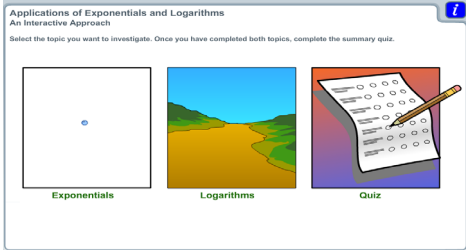
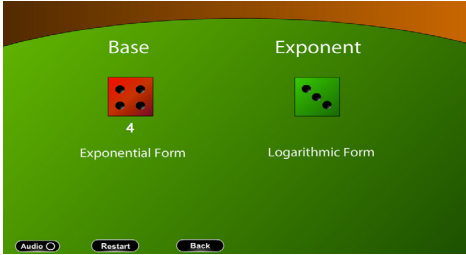
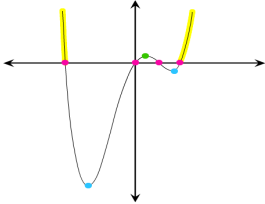


# MHF4U

## Ontario Educational Resources Bank (OERB) Activities

Exponential and Logarithmic Functions	
Activity	Description
<p><b>Applications of Exponential and Logarithmic Functions</b></p>  <p><b>Resource ID: ELO1090780</b></p>	<p>Build understanding of exponential and logarithmic functions by investigating real-world situations involving exponential growth or decay as well as situations involving logarithmic formulae. Practise applying this knowledge by completing a quiz.</p>
<p><b>Log Laws</b></p> <p>Recall: a logarithm is an alternative notation for expressing an exponent; it is the inverse of exponentiation. The logarithm of a number is the exponent to which a base must be raised to get the number.</p> <p>Example 1:</p> $\log_5 125 = 3$ <p>and</p> $5^3 = 125$ <p><input type="button" value="Next"/></p> <p><b>Resource ID: ELO1087840</b></p>	<p>Build understanding of the product, quotient and power laws for logarithms by investigating a variety of equations after reviewing the definition of a logarithm.</p>
<p><b>Log Rolling (Can be Dicey)</b></p>  <p><b>Resource ID: ELO1178270</b></p>	<p>Practise converting between logarithmic and exponential forms and evaluating logarithms by answering questions in a challenge activity.</p>
Polynomial and Rational Functions	
Activity	Description
<p><b>Characteristics of Polynomials</b></p> <p>Move the cursor over the coloured parts of the graph of this polynomial function to see their description. Click the coloured parts to learn more.</p>  <p><b>Resource ID: ELO1090650</b></p>	<p>Build understanding of polynomial functions by reviewing the key characteristics of polynomial functions through interactive descriptions.</p>

## Polynomial and Rational Functions (continued)

## Activity

## Description

## Complex Rational Functions Curve Sketching

Complex Rational Functions  
Curve Sketching

Characteristics

From Characteristics to Graphs

Practice

$$f(x) = \frac{h(x)}{g(x)}, g(x) \neq 0$$



Resource ID: ELO1090760

Build understanding of complex rational functions by viewing a tutorial analysis of the critical characteristics of their equations leading to sketches of their graphs. Practise applying this knowledge by completing analyses of several rational functions and matching each equation to an appropriate graph.

## Division of Polynomials

## Synthetic Division

$(x^2 - 7x + 10) \div (x - 5)$

k	1	-7	10
5		5	-10
			-2
			0

Quotient:  $1x - 2 R0$   
(though we usually do not put in the 1)

Steps:  
 Note: Arrange dividend in descending degree first.  
 Step 1: Divide divisor  $\div 5$  to find a value we will call  $k$ . Write the  $k$  value to the left of box.  
 Step 2: Write numerical coefficients of the dividend vertically inside the box. Use a zero coefficient for any missing degrees of the dividend.  
 Step 3: Drop the first coefficient of dividend to just below box.  
 Step 4: Multiply  $k$  value by dropped-down first coefficient. Write result in box under next coefficient.  
 Step 5: Add and put result under box beneath sum figure.  
 Step 6: Multiply new value under box by  $k$ . Put the result in the box beneath next coefficient. Add and drop result beneath box already below next figure.  
 Step 7: Continue until you have used all the coefficients.  
 Step 8: Interpret the result.  
 Numbers below the box are coefficients of variables, beginning with one degree LESS than the dividend.

Menu Sample Problems Back Next

Resource ID: ELO1093610

Practise long division and synthetic division of a polynomial by a binomial by following the illustrated step-by-step procedures provided.

