1.0 How do we solve equations and inequalities?

Do Now: Solve for all values of $x$ in the equations below.

1. $9x + 8 = 3x - 10$

2. $\frac{5x + 9}{2} = 12$

- **Standard Form:** $Ax + By = C$
  where $A$ and $B$ are not both zero
- **Slope-Intercept Form:** $y = mx + b$
  where $m = \text{slope}$ and $b = \text{y-intercept}$
- Let $(x_1, y_1)$ and $(x_2, y_2)$ be two points in the plane.
  $$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

Solve for $x$:

1) $-4(3 - x) = 8$

2) $3x - 2(x + 1) = 0$

Solve the system of equations:

3) $-2x + y = 8$
   $$y = -3x - 2$$

Factor each of the following polynomials:

4) $x^2 - x - 72$

5) $10m^3n^2 - 15m^2n$
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<table>
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<tbody>
<tr>
<td>6) $x^2 + 12x + 36$</td>
<td>7) $x^2 - 64$</td>
</tr>
<tr>
<td>8) $a^2 - 10a + 24$</td>
<td>9) $3x^2 + 18x + 27$</td>
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Solve the following quadratic equations:

10) $(x + 1)(x + 3) = 0$

11) $p^2 + 6p = 0$

Simplify each of the following:

12) $(-3x^2 + 4x - 7) + (2x^2 - 7x + 8)$

13) $(-4a^3 + 2a^2 - a - 7) - (3a^3 - 2a^2 - a + 8)$

14) $(x + 7)(x + 5)$

15) $-3xy^2(x - 2y)$
16) \((15a^4b^2c)^0\)

17) \((8a^3b^2)(2a^{-4}b^5)\)

18) \(\frac{(3x^2y)^3}{6x^{-2}y^5}\)

19) \((x + 6)^2\)

Graph each of the following without using a calculator.

20) \(y = -\frac{3}{4}x + 4\)

21) \(y = -3x\)

Perform the given operations with fractions WITHOUT using a calculator. Show all work and simplify your final answer.

25) \(\frac{1}{2} + \frac{1}{4}\)

26) \(2\left(\frac{3}{4}\right)\)

27) \(\frac{3}{4} - \frac{5}{7}\)
28) \(\frac{17}{5} + \frac{2}{10}\)  
29) \(\frac{1}{x} + \frac{5}{x}\)  
30) \(\frac{5}{2} \cdot \frac{1}{4}\)  

31) \(\frac{2}{3} + 8\)  
32) \(\sqrt{\frac{9}{16}} + 5\)  
33) \(\left(\frac{5}{6} + \frac{2}{10}\right) - 2\left(\frac{1}{4}\right)\)

Answer the following questions concerning linear equations.

34) Determine the slope of the line containing the points (6,-2) and (-1,5).

35) Determine an equation for a line with slope \(\frac{1}{2}\) and y-intercept at (0, -3).

36) Solve the system of equations:
\[-x + 3y = 0\]
\[2x + 6y = 12\]

37) Find the area of a square whose diagonal is equal to 4x.

38) Is (0,-5) a solution to the following system of inequalities? 6 + 3y < 4(3 - x)
39) A car salesman’s weekly salary is a base amount plus an additional amount for each car sold. The table below shows a person’s weekly salary earned for the last three weeks.

<table>
<thead>
<tr>
<th>Cars sold (c)</th>
<th>Weekly Salary (S)</th>
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<tbody>
<tr>
<td>4</td>
<td>$500</td>
</tr>
<tr>
<td>9</td>
<td>$1000</td>
</tr>
<tr>
<td>12</td>
<td>$1300</td>
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What is the person’s weekly salary when 13 cars are sold? Justify your answer.

40) Sketch a graph of \( f(x) = x^2 - x - 2 \). Then complete the characteristics below.

- Domain:
- Range:
- Axis of Symmetry:
- Increases:
- Decreases:
- x-intercepts:
- y-intercept:
- Minimum Value:
- Maximum Value:
- Continuous:

41) Determine \( \sin T \).

42) Determine \( \tan A \).