Student Guide

Skeletons of 3-D Shapes (SG pp. 316–318)
Questions 1–7

1. **A.*** I kept the front and back faces square-shape and changed four straws to half straws, two on the top and two on the bottom. See Figure 3.

   B.* They did not change; there are still 8 vertices.

   C.* Four faces changed from squares to rectangles and two are still squares.

   D.* The number of edges stayed the same, four just got shorter.

   E. See completed table in Figure 6.

2. **A.*** It is still a square pyramid because the base is still a square, just smaller. See Figure 4.

   B.* The base is a smaller square and the triangle faces look skinnier, but the side edges are still the same length because I didn't change those straws.

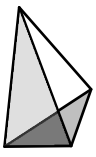
3. **A.*** I took out one full-length straw from a triangle face and one half-length straw from the base. See Figure 5.

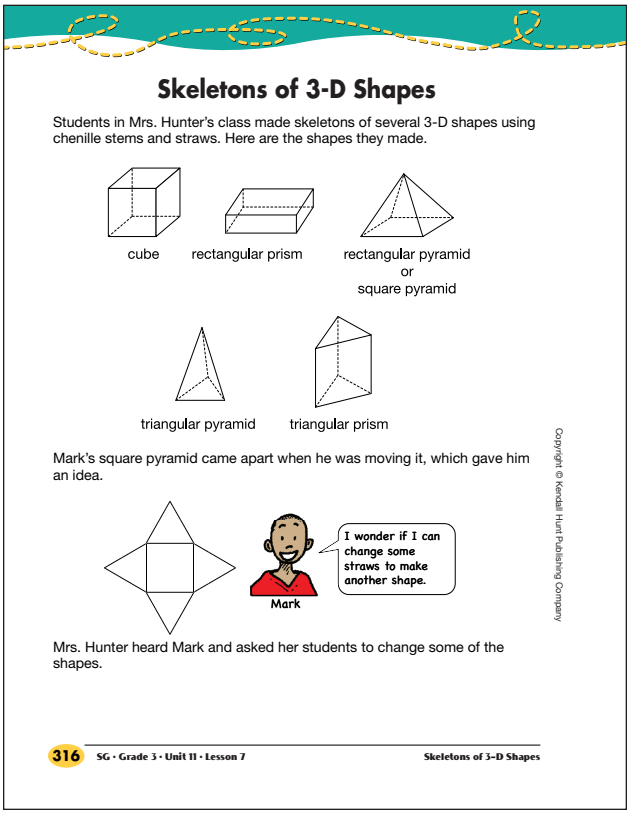
   B.* There is one less vertex, four instead of five.

   C.* The base changed from square to triangle. The other faces are still triangles.

   D.* There are six edges instead of eight because I took two away.

4. Changing any one straw will still result in a triangular pyramid. Possible drawing:





Skeletons of 3-D Shapes

Students in Mrs. Hunter's class made skeletons of several 3-D shapes using chenille stems and straws. Here are the shapes they made.

cube | rectangular prism | rectangular pyramid or square pyramid

triangular pyramid | triangular prism

Mark's square pyramid came apart when he was moving it, which gave him an idea.

Mark: "I wonder if I can change some straws to make another shape."

Mrs. Hunter heard Mark and asked her students to change some of the shapes.

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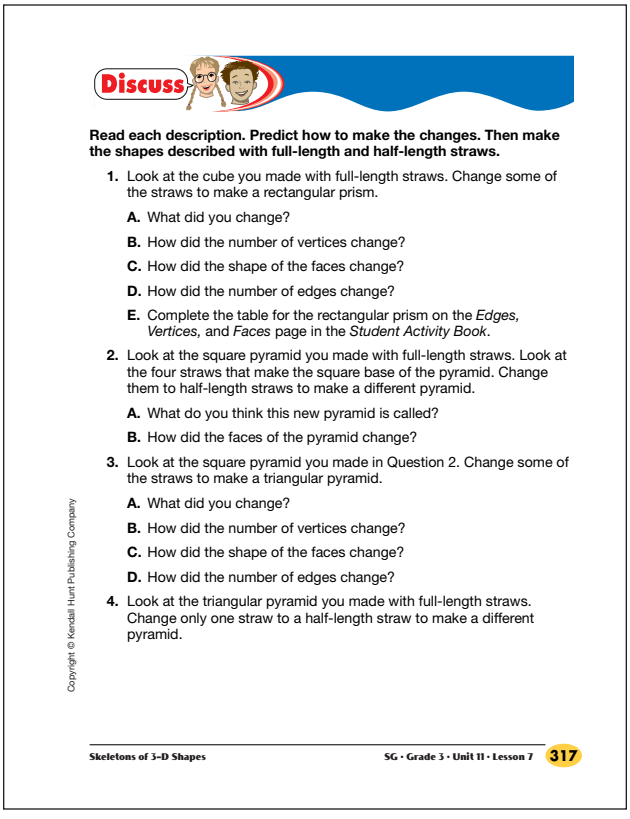

Discuss

Read each description. Predict how to make the changes. Then make the shapes described with full-length and half-length straws.