## Finite Differences

## Finite Differences - Application

## Example 2

Given the following data set:

x	f(x)	First Level Difference $\Delta_1 f(x)$	Second Level Difference $\Delta_2^2 f(x)$	Third Level Difference $\Delta_3^3 f(x)$
1	12			
2	-10	-22		
3	-18	-8	14	
4	0	18	26	12
5	66	66	30	12
6	162	106	50	12

3. Are these differences constant? If not, as in this case, find the next difference level.

Menu Back Continue

Resource ID: ELO1098290

Build understanding of finite differences by investigating the finite differences for linear, quadratic, cubic and quartic functions and how they can predict the leading coefficient of the function. Practise applying this knowledge by determining the finite differences, identifying the type of polynomial and the value of the leading coefficient from given tables of values.

## Polynomial Concentration

Polynomial Concentration

equation

$V = 2x(10 - x)^2$

table of values

x	V
0	0
2	208
4	208
6	192
8	64
10	0

graph

verbal description

The volume of a box with a height of 2x cm and a width and length of  $(10 - x)$  cm.

Click the button below.

Start

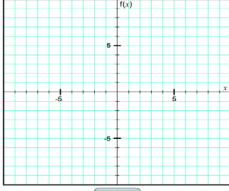
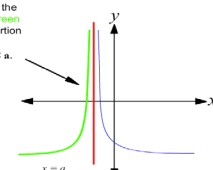
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Resource ID: ELO1178280

Build understanding of characteristics of polynomial functions by matching different representations of a variety of polynomial functions.

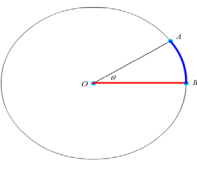
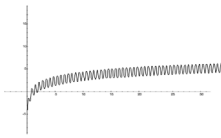
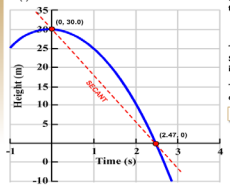
# MHF4U

## Ontario Educational Resources Bank (OERB) Activities

Polynomial and Rational Functions (continued)	
Activity	Description
<div style="text-align: center;"> <h3>Polynomial Inequalities</h3> <p>Polynomial Inequalities Practice</p> <p>Click on the choice that is the solution for the given polynomial inequality. Click the Graph button to view the graph of the related function.</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  </div> <div style="width: 45%;"> <div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 5px;"><math>x^2 &lt; x^2</math></div> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 48%;"><math>x = 1; x \neq 0</math></div> <div style="width: 48%;"><math>-3 &lt; x &lt; 0; 1 &lt; x &lt; 3</math></div> <div style="width: 48%;"><math>x \neq 0</math></div> <div style="width: 48%;"><math>x \geq 0.75</math></div> <div style="width: 48%;"><math>x \neq 0</math></div> <div style="width: 48%;"><math>x \geq -3; 0.6 &lt; x \leq 3</math></div> <div style="width: 48%;"><math>x \in \mathbb{R}; x \neq 3</math></div> <div style="width: 48%;"><math>x &gt; -3; -1.6 &lt; x \leq 1</math></div> <div style="width: 48%;"><math>-1.6 &lt; x &lt; 0; x \geq 1</math></div> <div style="width: 48%;"><math>x &lt; -3; -1.6 &lt; x \leq 1</math></div> <div style="width: 48%;"><math>-1 &lt; x &lt; 1</math></div> <div style="width: 48%;"><math>x \geq 1; x \neq 0</math></div> <div style="width: 48%;"><math>x \in \mathbb{R}; -1 &lt; x \leq 0; x \geq 1.4</math></div> <div style="width: 48%;"><math>x \geq -3</math></div> <div style="width: 48%;"><math>x \in \mathbb{R}; x \neq 0</math></div> <div style="width: 48%;"><math>-4 &lt; x &lt; 5</math></div> <div style="width: 48%;"><math>x &lt; -3; 0 &lt; x &lt; 2</math></div> <div style="width: 48%;"><math>x \in \mathbb{R}</math></div> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <span>Graph</span> <span>Menu</span> </div> <p style="text-align: center; font-weight: bold; margin-top: 10px;">Resource ID: ELO1088050</p> </div> <td style="padding: 10px; vertical-align: top;"> <p>Build understanding of polynomial inequalities by viewing an illustrated tutorial. Practise applying this knowledge by viewing graphs of related polynomial functions and then selecting the appropriate solution for the inequality given.</p> </td> </div>	<p>Build understanding of polynomial inequalities by viewing an illustrated tutorial. Practise applying this knowledge by viewing graphs of related polynomial functions and then selecting the appropriate solution for the inequality given.</p>
<div style="text-align: center;"> <h3>Rational Function Characteristics</h3> <p>Characteristics of Rational Functions    Intervals of Increase</p> <p>As you move from left to right, the function is increasing on the green portion of the function. This portion of the function is said to be increasing on the interval <math>x &lt; a</math>.</p>  </div> <div style="text-align: center; margin-top: 10px;"> <span>Continue</span> </div> <p style="text-align: center; font-weight: bold; margin-top: 10px;">Resource ID: ELO1090710</p>	

