Unit 3B Test: Zeros of a Quadratic (2022)

Grading:
knowledge and understanding: ?
application: ?
thinking: ?
communication: 4 + 2 (form)

(1) Solve the equation $2(x-1)^2 - 8 = 0$ [A][3].

We First move 8 to the other side of the equation

$$2(x-1)^2 = 8$$

$$(x-1)^2 = 4$$

$$x - 1 = \pm 2$$

And therefore $x = 1 \pm 2 = 3, -1$.

(2) Determine the equations of the parabola in vertex form for the following

a.) If the vertex of a parabola is $(3, -5)$ and the y-intercept is at $y = 8$ [T][3].

Since the vertex is at $V(3, -5)$, we get the equation is sofar

$$y = a(x-3)^2 - 5$$

Then, since we are given that the y-intercept is at $y = 8$, we get the point $(0, 8)$, which we will plug in to solve for a

$$8 = a(0-3)^2 - 5$$

$$a = \frac{13}{9}$$

Therefore, the final equation is $y = \frac{13}{9}(x-3)^2 - 5$.

b.) If the parabola $y = x^2$ is stretched by a factor of 5, moved 6 units to the right, and moved 7 units down [T][2].

hte equation is simply $y = 5(x-6)^2 - 7$, where we have that 5 because it is stretched by 5, we have $x - 6$ for shifting 6 units to the right, and at last we have that -7 because it is shifted down 7 units.

(3) Rewrite the equation $y = 2x^2 + 8x + 3$ in vertex form and also sketch it [A][3].

We first factor out a 2 from the first two terms to get

$$y = 2(x^2 + 4x) + 3$$

Then, we see that $(\frac{b}{2})^2 = (\frac{4}{2})^2 = 4$ so we add on $4 - 4$ inside the parantheses

$$y = 2(x^2 + 4x + 4 - 4) + 3$$

Then, we see that $x^2 + 4x + 4 = (x+2)^2$ and so we get

$$y = 2[(x+4)^2 - 4] + 3$$

Then, we use the distributive property to distribute the 2 to get

$$y = 2(x+4)^2 + 2(-4) + 3 = 2(x+4)^2 - 5$$

And so that is our final equation in vertex form.

(4) Sketch the parabola $y = 2(x+3)^2 - 2$. The sketch must include the x-intercept(s), y-intercept, and vertex of the parabola [A][3].

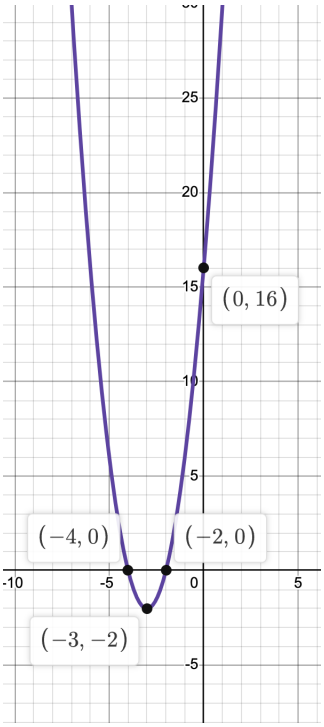
From this, we see that the vertex is at $(-3, -2)$. Additionally, we plug in $x = 0$ to get that the y-intercept is at $y = 2(0+3)^2 - 2 = 16$. Then, for the x-intercepts, we set $y = 0$ to get

$$0 = 2(x+3)^2 - 2$$

$$(x+3)^2 = 1$$

$$x = -3 \pm 1$$

And so the x-intercepts are at $(-2, 0)$ and $(-4, 0)$. Therefore, if you graph it, you will get something like this



(5) For the parabola $y = 3(x-5)^2 - 6$

a.) Identify the equation for the axis of symmetry, the max/min, and the vertex [K/U][3].

The axis of symmetry is at $x = 5$, the minimum is at $y = -6$, and the vertex is at $(5, -6)$.

b.) Describe the transformation of the parabola [C][4].

Vertically stretch by 3, shift 5 units to the right, and shift 6 units down.

c.) Determine the x-intercept of the parabola [K/U][2].

We plug in $y = 0$ to solve for x and we get

$$3(x-5)^2 - 6 = 0$$
$$(x-5)^2 = 2$$
$$x - 5 = \pm 2$$

And so therefore the x-intercepts are at $(5+\sqrt{2})$ and $(5-\sqrt{2}, 0)$.