

8th Grade Topic 3: Use Functions to Model Relationships		Estimate Time Frame: 16 days
Essential Standards: 8.F.1, 8.F.2, 8.F.3, 8.F.4, 8.F.5		
Assessment Resources: enVision Topic 3 and Formative Assessment Lesson (FAL): <a href="#">Distance Time Graphs</a>		
FCPS Supporting Links	Additional Supporting Links	
<a href="#">Pacing Guide</a> <a href="#">8th Grade Topic 3 Standards Resource with Sample Formative Assessments</a> <a href="#">enVision 8th Grade Topic 3 Standards Crosswalk Resource</a> <a href="#">FCPS P-12 Mathematics Guidance Document</a> <a href="#">FCPS Achievement &amp; Trauma Informed Strategies in the Classroom</a>	<a href="#">Kentucky Academic Standards</a> <a href="#">KSA Blueprint</a> <a href="#">Target of the Standards</a> - conceptual, procedural & application <a href="#">Three-Reads Routine</a> <a href="#">Notice and Wonder Routine</a> <a href="#">MILC Resources Topic 3: Use Functions to Model Relationships</a> <i>enVision Teacher Guide: page 158A to 158D for specific Topic 3 Focus-Coherence-Rigor</i>	
Big Ideas		
Define, evaluate, and compare functions. Use functions to model relationships between quantities.		
Essential Questions	Common Preconceptions/Misconceptions	
What is a function? How can you use functions to model linear relationships? What are the different representations of a function?	Identifying Functions- Vertical Line Test (vertical vs horizontal) Distance Time Graphs - students confuse constant speed vs acceleration.	
Standards for Mathematical Practices	Kentucky Interdisciplinary Literacy Practices (KILP)	

[MP.1. Make sense of problems and persevere in solving them.](#)  
[MP.2. Reason abstractly and quantitatively.](#)  
[MP.3. Construct viable arguments and critique the reasoning of others.](#)  
[MP.4. Model with mathematics.](#)  
[MP.5. Use appropriate tools strategically.](#)  
[MP.6. Attend to precision.](#)  
[MP.7. Look for and make use of structure.](#)  
[MP.8. Look for and express regularity in repeated reasoning.](#)

*enVision Teacher Guide: page 158E for specific Topic 3 Math Practice suggestions*

1. Recognize that text is anything that communicates a message.
2. Employ, develop, and refine schemas to understand and create text.
3. View literacy experiences as transactional, interdisciplinary, and transformational.
4. Utilize receptive and expressive language arts to better understand self, others, and the world.
5. Apply strategic practices, with scaffolding and then independently, to approach new literacy tasks.
- 6. Collaborate with others to create new meaning.**
- 7. Utilize digital resources to learn and share with others.**
- 8. Engage in specialized, discipline-specific literacy practices.**
- 9. Apply high-level cognitive processes to think deeply and critically about text.**
10. Develop a literacy identity that promotes lifelong learning.

*Incorporating texts into math instruction fosters interdisciplinary learning for a more engaging educational experience.*

### Essential Standards

### Sample Learning Intentions & Success Criteria

### HQIR/Resource Considerations

### Cluster: Define, evaluate, and compare functions.

**[KY.8.F.1](#)** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

☐ **Conceptual**   ☐ Procedural   ☐ Application

Clarifications: Students understand the reasoning that not all relations are functions.

**\*Function notation is not required in grade 8.**

Coherence KY.8.F.1 → KY.HS.F.1

We are learning to understand what a function is and is not.

- I can define a function.
- I can identify functions using diagrams.
- I can identify functions using input/output tables.
- I can identify functions using graphs.
- I can recognize a relation as a function if each input only has one output.
- I can recognize a relation that is not a function.

- Topic 3 Lesson 3-1
- [Topic 3: Let's Investigate! Sort It Out](#) (replaces Topic 3 Lesson 3-2)
- [enVision Language Support Handbook](#)

<b>MP.7, MP.8, KILP.7, KILP.8</b>		
<p><b><u>KY.8.F.3</u></b> Understand the properties of linear functions.</p> <ol style="list-style-type: none"> <li>Interpret the equation <math>y = mx + b</math> as defining a linear function whose graph is a straight line.</li> <li>Identify and give examples of functions that are not linear.</li> </ol> <p><input type="checkbox"/> <b>Conceptual</b>   <input type="checkbox"/> <b>Procedural</b>   <input type="checkbox"/> Application</p> <p>Clarifications:</p> <ol style="list-style-type: none"> <li>For example, the equation <math>c = 3g + 5</math> models the linear function for the total cost, <math>c</math>, of bowling, where <math>g</math> represents the number of games played, and shoe rental is \$5.</li> <li>For example, the function <math>A = s^2</math>, which gives the area of a square as a function of its side length, is not linear because its graph contains the points (1,1), (2,4), and (3,9), which are not on a straight line.</li> </ol> <p>Coherence KY.7.EE.4 → KY.8.F.3 → KY.HS.F.11</p> <p><b>MP.7, KILP.7, KILP.8</b></p>	<p>We are learning about the properties of linear functions.</p> <ul style="list-style-type: none"> <li>I can identify a linear function with <math>y = mx + b</math>.</li> <li>I can interpret an equation in the form <math>y = mx + b</math></li> <li>I can classify examples as functions or not.</li> <li>I can give examples of functions that are not linear.</li> </ul>	<ul style="list-style-type: none"> <li>Topic 3 Lesson 3-3</li> <li><a href="#">enVision Language Support Handbook</a></li> <li>Desmos - <a href="#">Graphing Stories</a></li> <li>Formative Assessment Lesson (FAL): <a href="#">Distance Time Graphs</a></li> <li>Formative Assessment Lesson (FAL): <a href="#">Distance Time Graphs - Option 2 on Desmos</a></li> </ul>
<p><b><u>KY.8.F.2</u></b> Compare properties of two functions, each represented differently (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic</p>	<p>We are learning to compare linear functions.</p> <ul style="list-style-type: none"> <li>I can compare the constant rate of change in two functions represented differently.</li> <li>I can compare the initial values of two functions that are represented differently.</li> </ul>	<ul style="list-style-type: none"> <li>Topic 3 Lesson 3-3</li> <li><a href="#">3-Act Task: Every Drop Counts</a></li> <li><a href="#">enVision Language Support Handbook</a></li> </ul>

expression, determine which function has the greater rate of change.

