## Lesson Plan

Grade 10 Academic Math
Unit: Quadratic Relations

Lesson: 4-5
Topic: Quadratic Models using Factored Form
\# homework check: Principles of Mathematics 10 p. 165\#1, 8-12, 15
\# note: Quadratic Models using Factored Form
We should be able to find the equation of any quadratic model if it passes through the x axis using the method that relies on $x$ intercepts. This means that if a curve of best fit can be drawn and has parabola form, we can find an equation that models that parabola. For example, find the equation for the model given.

*draw a curve of best fit

*find and label the important points

*write the equation using the x intercept form of the equation and solve for $\boldsymbol{a}$ using the point $(7,5)$ as your $(\mathrm{x}, \mathrm{y})$

$$
\begin{aligned}
& y=a(x-(-1))(x-8) \\
& 5=a(7+1)(7-8) \\
& 5=-8 a \\
& \frac{-5}{8}=a \\
& \therefore y=-\frac{5}{8}(x+1)(x-8) \\
& y=-0.625\left(x^{2}-7 x-8\right) \\
& y=-0.625 x^{2}+4.375 x+5
\end{aligned}
$$

We can also use technology to find a quadratic equation by using the quadratic regression calculation on a graphing calculator by creating a scatter plot. Enter your data into the columns under stat>edit then complete a regression and graph your equation by pressing stat $>$ calc $>5>$ L1, L2, vars > y-vars > enter > enter. The coefficients for each variable will be present on the screen and can be substituted in order to write the equation. For example, enter the following data and perform a quadratic regression.

| $x$ | $y$ |
| :---: | :---: |
| -2 | 7 |
| -1 | 4 |
| $\mathbf{0}$ | 3 |
| 1 | 4 |
| 2 | 7 |

The calculator gives us the values for $\mathrm{a}, \mathrm{b}$, and c in $\mathrm{ax}^{2}+\mathrm{bx}+\mathrm{c}$ form.
We get:

$$
\begin{aligned}
& \text { QuadReg } \\
& y=a x^{2}+b x+c \\
& a=1 \\
& b=0 \\
& c=3
\end{aligned}
$$

which means that the equation for this quadratic is $y=x^{2}+3$ and if we look at the graph, we can see the parabola that fits our data.


NOTE: It is important to recognize that although we can find the equation using graphing technology, we MUST also be able to find the equation by hand.
\# homework assignment: Principles of Mathematics 10 p. 175 \# 2, 4, 6, 8, 10, 12

