

1. Simplify each of the following.

$$(a) (3x - 7)^2 = 9x^2 - 42x + 49$$

$$(b) (2a^3 - 5b)(2a^3 + 5b) = 4a^6 - 25b^2$$

$$(c) \frac{2x - 7}{7 - 2x} = -1$$

$$(d) \frac{2x + 6}{18x - 2x^3} = \frac{1}{x(3 - x)}$$

$$(e) \frac{6xy - 2y - 3x + 1}{9x^2 - 1} = \frac{2y - 1}{3x + 1}$$

$$(f) \frac{3a - 12}{3a + 15} \cdot \frac{5a + 20}{a^2 - 16} = \frac{5}{a + 5}$$

$$(g) \frac{7x - 13}{2x - 5} - \frac{7 - x}{2x - 5} = 4$$

$$(h) \frac{(-3ab)^3 ab^3}{-3b^3 a^2 (3a^2 b)^2} = \frac{b}{a^2}$$

$$(i) (a + b)(a^4 - a^3b + a^2b^2 - ab^3 + b^4) = a^5 + b^5$$

$$(j) \sqrt{300} - 2\sqrt{75} + \sqrt{12} = 2\sqrt{3}$$

$$(k) (\sqrt{5} - 2)^2 = 9 - 4\sqrt{5}$$

$$(l) (\sqrt{5} - 2)^3 = 17\sqrt{5} - 38$$

2. Rationalize the denominator in each of the following expressions.

$$(a) \frac{4}{\sqrt{7}} = \frac{4\sqrt{7}}{7}$$

$$(b) \frac{1}{\sqrt{7} - 3} = -\frac{\sqrt{7} + 3}{2}$$

$$(c) \frac{1}{\sqrt{10} + 3} = \sqrt{10} - 3$$

3. Find the exact value of $x^2 - 6x + 1$ if $x = 3 - \sqrt{10}$. 2

4. Factor $2x^2 - 13x + 15$ by completing the square. $\frac{1}{2} \left(x - \frac{3}{2} \right) (x - 5) = (2x - 3)(x - 5)$

5. Factor completely each of the following:

$$(a) 2bnxy - 4anxy + 12anx^2 - 6bnx^2 = 2nx(2a - b)(3x - y)$$

$$(b) 75bm^3 - 150am^3 + 24am^5 - 12bm^5 = 3m^3(2a - b)(2m - 5)(2m + 5)$$

$$(c) 240a^5p - 160a^5q - 15apx^4 + 10aqx^4 = 5a(2q - 3p)(x^2 + 4a^2)(x - 2a)(x + 2a)$$

- (d) $8b^2 - 42b + 2b^3 = 2b(b - 3)(b + 7)$
 (e) $28a^2bp^2 - 2a^2bp - 6a^2b = 2a^2b(2p - 1)(7p + 3)$
 (f) $14m + 5m^2 - 3 = (5m - 1)(m + 3)$

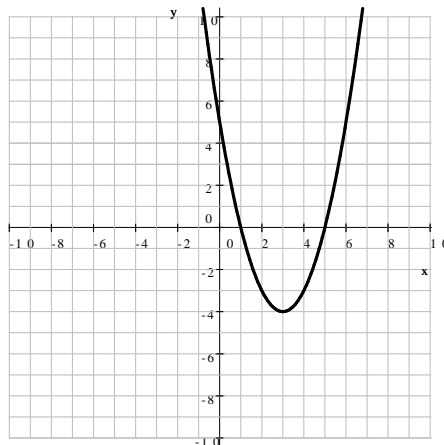
6. Solve each of the following equations. Make sure to check your solutions.

- (a) $\frac{3x - 1}{5} - \frac{7 - x}{3} = x - 2 \quad -8$
 (b) $5(x - 2) - (3 - 4x) = 8(x - 2) - (5 - x) \quad \text{identity, all numbers are solution}$
 (c) $5p^7 = 20p^6 \quad 0, 4$
 (d) $\frac{2a + 1}{5} - \frac{7 - a}{2} = -a - 9 \quad -3$
 (e) $\left| \frac{1}{3}x - 2 \right| - 5 = 11 \quad -42, 54$
 (f) $(3x - 8) - (4x - 5) = x - 3 \quad 0$
 (g) $\left| \frac{1}{3}x - 2 \right| + 11 = 5 \quad \text{no solution}$
 (h) $5p^7 = 20p^5 \quad -2, 0, 2$
 (i) $(-1 - 2x) - (3x + 5)(2x - 1) = 3(1 - 2x)(x - 1) + 7 \quad 0$
 (j) $m^2 + 55 = 16m \quad 5, 11$
 (k) $14 - (2x - 5)^2 = 2x - x(4x - 7) \quad 1$

7. Graph the straight lines $2x + y = 5$ and $y = -x + 1$ in the same coordinate system.

- (a) Use your graph to find the coordinates of the point where the lines intersect. $(4, -3)$
 (b) Use algebraic methods to check your solution for part a).

8. Graph the parabola $y = -6x + x^2 + 5$. Clearly label the coordinates of five points on the parabola, including vertex and intercepts.



9. Word Problems.

- (a) The population of a town has decreased by 10%. Now there are 7650 residents. Find the original population. **8500**
- (b) The difference between two numbers is 34, their sum is 20. Find these numbers. **-7, 27**
- (c) Ann and Betty are roommates. The monthly rent is \$ 980. The amount paid by Ann is \$ 130 less than twice the amount paid by Betty. How much do they each pay for rent? **\$ 370, 610**
- (d) The price of a TV is \$ 680. If this price was to be changed to \$ 442, what percent of a change does this represent? **35%**
- (e) One side of a rectangle is 5 ft shorter than twice the other side. Find the sides if the perimeter is 32 ft. **7 ft, 9 ft**
- (f) One side of a rectangle is 5 ft shorter than twice the other side. Find the sides if the area is 150 ft². **10 ft, 15 ft**
- (g) The hypotenuse of a right triangle is 82 cm. The difference between the other two sides is 62. cm. Find the sides of the triangle. **18 cm and 80 cm**

10. Find the distance between the points $A(3, -8)$ and $B(-5, 7)$. **17 units**