ALBERT

Name _____ Date _____

Cross Sections and Solids of Revolution Worksheet

Geometry · Common Core 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.

Practice

Builds the skill step by step.

1. What shape is a horizontal cross-section of an upright cylinder?
   A. oval with corners
   B. rectangle
   C. circle
   D. triangle

2. What shape is a vertical cross-section through the axis of an upright cylinder?
   A. circle
   B. rectangle
   C. triangle
   D. trapezoid

3. What shape is a horizontal cross-section of a square pyramid?
   A. square
   B. triangle
   C. circle
   D. pentagon

4. What shape is a vertical cross-section through the apex of a cone?
   A. parabola only
   B. rectangle
   C. circle
   D. triangle

5. A rectangle is rotated around one of its sides. What solid does it make?
   A. a cylinder
   B. a cone
   C. a sphere
   D. a prism

6. A right triangle is rotated around one of its legs. What solid does it make?
   A. a cylinder
   B. a pyramid
   C. a cone
   D. a sphere

7. A semicircle is rotated around its diameter. What solid does it make?
   A. a cylinder
   B. a torus
   C. a cone
   D. a sphere

8. What shape is every plane cross-section of a sphere?
   A. It depends on the plane.
   B. a circle
   C. an oval
   D. a square

9. A cube has side 5. What is the area of a cross-section parallel to a face?

10. A cylinder has radius 3. What is the area of a cross-section parallel to its base? It is $k\pi$ square units. What is k?

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On Level

Grade-level practice.

1. Which shape can NOT be a plane cross-section of a cube?

   A. a hexagon

   B. a triangle

   C. a circle

   D. a rectangle

2. A 4-by-3 rectangle is rotated around its side of length 4. What is the volume of the solid? It is kπ cubic units. What is k?

3. A right triangle with legs 6 and 2 is rotated around the leg of length 6. What is the volume of the solid? It is kπ cubic units. What is k?

4. What shape is a cross-section of a cone parallel to its base?

   A. a circle

   B. a triangle

   C. an ellipse that isn't a circle

   D. a rectangle

5. A square pyramid has a base side of 10 and a height of 12. What is the area of the horizontal cross-section halfway up?

6. A cone has radius 6 and height 9. A cross-section parallel to the base is 3 units below the apex. What is its area? It is kπ square units. What is k?

7. A cube is sliced by a plane through the three vertices next to one corner. What shape is the cross-section?

   A. a hexagon

   B. a square

   C. a right triangle

   D. an equilateral triangle

8. A sphere has radius 5. A plane cuts it 3 units from the center. What is the area of the cross-section? It is kπ square units. What is k?

9. A rectangle is rotated around a line parallel to one side but not touching the rectangle. What solid does it make?

   A. a solid cylinder

   B. a cylinder with a cylindrical hole through it

   C. a cone

   D. a sphere

10. A rectangular prism is 4 by 6 by 10. What is the area of a cross-section parallel to the 6-by-10 face?

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Challenge

Multi-step and word problems that stretch it.

1. Can a plane cross-section of a cube be a regular hexagon?
   A. Yes, a plane through the midpoints of six edges.
   B. No, only squares and rectangles.
   C. No, at most five sides.
   D. Yes, any plane through the center.

2. A 3-4-5 right triangle is rotated around its hypotenuse. What solid does it make?
   A. one cone
   B. a sphere
   C. a cylinder
   D. two cones joined at their bases

3. A sphere has radius 10. A plane cuts it 6 units from the center. What is the area of the cross-section? It is kπ square units. What is k?

4. The rectangle with corners (0, 0), (3, 0), (3, 2) and (0, 2) is rotated around the y-axis. What is the volume of the solid? It is kπ cubic units. What is k?

5. The same rectangle (corners (0, 0), (3, 0), (3, 2), (0, 2)) is rotated around the x-axis. What is the volume? It is kπ cubic units. What is k?

6. A cone has radius 4 and height 8. A cross-section parallel to the base is 2 units above the base. What is its area? It is $k\pi$ square units. What is k?

7. Describe how the cross-sections of a sphere change as a plane moves from the center to the edge.

8. A semicircle of radius 3 is rotated around its diameter. What is the volume of the solid? It is $k\pi$ cubic units. What is k?

9. A cylinder has radius 5 and height 12. It is cut by a vertical plane 3 units from its axis. What is the area of the rectangular cross-section?

10. Which solid can have a triangle as one cross-section and a circle as another?

    A. a sphere

    B. a cone

    C. a cube

    D. a cylinder