

MCR3U
Ontario Educational Resources Bank (OERB) Activities

Characteristics of Functions

| Activity | Description |
|----------|-------------|
|----------|-------------|

Completing the Square

Complete the Square

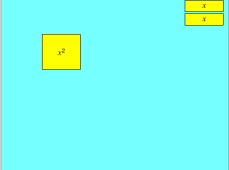
Re-arrange the tiles to form a square. What must be added to complete the square in each case?

To rotate a rectangular block, double-click it.

Click one of the letters below to bring up the tiles:

- A) $x^2 + 2x + ?$
- B) $x^2 + 4x + ?$
- C) $x^2 + 6x + ?$
- D) $x^2 + 8x + ?$

Click here for unit squares to add.



Unit Square

Record your results:

- A) $x^2 + 2x + \square = (x + \square)(x + \square)$
- B) $x^2 + 4x + \square = (x + \square)(x + \square)$
- C) $x^2 + 6x + \square = (x + \square)(x + \square)$
- D) $x^2 + 8x + \square = (x + \square)(x + \square)$

By this pattern, what is the missing term in $x^2 + 16x + ?$

Hint

Resource ID: ELO1084080

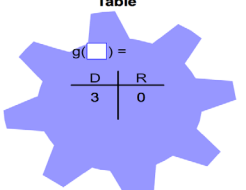
Build understanding of perfect square trinomials and a foundation for the process of completing the square by determining the missing tiles needed to complete perfect squares using virtual algebra tiles.

The Function Machine

The Function Machine

Determine the next two values for the range.

Table



g() =

| | |
|---|---|
| D | R |
| 3 | 0 |

| D | R |
|---|---|
| 0 | 0 |
| 1 | 0 |
| 2 | 0 |
| 3 | 0 |
| 4 | |
| 5 | |

Submit

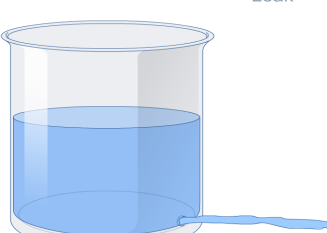
Click the menu button for another function representation. Menu

Resource ID: ELO1079500

Build understanding of the relationship between the domain values and the range values of a function by exploring tables of values, data sets, mapping diagrams and graphs. Practise making equations by making predictions for each relation described.

Leak

Leak



| Time (minutes) | Volume (litres) |
|----------------|-----------------|
| 0 | 1200 |
| 1 | 1083 |
| 2 | 972 |
| 3 | 867 |
| 4 | 768 |
| | |
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Resource ID: EL01079520

Build understanding of the properties of quadratic functions by exploring a water leaking simulation where data is collected and represented graphically. Practise applying this knowledge by completing a quiz.

Rectangle Factory

Rectangle Factory

Compare your answer with this given solution. Click Table to see a summary of the expressions you have completed.

| | | |
|-------|-------|-----|
| x^2 | x^2 | x |
| x | x | 1 |

$2x + 1$

| | | |
|-------|-------|-----|
| x^2 | x^2 | x |
| x | x | 1 |

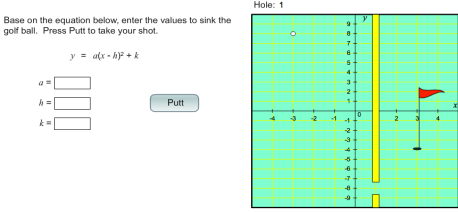
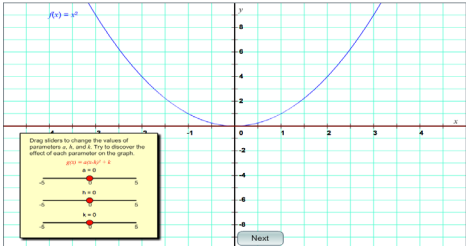
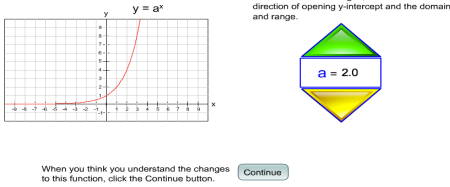
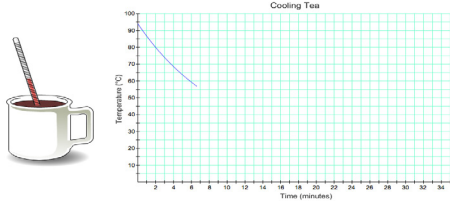
Menu

Resource ID: ELO1098970

Build understanding of factoring by creating rectangles with a given area, using virtual algebra tiles.

