Show all your work to get full/partial credit. Simplify your answers as much as possible.

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Solve:
1. \(2y(y - 2) = 5\)
   \(2y^2 - 4y - 5 = 0\)
   \(y = \frac{4 \pm \sqrt{16 - (4)(2)(-5)}}{4}\)
   \(= \frac{4 \pm \sqrt{56}}{4}\)
   \(y = \frac{4 + \sqrt{56}}{4}\) or \(y = \frac{4 - \sqrt{56}}{4}\)

OR completing Square method

\(2 [(y - 1)^2 - 1] - 5 = 0\)
\(2 (y - 1)^2 - 7 = 0\)
   \(y - 1 = \pm \sqrt{\frac{7}{2}}\)
   \(y = 1 \pm \sqrt{\frac{7}{2}}\)

2. \(\sqrt{13 + 3x} = x + 1\)
   \(13 + 3x = x^2 + 2x + 1\)
   \(x^2 - x - 12 = 0\)
   \((x - 4)(x + 3) = 0\)
   \(x = 4 \text{ or } x = -3\)

Check \(x = 4\): \(\sqrt{13 + 3(4)} = \sqrt{25} = 4 + 1\)
   \(x = -3\): \(\sqrt{13 + 3(-3)} = \sqrt{4} = 2 \neq -3 + 1 = -2\)

Therefore, solution is \(\{4\}\)

3. \(-3 \leq \frac{1 - 2x}{3} \leq 5\)
   \(-9 \leq 1 - 2x \leq 15\)
   \(-10 \leq -2x \leq 14\)
   \(5 \geq x \geq -7\)

Solution: \([-7, 5]\) or \(\{x | -7 \leq x \leq 5\}\)
4. \(2 + |3w - 4| > 7\)
\(|3w - 4| > 5\)
\(3w - 4 > 5 \text{ or } 3w - 4 < -5\)
\(w > 3 \text{ or } w < -\frac{1}{3}\)
\((3, \infty) \cup (-\infty, -\frac{1}{3})\)

5. \(|3m + 5| = |m + 1|\)
\(3m + 5 = m + 1 \text{ or } 3m + 5 = -(m + 1)\)
\(2m = -4 \quad 4m = -6\)
\(m = -2 \quad m = -\frac{6}{4} = -\frac{3}{2}\)
Check:
\(m = -2 \quad |3(-2) + 5| = |1| = |-1|\)
\(m = -\frac{3}{2} \quad |3(-\frac{3}{2}) + 5| = \left|\frac{1}{2}\right| = \left|-\frac{3}{2} + 1\right| = \left|-\frac{1}{2}\right|\)
\((-2, -\frac{3}{2})\)

6. Given \(6x - 4y = 24\).
   a) Find x-intercept.
   \(6x = 24\)
   \(x = 4\)
   \(x - \text{intercept:}(4,0)\)
   b) Find y-intercept.
   \(-4y = 24\)
   \(y = -6\)
   \(y - \text{intercept:}(0,-6)\)

7. Given \(C = \{x|x < 9\}, D = \{x|x \geq -1\}, F = \{x|x < 2\}\), write the solutions below in interval notation.
   a) \(C \cup D = (-\infty, 9) \cup [-1, \infty)\)
   b) \(D \cap F = [-1, \infty) \cap (-\infty, 2)\)
   \((-\infty, \infty)\)

8. Consider the points \((-1,1)\) and \((2,-3)\).
   a) Find the distance between the given points.
   Distance = \(\sqrt{(2 - (-1))^2 + (1 - (-3))^2}\) = \(\sqrt{9 + 16} = 5\)
   b) Find the midpoint of the given points.
   Midpoint = \(\left(\frac{2 - 1}{2}, \frac{1 - 3}{2}\right) = \left(\frac{1}{2}, -1\right)\)

9. Consider \(f(x) = \sqrt{2x + 8}\).
   a) State the domain of \(f(x)\) in interval notation. \(\text{Domain of } f = [-4, \infty)\) because \(2x + 8 \geq 0\)
   b) Evaluate \(f(4)\).
   \(\sqrt{2(4) + 8} = 4\)
   \(x \geq -4\)
10. Write the equation of the circle in standard form \[ x^2 + y^2 + 6x - 2y + 6 = 0. \]

\[
\begin{align*}
(x + 3)^2 - 9 + (y - 1)^2 - 1 + 6 &= 0 \\
(x + 3)^2 + (y - 1)^2 - 4 &= 0
\end{align*}
\]

11. The area of a triangle is 15 sq. ft., where the base and height of the triangle are consecutive integers. Find the base and height of the triangle by using a model. Note: Area of triangle = \( \frac{1}{2} \) base \times height.

Let \( x \) be the base.

Then, \( 15 = \frac{1}{2} \times x \times (x + 1) \)

\[
\begin{align*}
30 &= x^2 + x \\
0 &= x^2 + x - 30 \\
0 &= (x + 6)(x - 5) \\
x &= -6 \text{ or } x = 5
\end{align*}
\]

Since \( x \) is a length base should be 5, hence height is 6

12. A tree is 20 ft. tall and casts a 30 ft. shadow. A light post, right beside the tree, casts a shadow that is 5 feet longer than the height of the light post.

a) Set up a model to determine the height \( x \) of the light post, as well as the length of its shadow.

\[
\frac{20}{30} = \frac{x}{x + 5}
\]

b) Solve the model in part a).

\[
\begin{align*}
30x &= 20x + 100 \\
10x &= 100 \\
x &= 10
\end{align*}
\]

Therefore, height = 10 ft, shadow = 15 ft