**M.EE.F-IF.4-6**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.F-IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity;  
**M.F-IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function;  
**M.F-IF.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph | **M.EE.F-IF.4-6** Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc. | **Initial Precursor**  
- Arrange objects in pairs  
- Order objects  
**Distal Precursor**  
- Explain coordinate pairs (ordered pairs)  
- Explain x-coordinate  
- Explain y-coordinate  
**Proximal Precursor**  
- Recognize covariation  
- Recognize direction of covariation  
- Describe rate of change in a graph  
**Target**  
- Compare two functions with different rate of change  
- Analyze linear function graphs  
**Successor**  
- Solve real-world problems by interpreting linear function graphs  
- Compare properties of 2 functions represented in the same way |

© 2020 The Dynamic Learning Maps Essential Elements, linkage levels, and nodes are copyrighted by the University of Kansas Center for Research. Linkage levels and nodes are available for use by educators in DLM states but may not be used by commercial entities without written permission. Linkage level information and nodes may not be altered by anyone without express written permission from the University of Kansas Center for Research.
<table>
<thead>
<tr>
<th>How is the Initial Precursor related to the Target?</th>
<th>How is the Distal Precursor related to the Target?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Precursor:</strong> In order to construct graphs that represent a linear function, students begin by learning to notice what is new. The educator draws the students' attention to new objects or stimuli, labels them (e.g., “this set has all red objects; this set has all blue,” “these fidgets are big; these fidgets are small”), and the student observes, feels, or otherwise interacts with them. Educators encourage students to begin placing like objects together, drawing attention to the characteristics that make an item the same or different. Educators provide sorting activities that allow learners to isolate specific attributes while recognizing likenesses and differences among objects. Educators also provide activities that reinforce the skill of ordering (e.g., arrangement of objects from largest to smallest, sequencing daily events, and counting).</td>
<td></td>
</tr>
<tr>
<td><strong>Distal Precursor:</strong> As students’ attention to objects and details develops, educators can extend their attention by providing experience with finding and creating simple patterns using objects and moving to symbols (e.g., numerals). Educators should take care to start with simple patterns (e.g., 1-2-1-2) and take advantage of the symbols that are already being used in the classroom. Educators should demonstrate how students can create and identify the pattern/rule (e.g., using colored cubes, the student creates a line of 5 cubes; the educator then creates a matching set and explains what to do to follow the student’s pattern. Then, the student generates a third matching set. If the order is not followed, it is a good teaching opportunity to talk about why it doesn’t fit the pattern). Learning to identify the rule of patterns will help students extend their thinking across patterns. As students are working on identifying pattern rules, educators can also begin to demonstrate how rules can be used with ordered pairs. Provide students lots of opportunities to apply rules to create their own examples of ordered pairs. Educators should demonstrate how students can use their counting skills to figure out where to mark the point by counting how far along and how far up the x- and y-axes.</td>
<td></td>
</tr>
</tbody>
</table>

A diagram showing the relationship of nodes in the mini-map appears below.

**Key to map codes in upper right corner of node boxes:**

- IP Initial Precursor
- SP Supporting
- DP Distal Precursor
- S Successor
- PP Proximal Precursor
- UN Untested
- T Target
M.EE.F-IF.4-6 Construct graphs that represent linear functions with different rates of change and interpret which is faster/slower, higher/lower, etc.