Mini-Map for M.EE.4.NF.1-2

Subject: Mathematics
Number and Operations—Fractions (NF)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.NF.1-2 Identify models of one half (1/2) and one fourth (1/4).	**M.4.NF.1** Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ 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 <, and justify the conclusions, e.g., by using a visual fraction model.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate understanding of "wholeness" by recognizing an object that has all the parts joined together.	Divide familiar shapes, such as circles, triangles, squares, and/or rectangles, into two or more distinct parts. These parts may or may not be equal.	Divide familiar shapes, such as circles, squares, and/or rectangles, into two or more equal parts.	Identify the model that represents one half or one fourth of a familiar shape or object.	Identify the area model that is divided into halves or fourths.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

When working toward an understanding of fractions, students need exposure to a wide variety of items that can be taken apart and put back together (e.g., linking cubes, magnetic tiles, puzzles, cake, clay, apple). Encourage students to interact with the objects. Educators should take care to use the words "whole" and "part" to describe them. While students do not need to say these words, they do need to learn the meanings.

How is the Distal Precursor related to the Target?

As students begin to understand whole and part, educators will introduce partitioning shapes (which do not need to be equal parts). Educators will introduce the idea that shapes can be cut into parts, and when they are put back together, they form the whole shape. As students gain experience with cutting shapes into parts, the educator will introduce the concept of equal parts. In all partitioning activities, the student will work on counting the parts.

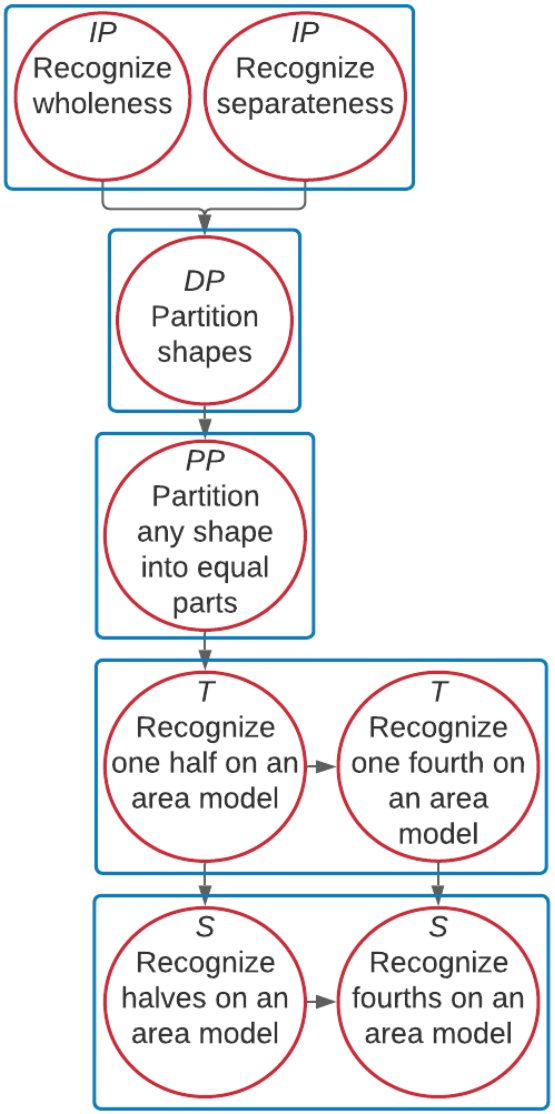
NOTE: Students do not need to physically cut the shape to work on this concept. Cutting can be accomplished via computer technology, assistive technology, directing another where to cut, etc.

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.

Link to Text-Only Map

M.EE.4.NF.1-2 Identify models of one half (1/2) and one fourth (1/4).



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

Boxes indicate tested nodes

Mini-Map for M.EE.4.NF.3

Subject: Mathematics
Number and Operations—Fractions (NF)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.NF.3 Differentiate between whole and half.	**M.4.NF.3** Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate understanding of "wholeness" by recognizing an object that has all the parts joined together.	Divide familiar shapes, such as circles, triangles, squares, and/or rectangles, into two or more distinct parts. These parts may or may not be equal.	Recognize an object as the part of a whole or unit when shown a whole or unit containing a group of objects. Demonstrate understanding of a unit fraction (e.g., 1/4) as the quantity formed by one part when a whole is partitioned into *n* (e.g., 4) equal parts.	Recognize a fraction as a number expressed as a quotient of two integers in the form a/b, with b not equal to zero. Recognize the area model that represents a whole and the area model that represents one half.	Recognize the area model that represents one fourth. Recognize the area model that is divided into halves or fourths.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

When working toward an understanding of fractions, students need exposure to a wide variety of items that can be taken apart and put back together (e.g., linking cubes, magnetic tiles, puzzles, cake, clay, apple). Encourage students to interact with the objects. Educators should take care to use the words "whole" and "part" to describe them. While students do not need to say these words, they do need to learn the meanings.

How is the Distal Precursor related to the Target?

As students begin to understand whole and part, educators will introduce partitioning shapes (which do not need to be equal parts). Educators will introduce the idea that shapes can be cut into parts, and when they are put back together, they form the whole shape. As students gain experience with cutting shapes into parts, the educator will introduce the concept of equal parts. In all partitioning activities, the student will work on counting the parts.

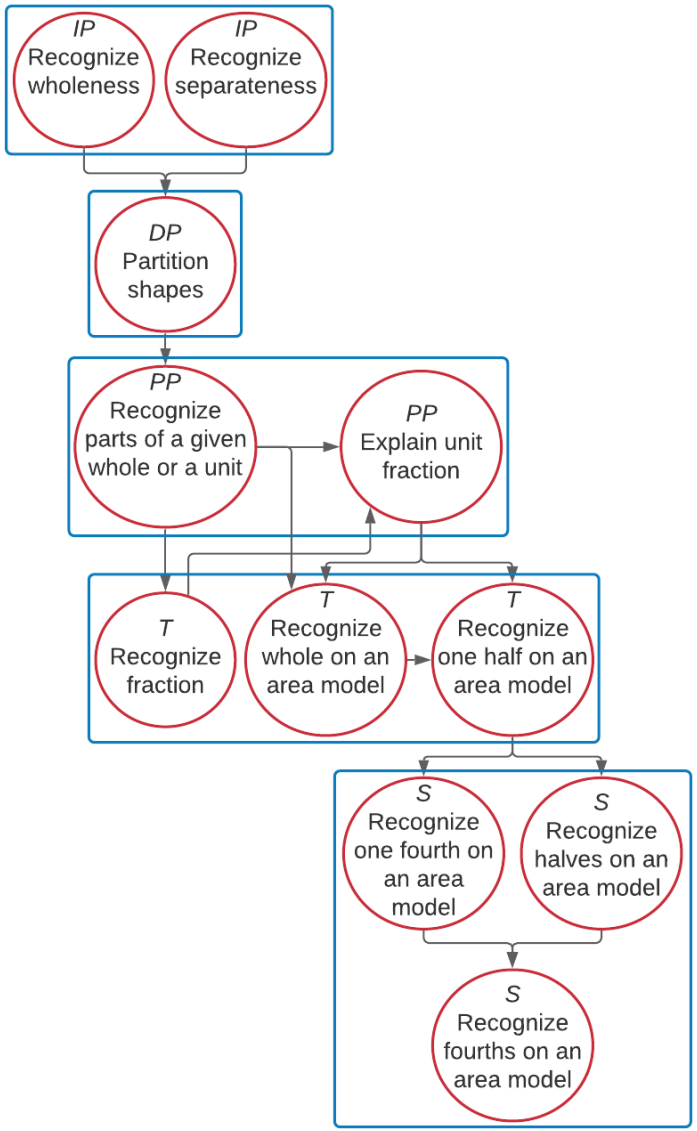
NOTE: Students do not need to physically cut the shape to work on this concept. Cutting can be accomplished via computer technology, assistive technology, directing another where to cut, etc.

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.

Link to Text-Only Map

M.EE.4.NF.3 Differentiate between whole and half.



Map Key	
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Boxes indicate tested nodes

Mini-Map for M.EE.4.NBT.2

Subject: Mathematics
Numbers and Operations in Base Ten (NBT)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.NBT.2 Compare whole numbers to 10 using symbols (<, >, =).	**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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate understanding of set by recognizing a group of objects sharing an attribute.	Count all objects in a set to communicate the total number of objects in a set. Identify sets having the same number of objects. Identify a set containing a different number of objects than the other two sets.	Use models such as concrete manipulatives, diagrams, pictures, or technology to compare two sets of objects up to 10, and communicate that the number of objects in one set is greater than, less than, or equal to the number of objects in the other set.	Compare two numbers up to 10 using the symbols >, <, and = to show that one number is greater than, less than, or equal to the other number.	Compare two numbers up to 100 using the symbols >, <, and = to show that one number is greater than, less than, or equal to the other number. Order three or more one-digit numerals from greatest to least or least to greatest.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to understand how numbers relate to one another (e.g., <, >, =) students need many opportunities to experience quantities and numerals in context across the school day. Educators provide lessons using a variety of sets. Teach students to recognize when items are grouped together into a set or separated out. As you present a set, label it (e.g., two balls, one bear, three blocks), count the items, label it again, and encourage students to use numerals to label and count the separate sets.

How is the Distal Precursor related to the Target?

