A. Lesson Context

BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basic skills and concepts of the idea of "a function" • understanding how to model real world scenarios with the basic concepts of "functions"		
CONTEXT of this LESSON:	Where we've been In Lessons 1,2 & 3 you practiced with D&R, features & inverses of functions	Where we are Expanding our repertoire of parent functions, beyond the linear, exponential & quadratic from IM2	Where we are heading How do we apply the concept of "functions" to linear & exponential relations.

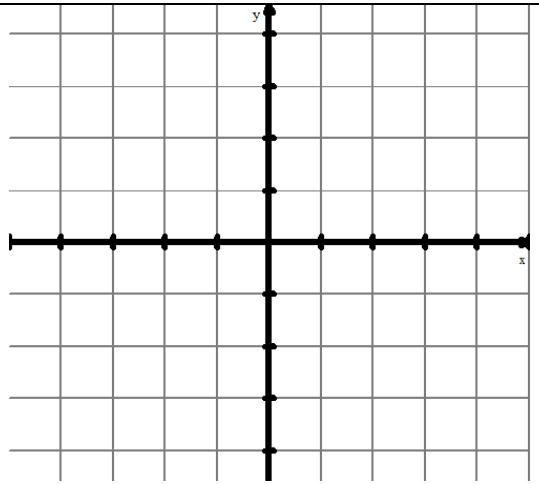
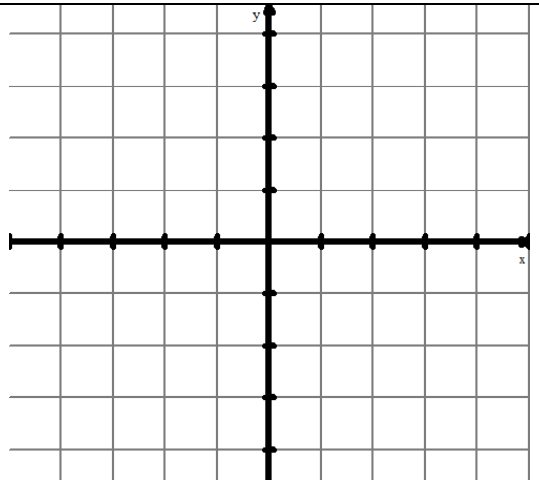
B. Lesson Objectives

a. Generate the graphs of parent functions on technology (TI-84 & DESMOS)
b. Relate the basics of function concepts to previously studied functions and new functions
c. Introduce the term "parent" functions and introduce new features that characterize these new functions

C. Opening Exercise

The stopping distance of a car is related to the speed at which the car travels. Mathematically, this relationship can be written as $d(v) = \frac{v^2}{15}$, where distance is measured in meters and speed is measured in m/s. For example, how much distance is required in order to safely stop a car travelling at 20 m/s (about 70 km/hr)? (i.e. evaluate d(20) = ???) In the inverse of this relation, we relate the velocity of the car to its stopping distance and the equation would be $v(d) = \sqrt{15d}$. For example, what should be your maximum speed if you are required to stop your car within 12 m of an obstacle on the road? (i.e. evaluate v(12) = ??)	(a) Evaluate d(20) and interpret. (b) Graph d(v). (c) What is the domain of d(v)? What is the range of d(v)? (d) Evaluate v(12) and interpret. (e) Is it easier to solve 12 = d(v) or to evaluate v(12) ? (f) Graph v(d) (g) Compare the graphs of d(v) and v(d)

