In March 2020, school districts across the state experienced school closure due to COVID-19. Although schools were closed, districts transitioned to online instruction. The design and content of the at-home instruction model for districts varied across the state. Some taught review units of instruction, while others continued to teach the next units of instruction within their scope and sequence. Although some districts continued to teach the next units of instruction, the depth of concept expectations within the units may not have been met by all students. In order to support foundational understandings of concepts within the last nine weeks of 2019-2020, the mathematics team of TEKS Resource System has designed the Mathematics COVID-19 Gap Implementation Tool for district considerations during the 2020-2021 school year.

For non-STAAR tested grade levels, some units in the last nine weeks may have included concepts that had not been introduced earlier in the school year. For STAAR-tested grade levels, most school districts were completing the teaching of all standards in preparation of the upcoming STAAR. TEKS Resource System was diligent when creating each grade level scope and sequence to ensure the 4th nine weeks units were designed to solidify foundational understandings for students to be prepared for the next grade level. Therefore, the TEKS Resource System Mathematics COVID-19 Gap Implementation Tool reminds teachers to consider all previous grade level(s) standards of the last nine weeks that are aligned to the current grade level standards of the 2020-2021 school year.
Note: Since these tools highlight the standards of the previous grade level(s), there is not a Kindergarten Mathematics COVID-19 Gap Implementation Tool.

Our goal is to encourage the inclusion of previous foundational understandings when appropriate throughout the year rather than beginning the 2020-2021 school year reviewing the last nine weeks of the previous year. We are not asking teachers to teach an additional nine weeks of school, but to use instructional techniques such as pre-assessing and wrapping of standards to connect vertically aligned grade level understandings seamlessly. Or, districts may choose to spiral previous foundational understandings prior to the current grade level unit of instruction.

**Gap Considerations at a Glance**

|  |  |  |
| --- | --- | --- |
| **Previous Grade Level → Current Grade Level** | **Previous Grade Level Concepts** **NOT Taught or NOT COMPLETELY Taught****Prior to Last Nine Weeks of 2019-2020****That Impact the Current Grade Level** | **Previous Grade Level Concepts** **Being Reviewed or Extended****in the Last Nine Weeks of 2019-2020****That May Impact the Current Grade Level** |
| Algebra II → Precalculus | Function models; Logarithmic functions, equations, and transformations | Graphing and writing functions; Key attributes of functions; Function models; Inverse functions; Transformations; Solving equations; Factoring; Parabolas |

**Quick Key to Reading the Mathematics COVID-19 Gap Implementation Tool**

|  |  |
| --- | --- |
| **Strikethrough(s)** | Strikethrough(s) in the previous grade level **Last 9 Weeks Standards** column reflect the strikethrough(s) that appear in the previous grade level Unit IFDduring the last 9 weeks. This strikethrough(s) indicates the part of the SE that was not included in the hyperlinked previous grade level unit.Strikethrough(s) in the current grade level **Aligned Standards** column reflect the strikethrough(s) that appear in the current grade level Unit IFD. This strikethrough(s) indicates the part of the SE that is not included in the current grade level unit where the gap is being considered.While the standards in each row of the table are vertically aligned, any strikethroughs are not necessarily vertically aligned. |
| **Underlines** | **No underline** indicates the standard was completely taught prior to the 4th nine weeks.**Underline** indicates the standard or part of the standard was not taught prior to the 4th nine weeks. |
| **Xs** | An X in a column **with** a previous grade level hyperlink indicates the current grade level unit in which all of the current grade level standards in the row occur and where the gap considerations from the previous grade level impact the current unit.An X in a column **without** a previous grade level hyperlink indicates where all or some of the current grade level standards in the row occur in the scope and sequence. |
| **Hyperlinks** | A hyperlink to the previous grade level Unit IFD along with the previous grade level standards allows for quick access to view the specificity of the previous grade level standard(s) that includes a potential gap. |
| **Alternating Shading** | Alternating white and gray shading allows for easy visualization of a change in unit number. |

For complete instruction on how to read this tool, see the [Mathematics COVID-19 Gap Implementation Tool Instructions](https://www.teksresourcesystem.net/module/portfolio/filehandler.ashx?ID=934322).