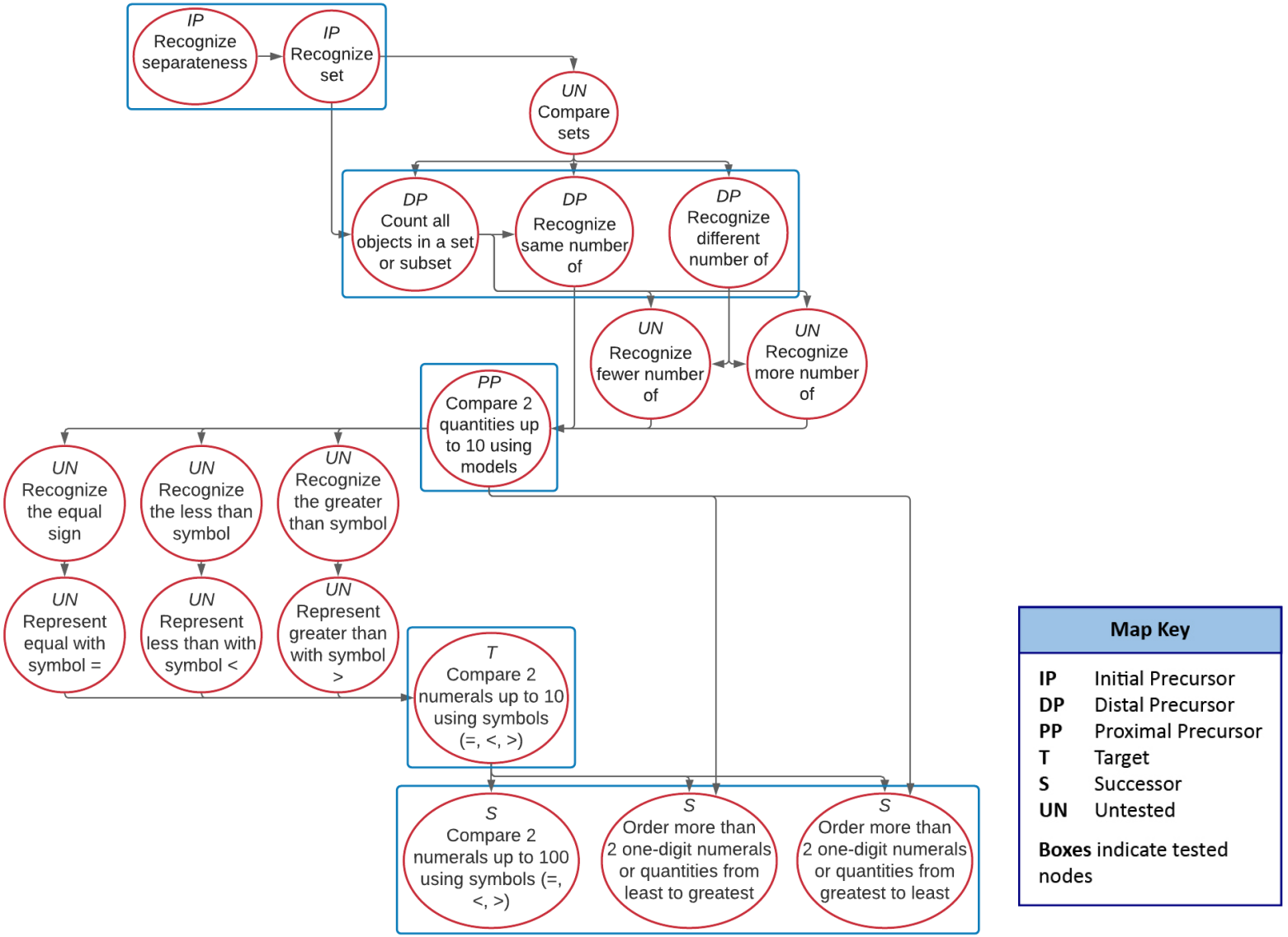
As students gain experience with creating simple sets, counting in context, and developing one-to-one correspondence, educators will introduce comparisons through terms such as same/different, more/less. Continue to count anything and everything across the school day and help students compare amounts.

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.

Link to Text-Only Map

M.EE.4.NBT.2 Compare whole numbers to 10 using symbols (<, >, =).



Map Key

IP	Initial Precursor
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T	Target
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Boxes indicate tested nodes

Mini-Map for M.EE.4.NBT.3

Subject: Mathematics
Numbers and Operations in Base Ten (NBT)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.NBT.3 Round any whole number 0-30 to the nearest ten.	**M.4.NBT.3** Use place value understanding to round multi-digit whole numbers to any place.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize set as a group of objects sharing one or more attributes. Without counting each object, recognize the number of objects in a set.	Recognize a unit as a group of countable objects. Recognize ten as a group of 10 individual objects or 1 ten. Recognize a group of 10-19 objects as 1 ten and a group of remaining ones and a group of 20 or more objects as multiple sets of 10 and a group of remaining ones. Decompose or represent a given number in terms of tens and ones (e.g., 43 = 4 tens and 3 ones).	Communicate understanding that the digit in the tens place is formed by grouping objects by tens and the digit in the ones place is composed of individual objects. Round numbers to the nearest ten using place-value understanding: the digit in the tens place is rounded up if the digit in the ones place equals 5 (e.g., 45 is rounded to 50) or more and is rounded down otherwise (e.g., 32 is rounded down to 30).	Round numbers 0-30 to the nearest ten by using a rounding strategy (e.g., number line, place value).	Round numbers 0-99 to the nearest ten by using a rounding strategy (e.g., number line, place value). Round numbers 100 and beyond to the nearest hundred by using a rounding strategy (e.g., number line, place value).

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

To round numbers, students first need to know number names, the count sequence, one-to-one correspondence, and have cardinality. These procedures and concepts develop through many experiences in early counting. Perceptual subitizing happens when the student is able to name the amount (1-3 items) without actually counting them. For example when an educator asks the student to get their shoes and asks, "How many shoes do you have?" The student would reply, "two" without using the count sequence of one, two. This only happens when students have been given many experiences counting small numbers with many different contexts and materials.

NOTE: Students who are blind will learn to use tactile enumeration for 1-3 items.

How is the Distal Precursor related to the Target?

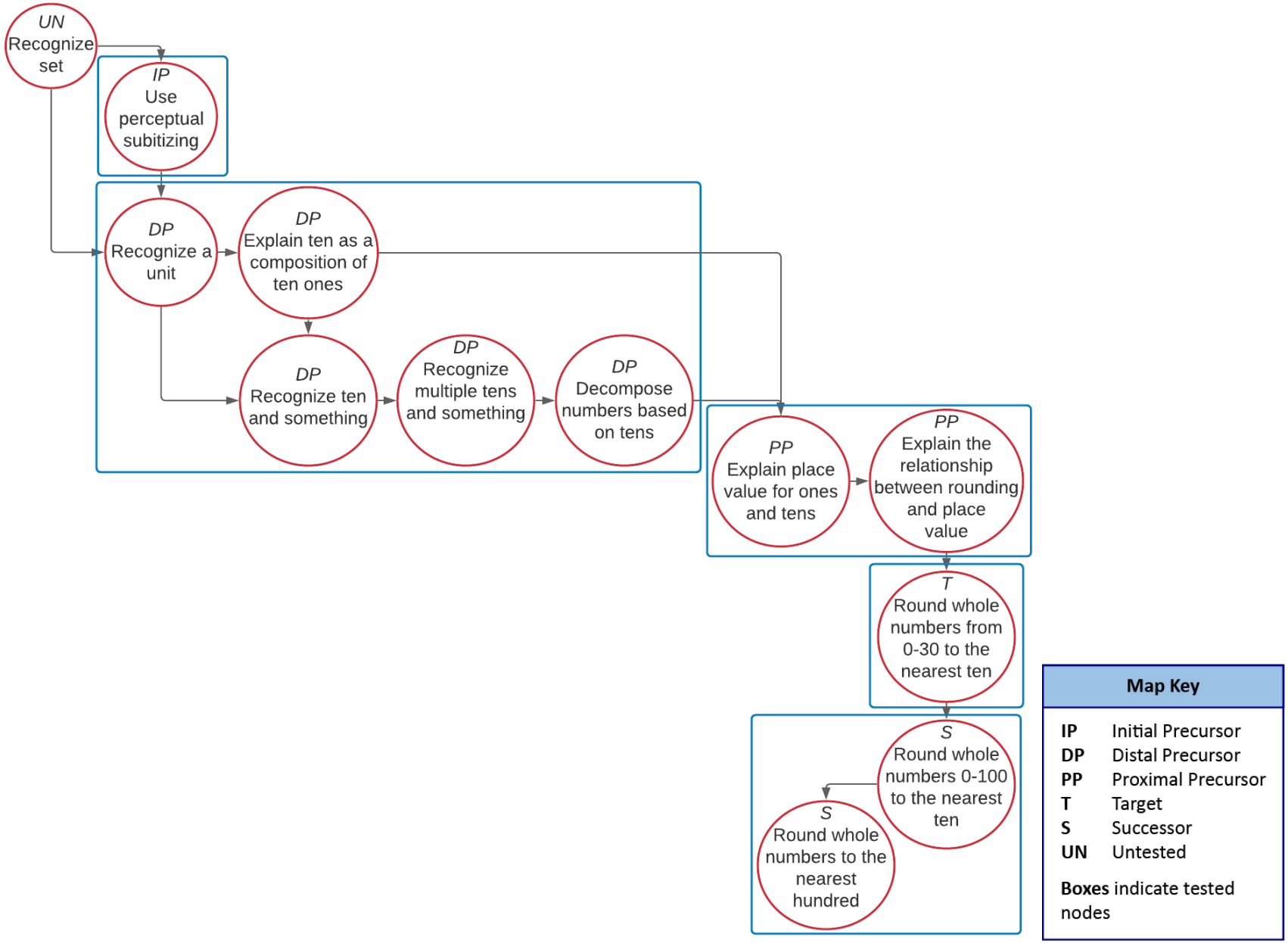
As students continue to gain experience in early counting (1-10 items), educators will introduce the concept that 10 can be grouped into one unit. Educators will use models that help students perceive a group of 10 and some more (e.g., bundles, ten frames, number line, arrays). Teen numbers are an important part of understanding this concept.

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.

Link to Text-Only Map

M.EE.4.NBT.3 Round any whole number 0-30 to the nearest ten.



