Student Response Example: Needs Practice

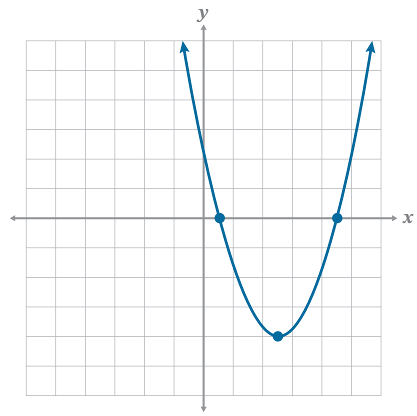
This is an example of a "Needs Practice" student response using the Mastery Check Rubric.

Use this example to help you understand the types of student responses that could indicate that your student needs to do more practice in the subject area in order to achieve mastery.

It is not an actual problem from the curriculum.

Show What You Know

A) Graph the quadratic equation to find the real roots. Label the roots on the coordinate plane.
$y = x^2 - 5x + 2.25$



$x = -\frac{b}{2a} = -\frac{(-5)}{2(1)} = 2.5$

$y = (2.5)^2 - 5(2.5) + 2.25$

$y = -4$

vertex: $(2.5, -4)$

$c = 2.25$

$(0, 2.25)$

This student marked the roots on the graph but did not label them. They wrote down the y-intercept but did not mark it on the graph. They would benefit from using best practices of graphing as described in the lesson.

B) Find the roots algebraically using the quadratic formula. Show all work.

$x = \frac{-(5) \pm \sqrt{(5)^2 - 4(1)(2.25)}}{2(1)} = \frac{-5 \pm \sqrt{25 - 9}}{2} = \frac{-5 \pm \sqrt{16}}{2} = \frac{-5 \pm 4}{2}$

$x = -\frac{9}{2}, -\frac{1}{2}$

$(-0.5, 0), (-4.5, 0)$

This student did not notice that the x-intercepts on the graph were not the same as the intercepts found using the quadratic formula. They would benefit from writing the formula and defining the values of a, b, and c from the given equation.

C) Explain what a discriminant of no real solutions means mathematically and what it would look like graphically.

This graph has two x-intercepts, therefore there are two real solutions.

This student did not answer the prompt in part C. They did not understand this was referencing a different type of equation than the one provided in parts A and B.

Student Response Example: Progressing

This is an example of a “Progressing” student response using the Mastery Check Rubric.

Use this example to help you understand the types of student responses that could indicate that your student has adequately mastered the subject area.

It is not an actual problem from the curriculum.

Show What You Know

A) Graph the quadratic equation to find the real roots. Label the roots on the coordinate plane.
$y = x^2 - 5x + 2.25$

$x = -\frac{b}{2a} = -\frac{(-5)}{2(1)} = 2.5$

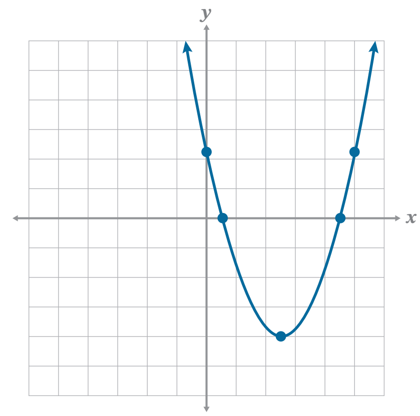
$y = (2.5)^2 - 5(2.5) + 2.25$

$y = -4$

vertex: $(2.5, -4)$

$c = 2.25$

$(0, 2.25)$



This student marked the roots on the graph but did not label them.

B) Find the roots algebraically using the quadratic formula. Show all work.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

This student used the formula correctly but should define the variables a, b, and c from the quadratic equation so anyone checking their work knows what values were substituted.

$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(2.25)}}{2(1)} = \frac{5 \pm \sqrt{25 - 9}}{2} = \frac{5 \pm \sqrt{16}}{2} = \frac{5 \pm 4}{2}$

$x = \frac{9}{2}, \frac{1}{2}$

$(0.5, 0), (4.5, 0)$

C) Explain what a discriminant of no real solutions means mathematically and what it would look like graphically.

When the discriminant has no real solutions, that means that $b^2 - 4ac < 0$.
The graph of the quadratic equation will never touch or cross the x-axis.

This student was asked verbally to explain how the discriminant related to quadratic equations. They responded, “It’s the terms under the radical. If it is negative then there are no x-intercepts.”

Student Response Example: Exceeding

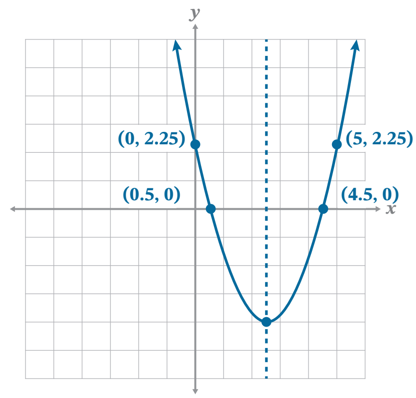
This is an example of an "Exceeding" student response using the Mastery Check Rubric.

Use this example to help you understand the types of student responses that could indicate that your student has exceptional understanding and mastery of the subject area.

It is not an actual problem from the curriculum.

Show What You Know

A) Graph the quadratic equation to find the real roots. Label the roots on the coordinate plane.
$y = x^2 - 5x + 2.25$



$x = -\frac{b}{2a} = -\frac{(-5)}{2(1)} = 2.5$

$y = (2.5)^2 - 5(2.5) + 2.25$

$y = -4$

vertex: $(2.5, -4)$

$c = 2.25$

$(0, 2.25)$

symmetric to y-intercept $(5, 2.25)$

This student showed all of the work needed to graph the key details of the parabola and labeled the x-intercepts on their graph.

B) Find the roots algebraically using the quadratic formula. Show all work.

$a = 1, b = -5, c = 2.25$

This student defined their variables and used the quadratic formula correctly.

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(2.25)}}{2(1)} = \frac{5 \pm \sqrt{25 - 9}}{2} = \frac{5 \pm \sqrt{16}}{2} = \frac{5 \pm 4}{2}$

$x = \frac{9}{2}, \frac{1}{2}$

$(0.5, 0), (4.5, 0)$

C) Explain what a discriminant of no real solutions means mathematically and what it would look like graphically.

When the discriminant has no real solutions that means that $b^2 - 4ac < 0$. If the discriminant is under the radical, this means that the answer will be an imaginary number. The quadratic equation can be graphed, but the parabola will never touch or cross the x-axis.

This student explained the discriminant and its relationship to the quadratic formula as well as that the result will be an imaginary number. The word parabola is also used correctly to describe the graph of a quadratic equation.