# Essential Element, Linkage Levels, and Mini-Map

**Math: Grade 4**

### M.EE.4.NF.1-2

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| **M.4.NF.1** Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions; **M.4.NF.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or < | **M.EE.4.NF.1-2** Identify models of one half (1/2) and one fourth (1/4) | **Initial Precursor:**  
- Recognize separateness  
- Recognize wholeness  

**Distal Precursor:**  
- Partition shapes  

**Proximal Precursor:**  
- Partition any shapes into equal parts  

**Target:**  
- Recognize one half on an area model  
- Recognize one fourth on an area model  

**Successor:**  
- Recognize halves on an area model  
- Recognize fourths on an area model |

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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

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M.EE.4.NF.1-2  Copyright © 2018 University of Kansas Center for Research. All rights reserved.  1 of 2
M.EE.4.NF.1-2 Identify models of one half (1/2) and one fourth (1/4)
### Essential Element, Linkage Levels, and Mini-Map

**Math: Grade 4**
**M.EE.4.NF.3**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
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</tr>
</thead>
</table>
| M.4.NF.3 Understand a fraction \( \frac{a}{b} \) with \( a > 1 \) as a sum of fractions \( \frac{1}{b} \) | M.EE.4.NF.3 Differentiate between whole and half | Initial Precursor:  
- Recognize wholeness  
- Recognize separateness  
Distal Precursor:  
- Partition shapes  
Proximal Precursor:  
- Recognize parts of a given whole or a unit  
- Explain unit fraction  
Target:  
- Recognize fraction  
- Recognize one half on an area model  
- Recognize whole on an area mode  
Successor:  
- Recognize one fourth on an area model  
- Recognize halves on an area model  
- Recognize fourths on an area model |

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M.EE.4.NF.3 Differentiate between whole and half
### Grade-Level Standard

**M.4.NBT.2**

- Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

### DLM Essential Element

**M.EE.4.NBT.2**

- Compare whole numbers to 10 using symbols (\(=, <, >\)).

### Linkage Levels

**Initial Precursor:**
- Recognize set
- Recognize separateness

**Distal Precursor:**
- Count all objects in a set or subset
- Recognize same number of
- Recognize different number of

**Proximal Precursor:**
- Compare 2 quantities up to 10 using models

**Target:**
- Compare 2 numerals up to 10 using symbols (\(=, <, >\))

**Successor:**
- Order more than 2 one-digit numerals or quantities from greatest to least
- Compare 2 numerals up to 100 using symbols (\(=, <, >\))
- Order more than 2 one-digit numerals or quantities from least to greatest

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M.EE.4.NBT.2 Compare whole numbers to 10 using symbols (\(=, <, >\))
## Essential Element, Linkage Levels, and Mini-Map
### Math: Grade 4
#### M.EE.4.NBT.3

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>M.4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place</td>
<td>M.EE.4.NBT.3 Round any whole number 0-30 to the nearest ten</td>
<td><strong>Initial Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use perceptual subitizing</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Distal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recognize a unit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain ten as a composition of ten ones</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recognize ten and something</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Recognize multiple tens and something</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Decompose numbers based on tens</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Proximal Precursor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain place value for ones and tens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Explain the relationship between rounding and place value</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Target:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Round whole numbers from 0-30 to the nearest ten</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Successor:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Round whole numbers 0-100 to the nearest ten</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Round whole numbers to the nearest hundred</td>
</tr>
</tbody>
</table>

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- DP Distal Precursor
- S Successor
- PP Proximal Precursor
- UN Untested
- T Target
M.EE.4.NBT.3 Round any whole number 0-30 to the nearest ten

- F-27 use perceptual subitizing
- F-38 recognize set
- M-43 recognize a unit
- M-2421 explain ten as a composition of ten ones
- M-42 recognize ten and something
- M-224 recognize multiple tens and something
- M-280 decompose numbers based on tens
- M-796 explain the relationship between rounding and place value
- M-593 round whole numbers from 0-30 to the nearest ten
- M-594 round whole numbers to the nearest hundred
- M-2636 round whole numbers 0-100 to the nearest ten
<table>
<thead>
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<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm | M.EE.4.NBT.4 Add and subtract two-digit whole numbers | Initial Precursor:  
- Recognize subset  
- Recognize set  
- Recognize separateness  
Distal Precursor:  
- Combine sets  
- Count all objects in a set or subset  
- Partition sets  
Proximal Precursor:  
- Add within 10  
- Add within 20  
- Subtract within 20  
- Subtract within 10  
- Add within 5  
- Add 1,2, 3 and/or 4  
- Add 1 and 1  
- Subtract 1 from 2  
- Subtract 1 from up to 5  
- Subtract within 5  
Target:  
- Add within 100 where all addends are multiple of 10  
- Add within 100  
- Add within 100 with a 2 digit number and a multiple of 10  
- Subtract within 100 where both numbers are multiple of 10  
- Subtract within 100  
- Subtract a multiple of 10 from a 2 digit number within 100  
Successor:  
- Solve addition word problems within 100  
- Solve subtraction word problems within 100  