Mini-Map for M.EE.4.NBT.4

Subject: Mathematics
Numbers and Operations in Base Ten (NBT)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.NBT.4 Add and subtract two-digit whole numbers.	**M.4.NBT.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate understanding of set by recognizing a group of objects sharing an attribute. Communicate understanding of a subset by recognizing a subset as a set or group of objects within a larger set that share an attribute.	Combine two or more sets of objects to create a new set. Divide a set of 10 or fewer objects into two or more distinct subsets. Count all objects in a set to communicate the total number of objects in a set.	Add two numbers with a sum within 20 using objects, drawings, counters, or a mathematical equation, and communicate the sum by combining both the numbers. Subtract a smaller number from a larger number (no larger than 20) by taking counters/objects away from the larger set or using drawings or a mathematical equation, and communicate the left-over number as the difference.	Demonstrate addition by adding two numbers up to 100. Demonstrate subtraction by subtracting numbers up to 100. Use place-value reasoning including multiples of 10 and 100 to add or subtract numbers.	Use addition and subtraction within 100 to solve word problems, including join, separate, part-part-whole, and compare problems.

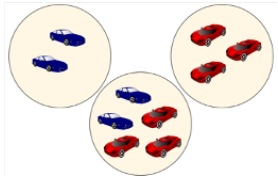
Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

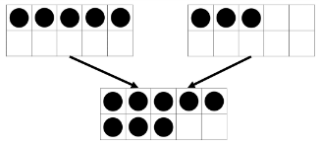
How is the Initial Precursor related to the Target?

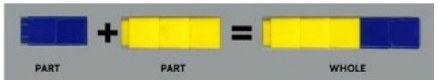
In order to add and subtract two-digit whole numbers, students must first learn to organize items into groups/sets based on a common characteristic such as size, color, shape, texture, or flavor. Students learn how to sort items by separating a group of items into two groups (e.g., vehicles and animals). As students gain comfort sorting items into sets, they are encouraged to use their language to convey their thought process by identifying and naming the characteristic that determines the set (e.g., wheels and legs). Activities that require students to engage actively with the items will foster the students' understanding of set, subsets, and separateness (e.g., the game "one of these things is not like the other"; highlighting one characteristics in a group of similar items [e.g., color] by which the items will be grouped; incorporating creating sets into everyday activities [e.g., during cleanup time, students place items into one of two bins based on a designated characteristic]).

How is the Distal Precursor related to the Target?

As students gain an understanding of how to group items into sets, educators will begin to help students connect their knowledge of sets with their knowledge of counting. Educators will provide multiple experiences counting sets and combining sets using multiple models. The following are examples of models.





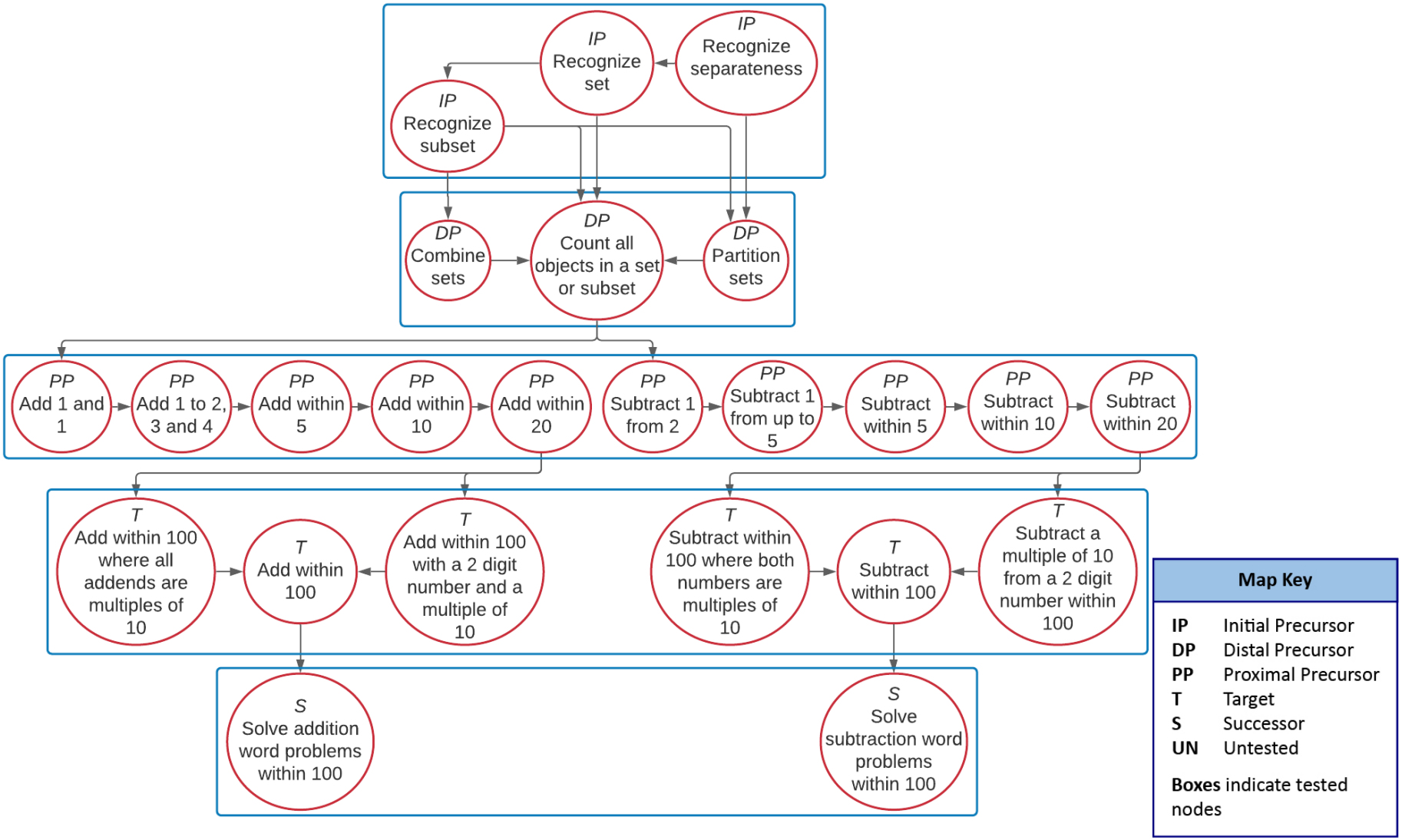


Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets.
Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction.

Link to Text-Only Map

M.EE.4.NBT.4 Add and subtract two-digit whole numbers.



Mini-Map for M.EE.4.G.1

Subject: Mathematics
Geometry (G)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.G.1 Recognize parallel lines and intersecting lines.	**M.4.G.1** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize attributes or characteristics of an object, such as color, orientation, length, width, and weight.	Recognize a point as a precise location on a plane or in space, usually represented by a dot.	Recognize a line as a straight line that extends infinitely in two directions, and recognize a line segment as a part of a line with two end points.	Recognize intersecting lines or line segments as those that have at least one point in common, and recognize parallel lines or line segments as those that are equal distance apart.	Recognize perpendicular lines or line segments as those that intersect each other at a 90-degree angle. Recognize parallel line segments in a two-dimensional figure such as a square or rectangle (e.g., opposite sides of a square or rectangle are parallel).

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

Being able to recognize parallel and intersecting lines requires a student to notice what is new. The educator draws the student's attention to new objects or stimuli, labels them, and the student observes, feels, or otherwise interacts with it. While the student interacts with the object, the educator can describe its various attributes, including lines, line segments, and points. Educators should use these words when defining and demonstrating their meanings. While students do not need to use the words, they do need to understand the meanings.

How is the Distal Precursor related to the Target?

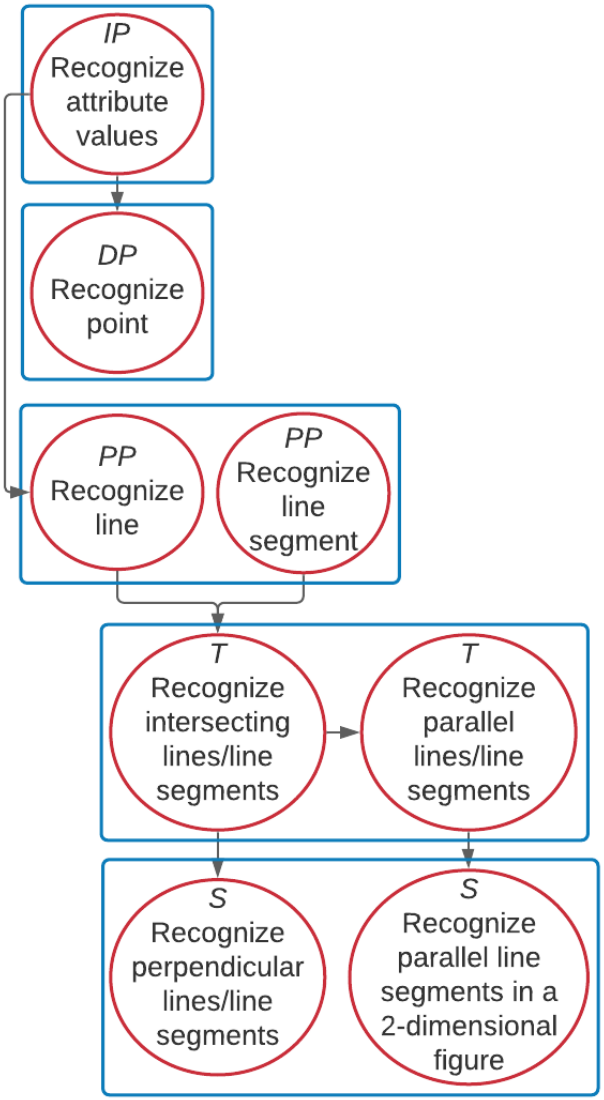
As the students' attention to objects increases, the educator will provide multiple objects and tactuals, helping the student explore them and guiding the student using hand-under-hand to draw their attention to where line segments begin and end. While teaching intersecting lines/line segments and parallel lines/line segments, the educator can ask the student at the Distal Precursor level to identify where the line starts or begins.

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.

Link to Text-Only Map

M.EE.4.G.1 Recognize parallel lines and intersecting lines.



