

## Technology Integration Workshop 2016

**Unit Title: Exponential Functions**

**Grade Level: 9-12**

**Subject Area: Algebra 2**

**Duration/Length/Number of class periods: 77 minute class periods**

**Description:**

Students will be able to describe exponential growth and decay through real life contexts using graphs, equations, tables, and written descriptions.

**Established Goals (National, State, Local):**

**9.2.2.2:** Represent and solve problems in various contexts using exponential functions, such as investment growth, depreciation and population growth.

**9.2.2.3:** Sketch graphs of linear, quadratic and exponential functions, and translate between graphs, tables and symbolic representations. Know how to use graphing technology to graph these functions.

**9.2.4.2:** Represent relationships in various contexts using equations involving exponential functions; solve these equations graphically or numerically. Know how to use calculators, graphing utilities or other technology to solve these equations.

**9.2.4.8:** Assess the reasonableness of a solution in its given context and compare the solution to appropriate graphical or numerical estimates; interpret a solution in the original context.

**What Enduring Understandings are desired?** Students will be able to analyze the effects of interest in various contexts.

**What Essential Questions will be considered?**

- What is interest?
- How do I write a formula to use an equation to model interest?
- How can I use formulas, tables, and graphs to answer interest problems?
- How can I sketch a graph using a table or equation?
- What does interest look like in different contexts?

**Students will know / be able to:**

- Use tables to describe and predict exponential growth with interest rates.
- Use an equation to describe and predict exponential growth with interest rates **more efficiently**.
- Sketch a graph of an exponential function by using a table or equation.
- Explain the reasonableness of a solution about interest in its given context by using tables, graphs, and equations to support justification.

Description	Units must include at least one of each formative, summative, introductory activity and learning activity. Check the appropriate box; one per row.							<a href="#">Formative</a>	<a href="#">Summative</a>	Introductory Activity	Learning Activity	Student Technology Used	Teacher Technology Used	<a href="#">ISTE Standards</a>
<b>(Day 1) What is interest?</b> <ul style="list-style-type: none"><li>● Generate a list of where students have seen interest before.</li><li>● Generate a list of why it is important to understand.</li><li>● Show video/ tell a story of my personal experiences with credit cards, student loans, and savings accounts.</li><li>● Give students a problem:<ul style="list-style-type: none"><li>○ Walter put \$1000 in his savings account. The account pays 4% interest yearly. How much will Walter have after 10 years?</li></ul></li><li>● Record and highlight different ways to solve. (Compound or simple)</li><li>● ASK: Is this a realistic problem? What are real interest rates? Different banks? Different types (CD, standard, large balances).</li><li>● Recalculate and discuss advantages/disadvantages of keeping money in savings.</li><li>● Introduce project: <b>Investigation of Interest</b></li><li>● Assign 2-3 problems using various rates and compounding times. (Schoology)</li><li>● Exit assessment on Schoology with questions on:<ul style="list-style-type: none"><li>○ Places interest exists,</li><li>○ Realistic interest rates.</li><li>○ One compounding interest rate problem.</li></ul></li></ul>	x		x	x	x	x		<b>1a</b> 2a 3c 4a						
<b>(Day 2) How do I write a formula to use an equation to model interest?</b> <ul style="list-style-type: none"><li>● Provide video on how a formula is derived to model interest.</li><li>● Provide another video on how to use the formula.<ul style="list-style-type: none"><li>○ <math>A(t) = a(1 \pm r)^t</math></li><li>○ <i>a: starting value, r: %rate as decimal, (+): growth or (-): decay</i></li></ul></li><li>● (Optional) Provide video of how students can enter equation into graphing calculator to generate graph or table AND how to use table to answer questions like “How long would it take for his money to double?”</li></ul>	x			x	x	x								

<ul style="list-style-type: none"> <li>• Have practice sheet of various interest problems for formative assessment in next class.</li> <li>• Time to work on Project</li> <li>• Exit ticket (Google form): <ul style="list-style-type: none"> <li>○ What are the advantages or disadvantages to using the formula instead of a table?</li> <li>○ How far are you in your project?</li> <li>○ What are challenges you have had so far or topics you need help on still?</li> </ul> </li> </ul>							
<b>(Day 3) How can I use formulas, tables, and graphs to answer interest problems?</b> <ul style="list-style-type: none"> <li>• Formative assessment on solving problems using an equation.</li> <li>• Possible review of topics based on previous exit ticket.</li> <li>• (Review) or provide video of how students can enter equation into graphing calculator to generate graph or table AND how to use table to answer questions like “How long would it take for his money to double?”</li> <li>• Revisit expectations of project.</li> <li>• Peer feedback at end of class</li> </ul>	x				x	x	
<b>(Day 4) How can I sketch a graph using a table or equation?</b> <ul style="list-style-type: none"> <li>• Ask students to work in groups to create a graph <u>without</u> using a calculator.</li> <li>• Monitor and record various strategies to discuss as whole class using Explain Everything to take pictures and make notes.</li> <li>• Have students record example in interactive notebooks.</li> <li>• Time to finish project. Due at the beginning of next class for presentation.</li> </ul>	x				x	X	
<b>(Day 5): What does interest look like in different contexts?</b> <ul style="list-style-type: none"> <li>• Students present projects.</li> </ul>		x		x	x		1b 2b 4b 2c

**Materials, tools and resources:**

- [Interest Project](#) and Rubric (link will be updated)
- [Direct instruction videos](#) (to be made and posted on youtube)
- Interest practice problems sheet
- TI 84 calculators
- iPad/device to access internet
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**Unit Plan Author (name, school and optional email address or hyperlink to teacher’s web page)**

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Additional credit given to