Student Weekly Learning Targets

Students will be able to prior knowledge from grade 6 to calculate the area of composite figures (MATH.7.9.C, MATH.7.9.D). The student should be able to demonstrate and verify the following:

- I can determine the area of composite figures using combinations of rectangles, squares, parallelograms, trapezoids, triangles, semicircles and quarter circles.
- I can solve problems involving the lateral and total surface area of a three-dimensional figure by determining the area of the shape’s net.

Tuesday – Composite Figures using Addition

In previous grade 6 units, you learned how to calculate the areas of rectangles, parallelograms, triangles, and trapezoids using rational numbers. This lesson builds on that prior knowledge by asking you to use the figures together in composite figures. The composite figures can also include circles, semi-circles, and quarter circles.

Let’s review!
What figures do you see represented in the letter below?

![Image of a letter A](image)

Here is one possible solution – but it is not the only one! You may have seen different figures in the letter.

Did you see two equal rectangles (blue and green)? Did you see the square (pink)? Did you see the trapezoid (purple)?

Remember that the area of the composite figure (the area of the A) is the sum of the area of each of those pieces.

\[
2 \text{ Rectangles} + \text{ Square} + \text{ Trapezoid} = \text{ Total Area} \\
2 \, (2 \text{ units by 7 units}) + (2 \text{ units by 2 units}) + \left( \text{ base of 6 units and base of 2 units}(2 \text{ units height}) \right) = \\
2(bh) + (bh) + \frac{1}{2} (b_1 + b_2)h = 2(14) + 4 + \frac{1}{2} \cdot 8(2) = 28 + 4 + 8 = 40 \text{ square units}
\]

Image created by HISD Secondary Curriculum using GeoGebra
Tuesday – Composite Figures using Addition

Name Banner –
1. Use the square centimeter graph paper provided at the end of this document to write out your name in block format. Use the letter A given above as a model for how to write the letters of your name. You may want to create several copies of the graph paper if you make your letters really big.
2. Next, identify the sections you would use to deconstruct the letters into geometric shapes.
3. Finally, calculate the area for each letter using the composite shapes and add them together. Verify your answer by counting the units (using the graph paper) in each letter.

Wednesday – Introduction to Circles

One figure you have never worked with before is a circle.

Examine the circle in comparison to the other figures for which you know how to calculate area:

![Composite Figures Diagram]

What is different about the circle?

RIGHT! The circle doesn’t have sides that are segments – it has a curved edge. The figures for which you already know how to calculate area – rectangles, squares, triangles, trapezoids, parallelograms – are called polygons. The circle is NOT a polygon.

To calculate the area of a circle, you will have to use your understanding of the Order of Operations. Let’s look at the formula now:

\[
\text{The Area of a Circle} = \pi r^2
\]

Do you know what the \( r \) stands for in the formula?

It stands for the distance from the center of the circle to the edge of the circle … it is the \textit{radius}. 
Wednesday – Introduction to Circles

Sometimes they will give you the measure for the distance from one edge of the circle to the other edge through the center … this is called the diameter. The diameter is double (or two times) the radius.

Do you notice anything else about the formula?? Yes – that weird letter is actually a number! \( \pi \) stands for pi. This is a special number in mathematics that you will learn more about in grade 7. It can be approximated by using the number 3.14 or 22/7 … sometimes it is easier to use the decimal while other times it is easier to use the fraction.

We'll try to find the area of a circle using the radius.

\[
\text{r} = 2.5 \text{ cm}
\]

To calculate the area of the circle, there are some questions we should consider:

- What is the area formula for a circle? \( \text{Area} = \pi r^2 \)
- What number do we use for \( \pi \)?
- What is the radius of the circle?
- What is more important in the Order of Operations … multiplication or applying exponents?

Did you get the following answers?

