## Essential Element, Linkage Levels, and Mini-Map

### Math: High School

**M.EE.A-CED.1**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.A-CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions | M.EE.A-CED.1 Create an equation involving one operation with one variable, and use it to solve a real-world problem | **Initial Precursor:**  
  - Combine sets  
  - Partition sets  
**Distal Precursor:**  
  - Represent multiplication with equations  
  - Represent division with equations  
  - Represent subtraction with equations  
  - Represent addition with equations  
**Proximal Precursor:**  
  - Represent expressions with variables  
  - Represent the unknown in an equation  
**Target:**  
  - Solve real-world problems using equations with non-negative rational numbers  
  - Represent real-world problems as equations  
**Successor:**  
  - Solve rational equations in 1 variable |

© 2014 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.

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

---

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.A-CED.1 Create an equations involving one operation with one variable, and use it to solve a real-world problem
## Grade-Level Standard

<table>
<thead>
<tr>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M.A-CED.2</strong> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales;</td>
<td><strong>Initial Precursor:</strong></td>
</tr>
<tr>
<td><strong>M.A-CED.3</strong> Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context;</td>
<td>• Partition sets</td>
</tr>
<tr>
<td><strong>M.A-CED.4</strong> Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations</td>
<td>• Combine sets</td>
</tr>
<tr>
<td><strong>M.EE.A-CED.2-4</strong> Solve one-step inequalities</td>
<td><strong>Distal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td>• Represent division with equations</td>
</tr>
<tr>
<td></td>
<td>• Represent subtraction with equations</td>
</tr>
<tr>
<td></td>
<td>• Represent addition with equations</td>
</tr>
<tr>
<td></td>
<td>• Represent multiplication with equations</td>
</tr>
<tr>
<td></td>
<td><strong>Proximal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td>• Solve linear equalities in one variable</td>
</tr>
<tr>
<td></td>
<td><strong>Target:</strong></td>
</tr>
<tr>
<td></td>
<td>• Solve linear inequalities in 1 variable</td>
</tr>
<tr>
<td></td>
<td>• Represent solutions of inequalities on a number line</td>
</tr>
<tr>
<td></td>
<td><strong>Successor:</strong></td>
</tr>
<tr>
<td></td>
<td>• Explain solution to a linear inequality in one variable</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.E.E.A-CED.2-4 Solve one-step inequalities
M.EE.A-CED.2-4 Solve one-step inequalities

- M-1150: Represent expressions with variables
- M-1045: Explain equation
- M-1167: Explain inequalities with variables
- M-1164: Represent inequalities with variables
- M-1785: Solve linear equations in one variable
- M-1787: Solve linear inequalities in 1 variable
- M-1168: Represent solutions of inequalities on a number line
- M-1840: Explain solution to a linear inequality in one variable
### MATH: HIGH SCHOOL
**M.EE.A-REI.10-12**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **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; **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 | **M.EE.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 | **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:**  
- Analyze linear function graphs  
- Interpret a point on the graph of a linear function  
**Successor:**  
- Solve real-world problems by interpreting linear function graphs |

© 2014 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.
A diagram showing the relationship of nodes in the mini-map appears below.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Initial Precursor</td>
</tr>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
</tr>
<tr>
<td>SP</td>
<td>Supporting</td>
</tr>
<tr>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>UN</td>
<td>Untested</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
</tr>
</tbody>
</table>
M.EE.A-REI.10-12 Interpret the meaning of a point on the graph of a line
## Math: High School

**M.EE.A-SSE.1**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.A-SSE.1 Interprete expressions that represent a quantity in terms of its context | M.EE.A-SSE.1 Identify an algebraic expression involving one arithmetic operation to represent a real-world problem | **Initial Precursor:**  
- Combine sets  
- Partition sets  
**Distal Precursor:**  
- Represent subtraction with equations  
- Represent addition with equations  
- Represent multiplication with equations  
- Represent division with equations  
**Proximal Precursor:**  
- Represent the unknown in an equation  
- Represent expressions with variables  
**Target:**  
- Represent real-world problems as equations  
- Represent real-world problems as expressions  
**Successor:**  
- Solve real-world problems using equations with non-negative rational numbers |

© 2014 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.

