Mini-Map for M.EE.HS.A.REI.10-12

Subject: Mathematics
Algebra—Reasoning with Equations and Inequalities (A.REI)
Grade: 10

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.HS.A.REI.10-12 Interpret the meaning of a point on the graph of a line. For example, on a graph of pizza purchases, trace the graph to a point and tell the number of pizzas purchased and the total cost of the pizzas.	**M.A.REI.10** Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). **M.A.REI.11** Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. **M.A.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Form a pair by arranging objects in specific order (e.g., putting together a pencil and a ruler, where the pencil is placed first and the	Communicate understanding that a coordinate pair (ordered pair) is a set of numbers used to show a position on a graph. The first number, "x," or the x-coordinate in the	Recognize covariation as the pattern in which two variables or quantities change together. Recognize the direction in which two variables change together (e.g., as x	Examine the shape of a linear function graph to recognize the relationship between two varying quantities (e.g., increasing, decreasing, constant). Use the understanding	Find solutions to real-world problems by interpreting linear function graphs.

| Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
ruler is placed next to it).	coordinate pair (x, y), represents x units left or right on the x-axis. The second number, "y," or the y-coordinate, represents y units up or down on the y-axis [e.g., (4, 8) represents 4 units right on the x-axis and 8 units up on the y-axis].	increases, y decreases). Describe the rate of change in a function graph by quantifying covariation between two variables (e.g., as x increases by 2 units, y decreases by 3 units).	of linear functions to interpret the meaning of a point on a linear function graph [e.g., the point (5, 2) might represent that 5 people need 2 medium-sized pizzas].	

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to analyze function graphs, 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).

How is the Distal Precursor related to the Target?

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.
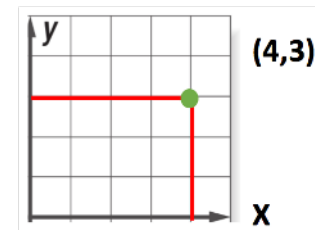
Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets.

Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction.

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Concept map nodes:

- *UN* Recognize attribute values
- *IP* Order objects
- *IP* Arrange objects in pairs
- *UN* Recognize patterns
- *UN* Explain number sequence pattern
- *UN* Recognize number line
- *UN* Recognize first quadrant of coordinate plane
- *UN* Recognize origin
- *UN* Explain origin
- *DP* Explain y-coordinate
- *DP* Explain coordinate pairs (ordered pairs)
- *DP* Explain x-coordinate
- *PP* Describe rate of change in a graph
- *PP* Recognize direction of covariation
- *PP* Recognize covariation
- *UN* Recognize linear functions
- *UN* Recognize function
- *UN* Recognize decreasing linear function
- *UN* Recognize constant function
- *UN* Recognize increasing linear function
- *UN* Explain linear functions
- *UN* Explain decreasing linear function
- *UN* Explain constant function
- *UN* Explain increasing linear function
- *T* Interpret a point on the graph of a linear function
- *T* Analyze linear function graphs
- *S* Solve real-world problems by interpreting linear function graphs

Map Key

IP	Initial Precursor
DP	Distal Precursor
PP	Proximal Precursor
T	Target
S	Successor
UN	Untested

Boxes indicate tested nodes