- What is the area formula for a circle? \( \text{Area} = \pi r^2 \)
- What number do we use for \( \pi \)? 3.14 (or you could use the fraction 22/7)
- What is the radius of the circle? \( r = 2.5 \)
- What is more important in the Order of Operations … multiplication or applying exponents? Do the exponents first

For this problem, here are the calculations:

\[
\text{Area} = \pi r^2 \\
A = (3.14) (2.5)^2 \\
A = (3.14) (6.25) \\
A = 19.625 \text{ sq cm}
\]

Try to find the area for the following circle:

\[
\text{r} = 5 \text{ cm}
\]
Wednesday – Introduction to Circles

What if I only want to find the area of half a circle – a semi-circle??

That’s right! I find the area and then multiply it by $\frac{1}{2}$ or divide it by 2!

Try this next example:

![diameter = 6 cm](image)

Now you will be able to use circles when creating or working with composite figures.

Thursday – Make your Own Composite Figure

Now, you will create your own composite image – and this time you need to include circles.

When you are creating your image, draw the figures lightly so that you can erase them when your figure is complete. Outline the perimeter of the figure in dark segments. Later, you will test a family member using this picture and see if they can figure out the figures you used.

Craft a rationale that explains the figures in your image and write a word equation that explains how to calculate its area.

Use the grip paper at the end of this document.

Here is a sample design:

![Full image = Rectangle + Trapezoid + Triangle + 2 (1/4) circles](image)

Don’t forget your tips:
- Draw the figures lightly so that you can erase them when your figure is complete.
- Outline the perimeter of the figure in dark segments.
- Later, you will test a family member to see if they can figure out the shapes you used.
Friday – Composite Figures using Subtraction

So far, we have been calculating composite figures where all the shapes are added together … but that doesn't always happen.

Examine the image of the house at left.

- What do you notice?
- What do you wonder?

What geometric figures do you notice in the picture?

1. What shapes do you see in the picture above?
2. How would you find the area of each shape?
3. If you wanted to paint the exterior of the house, how could you find the total area of that part of the house?

Did you see small rectangles for the two upstairs windows? A larger rectangle (maybe double in size) for the large downstairs window? A rectangle for the door? What about the triangle for the top of the house … maybe the attic area? And the circular window for the attic? Oh – what about the trapezoid-shaped chimney with a rectangle top?

In previous PBL lessons, you made a composite shape – by adding figures together. Now we will work on subtracting shapes. For instance, if I wanted to paint the front face of the house, I wouldn’t paint over the windows! So, to calculate the face of the house, I would find the area of the large rectangle … then I would subtract out the two small upstairs windows and the door and the larger downstairs window.
Don’t Paint the Window or the Door!

Your teacher wants to paint a wall in the living room. In order to buy paint, she must know the size of the wall (in feet) that she is going to be painting. Find the total number of feet she will have to paint and remember to NOT paint the window or the door.

Answer the following questions below.

1. What shapes make up the composite figure?

2. How can you find the area of a composite figure?
Monday – Using Composite Figures in 3D

What figures are represented in the figure?

List the figures below:

Image adapted from [HMH Go Math 6-8](https://www.hmhco.com/education/math/go-math/gomath68) with permission
Monday – Using Composite Figures in 3D

Now that you have listed the shapes in the previous figure, write the area formula needed for each figure. Complete the table below:

<table>
<thead>
<tr>
<th>Figure</th>
<th>Drawing of Figure</th>
<th>Area Formula</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

Use a ruler to measure each of the segments on the figure. Calculate the area of each.

1. If you sum the area of all of the figures, what is your final answer?

2. What if you sum the area of the triangles only? What is your answer?

Now, imagine that you cut out the figure (you may do so if you would like). Fold the figure so the rectangle is on the bottom and each of the triangles form sides that merge together into a point.

What is the name of the shape of this three-dimensional shape?
Monday – Using Composite Figures in 3D

When you calculated the answer to question 1, you determined the total surface area of this pyramid. When you calculated the answer to question 2, you determined the lateral surface area of the pyramid because you did not include the base area.

Student-Produced Weekly Product

Student successfully demonstrates conceptual understanding through the following products:

- Name Banner
- Composite figure using circles
- Surface Area calculations for the pyramid