Unit: Quadratic Relations

Lesson: 4-3
Topic: Factored Form of a Quadratic
\# homework check: Principles of Mathematics 10 p. 146 \#4, 6, $7 \mathrm{c}-\mathrm{f}, \# 8$ (without technology), \# 12, 13

## \# note: Factored Form of a Quadratic

The factored form of a quadratic looks like $y=a(x-r)(x-s)$ and each factor is then used to determine the x intercepts or zeroes of the function. The x intercepts of this function are then $\boldsymbol{r}$ and $\boldsymbol{s}$. The equation of the line of symmetry is still found by determining the midpoint of these roots. For example, find the roots and the equation of the axis of symmetry:
a) $y=2(x+5)(x-3)$
x intercepts occur when each factor is set to zero
$x+5=0 \quad x-3=0$
$x=-5 \quad x=3$
equation of the axis of symmetry is found by calculating the midoint of these roots
$\frac{-5+3}{2}=-1$
$x=-1$ is the eqution of the axis of symmetry
b) $y=-3(x+2)(x+8)$
x intercepts occur when each factor is set to zero
$x+2=0 \quad x+8=0$
$x=-2 \quad x=-8$
equation of the axis of symmetry is found by calculating the midoint of these roots
$\frac{-8+(-2)}{2}=-5$
$x=-5$ is the eqution of the axis of symmetry
If we know the zeroes of the function and one other point, we can use this information to find the equation of the quadratic.

Writing the equation of any quadratic can be done if we know the roots and one other point on the curve so that we can find the value of $\boldsymbol{a}$. For example, find the equation of the given parabola.
c) Sean throws a ball from the top of the bleachers in the park. The bleachers are 4 m high. The ball reaches a maximum height of 8 m after 2 s in the air and hits the ground 5 s after being thrown. Write an equation that models this behavior. As part of your solution, discuss important information that includes a detailed sketch, the x and y intercepts, the axis of symmetry, and the vertex of the parabola.

Sketch:

x intercepts: $(-1,0)$ and $(5,0)$
y intercept: $(0,4)$
vertex: $(2,8)$
axis of symmetry $x=2$
place value of roots in the place of r and s
$y=a(x-(-1))(x-5)$
$y=a(x+1)(x-5)$
assign values to x and y using another point that we know
$4=a(0+1)(0-5)$
$4=-3 a$
$\frac{-4}{5}=a$
$y=-0.8(x+1)(x-5)$ is the equation of our parabola
if we simplify this equation we get:
$y=-0.8\left(x^{2}-4 x-5\right)$
$y=-0.8 x^{2}+3.2 x+4$
\# homework assignment: Principles of Mathematics 10 p. 155 \# 2-6, 10, 12, 13, 15

