

# Module 2: Perimeter and Area of Polygons

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## What Students Should Gain from this Module

At the end of this module, student should be able to:

- Identify polygons that are common in construction
- Calculate the perimeter of polygons that are common in construction
- Calculate the area of polygons that are common in construction

**Recommended Timing for this Module**    1hour and 45 minutes




## Required Equipment and Materials



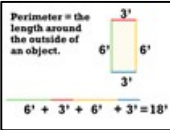
- An LCD projector and a Windows computer or laptop. The computer should have high speed internet access, a recent version of PowerPoint, an updated Internet browser, and speakers
- Cords for connecting the LCD projector to the computer
- A screen visible to all in the room
- *Perimeter and Area of Polygons* PowerPoint file
- A copy of the *Perimeter and Area of Polygons Slides* handout for each student and instructor
- A copy of the *Perimeter and Area Practice* handout for each student and instructor










## Optional Materials

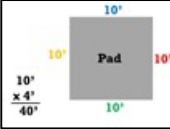




At Math-Aids.com <http://www.math-aids.com> you can create and print a wide variety of practice problem sets (and answer keys) for students who want or need additional practice. You can also create problem sets that offer a higher degree of challenge for students who want an additional challenge. Be sure to confirm that your use of the Math-Aids resources complies with its usage guidelines.



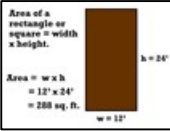
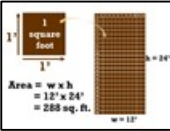

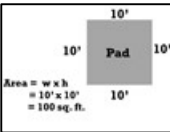
Time	Activity	Materials	What to Do
3	<b>Introduction</b>  <b>Handout:</b> <i>Perimeter and Area Slides</i>	  	<p><b>Pass out</b> the slide handouts.</p> <p><b>Ask</b> what all of these shapes have in common.</p> <p><b>Say</b> that enclosed, two-dimensional shapes that only have straight lines are called polygons.</p>

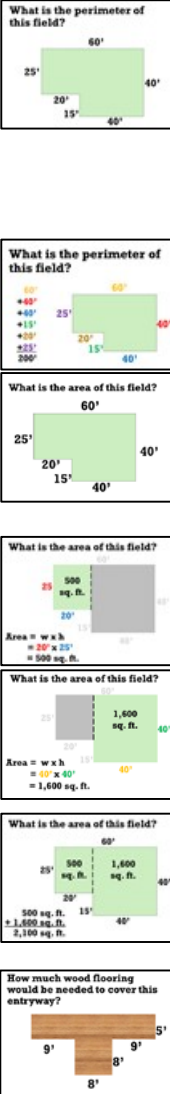
Time	Activity	Materials	What to Do
			<p><b>Say</b> that, polygons like triangles, squares, and rectangles, are often used in construction.</p> <p><b>Ask</b> what the black shape is.</p> <p><b>Say</b> that, on the job, they will need to be able to measure the perimeter and area of shapes like rectangles, triangles, squares and octagons.</p>
1	Review Module Objectives		<p><b>Review</b> the objective.</p> <p><b>Ask</b> what perimeter means.</p>
1	Defining Perimeter		<p><b>Say</b> that perimeter is the length around the outside of an object, i.e. adding up the length of all of the sides, and is measured in inches, feet, yards, etc.</p> <p><b>Say</b> that the apostrophe means “feet.”</p> <p><b>Point out</b> how all sides, added together, equals 18 feet.</p>
5	Identifying Polygons and How They are Used in Construction		<p><b>Ask</b> students to identify polygons in the classroom.</p> <p><b>Say</b> they might need to measure perimeter to determine how much wood they would need to frame the doors and windows for a building.</p>

Time	Activity	Materials	What to Do
		     	<p><b>Say</b> they might need to measure the perimeter of a sheet metal box</p> <p>Or the perimeter of a field or a yard to determine how much fencing they'll need.</p> <p>Or the perimeter of a pool to determine how much decorative tile they'll need for the edge of the pool.</p> <p>Or they might need to measure the perimeter of a ceiling to determine how much crown moulding they'll need. (Point out the crown moulding.)</p> <p><b>Say</b> that octagons are used to build bay windows so they might need to determine the perimeter of the octagon when building the window.</p> <p>Or they might need to measure the perimeter of an octagon to purchase materials for a gazebo, which are often octagons.</p> <p><b>Ask</b> where they might have had to measure the perimeter for something at home.</p>

