• Students leave gaps between shapes when composing figures.

Students may leave gaps in the composite shape, especially when they use more than two individual shapes to build the composite shape. If they are using paper shapes or drawings (shapes without any thickness, unlike shape tiles), they may also allow shapes to overlap within the composite shape. Explain that when we compose shapes, we put them right next to each other with no gaps or overlaps. Using a simple example like two squares to make a rectangle, demonstrate the correct way to compose a shape, by putting the squares next to each other. Then, demonstrate the error that the student made and point out the gap or overlap, so that students understand what is meant by gap or overlap. Ask students to make the shape they were trying to make again, this time with no gaps or overlaps.

• Students struggle to form composite shapes when it requires turning or flipping the existing shapes.

Students may find it harder to figure out how to compose shapes when they need to change the orientation of the shapes before putting them together. For example, making a rectangle out of two triangles (where the triangles do not start out in the correct orientations) is more difficult than making a rectangle out of two squares. Give these students plenty of opportunities to use shape tiles or other physical shapes to compose shapes. If they don’t see how to compose a shape at first, encourage them to move, turn, and flip the shape tiles until they get an idea. With more practice, students should find it easier to form these composite shapes.

• Students think that any two triangles can make a rectangle.

One of the first examples students see is that two triangles make a rectangle, they may think this is a rule rather than a special case. This may frustrate them later if they are asked to form shapes using non-right triangles, and think that they should be able to form a rectangle. Make sure students understand that since triangles can have different shapes, not all triangles make the same shapes when they are combined. Show some examples of pairs of triangles that can make squares or rectangles, and some that cannot. Some students may notice a pattern: you can make a rectangle out of a pair of triangles when the triangles are the same size and each have a right angle (or “square corner”). Agree with students who point out this pattern, but note that it is not necessary for students to recognize this pattern. While students need to be able to make a rectangle if they are given two right triangles, they don’t need to be able to identify different types of triangles or explain which triangles can make a rectangle.

Students may also have similar misconceptions about other shapes. For example, sometimes you can combine two rectangles to make a square, but not always. Treat these misconceptions the same way.
Two- and Three-Dimensional Shapes

Students have already been introduced to two-dimensional (or “flat”) shapes and three-dimensional (or “solid”) shapes. They should be familiar with the names of many of these shapes and be able to identify them based on their properties. For example, they know that a flat shape with three sides is a triangle. Students use this existing knowledge in this lesson to identify the shapes they start with and the shapes they compose.

If any shapes in the lesson are unfamiliar to students, draw some versions of 2D shapes or present students with 3D shapes. It is important to give students multiple examples of the shapes and solids so that they can see what features the shape always has, and what features it only sometimes has. For example, if students do not know what a cylinder is, show them a tall thin cylinder like an unsharpened round pencil and a short wide cylinder like a can of food. Explain that a cylinder is a solid shape, and it has two faces that are circles. Point out these faces on your cylinder examples.

Composing Two-Dimensional Shapes

Students learn to compose new two-dimensional shapes from existing two-dimensional shapes. As you introduce this new concept, give students shape tiles, paper cut-outs, or other shapes that they can manipulate. These allow students to try out lots of ways of combining shapes and to see what works.

Understanding how to compose shapes prepares students to learn about decomposing shapes, which they will be introduced to later in this grade and in future grades. Students will decompose shapes as they learn about fractions and about area.

Composing Three-Dimensional Shapes

Students learn to compose new three-dimensional shapes from both two- and three-dimensional shapes. Again, real shapes that students can manipulate are very helpful for students. This is especially true for three-dimensional shapes, since they can be harder to visualize or draw.

To use two-dimensional shapes to compose a three-dimensional shape, students should think about the number and shapes of the faces of the three-dimensional shape. For example, you can make a cube out of six squares because a cube has six square faces. This understanding helps students in later grades when they use nets to calculate the surface area of three-dimensional shapes.

Composing three-dimensional shapes from three-dimensional shapes is similar to composing two-dimensional shapes from two-dimensional shapes. Students can put three-dimensional shapes together to see what new shapes they make. This understanding helps students in later grades when they decompose three-dimensional figures to find volume.

Teacher Tips

As students learn to compose shapes, it is very helpful for them to have shapes that they can move around to see how they go together. Provide students with plenty of opportunities to use physical shapes. This can include giving them shape tiles to compose two-dimensional shapes and nets or three-dimensional shapes to compose other three-dimensional shapes.