

Content Area: Mathematics
Standard: 3. Data Analysis, Statistics, and Probability

Prepared Graduates:

- Solve problems and make decisions that depend on understanding, explaining, and quantifying the variability in data

Grade Level Expectation: Third Grade

Concepts and skills students master:

1. Visual displays are used to describe data

Evidence Outcomes	21 st Century Skills and Readiness Competencies
<p>Students can:</p> <p>a. Represent and interpret data. (CCSS: 3.MD)</p> <ul style="list-style-type: none"> i. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. (CCSS: 3.MD.3) ii. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.¹ (CCSS: 3.MD.3) iii. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. (CCSS: 3.MD.4) 	<p>Inquiry Questions:</p> <ul style="list-style-type: none"> 1. What can data tell you about your class or school? 2. How do data displays help us understand information? <p>Relevance and Application:</p> <ul style="list-style-type: none"> 1. The collection and use of data provides better understanding of people and the world such as knowing what games classmates like to play, how many siblings friends have, or personal progress made in sports. <p>Nature of Mathematics:</p> <ul style="list-style-type: none"> 1. Mathematical data can be represented in both static and animated displays. 2. Mathematicians model with mathematics. (MP) 3. Mathematicians use appropriate tools strategically. (MP) 4. Mathematicians attend to precision. (MP)

Standard: 3. Data Analysis, Statistics, and Probability
Third Grade

¹ For example, draw a bar graph in which each square in the bar graph might represent 5 pets. (CCSS: 3.MD.3)

Content Area: Mathematics

Standard: 4. Shape, Dimension, and Geometric Relationships

Prepared Graduates:

- Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Grade Level Expectation: Third Grade

Concepts and skills students master:

1. Geometric figures are described by their attributes

Evidence Outcomes

Students can:

a. Reason with shapes and their attributes. (CCSS: 3.G)

- i. Explain that shapes in different categories¹ may share attributes² and that the shared attributes can define a larger category.³ (CCSS: 3.G.1)
 1. Identify rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (CCSS: 3.G.1)
- ii. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.⁴ (CCSS: 3.G.2)

21st Century Skills and Readiness Competencies

Inquiry Questions:

1. What words in geometry are also used in daily life?
2. Why can different geometric terms be used to name the same shape?

Relevance and Application:

1. Recognition of geometric shapes allows people to describe and change their surroundings such as creating a work of art using geometric shapes, or design a pattern to decorate.

Nature of Mathematics:

1. Mathematicians use clear definitions in discussions with others and in their own reasoning.
2. Mathematicians construct viable arguments and critique the reasoning of others. (MP)
3. Mathematicians look for and make use of structure. (MP)

Standard: 4. Shape, Dimension, and Geometric Relationships
Third Grade

¹ e.g., rhombuses, rectangles, and others. (CCSS: 3.G.1)

² e.g., having four sides. (CCSS: 3.G.1)

³ e.g., quadrilaterals. (CCSS: 3.G.1)

⁴ For example, partition a shape into 4 parts with equal area, and describe the area of each part as $\frac{1}{4}$ of the area of the shape. (CCSS: 3.G.2)

Content Area: Mathematics

Standard: 4. Shape, Dimension, and Geometric Relationships

Prepared Graduates:

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

Grade Level Expectation: Third Grade

Concepts and skills students master:

2. Linear and area measurement are fundamentally different and require different units of measure

Evidence Outcomes

Students can:

- a. Use concepts of area and relate area to multiplication and to addition. (CCSS: 3.MD)
 - i. Recognize area as an attribute of plane figures and apply concepts of area measurement.¹ (CCSS: 3.MD.5)
 - ii. Find area of rectangles with whole number side lengths using a variety of methods² (CCSS: 3.MD.7a)
 - iii. Relate area to the operations of multiplication and addition and recognize area as additive.³ (CCSS: 3.MD.7)
- b. Describe perimeter as an attribute of plane figures and distinguish between linear and area measures. (CCSS: 3.MD)
- c. Solve real world and mathematical problems involving perimeters of polygons. (CCSS: 3.MD.8)
 - i. Find the perimeter given the side lengths. (CCSS: 3.MD.8)
 - ii. Find an unknown side length given the perimeter. (CCSS: 3.MD.8)
 - iii. Find rectangles with the same perimeter and different areas or with the same area and different perimeters. (CCSS: 3.MD.8)

21st Century Skills and Readiness Competencies

Inquiry Questions:

1. What kinds of questions can be answered by measuring?
2. What are the ways to describe the size of an object or shape?
3. How does what we measure influence how we measure?
4. What would the world be like without a common system of measurement?

Relevance and Application:

1. The use of measurement tools allows people to gather, organize, and share data with others such as sharing results from science experiments, or showing the growth rates of different types of seeds.
2. A measurement system allows people to collaborate on building projects, mass produce goods, make replacement parts for things that break, and trade goods.

