Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	1 of 6	1 and 2

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
4. MD.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.*	•Apply area formula to find unknown lengths *or* areas for rectangles in real-world and mathematical problems. •Apply perimeter formula to find unknown lengths *or* perimeters for rectangles in real-world and mathematical problems.	**SMP2** Reason Abstractly and quantitatively. **SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	•How can you use a formula to find the perimeter or area of a rectangle? •How can you find the area of combined rectangles?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Necessary Materials**
•Recognize properties of rectangles. •Use a formula to find the area of a rectangle. (for lesson87 on area of combined rectangles)	Perimeter Length Width Height Area Base Formula	Students may mistake the base of a plane figure (length) with the base of a solid figure (length x width).	**OnCore** Lessons 87 -89 Student pp. 173 – 178 **Investigations** Unit 4 Sessions 1.3, 1.5 SAB pp. 7-8, 10, 14

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to use a formula to find the perimeter of a rectangle and area of a rectangle and the area of combined rectangles following the lesson guidelines in OnCore lessons 87 -89 (TM pp. 91-93), teachers will: •Remind students a rectangle is a parallelogram with four right angles and like all parallelograms, it has two pairs of opposite sides that are equal in length. Discuss perimeter, length, and width in relation to a rectangle. Use grid lines to help students understand. Extend the process by discussing the perimeter of a square. •Remind students that the perimeter of a rectangle is the distance around it and that now they are measuring the space inside a rectangle. Discuss the set of terms *area, base, height*, and *formula*. **Discuss the relationship between the set of terms *base and height* and *length and width*. Make sure they understand that both sets of terms refer to the dimensions of the figure and may be used interchangeably.** Extend the process by discussing the area of a square. •Explain that sometimes rectangles are combined to form larger figures and that they can use the areas of the rectangles to find the areas of the combined figure. Point out that they can draw lines to divide the figures into rectangles and that sometimes all the side lengths are labeled and that other times they will need to subtract to find the unknown side length. Teachers will be following lesson activities from Investigations Unit 4 sessions 1.3 and 1.5 materials. (TM pp.33-40 and 47-49) In the activities teachers will: Guide students to find perimeter using standard and metric units.	In Lessons 87-89 students will: •Find the perimeter of a rectangle when given the length and width. •Find the area of a rectangle when given the length and width (base and height) •Find the area of combined rectangles. •Find the unknown side lengths by subtracting. •Complete student pp.173-178. In Investigations Unit 4 Sessions 1.3 and 1.5 students will: • Measure the perimeter of the classroom and object in the classroom. •Complete SAB pp. 7-8, 10, 14

Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	2 of 6	3

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
4. MD.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.*	Apply area formula to find unknown lengths *or* areas for rectangles in real-world and mathematical problems. Apply perimeter formula to find unknown lengths *or* perimeters for rectangles in real-world and mathematical problems.	**SMP1** Make sense of problems and persevere in solving them. **SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	•How can you find an unknown measure of a rectangle given its area or perimeter? •How can you use the strategy solve a simpler problem to solve area problems?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
•Use a formula to find the perimeter of a rectangle. •Use a formula to find the area of a rectangle.			**OnCore** Lessons 90 -91 Student pp. 179-182

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to find the unknown measure of a side of a rectangle and use the strategy *solve a simpler problem* to solve area problems following the lesson guidelines in OnCore lessons 90 -91(TM pp. 94-95), teachers will: •Discuss with students they can use a formula to find the perimeter or the area of a rectangle when they know the lengths of the sides and that these formulas can also be used to find the side lengths of a figure if one of the side lengths in unknown but the perimeter or he area is known. Point out that in the two examples at the top of page 179 the problem with the perimeter formula requires two calculations while the one with the area formula requires only one. Ask students to explain why the answer to the problem is 12 inches and not 12 square inches. •Remind students how they found area of some figures by separating them into two or three rectangles and adding the areas and tell them know they will see how to solve problems by finding the areas of two or three rectangles and subtracting. Suggest they draw pictures to show the situation. Make sure students recognize the three simpler problems whose solutions join together to form the solution to the original problem. Ask them to explain why the two simpler area are subtracted, not added. Remind students that, in using the area formula, either side of a rectangle can be called the base.	In Lessons 90-91 students will: •Find the unknown measure of a side of a rectangle given the perimeter or area. •Use the strategy *solve a simpler problem* to solve area problems. •Complete student pp.179-182.

Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	3 of 6	4-6

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
4. MD.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),…	•Know relative size of measurement units within the same system of measurement. •Express measurement of a larger unit in terms of a smaller unit within the same system and state as a multiplicative comparison. •Record measurement conversions in a two-column table.	**SMP2** Reason Abstractly and quantitatively. **SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	•How can you use benchmarks to understand relative sizes of measurement units? •How can you use models to compare customary units of length, weight or liquid volume?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Necessary Materials**
•Recognize customary units of length, weight, and liquid volume. •Recognize metric units of length, weight, and liquid volume. •Know customary length equivalents for foot and yard. •Multiply within 100. •Use comparison notation >, <, and =. •Know customary length equivalents for liquid volume.	Inch, Yard, Foot, Ounce, Pound, Ton, Fluid ounce, Cup, Pint, Quart, Half Gallon, Gallon	Students may think that the larger unit of measure has more units of them because it is larger instead of knowing that because it is larger there will be fewer of them and the smaller the unit the more of them.	**OnCore** Lessons 76 -79 Student pp.151-158 3 sheets of paper &1-foot ruler scissors and tape **Investigations** Unit 4 Session 1.2 SAB p.6 and Unit 7 Snap-In Session 3.5A SAB pp C49-51

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to use benchmarks to understand the relative size of measurement units and use models to compare customary units of length, weight, and liquid volume following the lesson guidelines in OnCore lessons 76-79 (TM pp. 80-83), teachers will: •Remind students they've learned different measurements units. Have them name customary units they remember as you group them into categories of length, liquid volume and weight on the board. Repeat for metric units of length, liquid volume, and mass. (**PLEASE NOTE**: In the metric (SI) system, the term **mass** is used instead of **weight**. The customary system measures weight and the metric system measures mass.) •Review equivalent customary units of length that students know and help students complete the modeling activity. Review comparison symbols. •Review benchmarks for weight. Discuss the conclusion that 16 oz = 1 lb and explain that a pound is larger than an ounce, so you multiply to find the number of ounces in a given number of pounds. Ask how to find the number of pounds in 4 tons. •Have students name familiar liquid measures. Discuss which liquid measures are larger than others and have students draw models to help see the relationships between the different units. Help students use the equivalents in the table to complete the activity and have them explain how their diagram shows the relationships. Teachers will be following lesson activities from Investigations Unit 4 Session 1.2 and Unit 7 Session 3.5A Snap-in materials. (TM pp.28-32 and CC73 –CC77) In the activities teachers will: Guide students convert measurement units within one system and make a table of equivalents.	In Lessons 76-79 students will: •Choose the customary and metric units use to measure different objects, •Select best estimates of mass, weight, length, and liquid volume. •Refer to models and visualize the relative sizes of ounce, pound, and ton. •Compare customary units of weight. •Draw models to help them see the relationships between liquid measures and to compare amounts of liquid given in different units. •Complete student pp.151-158. In Investigations Unit 4 session 1.2 and Unit 7 Snap-In session 3.5A students will: • Convert measurements in larger units to smaller units •Make tables of equivalent measurements. •Complete SAB p. 6 and 52A

Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	4 of 6	7

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
4. MD.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),…	Know relative size of measurement units within the same system of measurement. •Express measurement of a larger unit in terms of a smaller unit within the same system and state as a multiplicative comparison. •Record measurement conversions in a two-column table.	**SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	•How can you use models to compare metric units of length? •How can you use models to compare metric units of mass and liquid volume?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
•Measure length using a metric ruler and meterstick. •Write tenths an hundredths as fractions and decimals. •Measure and compare mass using a balance scale. •Measure and compare liquid volume using various containers. •User comparison notation >, <, and =.	Millimeter Centimeter Decimeter Meter Gram Kilogram Liter Milliliter	Students may think that the larger unit of measure has more units of them because it is larger instead of knowing that because it is larger there will be fewer of them and the smaller the unit the more of them.	**OnCore** Lessons 80-81 Student pp. 159-162 Metric ruler Meter stick

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to use models to compare metric units of length, mass and liquid volume following the lesson guidelines in OnCore lessons 80-81 (TM pp. 84-85), teachers will: • Ask students to name metric units of length they have used to estimate and measure. Hold up a metric ruler and meter stick and tell students they can use these tools to learn new metric units decimeter, and millimeter, and how they are related to the metric units they already know, meter and centimeter. Be sure students can distinguish the lines that show centimeter and those that show millimeters. Have them count to discover that 10 millimeters = 1 cm and similarly that 10 decimeters = 1 meter using a meter stick. • Ask students to name metric units of mass and of liquid volume. Show pictures that provide benchmarks for the metric measures and have students recall other benchmarks for metric mass or capacity they have used. Have students identify the larger unit, gram or kilogram. Point out that the activity begins with kilograms, the larger unit, and that you multiply to get the number of grams, the smaller unit. Have a stem tell if a milliliter or liter is larger and have them explain how they conclude that 1 liter = 1,000 milliliters. Discuss how they might use multiplication to find the number of milliliters in 2 or more liters.	In Lessons 80-81 students will: •Compare other units of length to meters using fraction or decimal tenths or hundredths. •Compare amount written in different units by multiplying to change the larger unit to smaller units. •Complete student pp.159-162.

Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	5 of 6	8

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
4. MD.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),…	Know relative size of measurement units within the same system of measurement. •Express measurement of a larger unit in terms of a smaller unit within the same system and state as a multiplicative comparison. •Record measurement conversions in a two-column table.	**SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	•How can you use models to compare units of time? •How can you use patterns to write number pairs for measurement units?
5. Prerequisite Knowledge	**6. Essential Vocabulary**	**7. Possible Misconceptions**	**8. Necessary Materials**
•Know time units: seconds, minutes, hours, days, weeks, months, and years. •Use comparison notation >, <, and =. •Multiply by 1-digit numbers. Interpret two-column tables. Find multiplication patterns.	Hour hand Second Minute hand Second hand		**OnCore** Lessons 82-83 Student pp. 163-166 Clocks (optional)

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to use models to compare units of time and to use patterns to write number pairs for measurement units following the lesson guidelines in OnCore lessons 82-83 (TM pp. 86-87), teachers will: • Have students identify the hour and minute hands. Explain that they can think of a clock as a number line to figure out relationships. Help them make this connection by counting by ones to show the movement of the hour hand, and by 5's to show the movement of the minute hand. Have students use the table on p.163 to complete time equivalents. Review how to compare measurements given two different units. Advise students to identify the larger unit, multiply to find its equivalent in the smaller units, then compare. •Create a table of the multiples of 3. On the left side will be the counting numbers 1, 2, 3,.. and on the left side will be the multiples 3, 6, 9,…Point out that they can also make a table of the number of feet in 1 yd, 2 yds, 3 yds, etc. Have students explain how they found the relationship between the number pairs in the table. Call attention to the table of equivalent units and asks which measurement relationship the 2-column table shows. Have them label the columns of the table. Extend the activity by reviewing some metric equivalents of length. These relationships can also create patterns in a two-column table. Remind them to think about which measurement relationship is named by the first pair of numbers in each table.	In Lessons 82-83 students will: •Use a number line to model time relationships. •Change between units of time measurements. •Label the columns of tables by looking at the patterns for the two customary units. •Complete student pp.163-166.

Grade 4

Unit	Unit Title	Lesson	Day
2.3	Area, Perimeter, and Measurement	6 of 6	9-10

Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
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.	•Use addition, subtraction, and multiplication to solve word problems involving distances, time, liquid volume, and mass that may require conversion of a larger unit into a smaller unit of measure. •Represent measurement quantities when solving problems using diagrams such as a scaled number line.	**SMP5** Use appropriate tools strategically. **SMP6** Attend to precision.	• How can you use the strategy *draw a diagram* to solve elapsed time problems? • How can you solve problems involving mixed measures?

5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
•Use a number line. •Count by 5s. •Tell time to the minute. •Know customary unit equivalents. •Know time equivalents.	Elasped time		**OnCore** Lessons 85-86 Student pp. 169-172 Clocks (optional) Number lines (optional) **Investigations** Unit 7 Snap-In Session 3.5B SAB pp C52-56

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide children to use the strategy *draw a diagram* to solve elapsed time problems and solve problems involving mixed measures following the lesson guidelines in OnCore lessons 85-86 (TM pp. 89-90), teachers will: • Ask students to suppose they play a soccer game from 3:00 P.M. until 4:30 P.M. Discuss the length of time between the beginning and the end of the game as elapsed time. Read the top problem on p. 169 with students and have them note that the problem provides the end time and the elapsed time. Have them use the clock diagram to count back to find the start time. Before having students complete the problems have them decide whether they need to find the elapsed time, the start time, or the end time in each problem. Remind student they can think of a clock as a number line so they can draw a number line to solve elapsed time problems. • Illustrate mixed measures by reminding students of how heights are often stated as 5 feet 3 inches. Tell them that to solve a problem with mixed measures they need to use more than one step. Ask students why in the second problem on p. 171 they need to rename 1 hour to 60 minutes to subtract. Extend the activity by giving students a problem in which they add like units and need to simplify the sum by renaming a number of smaller units as a larger unit. Teachers will be following lesson activities from Investigations Unit 7 session 3.5B Snap-In materials. (TM CC90-94) In the activities teachers will: Have students use the 4 operations to solve problems involving measurement.	In Lessons 85-86 students will: •Use a diagram to determine elapsed time. •Sketch a clock or a number line to solve problems of elapsed time. •Solve elapsed time problems. •Convert mixed measures. •Solve problems with mixed measures. Add like units and simplify the sum by renaming a number of smaller units as a larger unit. •Complete student pp.169-172. In Investigations Unit 7 Snap-In session 3.5B students will: • Solve problems involving measurements using the 4 operations. •Complete SAB pp. C 52-56