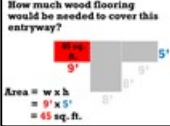
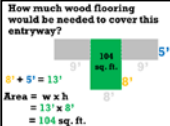
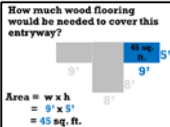
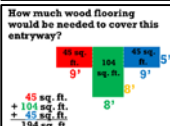
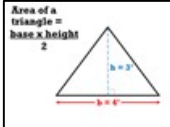
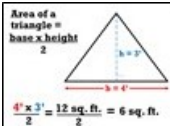
Time	Activity	Materials	What to Do
10	Calculating Perimeter		<p>Ask how they would determine the perimeter of the ceiling in this slide.</p> <p>Show how the answer was determined.</p> <p>Have students correct their answers (if necessary) on their handouts.</p> <p>Have students write their answer on their handout.</p> <p>Show how the answer was determined.</p> <p>Have students correct their answers (if necessary) on their handouts.</p> <p>Have students write their answer on their handout.</p> <p>Ask how they got their answer.</p> <p>Have students correct their answers (if necessary) on their handouts.</p> <p>Ask how they could have gotten the answer without addition.</p>

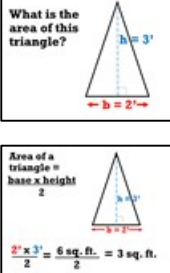
Time	Activity	Materials	What to Do
			<p><b>Say</b> that, for squares only, they can determine the perimeter by just multiplying the length of one side by 4.</p> <p><b>Ask</b> students what questions they have about finding the perimeter of rectangles, squares, or triangles.</p> <p><b>Before moving on to Area you might choose to have students practice calculating perimeter using the <i>Finding Perimeter and Area Practice</i> problems.</b></p>
10	<b>Defining and Calculating Area of Regular Rectangles and Squares</b>	   	<p><b>Say</b> that earlier they calculated the perimeter of a ceiling to determine how much crown moulding they would need.</p> <p>Now the building owner wants to install a decorative covering for the ceiling and they need to determine how much of the covering they need for the ceiling.</p> <p>The amount of space on the surface of something like a ceiling is called area and, on the job, they will often need to measure the area of something.</p> <p><b>Say</b> for example you might have to measure the area of wood panels</p> <p>Or roofing materials</p> <p>Or drywall</p>

Time	Activity	Materials	What to Do
		     	<p>Or wallpaper or paint</p> <p><b>Ask</b> how they would determine how much decorative covering they would need to cover the entire ceiling.</p> <p><b>Say</b> that to find the area of a square or rectangle, you multiple the length x width.</p> <p>Area is measured in square feet, square inches, square yards, etc.</p> <p><b>Say</b> that if they divided the ceiling into squares that were each 1 foot wide and 1 foot tall there would be 288 of those “square feet” in the ceiling.</p> <p><b>Have students write</b> their answer on their handout.</p> <p><b>Ask</b> how they got their answer.</p> <p><b>Have students correct their answer</b> on their handout if necessary</p> <p><b>Point out</b> that all sides of a square are equal.</p> <p><b>Ask</b> students what questions they have about finding the area of rectangles or squares.</p>

Time	Activity	Materials	What to Do
20	Calculating Area of Irregular Rectangles and Squares		<p><b>Say</b> that many polygons are not perfect rectangles or squares but it is still possible to calculate the perimeter and area.</p> <p><b>Have students calculate</b> the perimeter and write their answer on their handout.</p> <p><b>Have students correct their answer</b> if necessary.</p> <p><b>Ask</b> how they could determine the area.</p> <p><b>Show and have students write</b> the process on their handout.</p> <p><b>Show and have students write</b> the process on their handout.</p> <p><b>Show and have students write</b> the process on their handout.</p> <p><b>Have students correct their answer</b> if necessary.</p> <p><b>Have students write</b> their answer on their handout.</p>