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**M.EE.4.NBT.4** Add and subtract two-digit whole numbers
# Essential Element, Linkage Levels, and Mini-Map

**Math: Grade 4**

**M.EE.4.G.1**

<table>
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</tr>
</thead>
</table>
| M.4.G.1 Draw points, lines, lines segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures | M.EE.4.G.1 Recognize parallel lines and intersecting lines | Initial Precursor:  
- Recognize attribute values  
Distal Precursor:  
- Recognize point  
Proximal Precursor:  
- Recognize line  
- Recognize line segment  
Target:  
- Recognize intersecting lines/line segments  
- Recognize parallel lines/line segments  
Successor:  
- Recognize perpendicular lines/line segments  
- Recognize parallel line segments in a two-dimensional figure |

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M.EE.4.G.1 Recognize parallel lines and intersecting lines
# Essential Element, Linkage Levels, and Mini-Map

## Math: Grade 4

### M.EE.4.MD.5

<table>
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<tr>
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<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement | M.EE.4.MD.5 Recognize angles in geometric shapes | Initial Precursor:  
- Recognize attribute values  
Distal Precursor:  
- Recognize point  
Proximal Precursor:  
- Recognize line  
- Recognize ray  
- Recognize line segment  
Target:  
- Recognize angle  
Successor:  
- Make direct comparison of 2 angles |

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M.EE.4.MD.5 Recognize angles in geometric shapes
<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.4.MD.6             | M.EE.4.MD.6 Identify angles as larger and smaller | Initial Precursor:  
- Recognize attribute values  
- Recognize different  
- Recognize same  
Distal Precursor:  
- Recognize different amount  
- Recognize same amount  
Proximal Precursor:  
- Recognize more amount  
- Recognize less amount  
Target:  
- Make direct comparison of 2 angles  
Successor:  
- Order more than 2 angles using direct comparison |

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<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>
M.EE.4.MD.6 Identify angles as larger and smaller
<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
</tr>
</thead>
</table>
| M.4.MD.3             | M.EE.4.MD.3 Determine the area of a square or rectangle by counting units of measure (unit squares) | Initial Precursor:  
  - Recognize some  
  - Recognize separateness  

Distal Precursor:  
  - Recognize enclosure

Proximal Precursor:  
  - Explain unit square  
  - Explain area

Target:  
  - Calculate area by counting unit squares  
  - Calculate area of a rectangle with tiling

Successor:  
  - Solve word problems involving area of rectangles

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- DP Distal Precursor
- PP Proximal Precursor
- SP Supporting
- S Successor
- UN Untested
- T Target
M.EE.4.MD.3 Determine the area of a square or rectangle by counting units of measure (unit squares)
Grade-Level Standard | DLM Essential Element | Linkage Levels
---|---|---
M. 4.MD.2 | M.EE. 4.MD.2.a Tell time using a digital clock. Tell time to the nearest hour using an analog clock | Initial Precursor:
- Attend
- Recognize different
Distal Precursor:
- Recognize measureable attributes
Proximal Precursor:
- Recognize the hour hand
- Know hours on a clock
- Recognize the hour on a digital clock
- Recognize the minute hand
- Recognize the minute on a digital clock
Target:
- Tell time to the hour
- Read a digital clock
Successor:
- Tell time to the half hour
- Tell time to the quarter hour

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- UN Untested
- T Target
M.EE. 4.MD.2.a Tell time using a digital clock. Tell time to the nearest hour using an analog clock
# Essential Element, Linkage Levels, and Mini-Map

**Math: Grade 4**

**M.EE.4.MD.2.B**

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<thead>
<tr>
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</tr>
</thead>
</table>
| **M.4.MD.2.** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale | **M.EE.4.MD.2.b** Measure mass or volume using standard tools | **Initial Precursor:**  
- Recognize different  
- Recognize same  
**Distal Precursor:**  
- Make direct comparison of 2 volumes  
- Make direct comparison of 2 masses  
**Proximal Precursor:**  
- Measure volume using informal units  
- Measure mass using informal units  
**Target:**  
- Use an appropriate tool to measure liquid volumes in cups  
- Use an appropriate tool to measure mass in ounces  
- Use an appropriate tool to measure mass in pounds  
**Successor:**  
- Estimate liquid volume in cups  
- Estimate mass in ounces  
- Estimate mass in pounds |