D. Observation Table for Exploration

<table>
<tr><th>Function Equation</th><th>Sketch of Graph</th><th>Special Features & Symmetries</th><th>Domain & Range</th></tr>
<tr><td>$f(x) = x$ - Linear
<table><tr><th>x</th><th>Y</th></tr><tr><td>-3</td><td></td></tr><tr><td>-2</td><td></td></tr><tr><td>-1</td><td></td></tr><tr><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table></td><td>  </td><td></td><td></td></tr>
<tr><td>$f(x) = x^2$ - quadratic
<table><tr><th>x</th><th>Y</th></tr><tr><td>-3</td><td></td></tr><tr><td>-2</td><td></td></tr><tr><td>-1</td><td></td></tr><tr><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table></td><td>  </td><td></td><td></td></tr>
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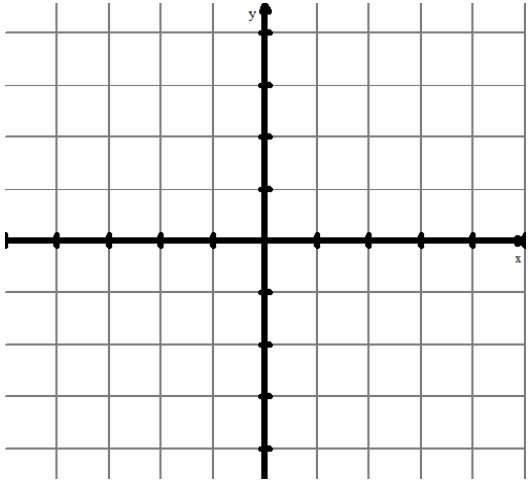
<td>  </td>
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<td>$f(x) = \sqrt{x}$ - Radical
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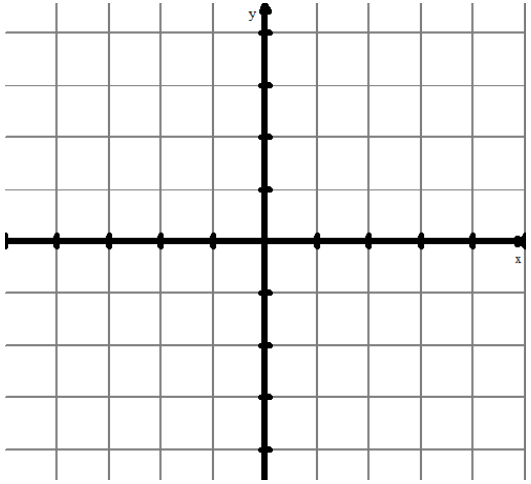
<td>  </td>
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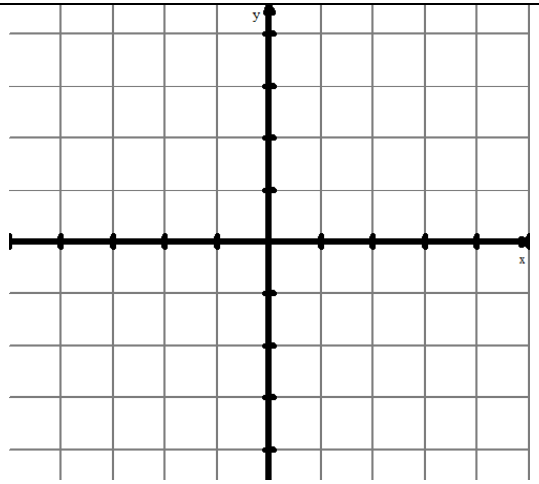
<td>$f(x)=\frac{1}{x}$ - Reciprocal
<table><tr><th>x</th><th>Y</th></tr><tr><td>-3</td><td></td></tr><tr><td>-2</td><td></td></tr><tr><td>-1</td><td></td></tr><tr><td>0</td><td></td></tr><tr><td>1</td><td></td></tr><tr><td>2</td><td></td></tr><tr><td>3</td><td></td></tr></table></td>
<td>  </td>
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<td>$f(x)=\left|x\right|$ - Absolute Value
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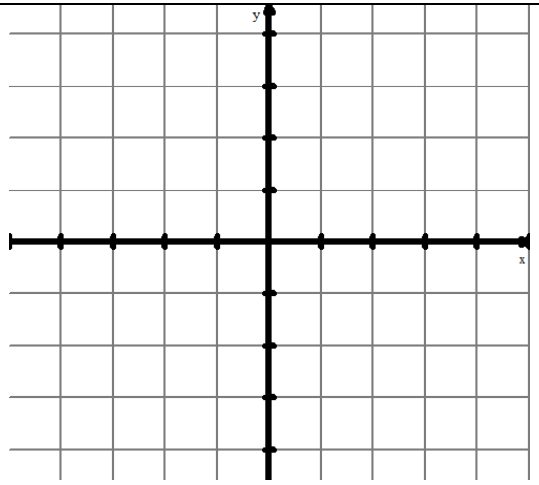
<td>  </td>
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