# Depth of Knowledge Matrix – Algebra 2 (Integrated 3)

| Topic | Rational Function Features | Square Root Function Features | Exponential Function Features | Logarithmic Function Features |
|---|---|---|---|---|
| CCSS Stand. | • F-IF.7d | • F-IF.7b | • F-IF.7e | • F-IF.7e |
| DOK 1 Example | Identify the function's vertical asymptote and its solution. $y = \frac{5}{x+8} + -3$ | Find the domain and x-intercept of the square root function. $y = -5\sqrt{x+7} + 3$ | Find the asymptote and y-intercept of the exponential function. $y = -2 \cdot 3^{(x+1)} + 4$ | Find the y-intercept of the logarithmic function. $y = -6\log_5(x-4) + 3$ |
| DOK 2 Example | Using the integers -9 to 9, at most one time each, fill in the boxes to create a rational function, its vertical asymptote, and its solution. $y = \frac{\square}{x+\square} + \square$ solution: $x = \square$ vertical asymptote: $x = \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a square root function, its domain, and the x-intercept. $y = \square\sqrt{x+\square} + \square$ domain: $x \geq \square$ x-intercept: $(\square, \square)$ | Use the digits 1 to 9, at most two times each, fill in the boxes to create an exponential growth function with its asymptote and y-intercept. $y = \square \cdot \square^{(x+\square)} + \square$ y-intercept: $(0, \square)$ asymptote: $y = \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes and create a logarithmic functions with the corresponding y-intercept. $y = \square\log_{\square}(x-\square) + \square$ y-intercept: $(0, \square)$ |
| DOK 3 Example | Using the integers -9 to 9, at most one time each, fill in the boxes to create a rational function, its vertical asymptote, and the greatest possible solution. $y = \frac{\square}{x+\square} + \square$ solution: $x = \square$ vertical asymptote: $x = \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a square root function, its domain, and the greatest possible x-intercept. $y = \square\sqrt{x+\square} + \square$ domain: $x \geq \square$ x-intercept: $(\square, \square)$ | Use the digits 1 to 9, at most two times each, fill in the boxes to create an exponential decay function with its asymptote and greatest possible y-intercept. $y = \square \cdot \square^{(x+\square)} + \square$ y-intercept: $(0, \square)$ asymptote: $y = \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a function with the greatest possible y-intercept. $y = \square\log_{\square}(x-\square) + \square$ y-intercept: $(0, \square)$ |

# Depth of Knowledge Matrix – Algebra 2 (Integrated 3)

| Topic | Polynomial Function Features | Multiplying Complex Numbers | Trinomial Function Features | Equations of Circles |
|---|---|---|---|---|
| CCSS Stand. | • F-IF.7c | • N-CN.2 | • F-IF.5 | • G-GPE.1 |
| DOK 1 Example | Find the roots of the function.<br>$y = x^3 - 2x^2 + 4x - 5$ | Multiply the binomials.<br>$(3 + 4i)(2 + 3i)$ | Find the range and roots of the function.<br>$y = -4x^2 + 9x - 2$ | Determine if the point is on the circle.<br>$(x - 4)^2 + (y - (-3))^2 = 6^2$ |
| DOK 2 Example | Using the integers -9 to 9, at most one time each, fill in the boxes to create a polynomial function with matching roots.<br>$y = \square x^3 + \square x^2 + \square x + \square$<br>roots: $x = \square$, $x = \square$, $x = \square$ | Using the integers -9 to 9 at most one time each, fill in the boxes twice: once to make a positive real number product and once to make a negative real number product. You may reuse all the integers for each product.<br>$(\square + \square i)(\square + \square i)$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a function with the corresponding range and roots.<br>$y = \square x^2 + \square x + \square$<br>roots: $x = \square$, $x = \square$<br>range: $y \geq \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a circle and a point on the circle.<br>$(x - \square)^2 + (y - \square)^2 = \square^2$<br>Point on circle: $(\square, \square)$ |
| DOK 3 Example | Using the integers -9 to 9, at most one time each, fill in the boxes to create a polynomial function with matching roots that are as close together as possible.<br>$y = \square x^3 + \square x^2 + \square x + \square$<br>roots: $x = \square$, $x = \square$, $x = \square$ | Using the integers -9 to 9 at most one time each, fill in the boxes to make a real number product with the greatest value.<br>$(\square + \square i)(\square + \square i)$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a function with the corresponding range and roots that are as close together as possible.<br>$y = \square x^2 + \square x + \square$<br>roots: $x = \square$, $x = \square$<br>range: $y \geq \square$ | Using the integers -9 to 9, at most one time each, fill in the boxes to create a circle and a point on the circle with the point being as close to the origin as possible.<br>$(x - \square)^2 + (y - \square)^2 = \square^2$<br>Point on circle: $(\square, \square)$ |