

# ROUTINE 7

## IT'S ABOUT

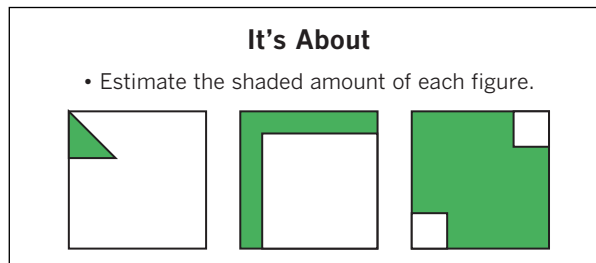
### About the Routine

Every day, we estimate quantities and relationships. We estimate how many potato chips remain in a bag or how much coffee is left in a pot. We estimate distance, length, weight, time, and all sorts of other quantities, but we don't always work in whole numbers. In many of these situations, we estimate the number of same-sized parts or pieces in the whole and compare our thinking with more accurate values when possible. Our precision improves as we continually estimate and compare estimates to exact amounts. In our real-world situations, the parts or partitions are not always clearly defined. Yet in mathematics classes, students often work with representations of fractions with clear partitions. *It's About* poses inexact partitions for students to reason about. This routine helps your students develop both estimation and fraction sense. It develops their ideas about benchmark

### Why It Matters

This routine helps students

- understand relationships between parts and the whole,
- consider how an irregular figure might be partitioned,
- reinforce notions about benchmark fractions,
- reason about partitioning and fractions as quantities (MP2),
- estimate values when exact amounts are unknown (MP2),
- determine reasonable estimates (MP2),
- develop comfort and confidence with ideas about fractions, and
- construct and critique arguments for strategies and solutions (MP3).



portions such as zero, quarters, halves, and wholes. It reinforces partitioning and reasoning by providing an opportunity for students to find the number of same-sized pieces in a whole. It also helps your students recognize that they can find fractional pieces even when clear partitions are not prevalent. You might extend the routine after ample practice to real-world examples or pictures so that students can apply their developing estimation skills.



All tasks can be downloaded for your use at [resources.corwin.com/jumpstartroutines/middleschool](https://resources.corwin.com/jumpstartroutines/middleschool)

## What They Should Understand First

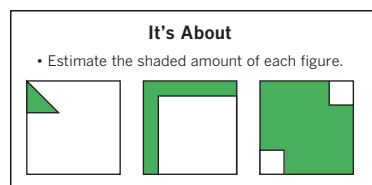
Clearly, your students should be able to recognize area or regional representations of fractions. They should also be able to partition shapes and figures to show specific fractions. They should show, to some extent, that they can find the number of parts when specific, clear partitions are not apparent. Students should be comfortable with various shapes and figures. Students should have strategies for comparing fractions to useful benchmarks such

as zero, halves, thirds, fourths, fifths, and wholes. They should be able to represent and justify why a fraction is close to or far away from a certain benchmark. Students should show that they can think of fractions as both a shaded part of a region and an unshaded part of a region. Students do not need to have complete, if any, procedural understanding of comparison or computation with fractions before engaging with the routine.

## What to Do

1. Determine how many shapes to discuss in the 5- to 7-minute routine.
2. Present these shapes or figures to students with some portion of the figure shaded. In some situations, it may make sense to prepare printed examples for students to work with directly at their desks.
3. Prompt students to estimate the amount of the shape that is shaded (or unshaded).
4. Gather and record student estimates.
5. Direct students to find a more precise or even exact value for the shaded portion.
6. As students share ideas about their estimates, you might ask:
  - » How did you find the number of equal-sized pieces or partitions?
7. Consider having students demonstrate their approaches to partitioning the figure.
  - » Why did you have to find the number of equal partitions?
  - » How might you have used the unshaded regions to find the shaded regions?
  - » Would you say that you found an “exact” or “about” answer?
  - » Did you think about halves, quarters, three-quarters, or other benchmarks to help you find your solution?
  - » How did your more precise answer compare to your estimate?

## Anticipated Strategies for This Example



In the highlighted example, students will likely create iterations of the shaded region or unshaded region.