Time	Activity	Materials	What to Do
		<p>How much wood flooring would be needed to cover this entryway?</p>  <p>Area = <math>w \times h</math>  <math>= 9' \times 5'</math>  <math>= 45 \text{ sq. ft.}</math></p> <p>How much wood flooring would be needed to cover this entryway?</p>  <p><math>9' + 5' = 13'</math>  Area = <math>w \times h</math>  <math>= 13' \times 8'</math>  <math>= 104 \text{ sq. ft.}</math></p> <p>How much wood flooring would be needed to cover this entryway?</p>  <p>Area = <math>w \times h</math>  <math>= 9' \times 5'</math>  <math>= 45 \text{ sq. ft.}</math></p> <p>How much wood flooring would be needed to cover this entryway?</p>  <p><math>45 \text{ sq. ft.}</math>  <math>+ 104 \text{ sq. ft.}</math>  <math>+ 45 \text{ sq. ft.}</math>  <math>= 194 \text{ sq. ft.}</math></p>	<p><b>Show and have students write</b> the process on their handout</p> <p><b>Show and have students write</b> the process on their handout</p> <p><b>Show and have students write</b> the process on their handout</p> <p><b>Show and have students write</b> the process on their handout</p> <p><b>Have students correct their answer</b> if necessary.</p> <p><b>Ask</b> students what questions they have about finding the area of rectangles and squares with irregular shapes.</p>
20	Calculating Area of Irregular Rectangles and Squares	<p>Area of a triangle = <math>\frac{\text{base} \times \text{height}}{2}</math></p>  <p>Area of a triangle = <math>\frac{\text{base} \times \text{height}}{2}</math></p>  <p><math>\frac{6' \times 2'}{2} = \frac{12 \text{ sq. ft.}}{2} = 6 \text{ sq. ft.}</math></p>	<p><b>Say</b> that, to find the area of a triangle, you multiple the base of the triangle x its height, then divide that amount by 2.</p> <p>The base could be any side of the triangle but the height must always be measured from the base.</p> <p><b>Show</b> how to find the height.</p> <p><b>Say</b> that, just like for a rectangle or square, the area of a triangle is measured in square feet, square inches, square yards, etc.</p>

Time	Activity	Materials	What to Do
			<p><b>Have students write</b> their answer on their handout.</p> <p><b>Show and have students write</b> the process on their handout</p> <p><b>Have students correct their answer</b> if necessary.</p> <p><b>Ask</b> students what questions they have about finding the area of a triangle.</p>
30	<b>Calculating Perimeter and Area Practice</b>	<b>Handout:</b> <i>Perimeter and Area Practice</i>	<p><b>Have students form groups</b> of 3 or 4.</p> <p><b>Say</b> that, in class or on the job, they will need to work as a team, which means supporting and encouraging one another. It is not enough for the group to get the right answers. Instead, they should take responsibility for helping one another until each member of the group has mastered the process and feels confident in her ability to solve the problems on her own.</p> <p><b>Say</b> that they should remember the goal(s) they set for themselves, what they pledged to do to “Commit to Grit” in the <i>Being Gritty</i> handout at the beginning of the course, and the importance of maintaining a growth mindset if they have difficulty or get frustrated.</p> <p><b>Say</b> that you can provide additional problem sets for students who want additional practice or additional challenge. See the information about Math-Aids under Optional Materials above.</p> <p><b>Pass out</b> the <i>Perimeter and Area Practice</i> handout.</p>

Time	Activity	Materials	What to Do
			<p><b>Say</b> what “not to scale” means.</p> <p><i>Before having groups work on their own, consider inviting a student to demonstrate, for the rest of the class, how to do one of the problems from each section of the handout.</i></p> <p><b>Have groups work through the problems.</b> As they do, check in with groups to answer questions and ensure that no individual(s) in the group is being left behind.</p>
5	<b>Planning to Apply their Learning</b>		<p><b>Have students reflect</b> on the learning from this module and note in their journal what they have learned that will be useful to them on the job, what they want to remember, tips, etc., and when they have demonstrated grit or a growth mindset.</p>