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.A-SSE.1 Identify an algebraic expression involving one arithmetic operation to represent a real-world problem
# MATH: HIGH SCHOOL
M.EE.A-SSE.3

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.A-SSE.3</td>
<td>M.EE.A-SSE.3</td>
<td>Initial Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Partition sets</td>
</tr>
<tr>
<td></td>
<td>Solve simple algebraic equations with one variable using multiplication and division</td>
<td>• Combine sets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distal Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Demonstrate the concept of division</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Demonstrate the concept of multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proximal Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Determine the unknown in a division equation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Determine the unknown in a multiplication equation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Target:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solve linear equations in one variable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solve linear equations in 1 variable with rational number coefficients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Successor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Solve linear inequalities in 1 variable</td>
</tr>
</tbody>
</table>

© 2014 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.

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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Essential Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Initial Precursor</td>
</tr>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
</tr>
<tr>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
</tr>
<tr>
<td>SP</td>
<td>Supporting</td>
</tr>
<tr>
<td>UN</td>
<td>Untested</td>
</tr>
</tbody>
</table>
M.EE.A-SSE.3 Solve simple algebraic equations with one variable using multiplication and division
## MATH: HIGH SCHOOL  
**M.EE.A-SSE.4**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.A-SSE.4            | M.EE.A-SSE.4          | Initial Precursor:  
  - Classify  
  - Contrast objects  
  - Order objects  
|                      |                      | Distal Precursor:  
  - Recognize symbolic patterns  
  - Recognize sequence  
|                      |                      | Proximal Precursor:  
  - Recognize the recursive rule for geometric sequences  
  - Recognize geometric sequences  
|                      |                      | Target:  
  - Extend a geometric sequence by applying the recursive rule  
|                      |                      | Successor:  
  - Determine the term in a geometric sequence given the nth term formula  

© 2014 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.

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.A-SSE.4 Determine the successive term in a geometric sequence given the common ratio
Grade-Level Standard | DLM Essential Element | Linkage Levels
---|---|---
M.F-BF.1 Write a function that describes a relationship between two quantities | M.EE.F-BF.1 Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change | Initial Precursor:
- Order objects
- Arrange objects in pairs
Distal Precursor:
- Explain y-coordinate
- Explain coordinate pairs (ordered pairs)
- Explain x-coordinate
Proximal Precursor:
- Recognize covariation
- Recognize direction of covariation
- Describe rate of change in a graph
Target:
- Represent real-world problems as graphs
Successor:
- Solve real-world problems by interpreting linear function graphs
M.EE.F-BF.1 Select the appropriate graphical representation (first quadrant) given a situation involving constant rate of change.
# Essential Element, Linkage Levels, and Mini-Map

## Math: High School

### M.EE.F-BF.2

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.F-BF.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms | M.EE.F-BF.2 Determine an arithmetic sequence with whole numbers when provided a recursive rule | Initial Precursor:  
  • Classify  
  • Contrast objects  
  • Order objects  
 Distal Precursor:  
  • Recognize symbolic patterns  
  • Recognize sequence  
 Proximal Precursor:  
  • Recognize arithmetic sequences  
  • Recognize the recursive rule for arithmetic sequences  
 Target:  
  • Extend an arithmetic sequence by applying the recursive rule  
 Successor:  
  • Determine the term in an arithmetic sequence given the nth term formula |

© 2014 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.