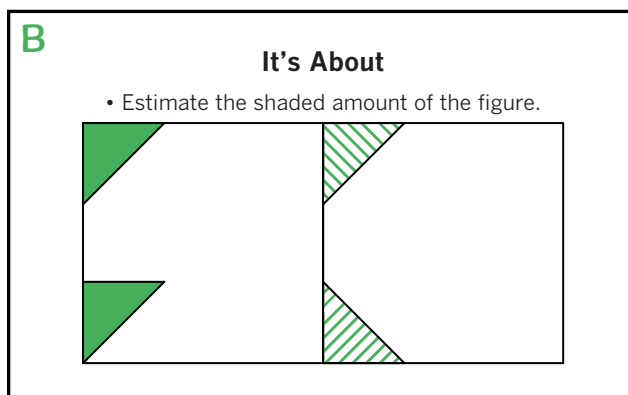
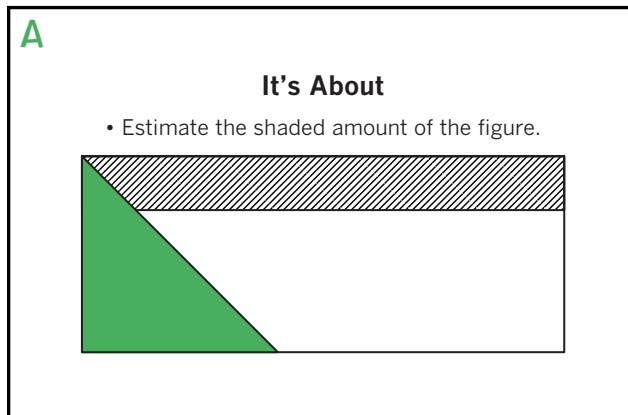
They will then count the shaded number and the total number. In the left example, students may reason that one triangle is half of a smaller square and that there are 9 smaller squares within the whole. So then  $\frac{1}{18}$  of the large square is shaded. In the middle example, students may find the number of rows to be about 6 or the number of columns to

be about 6. Within the square,  $\frac{1}{6}$  of the rows and  $\frac{1}{6}$  of the columns are shaded. They should note that the square has not quite  $\frac{2}{6}$  shaded because of the overlap. But an estimate of  $\frac{2}{6}$  is reasonable due to the strategy shared here. Some students may use the overlap of sixths to establish that there are 36 square units and so the shaded amount is about  $\frac{11}{36}$ . In the right example, they might find that there are 16 small white squares within the whole. Therefore,  $\frac{14}{16}$  of the square is shaded.

## IT'S ABOUT—ADDITIONAL EXAMPLES

**A.** You can adjust this routine to examine different partitions of just the same figure. You might deliberately ask an open question to promote discussion among students. In example A, ask them to estimate the shaded amount. They can then decide to describe the amount shaded fully, diagonally, or not at all. Each determination has a different strategy. This open-endedness helps students consider various possibilities. It can also turn one prompt into three. In this example, students may reason that there are a little more than four triangles in the figure so then one triangle is a little less than  $\frac{1}{4}$ . Their fractions may vary but each should be a little less than  $\frac{1}{4}$ . They may reason that there are four shaded rectangles but a little piece is missing so—again—a little less than  $\frac{1}{4}$  is shaded. They may be surprised that the rectangle and the triangle are both a little less than  $\frac{1}{4}$ . The amount of shading in all then must be a little less than  $\frac{1}{2}$  because  $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$ .

**B.** You can leverage common features and related partitions to develop student reasoning. In example B, students may find how much of one square is shaded and then double the amount for the entire figure. Or students may find how many triangles are in the figure. Other students may find it easier to consider the number of small squares in the figure. They will combine triangles to create smaller squares and then find the number of those small squares in a larger square or the entire figure as a whole. Example B has some of the openness referenced in example A, as students can again consider the type of shading for finding their solution.



**C.** There is obvious importance in adjusting the figures that students encounter during this routine. You can make use of regular and irregular polygons. You can offer non-polygons in time. In this example, students consider two different triangles. You can highlight that even though the shapes change, the strategies and reasoning still work. Students might think about rows of triangles in the first example, finding one triangle in the top row, three triangles in the middle row, and five triangles in the bottom row. In total, there are nine triangles, so  $\frac{3}{9}$  or  $\frac{1}{3}$  of the large triangle is shaded. Others might reason that there are six triangles in the middle hexagon to help them find the amount shaded. In the right triangle, students might see that the square is equivalent to two triangles, so  $\frac{1}{4}$  of the larger triangle is shaded.

**D.** You can modify the routine so that students work with regions that cannot be found cleanly. In these cases, they will find “about” answers as there may not be a way to easily find equal partitions. Example D shows what this might look like. The hexagon on the left presents a challenge in that there are no clear ways to find an exact relationship between the rectangle, the triangles, and the hexagon. Because of this, you should encourage students to rely on “about” or estimated values grounded in reasoning. They might conclude that it is about  $\frac{1}{3}$  or  $\frac{1}{4}$  shaded. You may also provide examples (such as the right square) that offer unique approaches to finding shaded values. These figures can help students see how one can reason about a figure. In the square, students might notice that both the larger and smaller squares have been quartered. They can see that each quarter of the smaller square is a quarter of its related larger square, so the four shaded squares combine to create one-fourth of the larger square.

**C**

**It's About**

- Estimate the shaded amount of each figure.

**D**

**It's About**

- Estimate the shaded amount of each figure.