1. Simplify each of the following expressions.

   (a) $\dfrac{ab-a-b+1}{b^2-1} = \dfrac{a-1}{b+1}$

   (b) $\dfrac{5x-30}{x^2-36} \cdot \dfrac{3x+18}{5} = 3$

   (c) $\dfrac{px^2-16q-16p+qx^2}{x^2+5x+6} \cdot \dfrac{x^2+6x+9}{4px^2+px^3+4qx^2+qx^3} = \dfrac{(x+3)(x-4)}{x^2(x+2)} = \dfrac{x^2-x-12}{2x^2+x^3}$

   (d) $\dfrac{3x}{x-2} - \dfrac{x+4}{x-2} = 2$

   (e) $\sqrt{125} - 3\sqrt{80} + \sqrt{45} = -4\sqrt{5}$

   (f) $\left(\sqrt{7}-2\right)^2 = 11-4\sqrt{7}$

   (g) $\left(\sqrt{3}-1\right)^3 = -10+6\sqrt{3}$

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

   (a) $\dfrac{3}{\sqrt{5}} = \dfrac{3\sqrt{5}}{5}$

   (b) $\dfrac{1}{\sqrt{10}-3} = \sqrt{10}+3$

   (c) $\dfrac{2}{\sqrt{7}+1} = \dfrac{\sqrt{7}-1}{3}$

3. Find the exact value of x^2-4x+6 if $x = 2-\sqrt{3}$. 5

4. Factor $13x+2x^2-24$ by completing the square. $2(x+8)\left(x-\dfrac{3}{2}\right) = (x+8)(2x-3)$

5. Factor completely each of the following:

   (a) $4a^2mn-15abm^2-6abmn+10a^2m^2 = am(2n+5m)(2a-3b)$

   (b) $a^2x^3-b^2x-a^2x+b^2x^3 = x(a^2+b^2)(x+1)(x-1)$

   (c) $162a+162b-2ax^4-2bx^4 = 2(9+x^2)(3+x)(3-x)(a+b)$

   (d) $x^2-6x+8 = (x-2)(x-4)$

   (e) $3a^2-5a-2 = (a-2)(3a+1)$

   (f) $4b^2-b-5 = (4b-5)(b+1)$

6. Solve each of the following equations. Make sure to check your solution(s).

   (a) $2x^3 = 20x^2 + 1750x$ $35, 0,$ and -25

   (b) $\dfrac{3x+17}{2} = x - 1 + \dfrac{x+19}{2}$ identity, all real numbers are solution

   (c) $|3 - 2x| + 2 = 5$ 0 and 3

   (d) $\dfrac{2}{3}(x-7) = \dfrac{4}{5}(x+1)$ -41

   (e) $7x^2 + (x+3)(2x-1) = (3x+1)^2$ -4

   (f) $8a + 2a^2 = 42$ $-7, 3$

   (g) $8x^3 = 50x^2$ $\dfrac{25}{4}, 0$

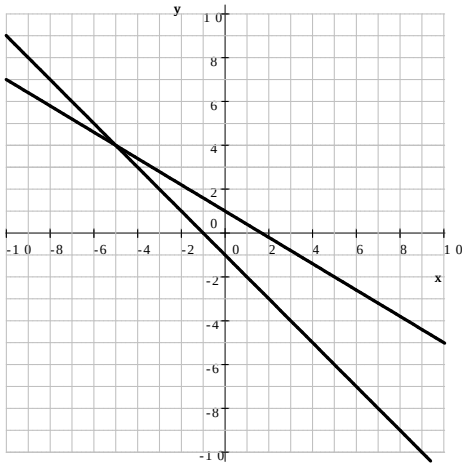
   (h) $8p^3 = 50p$ $-\dfrac{5}{2},\ 0,\ \dfrac{5}{2}$

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

   (j) $x^2 = 4x + 1.$ $2+\sqrt{5},\ 2-\sqrt{5}$

   (k) $4x^2 + 20x + 7 = 0$ $\dfrac{-5+\sqrt{18}}{2},\ \dfrac{-5-\sqrt{18}}{2}$

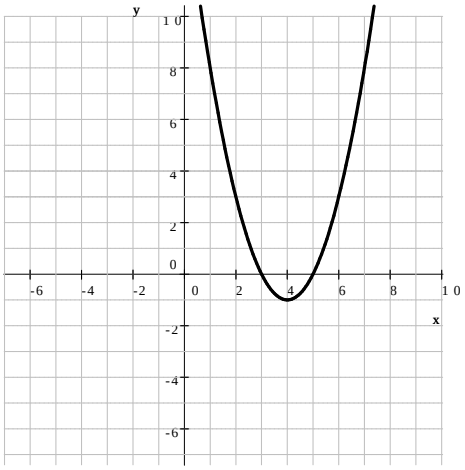
7. Graph the straight lines $3x + 5y = 5$ and $y = -x - 1$ in the same coordinate system. Use your graph to find the coordinates of the point where the lines intersect. $(-5, 4)$



8. Find an equation of the straight line that is parpendicular to $2x - 3y = -6$ and passes through the point $(-12, 5)$. $y = -\dfrac{3}{2}x - 13$

9. Find an equation of the straight line that passes through the points $(2, 7)$ and $(-2, -5)$. $y = 3x + 1$

10. Graph the parabola $y = -8x + x^2 + 15$. Clearly label the coordinates of five points on the parabola, including vertex and intercepts.
$y-$intercept: $(0, 15)$. Vertex: $(4, -1)$. $x-$intercepts: $(3, 0)$ and $(5, 0)$.
A few more points: $(2, 3)$ and $(6, 3)$



11. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the perimeter is 64 ft. 9 ft and 23 ft

12. One side of a rectangle is 4 ft shorter than three times the other side. Find the sides if the area is 84 ft^2. 6 ft and 14 ft

13. One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is 319 in^2. 11 in by 29 in

14. A bank teller has 23 more five-dollar bills than ten-dollar bills. The total value of the money is \$610. How much of each denomination of bill does he have? 33 ten-dollar bills and 56 five-dollar bills

15. The population of a town has decreased from 80 000 to 68 000. What percent of a decrease does this represent? 15% decrease

16. We invested \$10000 into two bank accounts. One account earns 14% per year, the other account earns 8% per year. How much did we invest into each account if the combined interest from the two accounts is \$1238 after the first year?
\$ 7300 at 14% and \$ 2700 at 8%

17. The hypotenuse of a right triangle is 68 cm. The difference between the other two sides is 28. cm. Find the sides of the triangle. 32 cm and 60 cm

18. Find the distance between $(3, 8)$ and $(8, -4)$. 13 units