

Slice or Spin

Sort geometric actions by what they create.

CCSS.Math.Content.HSG-GMD.B.4 "Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects."

NAME _____

DATE _____

PLANE SLICE

A flat plane cuts through a solid. The result is a two-dimensional shape.

A plane cuts an octagonal prism parallel to its base, producing an octagon.

ROTATING FIGURE

A flat figure turns around a line in its plane. The result is a three-dimensional solid.

A right trapezoid turns around its perpendicular side, producing a conical frustum.

1 SORT _____ 8 items

For Part 1, circle SLICE or ROTATION for each item; for Part 2, choose two items and explain how you knew each category.

- | | | | |
|----|--|--------------------------------------|---|
| 1. | A plane cuts a square pyramid parallel to its base, making a square. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 2. | A rectangle rotates around one of its sides, making a cylinder. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 3. | A semicircular region rotates around its diameter, making a sphere. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 4. | A plane cuts a cylinder parallel to its bases, making a circle. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 5. | A plane cuts a right circular cone through its vertex and the center of its base, making a triangle. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 6. | A plane cuts a rectangular prism parallel to one face, making a rectangle. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 7. | A right triangle rotates around its hypotenuse, making two cones joined at their bases. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |
| 8. | A plane cuts a sphere through its center, making a circle. | <input type="button" value="SLICE"/> | <input type="button" value="ROTATION"/> |

2 PROVE IT Explain your thinking

Pick two items from Part 1. For each one, tell how you knew where it belonged.

ITEM # _____ HOW I KNEW _____

ITEM # _____ HOW I KNEW _____

3 MAKE YOUR OWN One of each

Write one new SLICE example and one new ROTATION example. State the action and the shape or solid it produces.

SLICE _____

ROTATION _____

CHALLENGE

A plane cuts a regular pentagonal prism parallel to its bases. An isosceles triangle rotates around its altitude from the top vertex to the base. Name both resulting shapes.

PART 1 • SORT

#	ITEM	CATEGORY	WHY
1	A plane cuts a square pyramid parallel to its base, making a square.	SLICE	A plane cuts a solid, and the result is a two-dimensional square cross-section.
2	A rectangle rotates around one of its sides, making a cylinder.	ROTATION	A two-dimensional rectangle rotates around a line, creating a three-dimensional cylinder.
3	A semicircular region rotates around its diameter, making a sphere.	ROTATION	Rotating the semicircular region around its diameter creates a sphere.
4	A plane cuts a cylinder parallel to its bases, making a circle.	SLICE	A plane parallel to a cylinder's circular bases creates a circular cross-section.
5	A plane cuts a right circular cone through its vertex and the center of its base, making a triangle.	SLICE	The cutting plane creates a two-dimensional triangular cross-section.
6	A plane cuts a rectangular prism parallel to one face, making a rectangle.	SLICE	A plane parallel to a rectangular face produces a rectangular cross-section.
7	A right triangle rotates around its hypotenuse, making two cones joined at their bases.	ROTATION	Rotating the triangle around its hypotenuse creates a three-dimensional double cone, also called a bicone.
8	A plane cuts a sphere through its center, making a circle.	SLICE	A plane through the center of a sphere creates a circular cross-section.

PART 2 • PROVE IT

Accept any explanation that names the deciding feature from the rule box for the chosen item.

PART 3 • MAKE YOUR OWN (SAMPLE ANSWERS)

- **SLICE:** A plane cuts a regular hexagonal prism parallel to its base, making a hexagon.
- **ROTATION:** A quarter-circle region rotates around one radius, making a hemisphere.

Challenge: The cross-section is a pentagon, and the rotation makes a cone.

Accept bicone or double cone for item 7. In Part 2, students should cite a cutting plane for SLICE and rotation around a line for ROTATION.