|  |  | **2020–2021 School Year Precalculus Units Reflected on Year at a Glance (YAG)** |
| --- | --- | --- |
| **Algebra II** **Last 9 Weeks Standards 2019-2020** | **Precalculus Aligned Standards****2020-2021** | **Unit****01** | **Unit** **02** | **Unit** **03** | **Unit** **04** | **Unit** **05** | **Unit** **06** | **Unit** **07** | **Unit** **08** | **Unit** **09** | **Unit** **10** | **Unit** **11** | **Unit** **12** | **Unit** **13** |
| **2A.2A** Graph the functions *f(x)=*√*x, f(x)=*1*/x, f(x)=x*3*, f(x)=*3√*x, f(x)=bx, f(x)=|x|,*and *f(x)=logb (x)* where *b* is 2, 10, and *e*, and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval.*Readiness Standard* | **P.2F** Graph exponential, logarithmic, rational, polynomial, power, ~~trigonometric, inverse trigonometric~~, and piecewise defined functions, including step functions.**P.2I** Determine and analyze the key features of exponential, logarithmic, rational, polynomial, power, ~~trigonometric, inverse trigonometric~~, and piecewise defined functions, including step functions such as domain, range, symmetry, relative maximum, relative minimum, zeros, asymptotes, and intervals over which the function is increasing or decreasing. | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.2A** |  | **X** | **X** | **X** |  |  | **X** |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.2A, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2F and P.2I. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of graphing square root, rational, cubic, cube root, exponential, and logarithmic parent functions and determining their key attributes prior to graphing other forms of exponential, logarithmic, rational, polynomial, power, and piecewise defined functions and determining their key attributes.
* Pre-assess students’ understanding of analyzing domain, range, intercepts, symmetries, asymptotic behavior, maxima, and minima prior to analyzing symmetry and intervals over which the function is increasing or decreasing.
 |
| **District notes:**  |
| **2A.6K** Determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation.*Supporting Standard* | **P.2L** Determine various types of discontinuities in the interval (-∞, ∞) as they relate to functions and explore the limitations of the graphing calculator as it relates to the behavior of the function around discontinuities.**P.2M** Describe the left-sided behavior and the right-sided behavior of the graph of a function around discontinuities. | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.6K** |  |  | **X** |  |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.6K, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2L and P.2M. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of determining the asymptotic restrictions on the domain of rational functions prior to determining other types of discontinuities in functions.
* Pre-assess students’ understanding of determining the asymptotic restrictions on the domain of rational functions prior to describing the left- and right-sided behavior of the graph around these discontinuities.
 |
| **District notes:**  |
| **2A.8A** Analyze data to select the appropriate model from among linear, quadratic, and exponential models.*Supporting Standard***2A.8B** Use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data.*Supporting Standard***2A.8C** Predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models.*Readiness Standard* | **P.2N** Analyze situations modeled by functions, including exponential, logarithmic, rational, polynomial, and power functions, to solve real-world problems. | **X**[**A2U11**](https://teksresourcesystem.net/module/content/search/item/681109/viewdetail.ashx)**2A.8A****2A.8B****2A.8C**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)**2A.8C** |  | **X** | **X** | **X** |  |  |  |  |  |  |  |  |
| **Considerations:**Students may not have been taught 2A.8A, 2A.8B, and 2A.8C and may not have had the opportunity to solidify the foundational understandings to prepare them for P.2N. Precalculus teachers should be prepared to:* Introduce using regression methods available through technology to write an exponential function from a given data set.
* Introduce selecting the appropriate model for a data set using regression methods and the coefficient of determination (*r*2-value).
 |
| **District notes:**  |
| **2A.5B** Formulate exponential and logarithmic equations that model real-world situations, ~~including exponential relationships written in recursive notation~~.*Supporting Standard* | **P.2N** Analyze situations modeled by functions, including exponential, logarithmic, rational, polynomial, and power functions, to solve real-world problems. | **X**[**A2U10**](https://teksresourcesystem.net/module/content/search/item/681108/viewdetail.ashx)**2A.5B** |  | **X** | **X** | **X** |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.5B, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2N. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of formulating exponential equations that model real-world situations prior to analyzing situations modeled by exponential functions.

Although students may have been taught 2A.5B (formulating exponential equations), they may not have been taught 2A.5B (formulating logarithmic equations). So, students may not have had the opportunity to solidify the foundational understandings to prepare them for P.2N. Precalculus teachers should be prepared to:* Introduce writing logarithmic functions to model real-world problem situations using transformations of *y* = log*b*(*x*) and logarithmic regression