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- S Successor  
- UN Untested  
- T Target
M.EE.4.MD.2.b Measure mass or volume using standard tools
### Grade-Level Standard

**M.4.MD.2.d** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.

### DLM Essential Element

**M.EE.4.MD.2.d** Identify coins (penny, nickel, dime, quarter) and their values.

### Linkage Levels

<table>
<thead>
<tr>
<th>Initial Precursor:</th>
<th>Distal Precursor:</th>
<th>Proximal Precursor:</th>
<th>Target:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attend</td>
<td>• Recognize attribute values</td>
<td>• Recognize money</td>
<td>• State value of penny</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State value of nickel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State value of dime</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State value of quarter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognize penny</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognize nickel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognize dime</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognize quarter</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Successor:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State the value of a penny related to a quarter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State the value of a nickel related to a quarter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State the value of a penny related to a dime</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State the value of a penny related to a nickel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• State the value of a nickel related to a dime</td>
</tr>
</tbody>
</table>

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<tr>
<td>T</td>
<td>Target</td>
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**M.EE.4.MD.2.d** Identify coins (penny, nickel, dime, quarter) and their values
**ESSENTIAL ELEMENT, LINKAGE LEVELS, AND MINI-MAP**

**MATH: GRADE 4**

**M.EE.4.MD.4.B**

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</table>
| M.4.MD.4.b Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots | M.EE. 4.MD.4.b Interpret data from a picture or bar graph | Initial Precursor:  
- Classify  
- Order objects  
Distal Precursor:  
- Recognize the structure of a bar graph  
- Recognize the structure of a picture graph  
Proximal Precursor:  
- Use bar graphs to read the data  
- Use picture graphs to read the data  
Target:  
- Use graphs to read between the data  
Successor:  
- Use graphs to read beyond the data |

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- DP Distal Precursor  
- S Successor  
- PP Proximal Precursor  
- UN Untested  
- T Target
M.EE.4.MD.4.b Interpret data from a picture or bar graph
# Essential Element, Linkage Levels, and Mini-Map

**Math: Grade 4**

**M.EE.4.OA.1-2**

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</table>
| **M.4.OA.1** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations; **M.4.OA.2** Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison | **M.EE. 4. OA.1-2** Demonstrate the connection between repeated addition and multiplication | **Initial Precursor:**  
- Recognize subset  
- Recognize set  
- Recognize separateness  
**Distal Precursor:**  
- Demonstrate the concept of addition  
- Combine sets  
- Combine  
**Proximal Precursor:**  
- Represent repeated addition with an equation  
- Represent repeated addition with a model  
**Target:**  
- Demonstrate the concept of multiplication  
**Successor:**  
- Multiply by 5  
- Multiply by 4  
- Multiply by 3  
- Multiply by 2  
- Multiply by 1  

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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.4.OA.1-2** Demonstrate the connection between repeated addition and multiplication

[Diagram showing the relationship of nodes in the mini-map]
# Essential Element, Linkage Levels, and Mini-Map

## Math: Grade 4

**M.EE.4.OA.3**

<table>
<thead>
<tr>
<th>Grade-Level Standard</th>
<th>DLM Essential Element</th>
<th>Linkage Levels</th>
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</thead>
<tbody>
<tr>
<td>M.4.OA.3</td>
<td>M.EE.4.OA.3</td>
<td></td>
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</tbody>
</table>
| Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. | Solve one-step real-world problems using addition and subtraction within 100 | Initial Precursor:  
- Combine sets  
- Partition sets  

Distal Precursor:  
- Demonstrate the concept of addition  
- Demonstrate the concept of subtraction  

Proximal Precursor:  
- Determine the unknown in an addition equation  
- Determine the unknown in a subtraction equation  

Target:  
- Solve subtraction word problems within 100  
- Solve addition word problems within 100  

Successor:  
- Solve 2-step addition and subtraction word problems  

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- T: Target
M.EE.4.OA.3 Solve one-step real-world problems using addition and subtraction within 100
## Grade-Level Standard

**M.4.OA.5**

Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.

## DLM Essential Element

**M.EE.4.OA.5** Use repeating patterns to make predictions.

## Linkage Levels

**Initial Precursor:**
- Recognize attribute values
- Arrange objects in pairs

**Distal Precursor:**
- Recognize patterns

**Proximal Precursor:**
- Recognize symbolic patterns
- Recognize repeating patterns
- Recognize pictorial patterns

**Target:**
- Recognize the core unit in a repeated pattern

**Successor:**
- Extend a pictorial pattern by applying the rule
- Extend a symbolic pattern by applying the rule

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