Title of Lesson:
Graphs & Models (Precalculus Review)
By the end of this lesson, I will be able to answer the following questions...

1. How do I graph common equations by hand and using technology?

2. What are the basic rules for transformation of functions?

3. How do I determine the intercepts of a graph using algebra and technology?

4. How do I determine the domain/range of functions and write results in interval notation?
Vocabulary

1. Parent Function
2. Transformation
3. Domain
4. Range
Prerequisite Skills with Practice

• Using your Graphing Calculator to create a reasonable graph of a function....
Basic Graph Sketching
Sketch the following graphs below and confirm your sketch using your graphing calculator

\[ f(x) = (x - 1)^2 + 3 \]

\[ g(x) = |x + 2| - 1 \]

\[ h(x) = (x + 4)^3 + 2 \]

\[ y(x) = -\ln x \]

\[ f(x) = \frac{4}{x - 6} \]
**Basic Transformations (c > 0):**

<table>
<thead>
<tr>
<th>Transformation</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Graph</td>
<td>( y = f(x) )</td>
</tr>
<tr>
<td>Horizontal shift c units right</td>
<td>( y = f(x-c) )</td>
</tr>
<tr>
<td>Horizontal shift c units left</td>
<td>( y = f(x+c) )</td>
</tr>
<tr>
<td>Vertical shift c units up</td>
<td>( y = f(x)+c )</td>
</tr>
<tr>
<td>Vertical shift c units down</td>
<td>( y = f(x)-c )</td>
</tr>
<tr>
<td>Reflection about the x-axis</td>
<td>( y = -f(x) )</td>
</tr>
<tr>
<td>Reflection about the y-axis</td>
<td>( y = f(-x) )</td>
</tr>
<tr>
<td>Reflection about the origin</td>
<td>( y = -f(-x) )</td>
</tr>
<tr>
<td>Finding Intercepts of a Graph Algebraically</td>
<td>Finding Intercepts of a Graph Using Technology</td>
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<td>------------------------------------------</td>
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<tr>
<td><strong>Finding the x-intercept:</strong> Plug zero in for y and solve for x</td>
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Find the x- and y-intercepts of the graph of 
\[ y = x^3 - 5x^2 - 6x \] algebraically.

Use a graphing utility to find the x- and y-intercepts of the graph of 
\[ y = x^4 - 3x^3 + 2x^2 - x - 4. \]
The Domain & Range of a Function

The domain is the set of all input values for x. The range is the set of all outcomes of f(x).

Find the domain and range of each function.

\[ f(x) = x^2 + 2 \]
\[ g(x) = \sqrt{4x + 1} \]

\[ h(\theta) = \sec(\theta) \]
\[ l(x) = \frac{1}{3x - 1} \]
THE END

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