☐ **Conceptual** ☐ Procedural ☒ **Application**

Clarifications:

Given a linear function represented using one method listed and another linear function represented by a different method listed, determine which function has the greater or lesser rate of change or the greater or lesser initial value.

Coherence KY.7.RP.2→ KY.8.F.2→ KY.HS.F.1

**MP.1, MP.2, MP.4, KILP.2, KILP.5, KILP.8**

**Cluster: Use functions to model relationships between quantities.**

**KY.8.F.4** Construct a function to model a linear relationship between two quantities.

☐ **Conceptual** ☒ **Procedural** ☐ Application

- a. Determine the rate of change and initial value of the function from a description of a relationship or two (x, y) values, including reading these from a table or graph.

☐ **Conceptual** ☒ **Procedural** ☐ Application

- b. Interpret the rate of change and initial value of a linear function in terms of the situation it models and its graph or a table of values.

We are learning to construct functions to model linear relationships.

- I can determine the rate of change from a description, two (x,y) values, a table, or a graph.
- I can determine the y-intercept from a description, two (x,y) values, a table, or a graph.
- I can write a function in the form  $y = mx + b$  from two values and a graph.
- I can interpret the rate of change based on the situation, a graph, or a table of values.
- I can interpret the initial value in terms of the situation, graph, or a table of values.

- Topic 3 Lesson 3-4
- [enVision Language Support Handbook](#)

<p><input type="checkbox"/> <b>Conceptual</b>   <input type="checkbox"/> <b>Procedural</b>   <input type="checkbox"/> Application</p> <p>Clarifications: Examining a relationship between two quantities yields a function rule. This function rule can be described using its initial value and rate of change, from various representations, including tables, graphs, equations, and verbal descriptions.</p> <p>Coherence KY.7.RP.2→ KY.8.F.4→ KY.HS.F.3</p> <p><b>MP.4, MP.5, MP.8, KILP.1, KILP.3, KILP.9</b></p>		
<p><b><u>KY.8.F.5</u></b> Use graphs to represent functions.</p> <ol style="list-style-type: none"> <li>Describe the functional relationship between two quantities qualitatively by analyzing a graph.</li> <li>Sketch a graph that exhibits the qualitative features of a function described verbally.</li> </ol> <p><input type="checkbox"/> <b>Conceptual</b>   <input type="checkbox"/> Procedural   <input type="checkbox"/> <b>Application</b></p> <p>Clarifications: Students describe whether a function is increasing or decreasing and linear or nonlinear. Function examples are described in contexts as well as in symbols.</p> <p>Coherence KY.7.RP.2→ KY.8.F.5→ KY.HS.F.4</p> <p><b>MP.3, MP.7, KILP.7, KILP.10</b></p>	<p>We are learning to describe the functional relationship between two quantities by analyzing a graph.</p> <ul style="list-style-type: none"> <li>I can determine a graph's input variable, output variables, and intervals.</li> <li>I can describe the intervals of a graph as increasing, decreasing, or constant.</li> <li>I can analyze the relationship between the two variables from the graph.</li> </ul> <p>We are learning to sketch functions from verbal descriptions.</p> <ul style="list-style-type: none"> <li>I can sketch and label a graph to represent the function's behavior.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Topic 3: Let's Investigate! Graph Me a Story</a> (replaces Topic 3 Lesson 3-5 and Topic 3 Lesson 3-6)</li> <li><a href="#">enVision Language Support Handbook</a></li> <li>Desmos - <a href="#">Graphing Stories</a></li> <li>MILC - Lines BUMP</li> </ul>
<p><b>Attending to the Standards for Mathematical Practice</b></p>		

Students examine, interpret, and represent functions symbolically (MP.2, MP.4).

They make sense of quantities and their relationships in problem situations (MP.2). For example, students make sense of values relating to the total cost of items purchased or a phone bill based on usage in a particular time interval.

Students use what they know about the rate of change to distinguish between linear and nonlinear functions (MP.8). They also contextualize information gained from comparing two functions (MP.7).

### Supporting Standards

N/A

### Vocabulary

**input** - The number substituted for the variable in a function or rule machine.

**linear function** - A function defined by  $f(x) = mx + b$ .

**non-linear** - Not on a line.

**non-linear association** - Not having a resemblance to a line.

**output** - The number resulting from a function or rule machine.

**rate of change** - The speed at which a variable changes over a specific period. Also, the slope of a function is the same.

**identifying functions** - Vertical Line Test (vertical vs horizontal)

**Distance-time graphs** - students confuse constant speed vs acceleration. Students misinterpret the meaning of the graph.

\*Disclaimer: Success Criteria is the evidence students must produce to demonstrate learning. This example is not comprehensive.

\*\* Mathematical Practices (A.MP. 1- 8) should be evidenced at some point throughout each unit, depending on the explored tasks. It is important to note that MP. 2 should support learning in every lesson.

\*\*\* Modeling Standards: Modeling is best interpreted not as a collection of isolated topics but rather with other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★). The star symbol sometimes appears on the heading for a group of standards; in that case, it should be understood to apply to *all* standards in that group.