Note: In Algebra II, students also formulated absolute value, quadratic, square root, and rational equations to model real-world situations. These standards are not included in this table as they did not fall within the last 9 weeks. |
| **District notes:**  |
| **2A.2B** Graph and write the inverse of a function using notation such as *f* -1 (*x*).*Supporting Standard***2A.2C** Describe and analyze the relationship between a function and its inverse (quadratic and square root, logarithmic and exponential), including the restriction(s) on domain, which will restrict its range.*Readiness Standard* | **P.2E** Determine an inverse function, when it exists, for a given function over its domain or a subset of its domain and represent the inverse using multiple representations. |  | **X**[**A2U10**](https://teksresourcesystem.net/module/content/search/item/681108/viewdetail.ashx)**2A.2B****2A.2C**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.2C** |  |  | **X** |  |  | **X** |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.2B and 2A.2C, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2E. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of inverse relationships between quadratic and square root functions and logarithmic and exponential functions prior to determining an inverse function for other types of functions.
 |
| **District notes:**  |
| **2A.4C** Determine the effect on the graph of *f(x) =* √*x* when *f(x)* is replaced by *af(x), f(x) + d, f(bx)*, and *f(x*- *c)* for specific positive and negative values of *a, b, c,* and *d*.*Readiness Standard* | **P.2G** Graph functions, including ~~exponential, logarithmic, sine, cosine, rational~~, polynomial~~,~~ and power functions and their transformations, including *af(x), f(x) + d, f(x - c), f(bx)* for specific values of *a*, *b*, *c*, and *d*, in mathematical and real-world problems. |  |  | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.4C** | **X** | **X** |  |  | **X** |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.4C, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2G. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of the effect of *a*, *b*, *c*, and *d* on the graph of a parent function (such as a quadratic, cubic, square root, or cube root parent function) prior to analyzing the effect of *a*, *b*, *c*, and *d* on the graphs of other polynomial and power functions.

Note: In Algebra II, students also determined the effects of transformations on cubic and cube root parent functions. This standard is not included in this table as it did not fall within the last 9 weeks. |
| **District notes:**  |
| **2A.4F** Solve quadratic and square root equations.*Readiness Standard***2A.7D** Determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods.*Supporting Standard***2A.7E** Determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping.*Readiness Standard* | **P.5J** Solve polynomial equations with real coefficients by applying a variety of techniques in mathematical and real-world problems.**P.5K** Solve polynomial inequalities with real coefficients by applying a variety of techniques and write the solution set of the polynomial inequality in interval notation in mathematical and real-world problems. |  |  | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.4F****2A.7D****2A.7E** |  |  |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.4F, 2A.7D, and 2A.7E, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.5J and P.5K. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of solving quadratic equations prior to solving polynomial equations and inequalities.
* Pre-assess students’ understanding of factoring polynomial expressions of degree three and degree four prior to solving polynomial equations and inequalities.
 |
| **District notes:**  |
| **2A.6G** Analyze the effect on the graphs of *f*(*x*) = 1/*x* when *f(x)* is replaced by *af(x), f(bx)*, *f(x*-*c)*, and *f(x)* + *d*for specific positive and negative real values of *a, b, c,*and *d*.*Supporting Standard* | **P.2G** Graph functions, including ~~exponential, logarithmic, sine, cosine~~, rational, ~~polynomial, and power~~ functions and their transformations, including *af(x), f(x) + d, f(x - c), f(bx)* for specific values of *a*, *b*, *c*, and *d*, in mathematical and real-world problems. |  |  | **X** | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.6G** | **X** |  |  | **X** |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.6G, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2G. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of the effect of *a*, *b*, *c*, and *d* on the graph of the *f*(*x*) = 1/*x* prior to analyzing the effect of *a*, *b*, *c*, and *d* on the graphs of other rational functions.
 |
| **District notes:**  |
| **2A.6K** Determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation.*Supporting Standard* | **P.2K** Analyze characteristics of rational functions and the behavior of the function around the asymptotes, including horizontal, vertical, and oblique asymptotes. |  |  |  | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.6K** |  |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.6K, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2K. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of determining the asymptotic restrictions on the domain of rational functions prior to analyzing the behavior of rational functions around their asymptotes.
* Pre-assess students’ understanding of determining the asymptotes of rational functions prior to analyzing the behavior of rational functions around these asymptotes.
 |
| **District notes:**  |
| **2A.6I** Solve rational equations that have real solutions.*Readiness Standard* | **P.5L** Solve rational inequalities with real coefficients by applying a variety of techniques and write the solution set of the rational inequality in interval notation in mathematical and real-world problems. |  |  |  | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.6I** |  |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.6I, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.5L. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of solving rational equations prior to solving rational inequalities.
 |
| **District notes:**  |
| **2A.5A** Determine the effects on the key attributes on the graphs of *f(x) = bx* and *f(x) = logb (x)* where *b* is 2, 10, and *e* when *f(x)* is replaced by *af(x), f(x) + d,* and *f(x - c)* for specific positive and negative real values of *a, c,* and *d*.*Readiness Standard* | **P.2G** Graph functions, including exponential, logarithmic, ~~sine, cosine, rational, polynomial, and power~~ functions and their transformations, including *af(x), f(x) + d, f(x - c), f(bx)* for specific values of *a*, *b*, *c*, and *d*, in mathematical and real-world problems. |  |  | **X** | **X** | **X**[[**A2U10**](https://teksresourcesystem.net/module/content/search/item/681108/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681108/viewdetail.ashx)**2A.5A**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.5A** |  |  | **X** |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.5A, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.2G. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of the effect of *a*, *b*, *c*, and *d* on the graph of the *f*(*x*) = *bx* (where *b* is 2, 10, and *e*) prior to analyzing the effect of *a*, *b*, *c*, and *d* on the graphs of other exponential functions.

