

1. Factor $3x^2 - 14x + 15$ by **completing the square**.

2. Simplify each of the following.

a) $\frac{\frac{1}{a} + \frac{1}{b}}{\frac{1}{b} - \frac{1}{a}}$

c) $3\sqrt{4}(4\sqrt{6} + 2\sqrt{2})$

e) $\frac{1}{\sqrt{5} - 2}$

b) $\left(\frac{3a^2b^{-3}a^0}{-2a^{-3}b^2}\right)^{-2}$

d) $\frac{a^2 - 5a - 6}{a^2 - 10a + 16} - \frac{3}{a - 8}$

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

a) $\left|\frac{x-3}{2}\right| - 1 = 1$

c) $|3x + 1| - 3 = 5$

b) $6x^2 + x^3 = 567x$

d) $(x-1)(x-2) + 7 = 4 - (3-x)(x-5)$

4. Solve the following system of linear equations.

$$3x - 2y = -5$$

$$3x + y = 7$$

5. Solve the inequality $\frac{3-4x}{3} - \frac{2x-3}{7} \geq -x+7$

6. If $f(x) = \frac{1}{2}x + 4$, find the coordinates of the

a) x -intercept.

b) y -intercept.

7. Find an equation of the straight line that is parallel to $y = 3x - 7$ and passes through the point $(3, 11)$.

8. Find an equation of the straight line that is perpendicular to $2x - 7y = 42$ and passes through the point $(2, 2)$.

9. Consider the points $A(-1, 8)$ and $B(4, -7)$.

(a) Find the distance between A and B .

(b) Find an equation of the line that passes through A and B .

10. Find the length of the diagonal in a rectangle with sides 4 m (meters) and 9 m long.

11. The shortest side of a right triangle is 7 m long. The difference between the other two sides is 1 m. Find the length of all sides in this triangle.

12. The hypotenuse of a right triangle is 34 units long. The difference between the other two sides is 14 units. Find the length of all sides in this triangle.

13. Graph the parabola $y = 8x - x^2 - 12$. Clearly indicate the coordinates of five points, including vertex and intercepts.