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  
- DP: Distal Precursor  
- PP: Proximal Precursor  
- T: Target  
- SP: Supporting  
- S: Successor  
- UN: Untested
M.EE.F-BF.2 Determine an arithmetic sequence with whole numbers when provided a recursive rule
### Grade-Level Standard

**M.F-IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If $f$ is a function and $x$ is an element of its domain, then $f(x)$ denotes the output of $f$ corresponding to the input $x$. The graph of $f$ is the graph of the equation $y = f(x)$;

**M.F-IF.2** Use function notation, evaluate functions for inputs in their domains, interpret statements that use function notation in terms of a context; **M.F-IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n + 1) = f(n) + f(n - 1)$ for $n \geq 1$

### DLM Essential Element

**M.EE.F-IF.1-3** Use the concept of function to solve problems

### Linkage Levels

**Initial Precursor:**
- Order objects
- Arrange objects in pairs

**Distal Precursor:**
- Explain $x$-coordinate
- Explain $y$-coordinate
- Explain coordinate pairs (ordered pairs)

**Proximal Precursor:**
- Describe the rate of change in a table
- Describe rate of change in a graph

**Target:**
- Solve real-world problems by interpreting linear function graphs
- Solve real-world problems by interpreting linear function tables

**Successor:**
- Use graphs to read beyond the data
- Use tables to predict function values

© 2014 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.
A diagram showing the relationship of nodes in the mini-map appears below.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Initial Precursor</td>
</tr>
<tr>
<td>SP</td>
<td>Supporting</td>
</tr>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
</tr>
<tr>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
</tr>
<tr>
<td>UN</td>
<td>Untested</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
</tr>
</tbody>
</table>

**M.EE.F-IF.1-3** Use the concept of function to solve problems
# Math: High School

## 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 |

© 2014 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.
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.
# Math: High School
### M.EE.F-LE.1-3

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.F-LE.1** Distinguish between situations that can be modeled with linear functions and with exponential functions; **M.F-LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table); **M.F-LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function | **M.EE.F-LE.1-3** Model a simple linear function such as $y=mx$ to show that these functions increase by equal amounts over equal intervals | **Initial Precursor:**  
- Arrange objects in pairs  
- Order objects  

**Distal Precursor:**  
- Explain x-coordinate  
- Explain y-coordinate  
- Explain coordinate pairs (ordered pairs)  

**Proximal Precursor:**  
- Recognize covariation  
- Recognize direction of covariation  
- Determine slope based on coordinate pairs  

**Target:**  
- Explain average rate of change  
- Determine rate of change of linear functions  

**Successor:**  
- Recognize intervals where function is increasing  
- Recognize intervals where function is decreasing  
- Estimate average rate of change given graph |

© 2014 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.

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
- DP Distal Precursor
- PP Proximal Precursor
- T Target
- SP Supporting
- S Successor
- UN Untested

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
EE.F-LE.1-3 Model a simple linear function such as \( y = mx \) to show that these functions increase by equal amounts over equal intervals.
**Math: High School**  
**M.EE.G.CO.1**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc | M.EE.G.CO.1 Know the attributes of perpendicular lines, parallel lines, and line segments, angles, and circles | **Initial Precursor:**  
- Recognize same  
- Recognize different  
- Recognize attribute values  
**Distal Precursor:**  
- Recognize point  
- Recognize ray  
- Recognize angle  
- Recognize right angles  
**Proximal Precursor:**  
- Recognize circles  
- Recognize parallel lines/line segments  
- Recognize perpendicular lines/line segments  
**Target:**  
- Define circle  
- Explain angle  
- Explain perpendicular lines/line segments  
- Explain parallel lines/line segments  
**Successor:**  
- Explain straight angles  
- Explain adjacent angles  
- Explain vertical angles  

© 2014 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.