Although students may have been taught 2A.5A (transformations of exponential parent functions), they may not have been taught 2A.5A (transformations of logarithmic parent functions). So, students may not have had the opportunity to solidify the foundational understandings to prepare them for P.2G. Precalculus teachers should be prepared to:* Introduce transformations of logarithmic functions of the form *f(x) = logb (x)* where *b* is 2, 10, and *e*.
 |
| **District notes:**  |
| **2A.5C** Rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations.*Supporting Standard* | **P.5G** Use the properties of logarithms to evaluate or transform logarithmic expressions. |  |  |  |  | **X**[[**A2U10**](https://teksresourcesystem.net/module/content/search/item/681108/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681108/viewdetail.ashx)**2A.5C** |  |  |  |  |  |  |  |  |
| **Considerations:**Students may not have been taught 2A.5C and may not have had the opportunity to solidify the foundational understandings to prepare them for P.5G. Precalculus teachers should be prepared to:* Introduce rewriting exponential equations as their corresponding logarithmic equations and rewriting logarithmic equations as their corresponding exponential equations prior to introducing the properties of logarithms.
 |
| **District notes:**  |
| **2A.5D** Solve exponential equations of the form *y = abx* where *a* is a nonzero real number and *b* is greater than zero and not equal to one and single logarithmic equations having real solutions.*Readiness Standard***2A.5E** Determine the reasonableness of a solution to a logarithmic equation.*Supporting Standard* | **P.5H** Generate and solve logarithmic equations in mathematical and real-world problems.**P.5I** Generate and solve exponential equations in mathematical and real-world problems. |  |  |  |  | **X**[[**A2U10**](https://teksresourcesystem.net/module/content/search/item/681108/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681108/viewdetail.ashx)**2A.5D****2A.5E**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.5D** |  |  |  |  |  |  |  |  |
| **Considerations:**Although students may have been taught 2A.5D, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.5I. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of solving exponential equations of the form *y = abx* prior to solving exponential equations in other forms.

Although students may have been taught 2A.5D (solving exponential equations), they may not have been taught 2A.5D (solving logarithmic equations). So, students may not have had the opportunity to solidify the foundational understandings to prepare them for P.5H. Precalculus teachers should be prepared to:* Introduce solving single logarithmic equations prior to solving logarithmic equations that require the use of the properties of logarithms.

Students may not have been taught 2A.5E and may not have had the opportunity to solidify the foundational understandings to prepare them for P.5H. Precalculus teachers should be prepared to:* Introduce determining the reasonableness of solutions to logarithmic equations.
 |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  | **X** |  |  |  |  |  |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  | **X** |  |  |  |  |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  |  | **X** |  |  |  |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  |  |  | **X** |  |  |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  |  |  |  | **X** |  |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  |  |  |  |  | **X** |  |  |
| **District notes:**  |
| There are no additional COVID-19 gap considerations from the previous grade level for this unit. |  |  |  |  |  |  |  |  |  |  |  | **X** |  |
| **District notes:**  |
| **2A.4B** Write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening.*Readiness Standard* | **P.3G** Make connections between the locus definition of conic sections and their equations in rectangular coordinates. |  |  |  |  |  |  |  |  |  |  |  |  | **X**[[**A2U12**](https://teksresourcesystem.net/module/content/search/item/681110/viewdetail.ashx)](https://teksresourcesystem.net/module/content/search/tcmpcbrowse/~/item/681110/viewdetail.ashx)**2A.4B** |
| **Considerations:**Although students may have been taught 2A.4B, they may not have had the opportunity to solidify the foundational understandings to prepare them for P.3G. Precalculus teachers should be prepared to:* Pre-assess students’ understanding of writing the equations of parabolas using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening prior to connecting the locus definition of parabolas and their equations in rectangular coordinates.
 |
| **District notes:**  |