Map Key	
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T	Target
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UN	Untested

Boxes indicate tested nodes

Mini-Map for M.EE.4.MD.5

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.5 Recognize angles in geometric shapes.	**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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize attributes or characteristics of an object, such as color, orientation, length, width, and weight.	Recognize a point as a precise location on a plane or in space, usually represented by a dot.	Recognize a line as a straight line that extends infinitely in two directions. Recognize a line segment as a part of a line with two end points. Recognize a ray as a part of a line that begins at one point and extends infinitely in one direction.	Recognize an angle as a figure formed by two rays sharing one endpoint.	Compare two angles without using any measuring tools, and communicate whether the angle is greater than, less than, or equal to the other angle.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to recognize angles, 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 is a circle, and it does not have any sides,” or “this is a rectangle, and it has four sides”), and the students observe, feel, or otherwise interact with the shapes. This exploration of shapes supports students in understanding that everything has a shape, and shapes can be categorized and named. Educators encourage students to begin placing like objects together, drawing attention to the characteristics that make an item the same or different. These students also need to explore shapes that are different in size, color, or texture (e.g., long, skinny rectangles; short, fat rectangles; right triangles; isosceles trangles).

How is the Distal Precursor related to the Target?

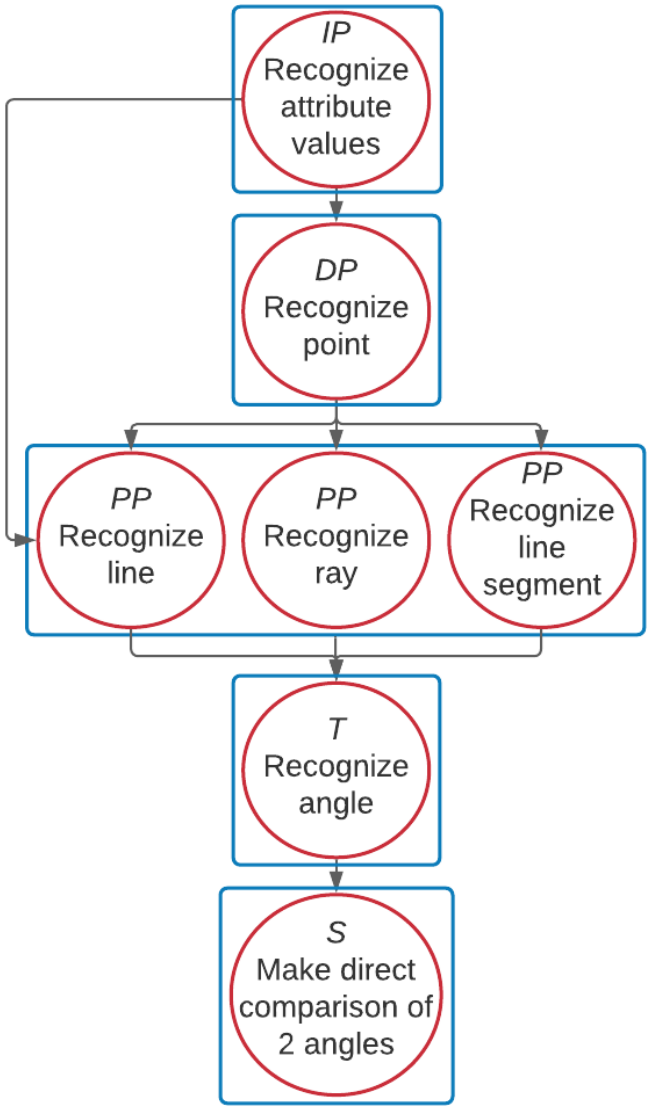
At this level, educators provide students with opportunities to use shape labels (e.g., circle, square, triangle) to describe (i.e., speech, signs, or symbols) what they see and/or feel. This stage is not about getting the right answer but clarifying understanding. For instance, if the student has a circle and labels it a square, the teacher might respond by saying, "A square is a shape, and squares have straight sides. Look (or feel) that this shape has no straight sides, so it is a circle." Students also need experience with nonexamples (e.g., a circle with a gap in the circumference, a shape that looks similar to a triangle but has curved points, or a rectangle that has curved corners).

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.

Link to Text-Only Map

M.EE.4.MD.5 Recognize angles in geometric shapes.



Map Key	
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Boxes indicate tested nodes

Mini-Map for M.EE.4.MD.6

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.6 Identify angles as larger and smaller.	**M.4.MD.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize attributes or characteristics of an object, such as color, orientation, length, width, and weight. Recognize "same" as the object that shares all of the same attributes as other objects in a group. Recognize "different" as the object that shares some or none of the attributes as other objects in a group.	Recognize whether two containers contain the same or different amounts.	Recognize whether a container is more full or less full than another container.	Compare two angles without using any measuring tools, and communicate whether the angle is greater than, less than, or equal to the other angle.	Compare three or more angles without using any measuring tools, and arrange them from least to greatest or greatest to least.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

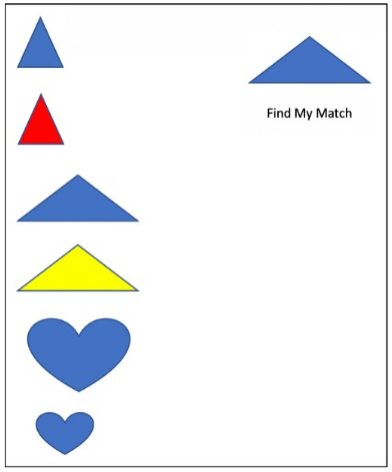
How is the Initial Precursor related to the Target?

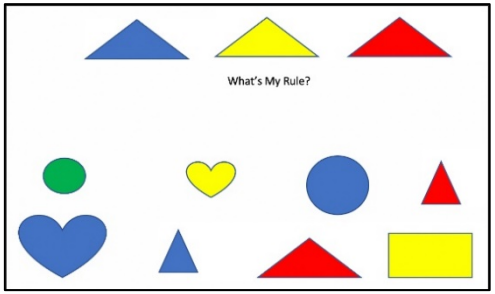
In order to identify angles as larger or smaller, students must first begin by learning to attend to people and objects when they are present. In the context of this Essential Element, educators should work on attending while interacting with shapes. As students' attention to people, objects, and shapes increases, the educator draws the students' attention to new objects or stimuli, labels them (e.g., “these are two red triangles; they are the same,” or "you have two fidgets; this one is big and this one is small, but they are both fidgets."), and the students observe, feel, or otherwise interact with them. Educators encourage students to begin placing like objects together, drawing attention to the characteristics that make an item the same or different.

How is the Distal Precursor related to the Target?

Now that students have experience identifying shapes and objects as “same” and “different,” provide instruction that focuses on creating sets that are grouped together in meaningful ways. Students do not have to label the shapes, but they do need to be able to match and identify items in a group based on the rule or attribute. For this Essential Element, create sets that include objects or images that differ in shape and size, so that students can match and work to find a rule that defines the pattern. These types of activities support students in understanding what attributes to pay attention to and what attributes to ignore based on the goal of the activity.

Note: Notice these activities are not just about sorting. The students are comparing an item or group of items to multiple items and learning to focus on attributes. This should be done first with real objects rather than pictures on a worksheet or folder activity. Activities that require matching are easier than activities that require finding a rule.



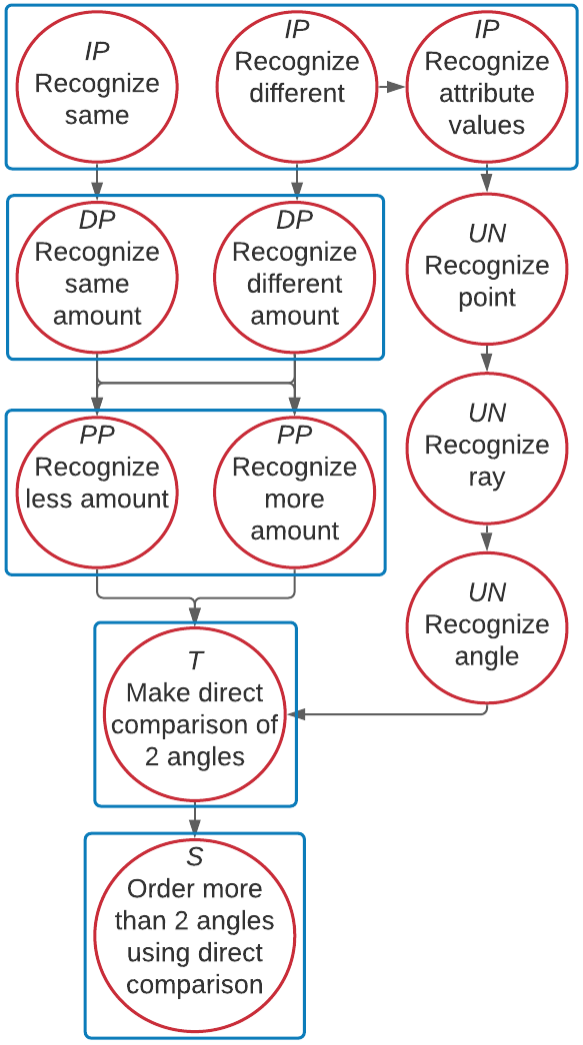


Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets.
Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction.

Link to Text-Only Map

M.EE.4.MD.6 Identify angles as larger and smaller.



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UN	Untested

Boxes indicate tested nodes

Mini-Map for M.EE.4.MD.3

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.3 Determine the area of a square or rectangle by counting units of measure (unit squares).	**M.4.MD.3** Apply the area and perimeter formulas for rectangles in real-world and mathematical problems.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate generic understanding of "some" as a certain amount or a number of people or things.	Recognize enclosure as an enclosed space that lies within a boundary that distinguishes it from the space that lies outside the boundary.	Communicate understanding that a unit square is a square with edge lengths of 1 unit and area of 1 square unit. Communicate understanding of area as the measure of space contained within the outline or boundary of a two-dimensional object or figure.	Calculate area of a square or rectangle by filling a figure with unit squares or tiles and counting the total number of unit squares or tiles. Calculate area of a square or rectangle by counting the number of square units drawn to cover the area.	Solve real-world problems by determining the area of a square or a rectangle. The area of a square or a rectangle can be calculated by counting the number of unit squares or tiles.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

Understanding how to calculate area requires a student to be able to recognize groups of items as a set, not just as individual objects. Work on this skill using a variety of sets. Help students recognize when items are grouped together into a set or separated out. As you present a set, label it (e.g., two balls, one bear, three blocks), count the items, label it again, and encourage students to use numerals to label and count the separate sets.

