

CREATING POLYNOMIAL EQUATIONS ALGEBRA 2 WITH TRIGONOMETRY

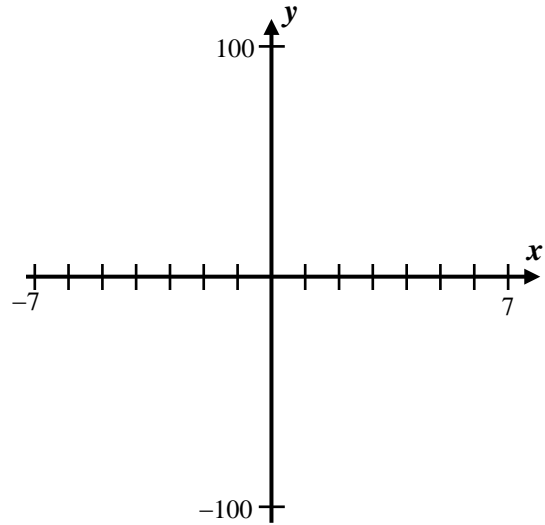
The connection between the zeros of a polynomial and its factors should now be clear. This connection can be used to create equations of polynomials. The key is utilizing the factored form of a polynomial.

THE FACTORED FORM OF A POLYNOMIAL

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

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

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 $a \neq 0$.

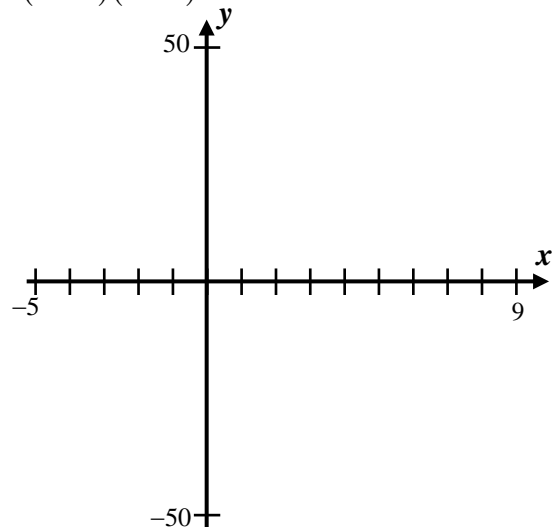
(a) What are the x -intercepts of this parabola?

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

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

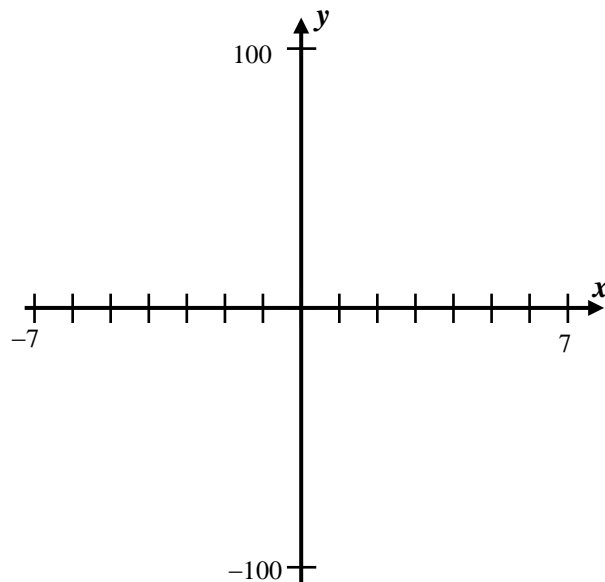
$$y = 2(x + 2)(x - 5)$$

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

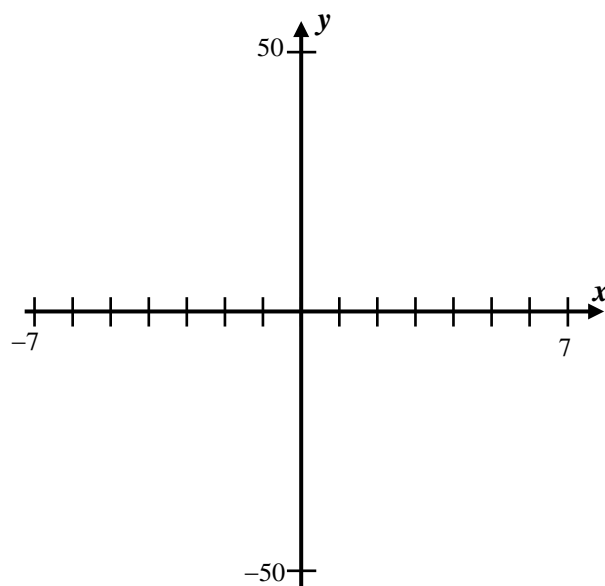


As we can see from this exercise, the value of a does not change the zeros of the function, but does vertically stretch the function. We can create equations of higher powered polynomials in a similar fashion.

