 14$ $-10 \leq x \leq 1$

(b) $-8 \leq -2x + 12 < 14$ $-1 < x \leq 10$

6. Graph the straight lines $5x - 3y = 21$ and $2x + y = 4$ in the same coordinate system.



(a) Use your graph to find the coordinates of the point where the lines intersect. $(3, -2)$

(b) Use algebraic methods to check your solution.

The point $(3, -2)$ is on the line $5x - 3y = 21$ since when substituting its coordinates, the equal sign is true.

$$\text{LHS} = 5(3) - 3(-2) = 15 + 6 = 21 = \text{RHS}$$

The point $(3, -2)$ is on the line $2x + y = 4$ since when substituting its coordinates, the equal sign is true.

$$\text{LHS} = 2(3) + (-2) = 6 - 2 = 4 = \text{RHS}$$

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

7. Solve the system of linear equations. Make sure to check your solution. $(-3, 7)$

$$3x + 5y = 26$$

$$2x + 3y = 15$$

8. Word problems.

(a) We have invested \$ 4000 into two bank accounts. One account earns 7% interest per year, the other account earns 5% interest per year. How much did we invest at 5% if the combined interest for the accounts was \$ 244? \$ 1800

(b) One number is one less than twice the other. The product of these numbers is 120. Find these numbers. $-\frac{15}{2}, -16$ and $8, 15$

- (c) One side of a rectangle is 3 in longer than twice the other side. The numerical value of the area is 29 larger than the numerical value of the perimeter. Find the sides. **5 in by 13 in**
- (d) We have 42 coins, all dimes and quarters. The total value of these coins is \$ 7.65. How many quarters, how many dimes? **19 dimes and 23 quarters**
- (e) A person is standing 40 ft away from a street light that is 30 ft tall. How tall is he if his shadow is 10 ft long? **6 ft**
- (f) Steve took four exams. His scores on the first three exams were 83, 71, and 93. What was the score given for his fourth exam if the average score of the four exams was 84? **89**