NOTE: Educators can work on the Initial Precursor level using the sets/arrays that students working at the Target level are calculating area.

How is the Distal Precursor related to the Target?

As students begin to understand labeling and counting small sets (1-4), they begin to use the number sequence, and students become more adept at tracking individual objects and can recognize groups as having more and less on the basis of overall area. Work on this skill using a variety of arrays, labeling and counting the array, moving items in and out of the array, then labeling and counting the array again.

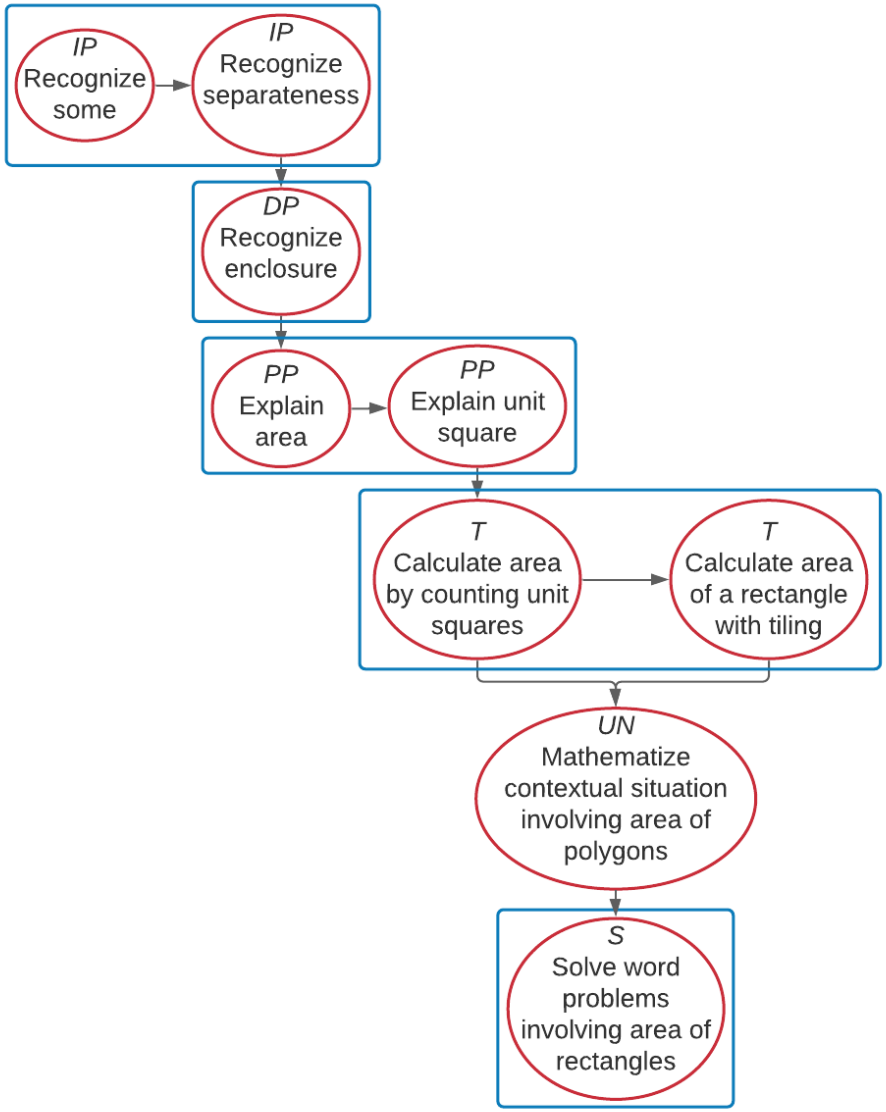
NOTE: Educators can work on the Distal Precursor level using the sets/arrays that students working at the Target level are calculating area.

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.

Link to Text-Only Map

M.EE.4.MD.3 Determine the area of a square or rectangle by counting units of measure (unit squares).



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

Boxes indicate tested nodes

Mini-Map for M.EE.4.MD.2.a

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.2.a Tell time using a digital clock. Tell time to the nearest hour using an analog clock.	**M.4.MD.2.a** 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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Show interest in and focused attention to a task, object, or any environment stimulus. Recognize that an object can share some or none of the attributes as other objects in a group, and recognize the object that does not share any attribute with other objects in a group as "different."	Recognize attributes or characteristics of an object that are measurable (e.g., length, weight, time).	Identify the hour and minute hands on an analog clock, with the understanding that each number on the clock represents a specific hour (e.g., when the hour hand is at 6, it represents 6 o'clock). Recognize hours and minutes on a digital clock, such that the numeral on the left side of the colon represents hours and the numeral on the	Tell time to the nearest hour (e.g., 3 o'clock, 6 o'clock) using both an analog and digital clock. Communicate the time shown on a digital clock.	Tell time to the nearest half hour (e.g., 4:30, 7:30) or quarter hour (e.g., 3:15, 6:45, 9:15) using both an analog and digital clock.

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
		right side of the colon represents minutes.		

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to understand the passage of time, and ultimately to tell time and understand its relevance, students begin by learning to focus their attention and recognize when things in their environment change or are different. In the context of learning to tell time, educators can help students attend to what is happening and contrast it with what will happen next or what happened in the past. They can draw student's attention to changes and help them notice new and different things in the environment, especially when those new and different things are associated with the passage of time.

How is the Distal Precursor related to the Target?

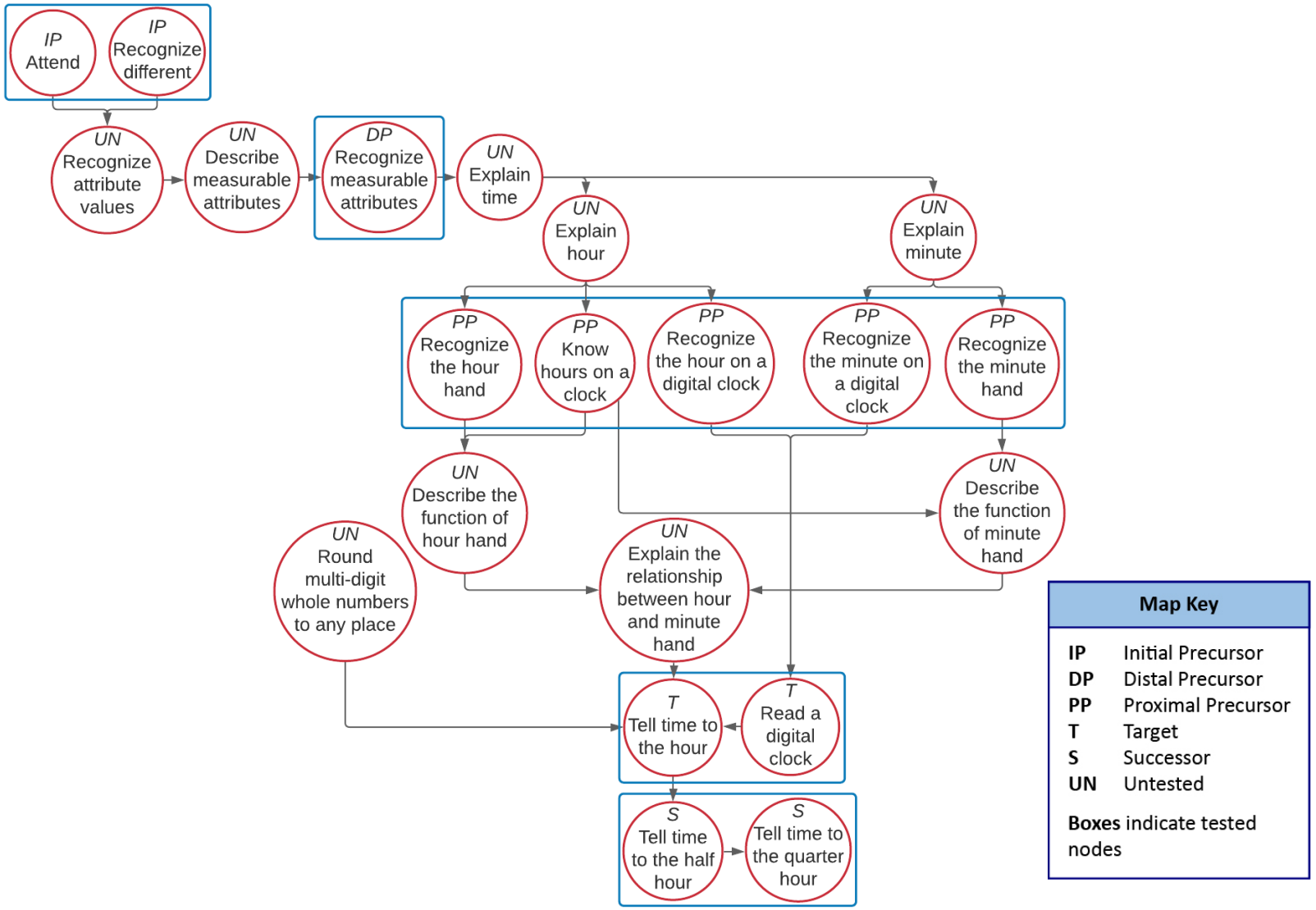
In the context of an Essential Element addressing the ability to tell time, recognizing measurable attributes refers to attributes that begin to mark time. For example, students recognize attributes such as the beginning and ending of an activity, things that are accomplished first then next, and specific time concepts such as day, night, today, tomorrow, and yesterday.

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.

Link to Text-Only Map

M.EE.4.MD.2.a Tell time using a digital clock. Tell time to the nearest hour using an analog clock.