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?



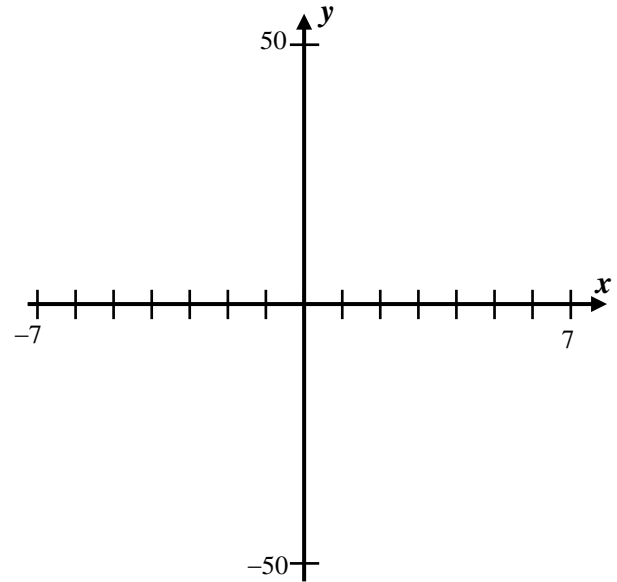
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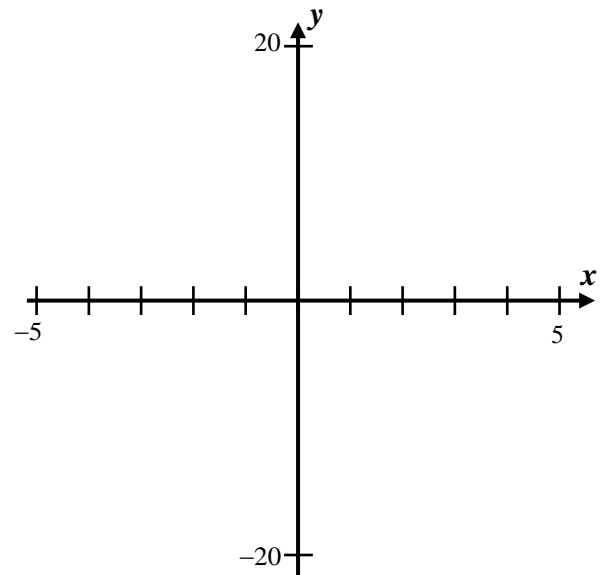
CREATING EQUATIONS OF POLYNOMIALS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

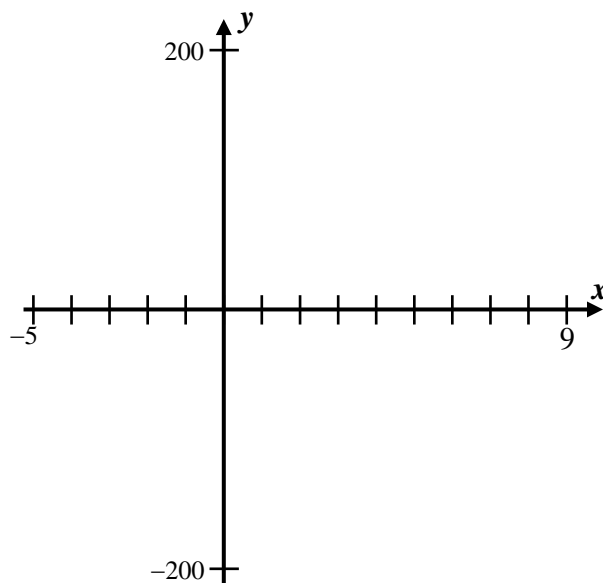
1. Create the equation of a quadratic polynomial, in standard form, that has zeros of -5 and 2 and which passes through the point $(3, -24)$. Sketch the graph of the quadratic below to verify your result.



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.



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.