# MHF4U

## Ontario Educational Resources Bank (OERB) Activities

Trigonometric Functions (continued)	
Activity	Description
<p style="text-align: center;"><b>Radian Measure: An Interactive Approach</b></p> <p style="text-align: center; font-size: small;">The Radian Measure</p> <p style="font-size: x-small;">Arc, Radius, and Radians</p> <p style="font-size: x-small;">If we measure the ratio of arc length to radius, we will have a unit-less value for a ratio.</p> <div style="display: flex; align-items: center; margin: 10px 0;"> <div style="font-size: x-small; margin-right: 20px;"> <math display="block">\frac{\text{ARC LENGTH}}{\text{RADIUS}} = \frac{2.76 \text{ cm}}{5.44 \text{ cm}} = 0.51</math> </div>  </div> <p style="text-align: center; font-size: x-small;">Next      Menu</p> <p style="text-align: center; font-weight: bold; margin-top: 10px;">Resource ID: ELO1079560</p>	<p>Build understanding of radian measure by completing interactive exploration activities demonstrating the relationship between radian and degree measure. Practise applying this knowledge by completing a multiple choice quiz.</p>
Characteristics of Functions	
Activity	Description
<p style="text-align: center;"><b>Investigating Compound Functions</b></p> <div style="display: flex; align-items: center; margin: 10px 0;">  <div style="margin-left: 20px; font-size: x-small;"> <p><b>Solution</b></p> <p><math>h(x) = f(x) + g(x)</math></p> <p>Select the two general functions that make up the graph to the left.</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="font-size: x-small;"> <p>f(x) Select one Function</p> <p><input type="checkbox"/> Sine/Cosine</p> <p><input type="checkbox"/> Cotangent/Secant</p> <p><input type="checkbox"/> Logarithmic</p> <p><input type="checkbox"/> Exponential</p> <p><input type="checkbox"/> Polynomial Degree 1</p> <p><input type="checkbox"/> Polynomial Degree 2</p> <p><input type="checkbox"/> Polynomial Degree 3</p> <p><input type="checkbox"/> Polynomial Degree 4</p> <p><input type="checkbox"/> Rational</p> </div> <div style="font-size: x-small;"> <p>g(x) Select one Function</p> <p><input type="checkbox"/> Sine/Cosine</p> <p><input type="checkbox"/> Cotangent/Secant</p> <p><input type="checkbox"/> Logarithmic</p> <p><input type="checkbox"/> Exponential</p> <p><input type="checkbox"/> Polynomial Degree 1</p> <p><input type="checkbox"/> Polynomial Degree 2</p> <p><input type="checkbox"/> Polynomial Degree 3</p> <p><input type="checkbox"/> Polynomial Degree 4</p> <p><input type="checkbox"/> Rational</p> </div> <div style="text-align: center;"> <p>Check</p> </div> </div> <p style="text-align: center; font-size: x-small; margin-top: 10px;">Menu</p> <p style="text-align: center; font-weight: bold; margin-top: 10px;">Resource ID: ELO1088080</p>	<p>Build understanding of the effects of combining two functions by investigating graphs, identifying the components of a compound function and matching compound functions to their graph.</p>
<p style="text-align: center;"><b>Investigating Instantaneous Rates of Change</b></p> <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <p style="font-size: x-small; margin: 0;"><b>Understanding Rates of Change</b></p> <p style="font-size: x-small; margin: 0;">The graph of the function is given below: <math>h(t) = 30.0 - 4.91t^2</math></p>  <div style="font-size: x-small; margin: 5px 0;"> <p>The average speed of the rock is represented by the slope of the line through the initial point and the final point.</p> <p>The line joining the two points is called a <b>SECANT</b>. A secant line of a curve is a line that intersects two or more points on the curve.</p> <p>The average speed is represented by the slope of the secant.</p> <p style="border: 1px solid black; display: inline-block; padding: 2px;">SLOPE OF SECANT</p> </div> </div> <p style="display: flex; justify-content: space-between; font-size: x-small; margin-top: 10px;"> <span>HOME</span> <span>BACK</span> </p> <p style="text-align: center; font-weight: bold; margin-top: 10px;">Resource ID: ELO1098990</p>	<p>Build understanding of average and instantaneous rates of change by investigating how the slope of a secant between two points on a curve can be used to determine the slope of a tangent to a single point.</p>