Unit 2 - Quadratics Review Sheet #2

1. Factor $3x^4 + 6x^3 - 27x^2 - 54x$ completely.

$3x(x^3+2x^2-9x-18)$ $\rightarrow$ $3x[x^2(x+2)-9(x+2)]$ $\rightarrow$ $3x(x^2-9)(x+2)$ $\rightarrow$ $3x(x+3)(x-3)(x+2)$

2. Solve $x^2 = 4x - 22$

$x^2-4x+22=0$ $\quad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $\quad x=\frac{4\pm\sqrt{-72}}{2}$ $\rightarrow$ $\frac{4\pm 6i\sqrt{2}}{2} = 2\pm 3i\sqrt{2}$

3. Solve for all values of x in simplest radical form by completing the square:

$$\frac{2x^2}{2} - \frac{14x}{2} - \frac{16}{2} = \frac{0}{2}$$

$x^2-7x-8=0$ $\quad x^2-7x+\frac{49}{4}=8+\frac{49}{4}$ $\quad \sqrt{(x-\frac{7}{2})^2}=\pm\sqrt{\frac{81}{4}}$ $\quad x-\frac{7}{2}=\pm\frac{9}{2}$ $\quad x=\frac{7}{2}\pm\frac{9}{2}$ $\rightarrow$ $x=8$, $x=-1$

4. Solve for all values of x: $2x = -x - \sqrt{12x-16} + 3$

$3x-3=-\sqrt{12x-16}$ $\quad (-3x+3)^2=(\sqrt{12x-16})^2$ $\rightarrow$ $9x^2-18x+9=12x-16$ $\quad 9x^2-30x+25=0$ $\quad x=\frac{30\pm\sqrt{0}}{18} \Rightarrow x=\frac{5}{3}$

5. Solve for all values of x: $-2x + 4 = (x-3)^2$

$-2x+4=x^2-6x+9$ $\quad 0=x^2-4x+5$ $\quad x=\frac{4\pm\sqrt{-4}}{2}$ $\quad x=\frac{4\pm 2i}{2}$ $\quad x=2\pm i$

6. Given the quadratic equation $ax^2 + 5x + 6 = 0$,

   a. For what integer values of a will the equation have real roots?

$b^2-4ac>0$ $\quad 25-24a>0$ $\quad 25>24a$ $\quad \frac{25}{24}>a$

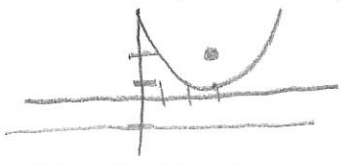
   b. For what integer values of a will the equation have imaginary roots?

$b^2-4ac<0$ $\quad 25-24a<0$ $\quad \frac{25}{24}<a$

7. If the roots of a quadratic equation are $3 + 3\sqrt{2}$ and $3 - 3\sqrt{2}$, write the equation in $ax^2 + bx + c = 0$ form.

$S=6=\frac{-b}{a}$ $\quad P=-9=\frac{c}{a}$ $\quad a=1$ $\quad b=-6$ $\quad c=-9$ $\rightarrow$ $1x^2-6x-9=0$

8. Write the equation of the parabola in standard form whose focus is (3, 2) and whose directrix is y = -1.



Vertex $(3, 0.5)$ $\quad p=1.5$ $\quad y=\frac{1}{4p}(x-h)^2+k$ $\rightarrow$ $y=\frac{1}{6}(x-3)^2+0.5$

9. Write the following quadratic equation in vertex form: $y = 3x^2 - 18x - 3$

$y=(3x^2-18x\ \ )-3$ $\quad y=3(x^2-6x\ \ )-3$ $\quad 27+y=3(x^2-6x+9)-3$ $\rightarrow$ $y=3(x-3)^2-3-27$ $\rightarrow$ $y=3(x-3)^2-30$