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

---

**Copyright © 2014 University of Kansas Center for Research. All rights reserved.**
M.EE.G.CO.1 Know the attributes of perpendicular lines, parallel lines, and line segments, angles, and circles

- F-76 recognize different
- F-65 recognize attribute values
- F-2 recognize same
- F-48 match the same two-dimensional shape with different sizes and same orientation
- F-9 match the same two-dimensional shape with same size and same orientation
- M-421 recognize line
- M-823 recognize point
- M-802 recognize ray
- M-833 recognize right angles
- M-803 recognize angle
- M-2635 classify same two-dimensional shapes with different size and/or different orientation
- M-2634 classify same two-dimensional shapes with same size and same orientation
- M-131 recognize circles
- M-830 recognize perpendicular lines/line segments
- M-2441 recognize intersecting lines/line segments
- M-2449 explain intersecting lines/line segments
- M-790 explain angle
- M-827 explain perpendicular lines/line segments
- M-1635 define circle
- M-838 explain parallel lines/line segments
- M-799 explain angle
- M-827 explain perpendicular lines/line segments
- M-1520 give an informal argument for the formula for circumference
- M-839 represent parallel lines/line segments
- M-840 represent perpendicular lines/line segments
- M-1338 explain vertical angles
- M-1447 explain straight angles
- M-1342 explain adjacent angles
# Essential Element, Linkage Levels, and Mini-Map

## Math: High School

### M.EE.G-CO.4-5

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.G-CO-4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments; M.G-CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another | M.EE.G-CO.4-5 Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent | **Initial Precursor:**  
- Recognize same  
- Recognize different  

**Distal Precursor:**  
- Match the same three-dimensional shapes with same size and different orientation  
- Match the same two-dimensional shape with same sizes and different orientations  

**Proximal Precursor:**  
- Recognize translation  
- Recognize rotation  
- Recognize reflection  
- Recognize congruent figures  

**Target:**  
- Explain the relationship between congruent figures and transformation  

**Successor:**  
- Use a sequence of transformations to describe congruence of 2 given figures |

© 2014 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.

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.G-CO.4-5 Given a geometric figure and a rotation, reflection, or translation of that figure, identify the components of the two figures that are congruent
### MATH: HIGH SCHOOL
**M.EE.G-CO.6-8**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.G-CO.6** Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent; **M.G-CO.7** Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent; **M.G-CO.8** Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions | **M.EE.G-CO.6-8** Identify corresponding congruent and similar parts of shapes | **Initial Precursor:**
- Recognize same
- Recognize different
**Distal Precursor:**
- Match the same two-dimensional shape with different sizes and same orientation
- Match the same two-dimensional shape with same size and same orientation
- Match the same three-dimensional shape with different size and same orientation
- Match the same three-dimensional shape with same size and same orientation
**Proximal Precursor:**
- Recognize congruent figures
- Recognize similar figures
**Target:**
- Explain congruent figures
- Explain similar figures
**Successor:**
- Explain the relationship between congruent figures and transformation
- Explain the relationship between similar figures and transformation

© 2014 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.
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
- **DP**  Distal Precursor
- **PP**  Proximal Precursor
- **T**   Target
- **SP**  Supporting
- **S**   Successor
- **UN**  Untested

**M.E.E.G-CO.6-8** Identify corresponding congruent and similar parts of shapes
# Math: High School

## M.EE.G-GPE.7

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.G-GPE.7 Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula | M.EE.G-GPE.7 Find perimeters and areas of squares and rectangles to solve real-world problems | **Initial Precursor:**  
- Recognize attribute values  
**Distal Precursor:**  
- Recognize measureable attributes  
**Proximal Precursor:**  
- Calculate perimeter by adding all the side lengths  
- Calculate area by counting unit squares  
**Target:**  
- Solve word problems involving perimeter of polygons  
- Solve word problems involving area of rectangles  
**Successor:**  
- Mathematize contextual situation involving perimeter of polygons  
- Mathematize contextual situations involving area of polygons |

© 2014 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.

