5th Grade Math

Unit 11: Geometry and measurement
5.5A, 5.7A

Unit conversion is essential for cooking, travel, and space exploration, while understanding shapes helps us interpret our surroundings, from buildings to road signs. When we dig into the world of unit conversion and polygons, we start seeing their relevance everywhere!

- Convert between metric units for distance, mass, and volume
- Convert between US customary units for distance, mass, and volume
- Classify polygons with an emphasis on triangles and quadrilaterals

<table>
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<tr>
<th>TEKS standards</th>
<th>Common misconceptions</th>
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<td><strong>5.5A:</strong> Classify two-dimensional figures in a hierarchy of sets and subsets using graphic organizers based on their attributes and properties.</td>
<td>&quot;Metric unit prefixes are so confusing!&quot; Students often mix up the metric prefixes like kilo-, centi-, and milli-.</td>
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<td>How to help: Consistently review the prefixes with students: kilo-means 1,000, centi-means 1/100, and milli-means 1/1000. Make a poster to display and give students lots of practice.</td>
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<td>&quot;I always confuse units of length, volume, and mass!&quot; These types of measurements may not be familiar to students and they may struggle with identifying which units measure what.</td>
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<td>How to help: As much as possible, have examples of both metric and US customary units available so students can see concrete examples. Have students identify the type of measure (length, volume, mass) in each problem before solving it. Make connections to real-life examples as much as possible.</td>
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<td><strong>5.7A:</strong> Solve problems by calculating conversions within a measurement system, customary or metric.</td>
<td>&quot;US customary units are so confusing!&quot; Students often get confused between the different units of measurement and may mix them up.</td>
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| | How to help: US customary units are challenging because the unit conversions are not consistent as they are with metric units. Students will likely have had experience with some units (gallon of milk, measuring cups in baking, etc.) but others may be new. Provide clear
definitions and physical examples, where possible. Creating a poster for reference can help.

**Misapplication of conversion skills** | Students might understand the concept of conversion but struggle to apply it in different contexts. For example, they might be able to convert meters to centimeters, but get confused when asked to convert kilometers to millimeters (larger “jump” between units).

**How to help:** Encourage students to work slowly and carefully when doing unit conversion, especially if the units vary greatly in size. It is common for students to be able to convert to a unit that is only one size larger or smaller, but have difficulty with conversions that are more complicated, especially with US customary units. Model solving these problems and showing each step and make sure students have plenty of practice.

**Confusion with classifying triangles** | Students often confuse the classification of triangles by sides (scalene, isosceles, equilateral) with the classification by angles (acute, right, obtuse). It may be challenging for students to differentiate between sides and angles at first and also to remember all of the new vocabulary.

**How to help:** Provide clear examples and visual representations of the types of triangles. Students will need to remember that every triangle can be classified by both sides and angles, so they will need to do both, too. Especially for isosceles and equilateral triangles, be sure students are familiar with and use congruence notation (tick marks) and right angle labels in their diagrams.

**Confusion with classifying quadrilaterals** | Similar to triangles, students might struggle to differentiate between the properties of different quadrilaterals, leading to confusion when classifying them.

**How to help:** As with triangles, provide clear examples and visual representations of types of quadrilaterals. Offer students practice exercises to reinforce distinctions between the types. Some quadrilaterals, like rectangles and squares, will be more familiar to students than others, like rhombi and parallelograms. Be sure students continue to use congruence notation in their diagrams to mark congruent sides and angles, right angles, and parallel sides.
Unit resources

- For added practice with shapes in Lessons 3-5, use these graphic organizer templates.
- For the videos in this unit, use the Learning summary video notetaking guide.
- For the articles in this unit, use the Article notetaking guide.
- For the exercises in this unit, use the Blank workspace template.
- To record key terms and information, use the Vocabulary and notation notetaker.

Lesson overview

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| Lesson 1: Converting metric units | Students will be able to convert between metric units for distance, mass, and volume. | - **Warm up activity:** Provide students with a review of metric measures. Give them a list of everyday items (paperclip, baseball bat, etc.) and have them determine whether their lengths are closest to a millimeter, centimeter, meter, or kilometer (or something similar with mass or volume). The idea here is to get their minds thinking about metric measures, which they have seen in previous years.
  - Model conversion problems together, showing your work for each step and explaining as you go. Always go back to make sure your answer makes sense so students get in the habit of this, too.
  - Talk with students about the different measures for length, mass, and volume. Give as many examples as you can to help students remember the type of measure that each unit represents (length, mass, volume), and the size of each. For example, having a meter stick, a paperclip (weighs about 1 gram), and a 1 liter soda bottle will be helpful for students to visualize the measures. |

| Lesson 2: Converting US customary units | Students will be able to convert between US customary units for distance, mass, and volume. | - Students will continue to convert between units, this time with US customary units. They will see that this is no longer a simple multiplication or division by a power of 10, but will require that they remember more conversions and perform more complicated calculations.
  - As in the previous lesson, have examples on hand for students to see for as many measures as you can. For example, in addition to the metric items,
Lesson 3: Triangles  
**TEKS standard: 5.5A, 5.7A**  
Students will be able to classify triangles based on their sides and angles.  
- There is a lot of triangle vocabulary and notation in this unit so discuss these with students and use the [Vocabulary and notation notetaker](#): Scalene, isosceles, equilateral, acute, right, obtuse, and notation for right angles and congruent sides/angles (use tick marks).  
- Students should be able to determine whether an angle is acute, right, or obtuse from looking at a diagram without angle measures labeled. They can use a corner of their paper (right angle) to see if an angle is acute (smaller than the corner), right (equal to the corner), or obtuse (larger than the corner).

