Name: ______________________________ Date: ______________

CREATING POLYNOMIAL EQUATIONS
COMMON CORE ALGEBRA II

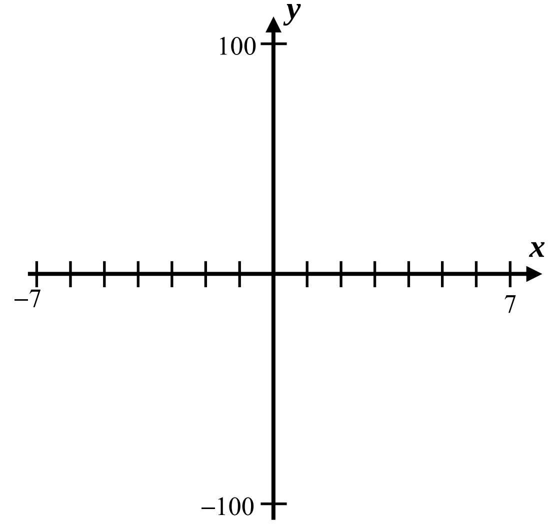
The connection between the zeroes of a polynomial and its factors should now be clear. This connection can be used to create equations of polynomials. The key is utilizing the factored form of a polynomial.

THE FACTORED FORM OF A POLYNOMIAL

If the set $\{r_1, r_2, r_3, ..., r_n\}$ represent the roots (zeroes) of a polynomial, then the polynomial can be written as:

$y = a(x - r_1)(x - r_2)\cdots(x - r_n)$ where a is some constant determined by another point

***Exercise* #1:** Determine the equation of a quadratic function whose roots are -3 and 4 and which passes through the point $(2, -50)$. Express your answer in standard form ($y = ax^2 + bx + c$). Verify your answer by creating a sketch of the function on the axes below.



It's important to understand how the *a* value effects the graph of the polynomial. This is easiest to explore if the polynomial remains in factored form.

***Exercise* #2:** Consider quadratic polynomials of the form $y = a(x + 2)(x - 5)$, where $a \neq 0$.

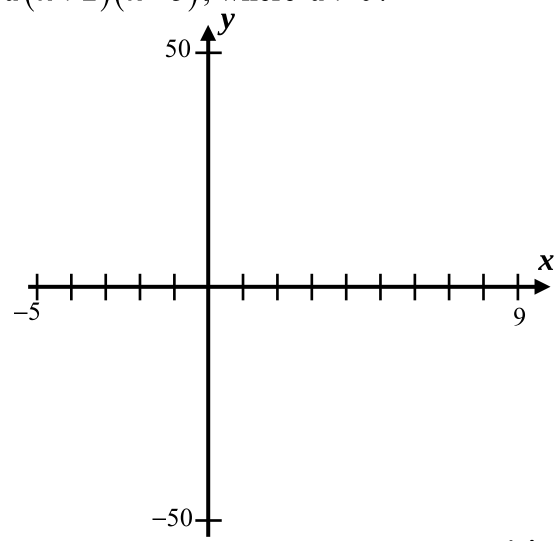
(a) What are the *x*-intercepts of this parabola?

(b) Sketch on the axes given the following equations:

$y = (x + 2)(x - 5)$

$y = 2(x + 2)(x - 5)$

$y = 4(x + 2)(x - 5)$



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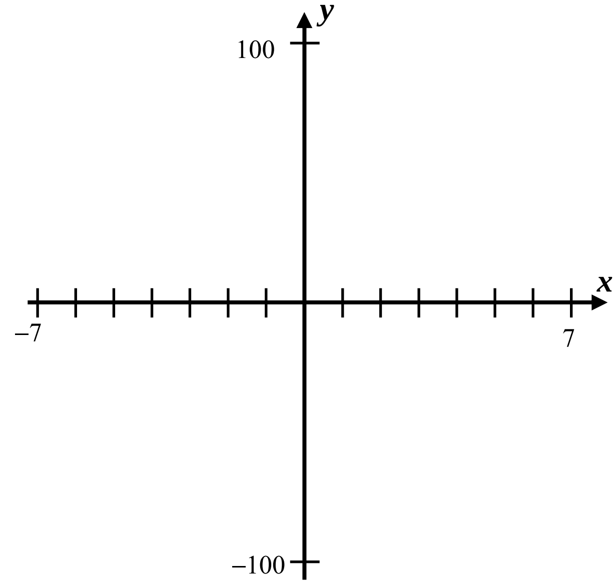
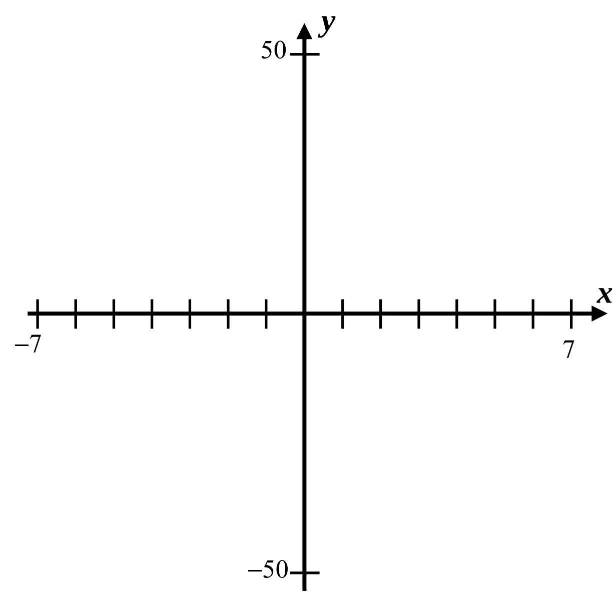
As we can see from this exercise, the value of a does not change the zeroes of the function, but does vertically stretch the function. We can create equations of higher powered polynomials in a similar fashion.