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

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

<table>
<thead>
<tr>
<th>IP</th>
<th>Initial Precursor</th>
<th>SP</th>
<th>Supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
<td>UN</td>
<td>Untested</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
M.EE.G-GPE.7 Find perimeters and areas of squares and rectangles to solve real-world problems
# Math: High School

**M.EE.G-MG.1-3**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M.G-MG.1</strong> Use geometric shapes, their measures, and their properties to describe objects; <strong>M.G-MG.2</strong> Apply concepts of density based on area and volume in modeling situations <strong>M.G-MG.3</strong> Apply geometric methods to solve design problems</td>
<td><strong>M.EE.G-MG.1-3</strong> Use properties of geometric shapes to describe real-life objects</td>
<td><strong>Initial Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Recognize same</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Recognize different</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Distal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Match the same two-dimensional shape with same size and same orientation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Match the same two-dimensional shape with different size and same orientation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Match the same three-dimensional shapes with same size and same orientation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Match the same three-dimensional shapes with different size and same orientation</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Proximal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Recognize squares, circles, triangles, rectangles, cubes, cones, cylinders, and/or spheres</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Target:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Use geometric shapes to describe objects</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Successor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Use geometric methods to solve design problems</td>
</tr>
</tbody>
</table>

© 2014 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.

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.G-MG.1-3 Use properties of geometric shapes to describe real-life objects
## MATH: HIGH SCHOOL

### M.EE.N-CN.2.a

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.N-CN.2.a</td>
<td>M.EE.N-CN.2.a</td>
<td>Initial Precursor:</td>
</tr>
<tr>
<td></td>
<td>Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers</td>
<td>- Recognize separateness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Recognize set</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Recognize subset</td>
</tr>
<tr>
<td></td>
<td>Use the commutative, associative, and distribute properties to add, subtract, and multiply whole numbers</td>
<td>Distal Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Combine sets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Demonstrate the concept of addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Combine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Demonstrate the concept of multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Solve repeated addition problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proximal Precursor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Add 1 and 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Add 1 to 2, 3, and/or 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Add within 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Add within 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Add within 20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Multiply by 1, 2, 3, 4, 5, and/or 10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Target:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Apply associative property of addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Apply commutative property of addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Apply the commutative property of multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Apply the associative property of multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Apply the distributive property</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Successor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Explain the associative property of addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Explain the commutative property of addition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Explain the commutative property of multiplication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Explain the distributive property</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Explain the associative property of multiplication</td>
</tr>
</tbody>
</table>

© 2014 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.
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
- **DP** Distal Precursor
- **PP** Proximal Precursor
- **T** Target
- **SP** Supporting
- **S** Successor
- **UN** Untested

**M.EE.N-CN.2.a** Use the commutative, associative, and distribute properties to add, subtract, and multiply whole numbers
## Essential Element, Linkage Levels, and Mini-Map

### Math: High School

**M.EE.N-CN.2.b**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M.N-CN.2</strong></td>
<td><strong>M.EE.N-CN.2.b</strong></td>
<td><strong>Initial Precursor:</strong></td>
</tr>
</tbody>
</table>
| Use the relation \( i^2 = -1 \) and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers | Solve real-world problems involving addition and subtraction of decimals and whole numbers, using models when needed | • Recognize set  
• Recognize separateness |
| **Distal Precursor:** | | • Recognize a unit  
• Explain ten as a composition of ten ones  
• Explain place value for ones and tens |
| **Proximal Precursor:** | | • Add 2 decimals with digits in the tenths place  
• Subtract 2 decimals with digits in the tenths place |
| **Target:** | | • Solve word problems involving addition with rational numbers  
• Solve word problems involving subtraction with rational numbers |
| **Successor:** | | • Solve multi-step problems with rational numbers |

© 2014 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.

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

---

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.N-CN.2.b Solve real-world problems involving addition and subtraction of decimals, using models when needed
# MATH: HIGH SCHOOL

## M.EE.N-CN.2.c

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.N-CN.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers | M.EE.N-CN.2.c Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed | Initial Precursor:  
- Recognize separateness  
Distal Precursor:  
- Recognize a unit  
- Explain place value for ones and tens  
- Explain ten as a composition of ten ones  
Proximal Precursor:  
- Multiply 2 decimals with digits in the tenths place  
Target:  
- Solve word problems involving multiplication with rational numbers  
Successor:  
- Solve multi-step problems with rational numbers |

© 2014 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.