Mini-Map for M.EE.4.MD.2.b

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.2.b Measure mass or volume using standard tools.	**M.4.MD.2.b** 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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize "same" as the object that shares all of the same attributes as other objects in a group. Recognize "different" as the object that shares some or none of the attributes as other objects in a group.	Compare the mass of two different objects without using a measuring tool and communicate whether the mass of one object is heavier than, lighter than, or equal to the other object. Compare the volume of two different objects without using a measuring tool, and communicate whether one container would	Measure the mass of an object using informal units such as counters or pennies (e.g., placing counters on one side of a balance, opposite an object, until the balance is even and communicating the mass of the object by counting the total number of counters). Measure the volume of a container using informal units such as beans or buttons (e.g.,	Use a scale or pan balance to measure the mass of an object in ounces and in pounds. Use appropriate measuring cups to measure the volume of a liquid in cups.	Estimate the mass of an object in ounces and in pounds. Estimate the volume of an object by visually guessing how many cups of water would be required to fill a container.

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
	hold more or less fluid than the other.	completely filling a container with beans or buttons and communicating the volume by counting the total number of units used to fill the container).		

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to build toward measuring mass and volume, students will engage in activities that compare at least two items. Educators will call attention to both how they are the same and how they are different. This type of instruction should include but may not be limited to how light or heavy objects are across the school day, so students have many opportunities to experience same and different.

How is the Distal Precursor related to the Target?

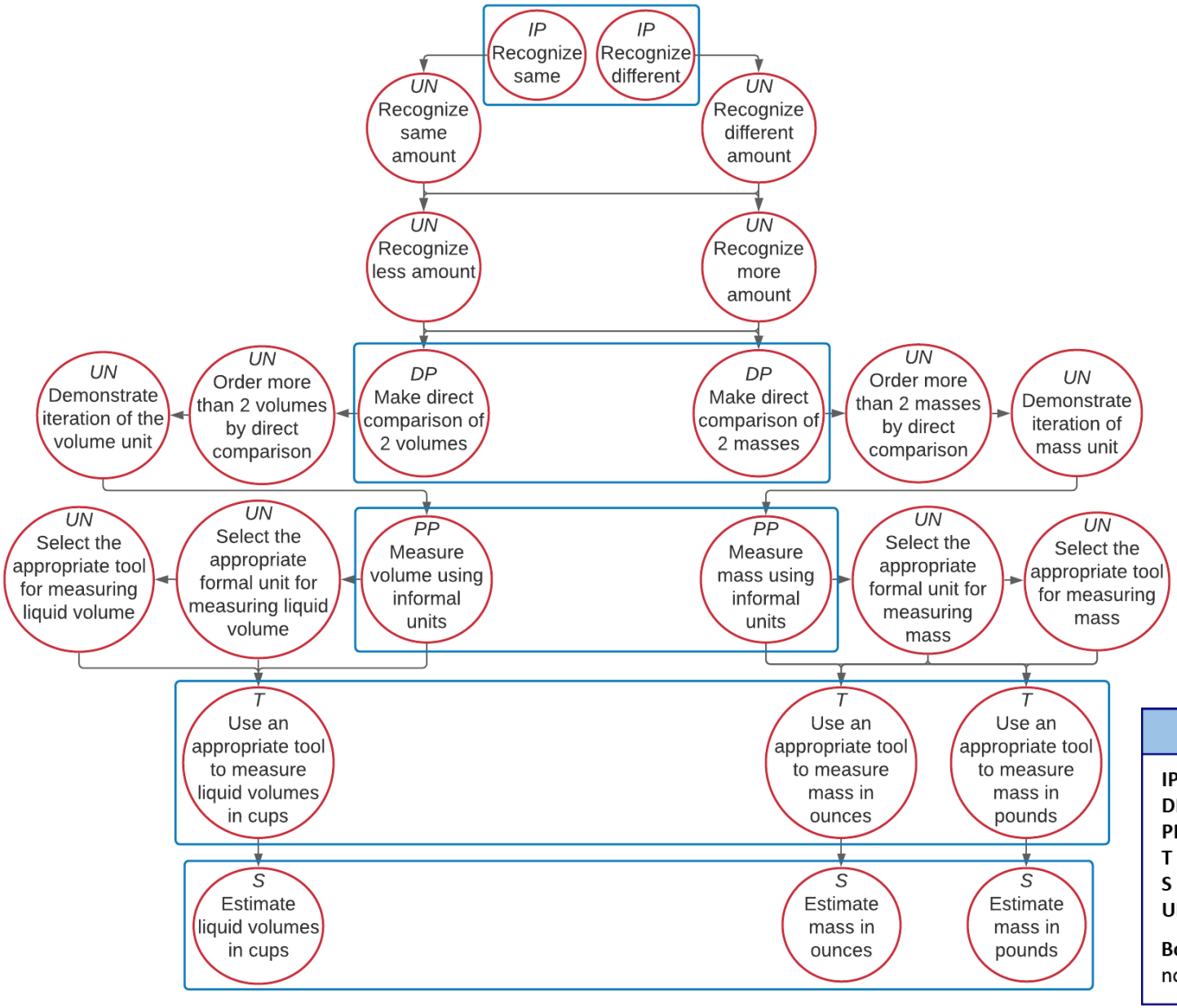
As students are learning to make comparisons, educators can utilize direct comparisons of familiar items based on mass (heaviness) or volume (how much something holds). For example, provide students with two items of similar size but with different masses (feeling of heaviness). Have them compare which feels heavier and which feels lighter. Students will need to be introduced to the language that describes mass and volume (e.g., heavy/light, more/less, same/different, how much it will hold).

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.

[Link to Text-Only Map]

M.EE.4.MD.2.b Measure mass or volume using standard tools.



Map Key

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

Boxes indicate tested nodes

Mini-Map for M.EE.4.MD.2.d

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.2.d Identify coins (penny, nickel, dime, quarter) and their values.	**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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Show interest in and focused attention to a task, object, or any environment stimulus.	Recognize any measurable (e.g., length, width, mass) or non-measurable (e.g., color) attribute values.	Recognize coins and bills as money, and recognize that money has value when compared to a piece of paper.	Identify pennies, dimes, nickels, and quarters when shown different coins. Communicate that a penny is worth 1 cent, a nickel is worth 5 cents, a dime is worth 10 cents, and a quarter is worth 25 cents.	Communicate that a number of coins of a lesser value can be worth the same as one coin of a greater value (e.g., five pennies have the same value as a nickel, 10 pennies have the same value as a dime, two nickels have the same value as one dime, 25 pennies have the same value as one quarter, and five nickels have the same value as one quarter).

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to recognize the distinctions among coins and their values, students must first attend to coins when they are present. In the context of this Essential Element, educators should work on attending while interacting with coins and using them to accomplish things (e.g., paying for lunch, collecting donations).

How is the Distal Precursor related to the Target?

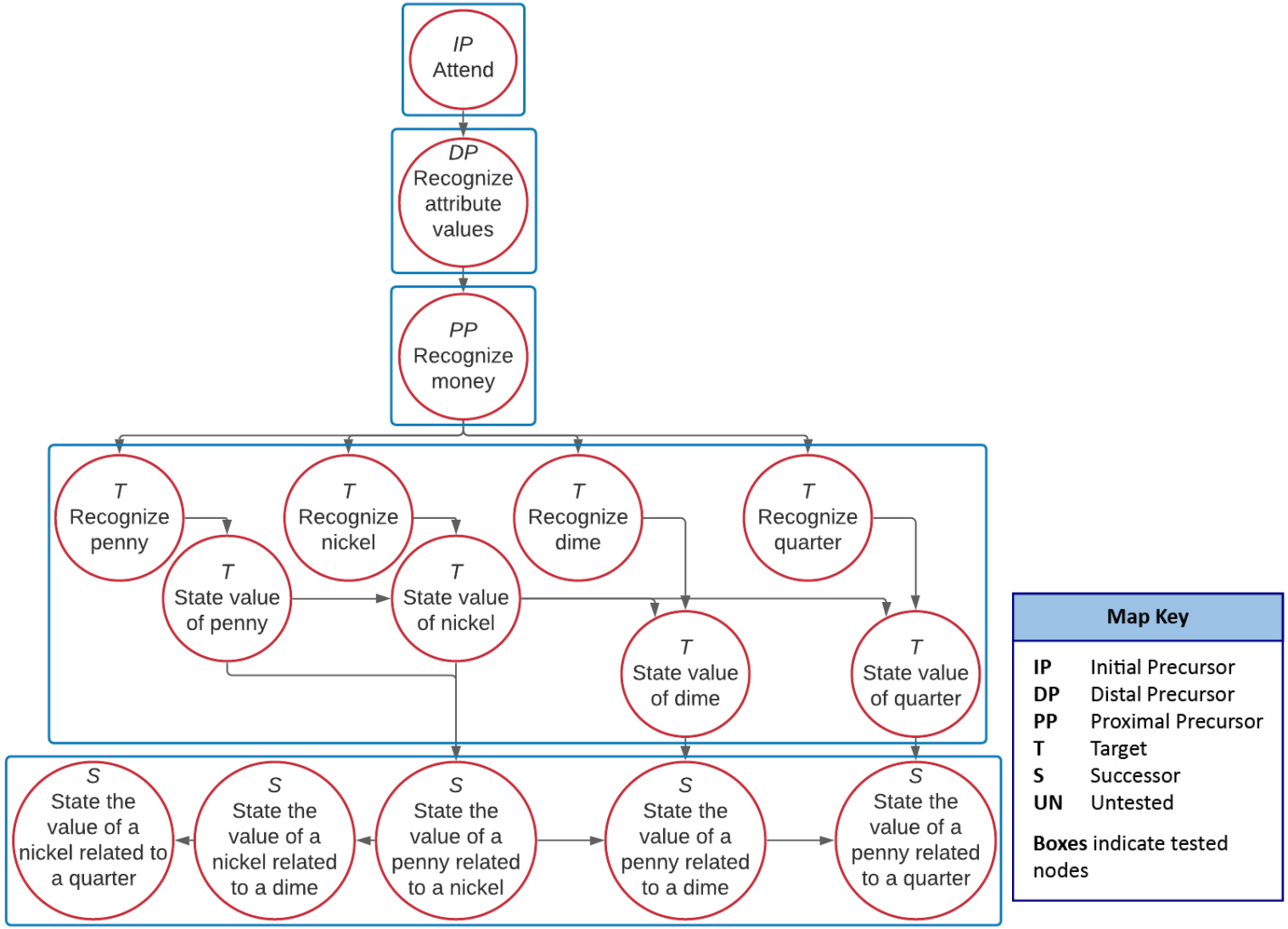
As students increase their attention to coins, they can begin working to recognize the different attributes of coins (e.g., size, color). When presenting various coins, educators should take care to use the names of the coins while defining and demonstrating their meaning. While students do not need to say these words, they do need to learn the meanings.