Nature of Mathematics:

1. Mathematicians use tools and techniques to accurately determine measurement.
2. People use measurement systems to specify attributes of objects with enough precision to allow collaboration in production and trade.
3. Mathematicians make sense of problems and persevere in solving them. (MP)
4. Mathematicians model with mathematics. (MP)

Standard: 4. Shape, Dimension, and Geometric Relationships
Third Grade

¹ A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. (CCSS: 3.MD.5a)

A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. (CCSS: 3.MD.5b)

² A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. (CCSS: 3.MD.5a)

A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. (CCSS: 3.MD.5b)

Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). (CCSS: 3.MD.6)

Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. (CCSS: 3.MD.7a)

Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. (CCSS: 3.MD.7b)

³ Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. (CCSS: 3.MD.7d)

Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$.

Use area models to represent the distributive property in mathematical reasoning. (CCSS: 3.MD.7c)

Content Area: Mathematics

Standard: 4. Shape, Dimension, and Geometric Relationships

Prepared Graduates:

- Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

Grade Level Expectation: Third Grade

Concepts and skills students master:

3. Time and attributes of objects can be measured with appropriate tools

Evidence Outcomes

Students can:

- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (CCSS: 3.MD)
 - Tell and write time to the nearest minute. (CCSS: 3.MD.1)
 - Measure time intervals in minutes. (CCSS: 3.MD.1)
 - Solve word problems involving addition and subtraction of time intervals in minutes¹ using a number line diagram. (CCSS: 3.MD.1)
 - Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (CCSS: 3.MD.2)
 - Use models to add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units.² (CCSS: 3.MD.2)

21st Century Skills and Readiness Competencies

Inquiry Questions:

- Why do we need standard units of measure?
- Why do we measure time?

Relevance and Application:

- A measurement system allows people to collaborate on building projects, mass produce goods, make replacement parts for things that break, and trade goods.

Nature of Mathematics:

- People use measurement systems to specify the attributes of objects with enough precision to allow collaboration in production and trade.
- Mathematicians use appropriate tools strategically. (MP)
- Mathematicians attend to precision. (MP)

Standard: 4. Shape, Dimension, and Geometric Relationships
Third Grade

¹ e.g., by representing the problem on a number line diagram. (CCSS: 3.MD.1)

² e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (CCSS: 3.MD.2)

Content Area: Mathematics

Standard: 1. Number Sense, Properties, and Operations

Prepared Graduates:

- Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations

Grade Level Expectation: Third Grade

Concepts and skills students master:

2. Parts of a whole can be modeled and represented in different ways

Evidence Outcomes

Students can:

- Develop understanding of fractions as numbers. (CCSS: 3.NF)
 - Describe a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; describe a fraction a/b as the quantity formed by a parts of size $1/b$. (CCSS: 3.NF.1)
 - Describe a fraction as a number on the number line; represent fractions on a number line diagram.¹ (CCSS: 3.NF.2)
 - Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. (CCSS: 3.NF.3)
 - Identify two fractions as equivalent (equal) if they are the same size, or the same point on a number line. (CCSS: 3.NF.3a)
 - Identify and generate simple equivalent fractions. Explain² why the fractions are equivalent.³ (CCSS: 3.NF.3b)
 - Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.⁴ (CCSS: 3.NF.3c)
 - Compare two fractions with the same numerator or the same denominator by reasoning about their size. (CCSS: 3.NF.3d)
 - Explain why comparisons are valid only when the two fractions refer to the same whole. (CCSS: 3.NF.3d)
 - Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions.⁵ (CCSS: 3.NF.3d)

21st Century Skills and Readiness Competencies

Inquiry Questions:

- How many ways can a whole number be represented?
- How can a fraction be represented in different, equivalent forms?
- How do we show part of unit?

Relevance and Application:

- Fractions are used to share fairly with friends and family such as sharing an apple with a sibling, and splitting the cost of lunch.
- Equivalent fractions demonstrate equal quantities even when they are presented differently such as knowing that $1/2$ of a box of crayons is the same as $2/4$, or that $2/6$ of the class is the same as $1/3$.

Nature of Mathematics:

- Mathematicians use visual models to solve problems.
- Mathematicians make sense of problems and persevere in solving them. (MP)
- Mathematicians reason abstractly and quantitatively. (MP)

Standard: 1. Number Sense, Properties, and Operations
Third Grade

¹ Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line. (CCSS: 3.NF.2a)

Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. (CCSS: 3.NF.2b)

² e.g., $1/2 = 2/4$, $4/6 = 2/3$. (CCSS: 3.NF.3b)

³ e.g., by using a visual fraction model. (CCSS: 3.NF.3b)

⁴ Examples: Express 3 in the form $3 = 3/1$; recognize that $6/1 = 6$; locate $4/4$ and 1 at the same point of a number line diagram. (CCSS: 3.NF.3c)

⁵ e.g., by using a visual fraction model. (CCSS: 3.NF.3d)