	Enhanced Algebra: Concepts & Connections (Grade 8)				
Unit title	*Unit 5: Modeling and Analyzing Exponential Expressions, Equations and Functions*	**MYP year**	*3*	**Unit duration (hrs)**	*Enter Hours* *MSGA- (5 hours per week)* *MMS- (4.5 hours per week)* *MHS- (7.5 hours per 2 weeks)*

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

A.PAR.8: Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations.
    A.PAR.8.1 Interpret exponential expressions and parts of an exponential expression that represent a quantity in terms of its framework
    A.PAR.8.2 Create exponential equations in one variable and use them to solve problems, including mathematically applicable situations.
    A.PAR.8.3 Create exponential equations in two variables to represent relationships between quantities, including in mathematically applicable situations; graph equations on coordinate axes with labels and scales.
    A.PAR.8.4 Represent constraints by exponential equations and interpret data points as possible or not possible in a modeling environment.

A.FGR.9: Construct and analyze the graph of an exponential function to explain a mathematically applicable situation for which the graph serves as a model; compare exponential with linear and quadratic functions.
    A.FGR.9.1 Use function notation to build and evaluate exponential functions for inputs in their domains and interpret statements that use function notation in terms of a context.
    A.FGR.9.2 Graph and analyze the key characteristics of simple exponential functions based on mathematically applicable situations.
    A.FGR.9.3 Identify the effect on the graph generated by an exponential function when replacing $f(x)$ with $f(x) + k$, and $k\,f(x)$, for specific values of k (both positive and negative); find the value of k given the graphs.
    A.FGR.9.4 Use mathematically applicable situations algebraically and graphically to build and interpret geometric sequences as functions whose domain is a subset of the integers.
    A.FGR.9.5 Compare characteristics of two functions each represented in a different way.

A.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics
    A.MM.1.1 Explain applicable, mathematical problems using a mathematical model.
    A.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.
    A.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

A.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

A.MP.1-8 : Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

Concepts/Skills to support mastery of standards

A.PAR.8.1 Interpret exponential expressions and parts of an exponential expression that represent a quantity in terms of its framework

A.PAR.8.2 Create exponential equations in one variable and use them to solve problems, including mathematically applicable situations.

A.PAR.8.3 Create exponential equations in two variables to represent relationships between quantities, including in mathematically applicable situations; graph equations on coordinate axes with labels and scales.

A.PAR.8.4 Represent constraints by exponential equations and interpret data points as possible or not possible in a modeling environment.

A.FGR.9.1 Use function notation to build and evaluate exponential functions for inputs in their domains and interpret statements that use function notation in terms of a context.

A.FGR.9.2 Graph and analyze the key characteristics of simple exponential functions based on mathematically applicable situations.

A.FGR.9.3 Identify the effect on the graph generated by an exponential function when replacing $f(x)$ with $f(x) + k$, and $k\,f(x)$, for specific values of k (both positive and negative); find the value of k given the graphs.

A.FGR.9.4 Use mathematically applicable situations algebraically and graphically to build and interpret geometric sequences as functions whose domain is a subset of the integers.

A.FGR.9.5 Compare characteristics of two functions each represented in a different way.

MCS Gifted Standards:

MSC.Gifted.S2B-Develop and apply the cognitive components of creative thinking: fluency, flexibility, originality, and elaboration.

MSC.Gifted.S4B- Recognize and examine the value of others strengths, thoughts, ideas, and feelings during collaboration.

Vocabulary

[K-12 Mathematics Glossary](#)

asymptotic behavior	average rate of change	coefficient	constraint	continuous	decay	decreasing
domain	end behavior	exponential expression	exponential model	exponential relationship	geometric sequence	growth
increasing	interval notation	parameter	range	term	x-intercept	y-intercept
half-life	simple interest	compound interest	horizontal translation	stretch	compression	strictly decreasing
interval of increase	strictly increasing	interval of decrease	transformations	infinity	vertical translation	negative infinity

exponential decay	zero	exponential growth	parent function	exponential	exponent	

Notation

Function Notation -

$f(t)$ Interval Notation - [.] , (,) Set Notation - $D: \{x|x \in R\}$ (Set of all real numbers) , $R: \{y \mid y \in R\}, \{x|5 \leq x \leq 7\}$

Key concept	Related concept(s)	Global context
Logic	Generalization, Pattern, Representation	Scientific and Technical Innovation

Statement of inquiry
Patterns and representations create relationships that can be used to determine opportunity and risk.