***Exercise* #3:** Create the equation of the cubic, in standard form, that has x-intercepts of $-4, 2,$ and 5 and passes through the point $(6, 20)$. Verify your answer by sketching the cubic's graph on the axes below.



***Exercise* #4:** Create the equation of a cubic in standard form that has a double zero at -2 and another zero at 4. The cubic has a y-intercept of 16. Sketch your cubic on the axes below to verify your result.



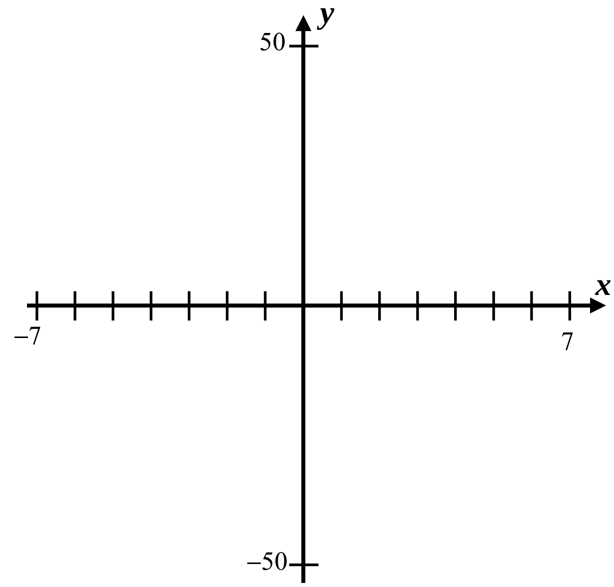
***Exercise* #5:** How would you describe this cubic curve at its double root?

Name: ____________________________ Date: ______________

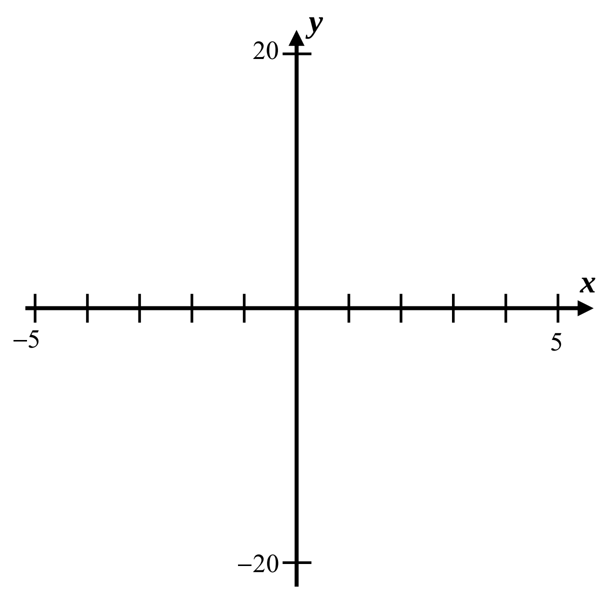
CREATING EQUATIONS OF POLYNOMIALS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Create the equation of a quadratic polynomial, in standard form, that has zeroes of -5 and 2 and which passes through the point $(3, -24)$. Sketch the graph of the quadratic below to verify your result.



2. Create the equation of a quadratic function, in standard form, that has one zero of -3 and a turning point at $(-1, -16)$. Hint – try to determine the second zero of the parabola by thinking about the relationship between the first zero and the turning point (axis of symmetry). Sketch your solution below.



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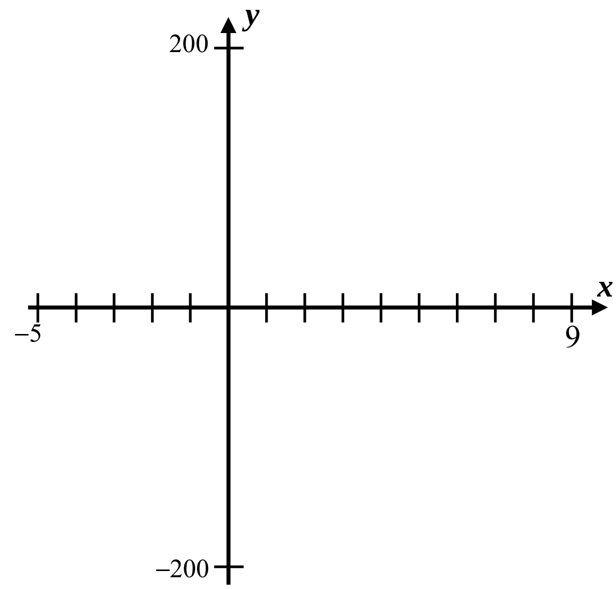
3. Create an equation for a cubic function, in standard form, that has x-intercepts given by the set $\{-3, 1, 7\}$ and which passes through the point $(-2, 54)$. Sketch your result on the axes shown below.



4. Create the equation of a cubic whose x-intercepts are given by the set $\{-6, -3, 5\}$ and which passes through the point $(3, 36)$. Note that your leading coefficient in this case will be a non-integer. Sketch your result below.