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.

Link to Text-Only Map

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



Mini-Map for M.EE.4.MD.4.b

Subject: Mathematics
Measurement and Data (MD)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.MD.4.b Interpret data from a picture or bar graph.	**M.4.MD.4** 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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Arrange objects in a specific order (e.g., smallest to largest). Group objects by some attribute value (e.g., shape, size, texture, numerical pattern).	Recognize the structure of bar and picture graphs such as the framework, specifiers, or labels for the *x*- and *y*-axes. Understand that bars are used to display data on bar graphs, where the height of the bar represents the number of observations for each category. Understand that pictures, symbols, or geometrical figures are used to display data on picture graphs, where the number of pictures or symbols represents the number of observations for each category.	Answer elementary-level questions by lifting information from a bar graph or picture graph, and understand the information represented on the graph (e.g., on the graph representing students' favorite ice cream, how many students like strawberry ice cream? How many students like chocolate ice cream?).	Interpret or integrate information on a bar graph or picture graph to answer questions (e.g., in a graph representing students' favorite ice cream, how many more students like strawberry ice cream than chocolate ice cream?).	Draw inferences or make predictions by interpreting information presented on a bar graph or picture graph (e.g., on a graph representing the number of pizzas required for a certain number of people, predict the number of pizzas required for 20 people).

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to be able to understand data on a graph, students begin learning to notice what is new. Educators draw the students' attention to the new objects or stimuli, label them (e.g., these are blocks, these are shapes, these are animals), and the student observes, feels, or otherwise interacts with it. Educators encourage students to begin placing like objects together.

How is the Distal Precursor related to the Target?

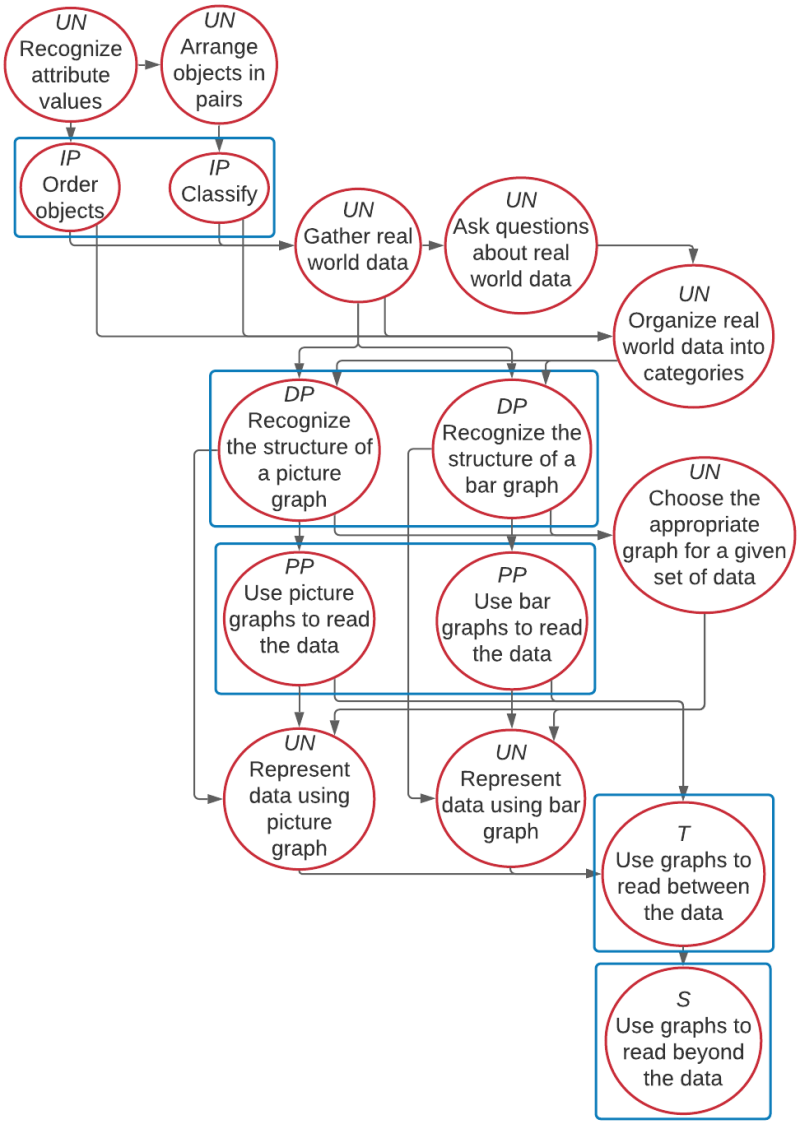
As the students' attention to objects increases, educators will begin to draw the students' attention to what is the same and different between familiar items: color, shape, quantity (1-4), size, texture, and pattern. Educators should take care to use attribute words while defining and demonstrating their meaning. While students do not need to say these words, they do need to learn the meanings. Students will also begin to group two or more items in the same set based on an attribute (e.g., two tigers, bumpy balls and bumpy gravel, red spoons). As the students group two or more items, the educator will demonstrate the representation in a bar or picture graph and encourage students to actively participate in the creation of the graph.

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.

Link to Text-Only Map

M.EE.4.MD.4.b Interpret data from a picture or bar graph.



Map Key	
IP	Initial Precursor
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PP	Proximal Precursor
T	Target
S	Successor
UN	Untested

Boxes indicate tested nodes

Mini-Map for M.EE.4.OA.1-2

Subject: Mathematics
Operations and Algebraic Thinking (OA)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.OA.1-2 Demonstrate the connection between repeated addition and multiplication.	**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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Communicate understanding of "separateness" by recognizing objects that are not joined together. Communicate understanding of set by recognizing a group of objects sharing an attribute. Communicate understanding of a subset by recognizing a	Combine two or more sets of objects to create a new set. Combine two or more parts (e.g., toys, shapes) to form a new whole. Demonstrate an understanding of addition by combining the objects of two or more sets.	Use models, such as mathematical equations (e.g., 5 + 5 + 5 = 15), sets of manipulatives, or number line diagrams to represent a repeated addition problem.	Demonstrate understanding of multiplication by combining multiple sets of the same quantity to find the total number of objects.	Multiply numbers up to 12 by factors 1 to 5, using manipulatives.

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
subset as a set or group of objects within a larger set that share an attribute.				

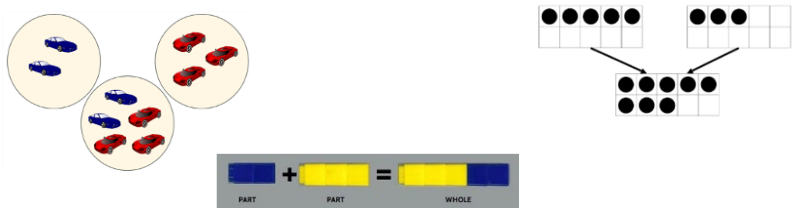
Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to understand multiplication, students must learn to organize items into groups/sets based on a common characteristic such as size, color, shape, texture, or flavor. Students learn how to sort items by separating a group of items into two groups (e.g., vehicles and animals). As students gain comfort sorting items into sets, they are encouraged to use their language to convey their thought process by identifying and naming the characteristic that determines the set (e.g., wheels and legs). Activities that require students to engage actively with the items will foster the students' understanding of set, subsets, and separateness (e.g., the game "one of these things is not like the other;" highlighting one characteristic [e.g., color] in a group of similar items by which the items will be grouped; incorporating creating sets into everyday activities [e.g., during cleanup time, students place items into one of two bins based on a designated characteristic]).

How is the Distal Precursor related to the Target?

As students gain an understanding of how to group items into sets, educators will begin to help students connect their knowledge of sets with their knowledge of counting. Educators will provide multiple experiences counting sets and combining sets using multiple models (see below for examples). Educators also need to introduce the concept of equal sets using the students' background knowledge of same and different.

