

Name \_\_\_\_\_

Date \_\_\_\_\_

## Advanced Algebra

## Unit 4: Quadratics

## Classwork/ Assignment #1

A major learning target of the Unit is "I can write the equation of a parabola" Many times the easiest way to do this is using the factored form of the equation  $y=a(x-h)(x-k)$ ; where  $h$  and  $k$  are the roots (  $x$  intercepts) of the parabola.

I have the roots + 1 point. All I need to do is put this in factored form and substitute the  $(x,y)$  point in and find the  $a$  value. We have said that this year, we are responsible for knowing "a" and understanding what this does to a function.

- 1) Roots are 2 and 6. The parabola has a y intercept at 16

$$y = \frac{4}{3}(x-2)(x-6)$$

- 2) Roots are 8 and 12. The parabola has a y intercept of 288

$$y = 3(x-8)(x-12)$$

- 3) Roots are -6 and 2. The parabola has a y intercept of -48

$$y = 4(x+6)(x-2)$$

- 4) Roots are 12 and 3. The parabola cuts the y axis at 36

$$y = (x-12)(x-3)$$

- 5) Roots are -2 and -18. The parabola cuts the y axis at 108

$$y = 3(x+2)(x+18)$$

- 6) Roots are 2 and 6. The parabola passes through the point (8,36)

$$y = 3(x-2)(x-6)$$

- 7) Roots are 4 and 10. The parabola passes through (6,-16)

$$y = 2(x-4)(x-10)$$

- 8) Roots are -4 and 6. The parabola passes through (8,12)

$$y = \frac{1}{2}(x+4)(x-6)$$

- 9) Roots are 8 and -12. The parabola passes through (10,11)

$$y = \frac{1}{4}(x-8)(x+12)$$

$$y = a(x-8)(x+12)$$

$$11 = a(10-8)(10+12)$$

$$11 = 44a$$

$$\textcircled{7} y = a(x-4)(x-10) \quad (6, -16)$$

$$-16 = a(6-4)(6-10)$$

$$a = 2$$

$$\textcircled{8} y = a(x+4)(x-6) \quad (8, 12)$$

$$12 = a(8+4)(8-6)$$

$$12 = 24a$$

$$y = a(x-2)(x-6) \quad (0, 16)$$

$$16 = 12a \quad a = \frac{16}{12} \quad \frac{4}{3}$$

$$\textcircled{2} y = a(x-8)(x-12) \quad (0, 288)$$

$$288 = 96a$$

$$a = 3$$

$$\textcircled{3} y = a(x+6)(x-2) \quad (0, -48)$$

$$-48 = -12a$$

$$\textcircled{4} y = a(x-12)(x-3) \quad (0, 36)$$

$$36 = a(0-12)(0-3)$$

$$36 = 36a$$

$$\textcircled{5} y = a(x+2)(x+18) \quad (0, 108)$$

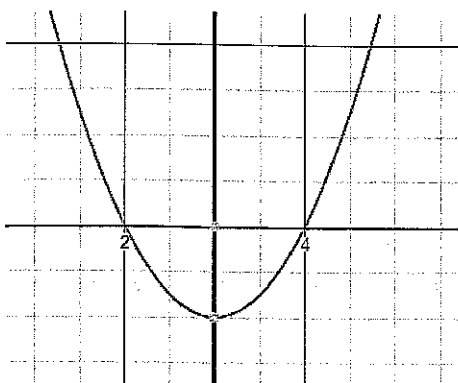
$$108 = 36a$$

$$= a$$

$$\textcircled{6} y = a(x-2)(x-6)$$

$$36 = 12a$$

$$a = 3$$



A parabola is symmetrical! This is a very key point of understanding quadratics and parabolas. The line going down the middle of the parabola is called the axis of symmetry.

We can find this axis of symmetry by adding the roots and dividing by 2. Notice  $\frac{2+4}{2} = 3$

I need to be able to think symmetrically. If I know one of the roots and the "middle" (axis of symmetry) then I can easily find the other root by observing what is the distance from the middle to the given root and then going the same distance the other direction to find the other root. Then you are back to doing the problem like the first section.

- 10) One of the roots of the parabola is 2. The axis of symmetry is given at  $x=6$ . The parabola passes through  $(8,-24)$

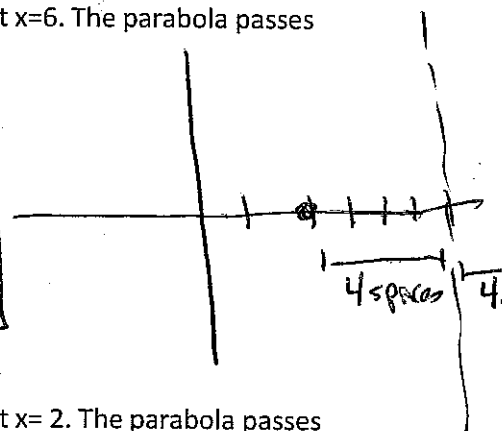
$$y = a(x-2)(x-10)$$

$$-24 = a(8-2)(8-10)$$

$$-24 = -12a$$

$$a = 2$$

$$y = 2(x-2)(x-10)$$

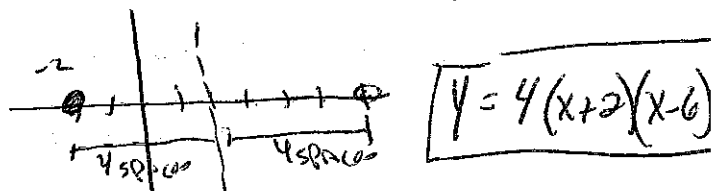


- 11) One of the roots of the parabola is 6. The axis of symmetry is given at  $x=2$ . The parabola passes through  $(4,-48)$

$$y = a(x+2)(x-6) \quad \text{point } (4, -48)$$

$$-48 = a(4+2)(4-6)$$

$$-48 = -12a \quad a = 4$$



- 12) One of the roots of the parabola is -10. The axis of symmetry is given at  $x=-7$ . It passes through the point  $(5,13.5)$

$$y = a(x+10)(x+4)$$

$$13.5 = a(5+10)(5+4)$$

$$1 = a$$

$$y = 1(x+10)(x+4)$$