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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Initial Precursor</td>
</tr>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
</tr>
<tr>
<td>SP</td>
<td>Supporting</td>
</tr>
<tr>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>UN</td>
<td>Untested</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
</tr>
</tbody>
</table>

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.N-CN.2.c Solve real-world problems involving multiplication of decimals and whole numbers, using models when needed
<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.N-Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays; **M.N-Q.2** Define appropriate quantities for the purpose of descriptive modeling; **M.N-Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities | **M.EE.N-Q.1-3** Express quantities to the appropriate precision of measurement | **Initial Precursor:**  
  - Use perceptual subitizing  
**Distal Precursor:**  
  - Round decimals to any place  
**Proximal Precursor:**  
  - Solve word problems involving multiplication with rational numbers  
  - Solve word problems involving subtraction with rational numbers  
  - Solve word problems involving addition with rational numbers  
**Target:**  
  - Express numerical answers with a degree of precision appropriate for the problem context  
**Successor:**  
  - Solve multi-step problems with rational numbers |

© 2014 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.

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

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>Initial Precursor</td>
</tr>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
</tr>
<tr>
<td>SP</td>
<td>Supporting</td>
</tr>
<tr>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>UN</td>
<td>Untested</td>
</tr>
</tbody>
</table>

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.N-RN.1

Grade-Level Standard  | DLM Essential Element  | Linkage Levels |
----------------------|------------------------|---------------|
M.N-RN.1              | M.EE.N-RN.1            |               |
Explain how the     | Determine the         |               |
definition of the    | value of quantity   |               |
meaning of rational  | that is squared or    |               |
exponents follows    | cubed               |               |
from extending the   |                       |               |
properties of integer|                       |               |
exponents to those  |                       | Initial Precursor:|
values, allowing for  |                       | • Combine       |
a notation for radicals|                       | • Combine sets  |
in terms of rational  |                       | • Demonstrate the concept of addition|
exponents. For      |                       | Distal Precursor:|
example, we define   |                       | • Explain repeated addition |
5¹/³ to be the cube   |                       | • Represent repeated addition with a model |
root of 5 because we  |                       | • Solve repeated addition problems |
want (5¹/³)³ = 5(1/3)³ |                       | Proximal Precursor:|
to hold, so (5¹/³)³   |                       | • Explain product |
must equal 5          |                       | • Explain multiplication problems |
|                       |                       | • Demonstrate the concept of multiplication |

Target:              |                       | • Evaluate expressions with whole number exponents |
Successor:           |                       | • Explain perfect cubes |
|                     |                       | • Explain perfect squares |

© 2014 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.

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.N-RN.1 Determine the value of quantity that is squared or cubed
## MATH: HIGH SCHOOL
### M.EE.S-CP.1-5

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.S-CP.1** Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”); **M.S-CP.2** Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent; **M.S-CP.3** Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B; **M.S-CP.4** Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities; **M.S-CP.5** Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations | **M.EE.S-CP.1-5** Identify when events are independent or dependent | **Initial Precursor:**  
- Compare objects for sameness  
- Arrange objects in pairs  
- Contrast objects  
**Distal Precursor:**  
- Classify  
**Proximal Precursor:**  
- Recognize possible outcomes  
- Explain simple events  
- Recognize impossible outcomes  
**Target:**  
- Determine if 2 events are independent or dependent  
**Successor:**  
- Explain compound events |

© 2014 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.
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.S-CP.1-5** Identify when events are independent or dependent
## Math: High School  
**M.EE.S-IC.1-2**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.S-IC.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population; **M.S-IC.2** Decide if a specified model is consistent with results from a given data generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? | **M.EE.S-IC.1-2** Determine the likelihood of an event occurring when the outcomes are equally likely to occur | **Initial Precursor:**  
- Compare objects for sameness  
- Arrange objects in pairs  
**Distal Precursor:**  
- Recognize outcomes of an event  
- Recognize possible outcomes  
**Proximal Precursor:**  
- Recognize sample space  
**Target:**  
- Determine theoretical probability of a simple event where all outcomes are equally likely  
**Successor:**  
- Determine theoretical probability of simple event where some outcomes are more likely than others |

© 2014 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.