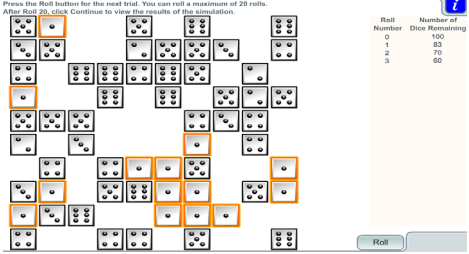
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Ontario Educational Resources Bank (OERB) Activities

| Characteristics of Functions (continued) | |
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| Activity | Description |
| <p style="text-align: center;">Quadratic Mini-Golf</p> <p style="text-align: center;">Quadratic Mini-Golf Game</p> <p>Base on the equation below, enter the values to sink the golf ball. Press Putt to take your shot.</p> $y = a(x - h)^2 + k$ <p> $a =$ <input type="text"/> $h =$ <input type="text"/> $k =$ <input type="text"/> </p> <p style="text-align: center;"><input type="button" value="Putt"/></p>  <p style="text-align: center;">Resource ID: ELO1099580</p> | <p>Practise determining the equation of a quadratic in vertex form $y = a(x - h)^2 + k$, by calculating a when given the vertex and another point in a golf simulation activity.</p> |
| <p style="text-align: center;">Quadratic Transformations</p>  <p style="text-align: center;">Resource ID: ELO1081340</p> | <p>Build understanding of transformations by exploring the effects of each parameter in the quadratic equation $y = a(x - h)^2 + k$. Practise applying this knowledge by completing a quiz.</p> |
| Exponential Functions | |
| Activity | Description |
| <p style="text-align: center;">Exploring Exponential Functions</p> <p style="text-align: center;">Exploring Exponential Functions</p>  <p style="text-align: center;">Resource ID: ELO1079540</p> | <p>Build understanding of the properties of the basic exponential function $y = a^x$ by exploring what happens to a graph as the value of the base a changes. Practise applying this knowledge by completing a quiz.</p> |
| <p style="text-align: center;">Just Chillin'</p> <p style="text-align: center;">Just Chillin'</p>  <p style="text-align: center;">Resource ID: ELO1081370</p> | <p>Build understanding of exponential decay by investigating and interpreting the parts of a graph related to a simulation of hot liquid cooling.</p> |

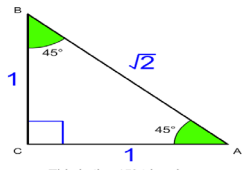
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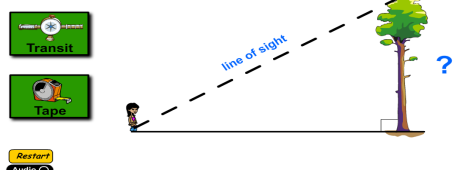
Exponential Functions (continued)

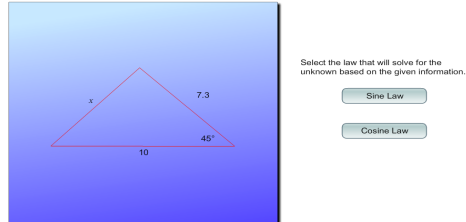
| Activity | Description |
|--|--|
| <p>Keep on Rollin'</p>  <p>Resource ID: ELO1087820</p> | <p>Build understanding of exponential decay by investigating and interpreting the parts of a graph related to a dice rolling simulation.</p> |

Trigonometric Functions

| Activity | Description |
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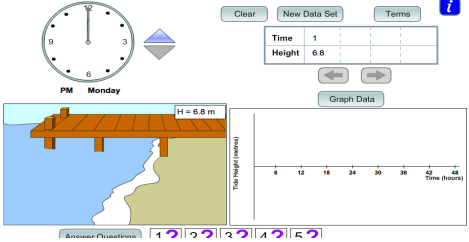
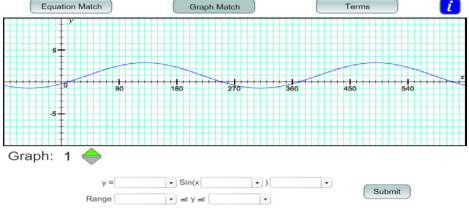
| | |
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| <p>Constructing the 45° Triangle</p> <p>Constructing the 45° Triangle</p>  <p>Resource ID: ELO1178310</p> | <p>Build understanding of how the measures in an isosceles right triangle are related by viewing how it can be constructed from a unit square.</p> |
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|---|---|
| <p>The Great Trig Trek</p> <p>The Great Trig  Trek North America</p> <p>You must calculate the height of a giant redwood tree in California. Select a tool and then click on the part of the diagram you wish to measure. Some measurements may not be available. You may ignore the height of the team member in the calculations.</p>  <p>Resource ID: ELO1194980</p> | <p>Practise selecting an appropriate tool by deciding whether a trig ratio, the sine law or the cosine law should be used to solve for a missing measure in a triangle. Practise problem solving by calculating the measure of a missing side or angle in real-life examples involving triangles.</p> |
|---|---|

| | |
|--|---|
| <p>Sine Law vs Cosine Law</p> <p>Sine Law vs. Cosine Law</p>  <p>Resource ID: ELO1410410</p> | <p>Practise the sine law and cosine law by selecting the appropriate law and solving for a missing measure in a triangle.</p> |
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| Trigonometric Functions (continued) | |
|--|---|
| Activity | Description |
| <p style="text-align: center;">Sinusoidal Tides</p> <p style="text-align: center;">Fun Day at the Tides</p>  <p style="text-align: center;">Resource ID: ELO1081390</p> | <p>Build understanding of the characteristics of the sine function by investigating the data collected and the graphs created from a simulation of the periodic behaviour of tides.</p> |
| <p style="text-align: center;">Transformations Exploration</p>  <p style="text-align: center;">Resource ID: ELO1084100</p> | <p>Build understanding of the sine function by investigating and interpreting the key features of graphs and equations of the form $y = a \sin(x - d) + c$.</p> |