***Pre-Calculus 11***

***Unit 4: Analyzing Quadratic Functions***

***Worksheet 4.5—Equivalent forms of the Equation of a Quadratic Function***

1. Find the value of c that will make each expression a perfect square trinomial.

 a) $x^{2}+10x+c$ b) $x^{2}-14x+c$ c) $x^{2}+11x+c$

 d) $x^{2}+\frac{3}{4}x+c$ e) $x^{2}-1.2x+c$ f) $x^{2}-10.3x+c$

2. Write each equation in standard form. $y=a\left(x-p\right)^{2}+q$

 a) $y=x^{2}+6x+8$ b) $y=x^{2}-10x+14$ c) $y=x^{2}+2x-5$

 d) $y=x^{2}-8x+1$ e) $y=x^{2}-4x-5$ f) $y=$ $x^{2}+12x+30$

3. Write each equation in standard form. $y=a\left(x-p\right)^{2}+q$

 a) $y=2x^{2}+4x+7$ b) $y=-2x^{2}+4x+5$ c) $y=3x^{2}-24x+40$

 d) $y=-5x^{2}-20x-30$ e) $y=-4x^{2}+24x-20$ f) $y=-2x^{2}-16x-14$

4. Write each equation in standard form. $y=a\left(x-p\right)^{2}+q$

 a) $y=4x^{2}+12x-5$ b) $y=-2x^{2}+14x-12$ c) $y=3x^{2}+9x-2$

 d) $y=-2x^{2}+10x+3$ e) $y=$ $-5x^{2}-15x-5$ f) $y=6x^{2}+30x-10$

5. Write each equation in standard form. $y=a\left(x-p\right)^{2}+q$

 a) $y=2x^{2}-5x+7$ b) $y=-3x^{2}+2x+2$ c) $y=2x^{2}-9x+18$

 d) $y=3x^{2}-4x-6$ e) $y=-4x^{2}+10x-7$ f) $y=-2x^{2}+5x$

6. Write each equation in standard form. $y=a\left(x-p\right)^{2}+q$

 a) $y=$ $\frac{1}{2}x^{2}-2x+7$ b) $y=0.4x^{2}+2x+2.5$ c) $y=\frac{3}{4}x^{2}-9x+7$

7. State the maximum or minimum value of y and the value of x when it occurs.

 a) $y=x^{2}-8x+10$ b) $y=2x^{2}-12x+9$ c) $y=-3x^{2}-12x+16$

 d) $y=-1.5x^{2}-9x+7$ e) $y=3x^{2}-4x+3$ f) $y=\frac{1}{2}x^{2}-3x+5$

8. a) Write $y=ax^{2}+bx+c$ in the form $y=a\left(x-p\right)^{2}+q$

 b) State the coordinates of the vertex

 c) State the equation of the axis of symmetry

 d) State the *y*-intercept.

9. If $f\left(x\right)=ax^{2}+bx+c$ has a minimum value 0, what conditions must be satisfied

 by a, b, and c?

***Solutions***

1. a) 25 b) 49 c) $\frac{121}{4}=30.25$

 d) $\frac{9}{64}=0.140625$ e) 0.36 f) 26.5225

2. a) $y=\left(x+3\right)^{2}-1$ b) $y=\left(x-5\right)^{2}-11$ c) $y=\left(x+1\right)^{2}-6$

 d) $y=\left(x-4\right)^{2}-15$ e) $y=\left(x-2\right)^{2}-9$ f)$ y=\left(x+6\right)^{2}-6$

3. a) $y=2\left(x+1\right)^{2}+5$ b) $y=-2\left(x-1\right)^{2}+7$ c) $y=3\left(x-4\right)^{2}-8$

 d) $y=-5\left(x+2\right)^{2}-50$ e) $y=-4\left(x-3\right)^{2}+16$ f) $y=-2\left(x+4\right)^{2}+18$

4. a) $y=4\left(x+\frac{3}{2}\right)^{2}-14$ b) $y=-2\left(x-\frac{7}{2}\right)^{2}+\frac{25}{2}$ c) $y=3\left(x-\frac{3}{2}\right)^{2}+\frac{35}{4}$

 d) $y=-2\left(x-\frac{5}{2}\right)^{2}+\frac{31}{2}$ e) $y=-5\left(x+\frac{3}{2}\right)^{2}+\frac{25}{4}$ f) $y=6\left(x+\frac{5}{2}\right)^{2}-\frac{95}{2}$

5. a) $y=2\left(x-\frac{5}{4}\right)^{2}+\frac{31}{8}$ b) $y=-3\left(x-\frac{1}{3}\right)^{2}+\frac{7}{3}$ c) $y=2\left(x-\frac{9}{4}\right)^{2}+\frac{63}{8}$

 d) $y=3\left(x-\frac{2}{3}\right)^{2}-\frac{22}{3}$ e) $y=-4\left(x-\frac{5}{4}\right)^{2}-\frac{3}{4}$ f) $ y=-2\left(x-\frac{5}{4}\right)^{2}+\frac{25}{8}$

6. a) $y=\frac{1}{2}\left(x-2\right)^{2}+5$ b) $y=0.4\left(x+2.5\right)^{2}$ c) $y=\frac{3}{4}\left(x-6\right)^{2}-20$

7. a) $ y=\left(x-4\right)^{2}-6$ b) $y=2\left(x-3\right)^{2}-9$ c) $y=-3\left(x+2\right)^{2}+4$

 d) $y=-1.5\left(x+3\right)^{2}+20.5$ e) $y=3\left(x-\frac{2}{3}\right)^{2}-\frac{5}{3}$ f) $y=\frac{1}{2}\left(x-3\right)^{2}-\frac{1}{2}$

8. a) $y=a\left(x+\frac{b}{2a}\right)^{2}+\frac{-b^{2}+4ac}{4a}$ b) $\left(\frac{-b}{2a},\frac{-b^{2}+4ac}{4a}\right)$ c) $x=\frac{-b}{2a}$ d) $y=c$

9. $b=\pm 2\sqrt{ac}, a>0, c\geq 0$