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.S-IC.1-2
M.EE.S-IC.1-2 Determine the likelihood of an event occurring when the outcomes are equally likely to occur
### MATH: HIGH SCHOOL

#### M.EE.S-ID.1-2

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.S-ID.1 | Represent data with plots on the real number line (dot plots, histograms, and box plots); M.S-ID.2 | M.EE.S-ID.1-2 Given data, construct a simple graph (table, line, pie, bar, or picture) and interpret data | Initial Precursor:  
- Classify  
- Order Objects  
Distal Precursor:  
- Recognize the structure of a bar graph  
- Recognize the structure of a picture graph  
- Recognize the structure of a line graph  
- Recognize the structure of a pie chart  
Proximal Precursor:  
- Use bar graphs to read the data  
- Use picture graphs to read the data  
- Use line graphs to read the data  
- Use pie charts to read the data  
Target:  
- Use graphs to read beyond the data  
- Represent data using bar graph  
- Represent data using picture graph  
- Represent data using line graph  
- Represent data using pie charts  
Successor:  
- Use graphs to read beyond the data |

© 2014 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.

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

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.S-ID.1-2 Given data, construct a simple graph (table, line, pie, bar, or picture) and interpret data.
MATH: HIGH SCHOOL
M.EE.S-ID.3

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.S-ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers) | M.EE.S-ID.3 Interpret general trends on a graph or chart | **Initial Precursor:**<br>• Order objects<br>• Classify<br>**Distal Precursor:**<br>• Recognize the structure of a bar graph<br>• Recognize the structure of a picture graph<br>• Recognize the structure of a line plot (dot plot)<br>• Recognize the structure of a pie chart<br>**Proximal Precursor:**<br>• Recognize symmetric distribution<br>• Recognize outliers<br>• Recognize peaks in data distribution<br>• Recognize variability in a data set<br>**Target:**<br>• Analyze overall shape of the data distribution<br>• Draw inferences by interpreting general trends on a graph or chart<br>**Successor:**<br>• Draw inferences by comparing two data sets

© 2014 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.

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

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

<table>
<thead>
<tr>
<th>IP</th>
<th>Initial Precursor</th>
<th>SP</th>
<th>Supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>Distal Precursor</td>
<td>S</td>
<td>Successor</td>
</tr>
<tr>
<td>PP</td>
<td>Proximal Precursor</td>
<td>UN</td>
<td>Untested</td>
</tr>
<tr>
<td>T</td>
<td>Target</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Copyright © 2014 University of Kansas Center for Research. All rights reserved.
M.EE.S-ID.3 Interpret general trends on a graph or chart
### Grade-Level Standard

**M.S-ID.4**

Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

### DLM Essential Element

**M.EE.S-ID.4**

Calculate the mean of a given data set (limit the number of data points to fewer than five)

### Linkage Levels

**Initial Precursor:**
- Recognize attribute values

**Distal Precursor:**
- Classify

**Proximal Precursor:**
- Summarize data by the number of observations

**Target:**
- Calculate mean

**Successor:**
- Summarize data by measurement

© 2014 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.

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
- **DP** Distal Precursor
- **PP** Proximal Precursor
- **SP** Supporting
- **S** Successor
- **UN** Untested
- **T** Target
M.EE.S-ID.4 Calculate the mean of a given data set (limit the number of data points to fewer than five)