Slice It: Cross-Sections

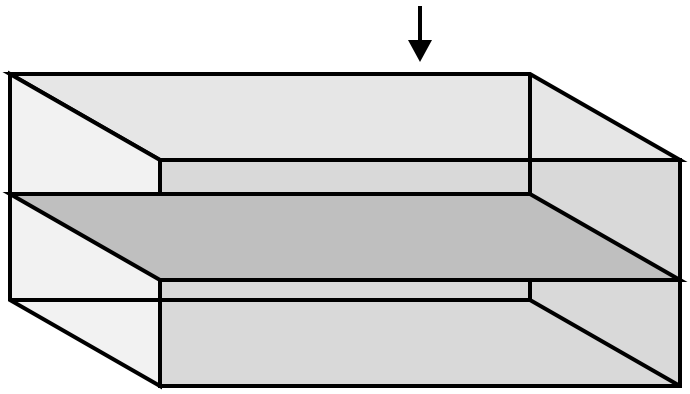
Predict and draw the 2D shape made when a plane cuts a solid

Name: _____ Date: _____

Part 1 - A rectangular prism

Directions: A cross-section is the flat 2D face exposed by a cut. Use the stated plane and viewing direction. Name the cross-section, then draw only the cut face in the box. Do not draw the whole solid.

1. Rectangular prism



Plane P is parallel to the rectangular base.

Look straight down at Plane P.

The cross-section is a _____. Draw the cut face as you would see it from above.

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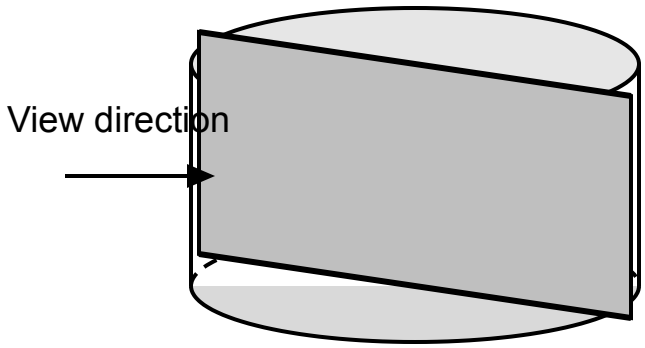
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Part 2 - A cylinder

2. Cylinder

Plane Q is vertical. It passes through the centers of both circular bases. The arrow shows a view direction that is normal (perpendicular) to Plane Q.



Plane Q contains a diameter of each circular base.

Its side edges meet the curved surface.

Look straight at Plane Q.

The cross-section is a _____. Draw the cut face as you would see it from the arrow.

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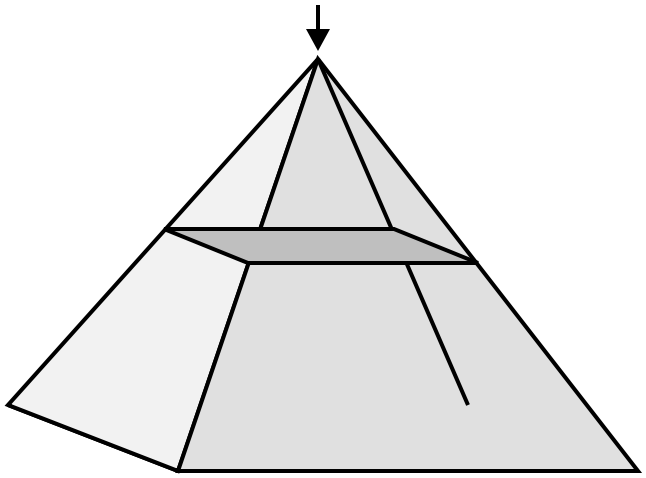
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Part 3 - A square pyramid

3. Square pyramid

Plane R is halfway from the apex to the square base. It is parallel to the square base. Look straight down at Plane R, as shown.



Plane R is parallel to the square base.

It is halfway from apex to base.

Look straight down.

The cross-section is a _____. Draw the cut face as you would see it from above.

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Answer key and teaching notes - Setup and script

Materials and setup: Print and supply all student pages, keeping teacher-key pages separate. Provide each student a pencil, straightedge, and eraser. The supplied diagrams are the accurate solids, explicit cutting planes, viewing arrows, and blank section boxes; no physical cutting is needed. If available, use a transparent rectangular-prism model, a right circular cylinder model, and a square pyramid model only to demonstrate the stated planes. Do not substitute an unlabeled sketch.

Teaching script: Say: “A cross-section is the flat face where an imaginary plane cuts a solid. Trace the boundary where the named plane meets the solid. Then use the arrow to imagine looking straight at that cut face. Draw that 2D shape, not the outside of the solid.” Point to Plane P and ask: “Is this plane parallel or perpendicular to the base?” Do not name its result. For Q, say: “Notice that both the top and bottom edges of Plane Q are diameters. Its two side edges reach the curved surface.” For R, say: “The position and orientation of the plane matter. Use the words on each diagram, not just the perspective drawing.”

Observation method: Circulate while students work. For each item, record whether the student (a) identifies the stated plane orientation, (b) draws a single 2D closed figure in the response box, and (c) names a matching shape. Prompt once with “Trace where the plane meets the solid.” Do not supply the shape name. A student is proficient on this focused practice with 3 of 3 accurate shape names/drawings, or 2 of 3 plus an explanation that correctly identifies the missed plane orientation.

Source credit: New York State Next Generation Mathematics Learning Standards, NY-7.G.3, “Describe the two-dimensional shapes that result from slicing three-dimensional solids parallel or perpendicular to the base.” https://www.nysed.gov/curriculum-instruction/new-york-state-next-generation-mathematics-learning-standards

Slice It: Cross-Sections

Predict and draw the 2D shape made when a plane cuts a solid

Answer key and teaching notes - Student responses

1. Rectangular prism: Rectangle. Plane P is parallel to the rectangular base, so its boundary has four right angles and matching side lengths to the base. Accept a clearly drawn rectangle, including one with different proportions than the perspective drawing.

2. Cylinder: Rectangle. Plane Q is a full vertical axial plane: its top and bottom edges are diameters of the circular bases, and its vertical side edges lie on the curved lateral surface. Viewed normal to Plane Q, these four straight boundary segments form a rectangle. Accept a clearly drawn rectangle. Do not accept an ellipse or circle.

3. Square pyramid: Square. Plane R is parallel to the square base, so the cross-section has the same shape as the base, but is smaller because the plane is between the apex and base. Accept a clearly drawn square. A diamond-shaped orientation is acceptable if all four sides are intended equal and the corners are right angles.

Feedback prompts: For an incorrect response, ask: “Where does the plane touch the solid?” and “Are you looking at the cut face or at the whole solid?” For Item 2, ask: “What are the top and bottom edges of Plane Q?” For Item 3, ask: “What shape is the base, and what does parallel tell us?”