

Iowa Core Mathematics

Measurement and Data standards for grades 2-5

Geometry standards for grade 6

Measurement and Data

2.MD

Measure and estimate lengths in standard units. (2.MD.A)

1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. **(2.MD.A.1) (DOK 1)**
2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen. **(2.MD.A.2) (DOK 2,3)**
3. Estimate lengths using units of inches, feet, centimeters, and meters. **(2.MD.A.3) (DOK 2)**
4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit. **(2.MD.A.4) (DOK 1,2)**

Relate addition and subtraction to length. (2.MD.B)

5. Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. **(2.MD.B.5) (DOK 2)**
- * 6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram. **(2.MD.B.6) (DOK 1,2)**

Work with time and money. (2.MD.C)

7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. **(2.MD.C.7) (DOK 1)**
- IA.1. Describe the relationship among standard units of time: minutes, hours, days, weeks, months and years. **(DOK 2,3)**
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?* **(2.MD.C.8) (DOK 2)**

Represent and interpret data. (2.MD.D)

- * 9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. **(2.MD.D.9) (DOK 2)**
- IA.2. Use interviews, surveys, and observations to collect data that answer questions about students' interests and/or their environment. **(DOK 2,3)**
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. **(2.MD.D.10) (DOK 2)**

Measurement and Data

3.MD

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. (3.MD.A)

- * 1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. **(3.MD.A.1) (DOK 1,2)**

- * 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. **(3.MD.A.2) (DOK 1,2)**

Represent and interpret data.

- 3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.* **(3.MD.B.3) (DOK 1,2)**
- * 4. 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. **(3.MD.B.4) (DOK 2)**

Geometric measurement: understand concepts of area and relate area to multiplication and to addition. (3.MD.C)

- 5. Recognize area as an attribute of plane figures and understand concepts of area measurement.
 - a. 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.
 - b. 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. **(3.MD.C.5) (DOK 1,2)**
- 6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). **(3.MD.C.6) (DOK 1,2)**
- 7. Relate area to the operations of multiplication and addition.
 - a. 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.
 - b. 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.
 - c. 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.
 - d. Recognize area as additive. 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. **(3.MD.C.7) (DOK 1,2)**

Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. (3.MD.D)

- 8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **(3.MD.D.8) (DOK 1,2)**

Measurement and Data

4.MD

Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. (4.MD.A)

- * 1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* **(4.MD.A.1) (DOK 1)**
- * 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. **(4.MD.A.2) (DOK 1,2)**
- * 3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* **(4.MD.A.3) (DOK 1,2)**

Represent and interpret data. (4.MD.B)

- * 4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* **(4.MD.B.4) (DOK 1,2)**

Geometric measurement: understand concepts of angle and measure angles. (4.MD.C)

- * 5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
 - a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through $\frac{1}{360}$ of a circle is called a "one-degree angle," and can be used to measure angles.
 - b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. **(4.MD.C.5) (DOK 1)**
- 6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **(4.MD.C.6) (DOK 1)**
- 7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. **(4.MD.C.7) (DOK 1,2)**

Measurement and Data

5.MD

Convert like measurement units within a given measurement system. (5.MD.A)

- 1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. **(5.MD.A.1) (DOK 1,2)**

Represent and interpret data. (5.MD.B)

- * 2. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **(5.MD.B.2) (DOK 1,2)**

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. (5.MD.C)

- 3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
 - a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
 - b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. **(5.MD.C.3) (DOK 1)**
- 4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **(5.MD.C.4) (DOK 1,2)**
- 5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
 - a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
 - b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
 - c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. **(5.MD.C.5) (DOK 1,2)**

Geometry

6.G

Solve real-world and mathematical problems involving area, surface area, and volume. (6.G.A)

- * 1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. **(6.G.A.1) (DOK 1,2)**
- * 2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **(6.G.A.2) (DOK 1,2)**
- 3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **(6.G.A.3) (DOK 1,2)**
- 4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. **(6.G.A.4) (DOK 1,2)**