Inquiry questions

Factual—

- What is the formula for growth and decay exponential equations?
- How do I graph an exponential function?
- What does half-life mean?
- What does a growth and a decay function look like on a graph?

Conceptual—

- How can you interpret an exponential function?
- What is the difference between a growth and a decay within an exponential function?

Debatable-

- Is it easier to interpret a graph of an exponential function or the equation?

MYP Objectives	Assessment Tasks	
What specific MYP **objectives** will be addressed during this unit?	*Relationship between summative assessment task(s) and statement of inquiry:*	*List of common formative and summative assessments.*
MYP A: Knowing and Understanding	Summative assessment will have questions that ask students to use multiplying cells learning activity to make predictions about sustainability.	**Formative Assessment(s):** **MYP A - CFA** **Summative Assessment(s):** **Unit 5 -** Summative Assessment **Unit 5 -** Retest **MYP Project -** DOE "Paper Folding"- Criteria A
Approaches to learning (ATL)		
Category: Self - Management Skill **Cluster:** Organization **Skill Indicator:** Use appropriate strategies for organizing complex information		

Learning Experiences		
Add additional rows below as needed.		
Objective or Content	**Learning Experiences**	**Personalized Learning and Differentiation**

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 A.MM.1: Apply mathematics to real-life situations; model real-life phenomena using mathematics
    A.MM.1.1 Explain applicable, mathematical problems using a mathematical model.
	The Marvel of Medicine
	
	https://lor2.gadoe.org/gadoe/file/f8349bc4-2cc0-4260-89bd-be4c270b3daf/1/The-Marvel-of-Medicine-Student-Reproducible.pdf
	(Student Document)
	
	https://lor2.gadoe.org/gadoe/file/f8349bc4-2cc0-4260-89bd-be4c270b3daf/1/The-Marvel-of-Medicine.pdf
	(Teacher Document)
		Learning Plan Description: In this learning plan, students will explore the use of exponential functions in the medical field to determine the medicine dosages as well as the level of medicine in a patient's body.

A.MP.1-8 : Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.		
A.PAR.8: Create and analyze exponential expressions and equations to represent and model real-life phenomena; solve exponential equations in mathematically applicable situations. **A.PAR.8.2** Create exponential equations in one variable and use them to solve problems, including mathematically applicable situations. **A.PAR.8.3** Create exponential equations in two variables to represent relationships between quantities, including in mathematically applicable situations; graph equations on coordinate axes with labels and scales. **A.MM.1:** Apply mathematics to real-life situations; model real-life phenomena using mathematics **A.MM.1.1** Explain applicable, mathematical problems using a mathematical model. **A.MM.1.4** Use various mathematical representations and structures with this information to represent and solve real-life problems. **A.MM.1.5** Define appropriate quantities for the purpose of descriptive modeling. **A.MP.1-8 :** Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in	**How Long Will It Take?** **https://lor2.gadoe.org/gadoe/file/fc960e51-fa50-440b-a079-cbf2b5386654/1/How-Long-Will-It-Take-Student-Reproducible.pdf** **(Student Document)** **https://lor2.gadoe.org/gadoe/file/fc960e51-fa50-440b-a079-cbf2b5386654/1/How-Long-Will-It-Take.pdf** **(Teacher Document)**	Learning Plan Description: In this learning plan, students will explore the use of exponential functions in the medical and business fields. They will make projections under assumptions of continued growth and assess whether those assumptions are reasonable. They will develop models to determine the level of medicine in the body after a given period.

mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.		

Content Resources

Textbook Correlation: enVision A|G|A - Algebra 1

  A.PAR.8.1 - Lesson 6-2, 6-3
  A.PAR.8.2 - Lessons 6-1
  A.PAR.8.3 - Lesson 6-3, Topic 6 - Mathematical Modeling in 3 Acts
  A.PAR.8.4 - Lessons 6-3

GA DOE - Learning Plans