

Spin It Right

Decide whether each stated rotation makes the named solid.

MA.912.GR.4.2 "Identify three-dimensional objects generated by rotations of two-dimensional figures."

NAME _____

DATE _____

MATCHES THE ROTATION

The named plane region rotates around a line in its plane. Its rotation sweeps out the named three-dimensional solid.

Rotating a right trapezoidal region around its perpendicular side makes a right circular frustum.

DOES NOT MATCH

The named rotation cannot create the stated solid. Rotating a region creates circular paths around the axis, so the result has a different shape.

Rotating a regular hexagonal region around a line through two opposite vertices does not make a hexagonal prism.

1 SORT 8 items

Circle MATCHES or MISMATCH for each item, then choose two items and explain how the stated rotation does or does not create the named solid.

- | | | |
|----|---|--|
| 1. | A right circular cone from rotating a right triangular region about one leg. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 2. | A square pyramid from rotating an isosceles triangular region about its altitude. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 3. | A solid torus from rotating a disk around a coplanar line outside the disk. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 4. | A triangular prism from rotating a rectangular region around one side. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 5. | A cube from rotating a square region around one of its sides. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 6. | A sphere from rotating a semicircular disk around its diameter. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 7. | A right circular cylinder from rotating a rectangular region around one side. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |
| 8. | A double cone from rotating a rhombus-shaped region around one diagonal. | <input type="button" value="MATCHES"/> <input type="button" value="MISMATCH"/> |

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 MATCHES example and one new MISMATCH example. Name the plane region, the axis, and the solid.

MATCHES

MISMATCH

CHALLENGE

Describe a rotation that makes a solid torus. State the plane region and where the axis is, then explain why the solid has a hole.

PART 1 • SORT

#	ITEM	CATEGORY	WHY
1	A right circular cone from rotating a right triangular region about one leg.	MATCHES	Rotating a right triangular region about a leg sweeps out a right circular cone.
2	A square pyramid from rotating an isosceles triangular region about its altitude.	MISMATCH	This rotation creates a circular cone, not a square pyramid.
3	A solid torus from rotating a disk around a coplanar line outside the disk.	MATCHES	An external coplanar axis leaves a hole as the disk rotates, creating a solid torus.
4	A triangular prism from rotating a rectangular region around one side.	MISMATCH	Rotating a rectangular region around a side creates a right circular cylinder, not a triangular prism.
5	A cube from rotating a square region around one of its sides.	MISMATCH	Rotating a square region around a side creates a right circular cylinder, not a cube.
6	A sphere from rotating a semicircular disk around its diameter.	MATCHES	The semicircular disk sweeps out every point inside a sphere when it rotates around its diameter.
7	A right circular cylinder from rotating a rectangular region around one side.	MATCHES	The side is the axis, and the opposite side traces a circle to form a right circular cylinder.
8	A double cone from rotating a rhombus-shaped region around one diagonal.	MATCHES	Each half of the rhombus sweeps out a cone, and the two cones meet at a circular base.

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)

- **MATCHES:** An ellipsoid formed by rotating an elliptical region around its major axis.
- **MISMATCH:** A tetrahedron is not formed by rotating an equilateral triangular region around an altitude, because that rotation makes a cone.

Challenge: Rotate a disk around a coplanar line outside the disk. The result is a solid torus because the axis does not pass through the disk, so a hole remains.

For Part 2, accept explanations that correctly connect the rotating region and axis to the resulting solid. Students should distinguish a disk or other filled region from a boundary curve when describing a solid of revolution.