1. Look at the cube you made with full-length straws. Change some of the straws to make a rectangular prism.
   - **A.** What did you change?
   - **B.** How did the number of vertices change?
   - **C.** How did the shape of the faces change?
   - **D.** How did the number of edges change?
   - **E.** Complete the table for the rectangular prism on the *Edges, Vertices,* and *Faces* page in the *Student Activity Book*.
2. Look at the square pyramid you made with full-length straws. Look at the four straws that make the square base of the pyramid. Change them to half-length straws to make a different pyramid.
   - **A.** What do you think this new pyramid is called?
   - **B.** How did the faces of the pyramid change?
3. Look at the square pyramid you made in Question 2. Change some of the straws to make a triangular pyramid.
   - **A.** What did you change?
   - **B.** How did the number of vertices change?
   - **C.** How did the shape of the faces change?
   - **D.** How did the number of edges change?
4. Look at the triangular pyramid you made with full-length straws. Change only one straw to a half-length straw to make a different pyramid.

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***Answers and/or discussion are included in the lesson.**

5. Look at the triangular prism you made with full-length straws. Change the length of 3 straws to half-length straws to make a different prism.
   - **A.** Draw a picture to show which three straws you changed.
   - **B.** What did not change?
6. Nisha and Tara explained how they counted the edges on a cube.

Nisha: I started at the top, then the bottom, then all the sides and counted each edge: 1, 2, 3 . . . and ended with 12 edges in all.

Tara: I counted 4 edges at the top and knew there were 4 more for the bottom because they are congruent. There are 4 vertices on each so I added 4 more edges connecting the top and bottom. Three groups of 4 make 12 edges in all.

   - **A.** Whose method is more efficient?
   - **B.** How can Tara's method be used to count the vertices?
   - **C.** How do you think Tara would count the faces?
7. Talk with a partner to describe the cylinder, cone, hexagonal prism, and hexagonal pyramid. Complete the table for these shapes on the *Edges, Vertices, and Faces Table* page in the *Student Activity Book*.

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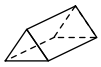
5. **A.** Picture should reflect that the straws on the parallel faces did not change.

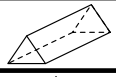


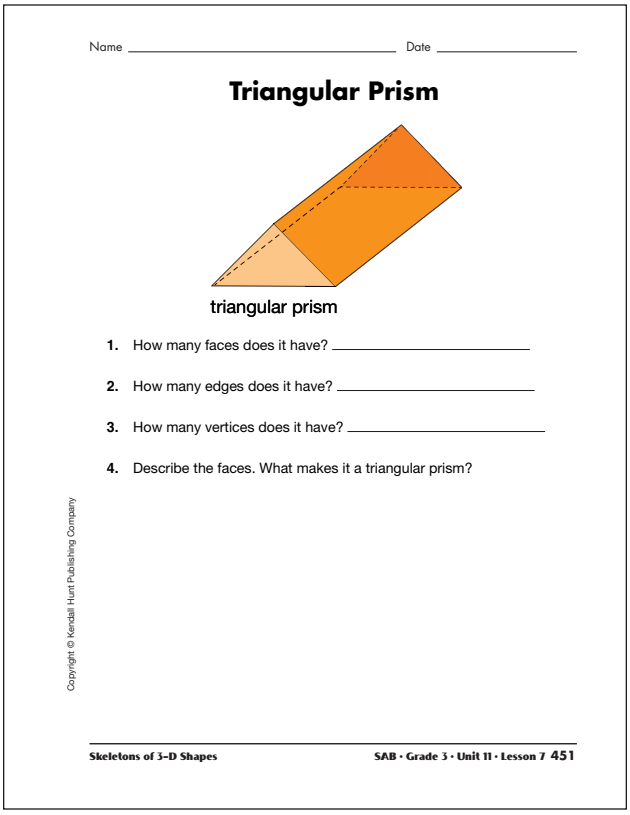
   B. The parallel faces remained the same.
6. **A.** Tara's method is more efficient.
   B. I could use Tara's strategy by counting the vertices at the top then just doubling that for the ones at the bottom; $4 + 4 = 8$ vertices.
   C. Tara would probably count the top and bottom faces making two so far and know that there are four edges on each so four faces would connect the top and bottom. Then she would add $2 + 4 = 6$ faces.
7.* See the completed table in Figure 6.

*Answers and/or discussion are included in the lesson.

Student Activity Book

Edges, Vertices, and Faces Table (SAB p. 449)

	Type of Shape	Number of Edges	Number of Vertices	Number of Right Angles (square corners)
1.		12	8	24
2.		9	6	12
3.		8	5	4
4.		6	4	0
5.		12	8	24
6.		18	12	24
7.		12	7	0
8.		0	0	0
9.		0	1 (apex)	0



Name _____ Date _____

Triangular Prism

triangular prism

1. How many faces does it have? _____
2. How many edges does it have? _____
3. How many vertices does it have? _____
4. Describe the faces. What makes it a triangular prism?

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Student Activity Book

Triangular Prism (SAB p. 451)
Questions 1–4

1. 5 faces
2. 9 edges
3. 6 vertices
4. Its base is a triangle and it doesn't meet at a vertex at the top. Its base and top are both congruent triangles. Its side faces are congruent rectangles.