Lesson 4: Quadrilaterals  
**TEKS standard: 5.5A**  
Students will be able to classify quadrilaterals as parallelograms, rectangles, squares, rhombuses, trapezoids, and kites.  
- **Warm up activity:** Put a variety of quadrilaterals (parallelograms, rectangles, rhombuses, squares, trapezoids, and kites) on the board and have students name them as best as they can. Ask students to write a definition for each of them.  
- Continue with the [Vocabulary and notation notetaker](#) for the new quadrilateral vocabulary: quadrilateral, parallelogram, rectangle, rhombus, square, kite, trapezoid. The article will be a valuable resource.  
- The videos go much more into detail than the students need for the exercises, so if students feel overwhelmed by the videos, have them move onto the exercises and use hints when they are stuck.

Lesson 5: Properties of shapes  
**TEKS standard: 5.5A**  
Students will be able to classify select polygons based on their properties.  
- Students will have an opportunity to explore more shapes here! Have students add new shapes and vocabulary to their [Vocabulary and notation notetaker](#).  
- Use these [graphic organizer templates](#) to give students additional practice with shapes!
Best practices

Showing work for metric unit conversion
As adults, we are generally able to do metric conversions simply by moving the decimal point one way or the other. We don’t want to teach students this right away, because they need to learn why it works first! They will need to know how to write out unit conversion problems when they get to US customary units, so this is a good place to start that habit.

Let’s convert 1,900 centimeters to meters.

I know that 1 meter = 100 centimeters, so

\[
1 \text{ centimeter} = \frac{1}{100} \text{ meter}.
\]

We will multiply the number of centimeters we have by the number of meters in one centimeter. Then, we multiply and cancel the units.

Any units that appear both in the numerator and denominator can be canceled out because we can treat units as though they are numbers, and if we have the same unit in the numerator denominator, they equal 1. \( \frac{\text{cm}}{\text{cm}} = 1 \)

\[
1,900 \text{ cm} = 1,900 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}}
= \frac{1,900 \text{ cm}}{1} \times \frac{1 \text{ m}}{100 \text{ cm}}
= \frac{1,900 \text{ m}}{100}
= 1,900 \text{ m} \div 100
= 19 \text{ m}
\]

1,900 centimeters converts to 19 meters. This answer is reasonable because meters are much larger than centimeters, so you will need fewer of them to fill the same length as 1,900 centimeters.

US customary unit conversion
It is more complicated to convert with US customary units because they don’t have a consistent exchange like the metric system. For example, 1 gallon = 4 quarts = 8 pints. It can be challenging to remember all of the conversion rates and then convert correctly.

Bigger units to smaller units

How many pints are in 8 quarts?

1 quart = 2 pints

\[
8 \text{ quarts} = 8 \text{ quarts} \times 2 \text{ pints} = 16 \text{ pints}
\]

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Smaller units to bigger units

How many gallons are 24 pints?

8 pints = 1 gallon

1 pint = \( \frac{1}{8} \) gallon

\[
\begin{align*}
8 \text{ pints} &= 1 \text{ gallon} \\
1 \text{ pint} &= \frac{1}{8} \text{ gallon}
\end{align*}
\]

\[
\begin{align*}
24 \text{ pints} &= 24 \text{ pints} \times \frac{1 \text{ gallon}}{8 \text{ pints}} = 3 \text{ gallons}
\end{align*}
\]

CLASSROOM ACTIVITIES

Student-created problems
Have students write their own unit conversion problems. Encourage students to write problems about things they are interested in and have them illustrate their situation. For example, How many inches long is a football field? How many cups of water are in a swimming pool (or fish tank) of a given size? How many ounces does a car weigh?

Identifying shapes outside of class
Challenge students to find examples of different types of triangles and quadrilaterals outside of math classrooms. They can take pictures or sketch what they see, describe its location, and explain why they think that particular shape was used. Give students a certain number of shapes to find or challenge them to identify all of them! For example: 9 triangles (right scalene, equilateral scalene, isosceles scalene, etc.) and 6 quadrilaterals (parallelogram, rectangle, rhombus, square, kite, trapezoid). Can anyone find a quadrilateral that is not one of these?

GENERAL CLASSROOM IMPLEMENTATION RESOURCES:

- **Weekly Khan Academy quick planning guide**: Use this template to plan your week using Khan Academy.
- **Using Khan Academy in the classroom**: Learn teaching techniques and strategies to support your students and save time with Khan Academy.
- **Differentiation strategies for the classroom**: Discover strategies to support the learning of all students.