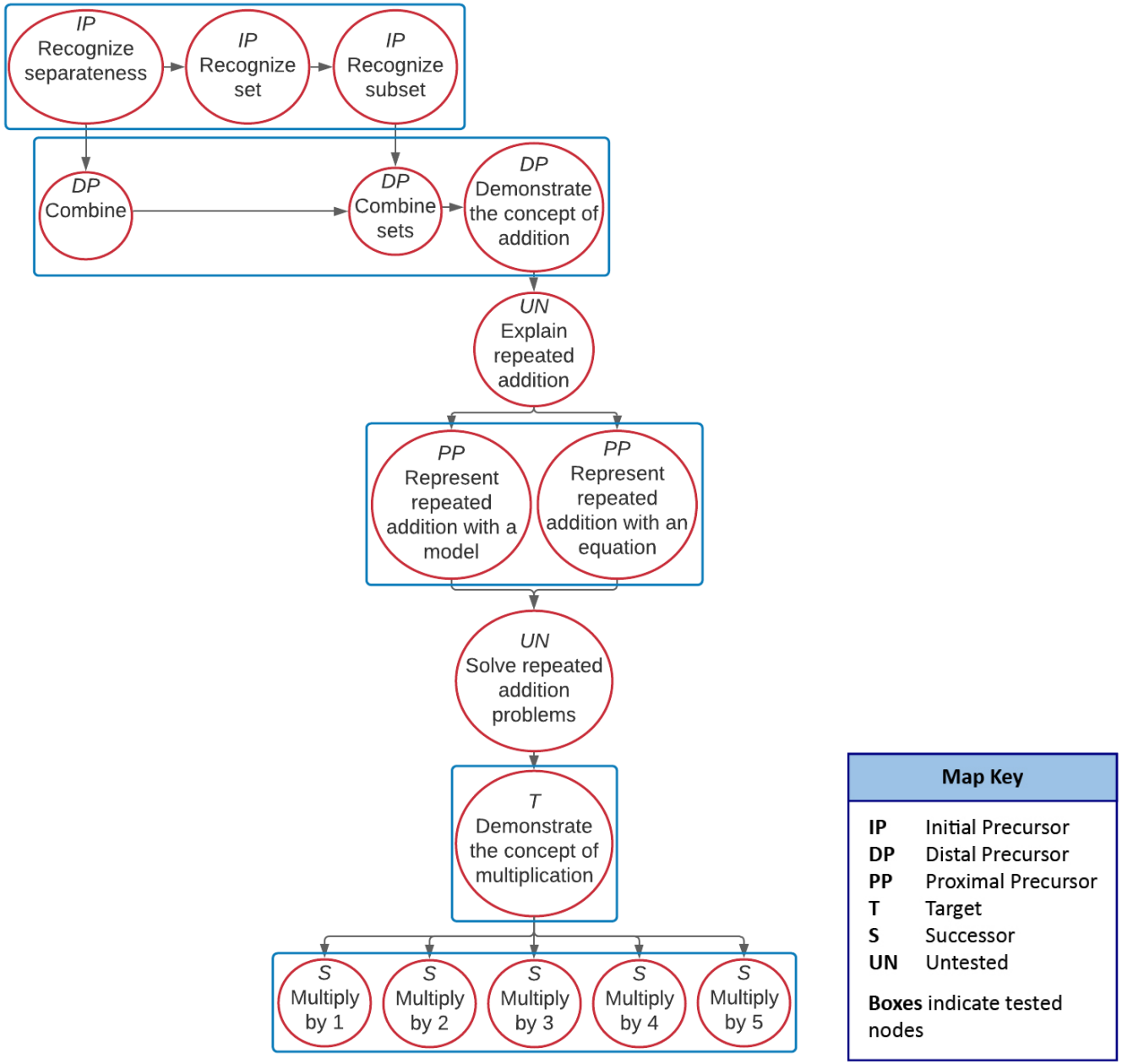


Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets.
Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction.

Link to Text-Only Map

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



Mini-Map for M.EE.4.OA.3

Subject: Mathematics
Operations and Algebraic Thinking (OA)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.OA.3 Solve one-step real-world problems using addition or subtraction within 100.	**M.4.OA.3** 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.

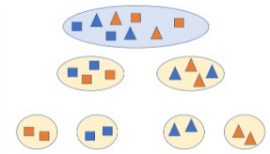
Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Combine two or more sets of objects to form a new set. Divide a set of 10 or fewer objects into two or more distinct subsets (e.g., dividing a set containing 10 objects into two subsets containing 4 and 6 objects).	Demonstrate understanding of addition by combining the objects of two or more sets, and demonstrate understanding of subtraction by removing some objects from a larger set.	Find the unknown sum (e.g., 5 + 8 = ?) or the missing addend (e.g., 6 + ? = 10) in an addition equation. Find the unknown difference in a subtraction equation (e.g., 12 - 7 = ?).	Solve word problems with numbers up to 100 using addition (e.g., Johnny has 25 suckers and buys 15 more; how many does he have now?) or subtraction (e.g., Johnny has 90 suckers and gives 20 away; how many does he have left?).	Solve two-step addition or subtraction word problems using an addition or subtraction strategy (e.g., Johnny has 25 suckers and buys 15 more, then he gives 10 to his brother; how many does he have now?).

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

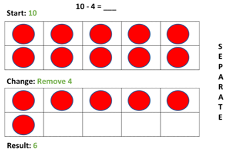
How is the Initial Precursor related to the Target?

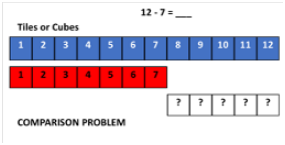
The knowledge needed to solve addition and subtraction real-world problems links back to an understanding of how to create sets, but it also requires learning to manipulate sets (i.e., combining and separating or partitioning). Provide students many opportunities to take a set of objects (e.g., tiles, linking cubes, buttons) and separate them based on a given characteristic (e.g., shape, color, size) into two distinct sets, then separate them again based on another characteristic. Guide students to notice how the set size changes each time the educator combines or partitions the sets.

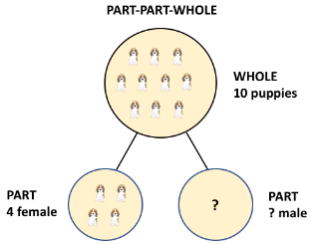


How is the Distal Precursor related to the Target?

As students gain an understanding of how to group and manipulate items into sets, educators will begin to help students connect their knowledge of sets and counting to addition and subtraction. Educators will provide multiple experiences using the various addition and subtraction problem types (e.g., joining, separating, part-part-whole, and comparison problems).





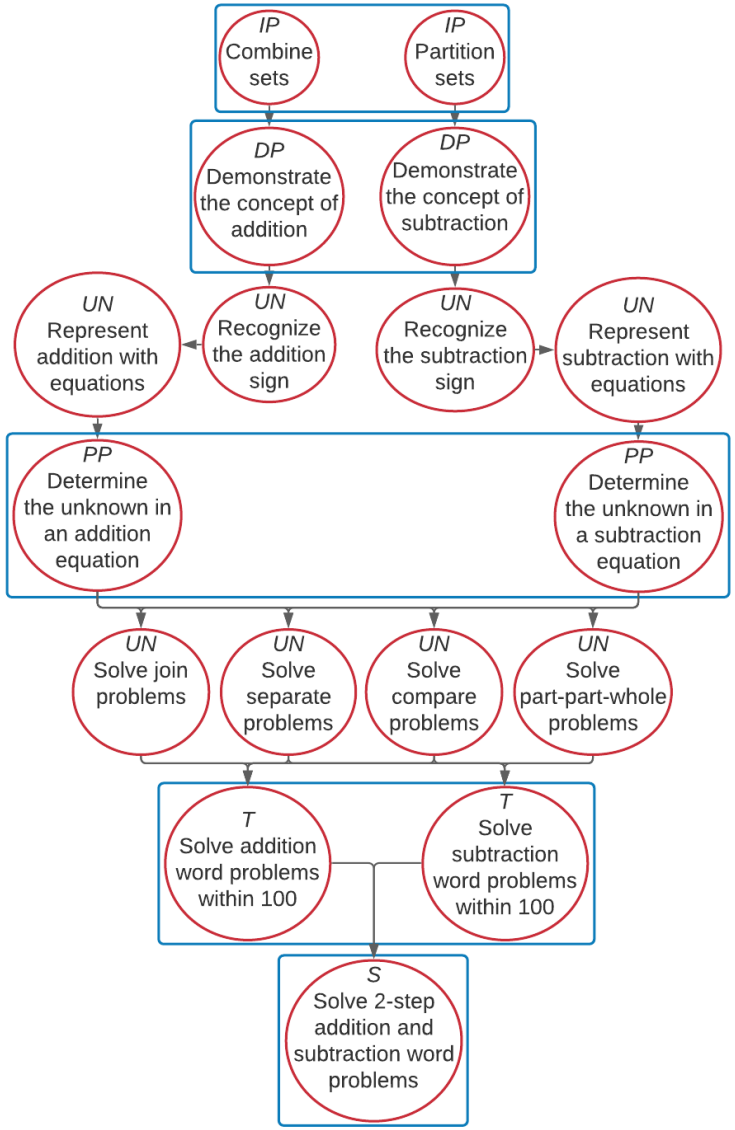


Instructional Resources

Released Testlets
See the Guide to Practice Activities and Released Testlets.
Using Untested (UN) Nodes
See the document Using Mini-Maps to Plan Instruction.

Link to Text-Only Map

M.EE.4.OA.3 Solve one-step real-world problems using addition or subtraction within 100.



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

Boxes indicate tested nodes

Mini-Map for M.EE.4.OA.5

Subject: Mathematics
Operations and Algebraic Thinking (OA)
Grade: 4

Learning Outcome

DLM Essential Element	Grade-Level Standard
M.EE.4.OA.5 Use repeating patterns to make predictions.	**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.

Linkage Level Descriptions

Initial Precursor	Distal Precursor	Proximal Precursor	Target	Successor
Recognize attributes or characteristics of an object such as color, height, or weight. Form a pair by putting together two objects (e.g., putting together a pencil and an eraser from two sets containing pencils and erasers).	Recognize patterns (or cycles) that exist in nature (e.g., seasons occur in a pattern, day and night occur in a pattern) or in everyday life (e.g., music, P.E., and art classes occur in a pattern in school).	Recognize the pattern that either repeats or grows when shown different patterns involving numbers, letters, symbols, pictures, or shapes (e.g., 1, 1, 2, 1, 1, 2, 1, 1, 2…, or 2, 4, 6, 8...).	Recognize the core unit in a repeating pattern by determining the smallest section of the pattern that is repeated over and over (e.g., the core unit in the pattern 1, 1, 2, 1, 1, 2, 1, 1, 2... is 1, 1, 2).	Communicate the next element in a repeating pattern by using the core unit. For example, the next term in the pattern 2, 4, 4, 2, 4, 4, 2, 4, 4... is 2 because the core unit is 2, 4, 4. The patterns should be limited to repeating patterns using numbers, letters, shapes, pictures, etc.

Initial Precursor and Distal Precursor Linkage Level Relationships to the Target

How is the Initial Precursor related to the Target?

In order to understand and work with patterns, students begin by learning to notice what is new. The educator draws the students' attention to new objects or stimuli, labels and describes them (e.g., “there are two cubes,” “this is a circle and then a square,” “this group has a short block, a long block, and a short block and this group has a short block, a long block, and a short block”), and the student observes, feels, or otherwise interacts with them. Educators encourage students to begin placing objects together to make their own pattern.

How is the Distal Precursor related to the Target?

As students develop their awareness of attributes and putting objects together, educators will draw the students' attention to patterns in words, symbols, numbers, images, routines, and the environment, and allow students to create their own patterns.

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.

Link to Text-Only Map

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