

Cross Sections of Prisms and Pyramids

Grade 7 math · Worksheet · Standards: 7.G.A.3

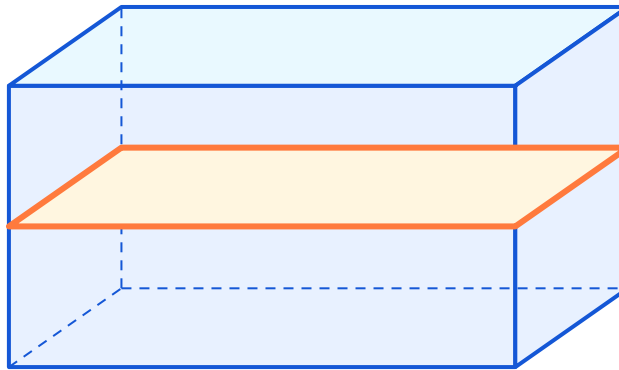
Name: _____ Date: _____ Class: _____

These problems train standard 7.G.A.3: describing the two-dimensional figures that result from slicing rectangular prisms and rectangular pyramids with planes parallel or perpendicular to the base. Early problems name shapes, and later ones find dimensions and areas. Picture the plane before you answer. For pyramid slices parallel to the base, use the ratio of the distance from the apex to the full height as the scale factor. The final six problems put the slices into buildings, tanks and blocks.

Standards: 7.G.A.3 · **Level:** Grade 7

Problem 1 Slice a Prism Flat (easy)

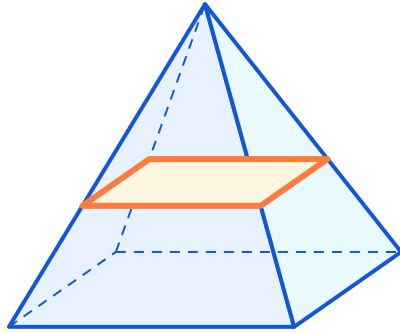
A flat cut runs parallel to the bottom of a box-shaped prism, as pictured. Which shape appears on the cut face?



Cut parallel to the base.

Problem 2 Slice a Pyramid Flat (easy)

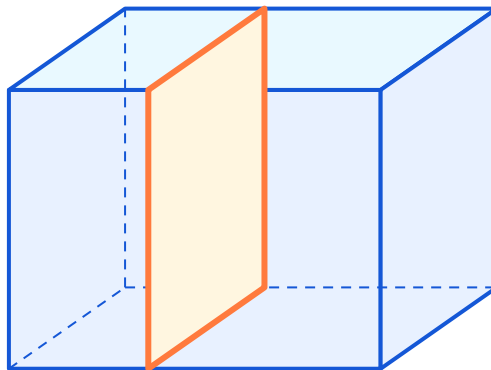
Picture a pyramid sliced by a flat cut that runs parallel to its bottom. Which shape appears on the cut face?



Cut parallel to the base.

Problem 3 Stand the Plane Up (easy)

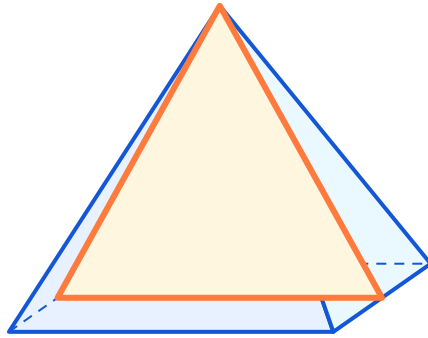
An upright flat cut stands perpendicular to the bottom of a box-shaped prism. Which shape appears on the cut face?



Vertical cut.

Problem 4 Through the Apex (easy)

A vertical plane passes through the apex of a rectangular pyramid. Name the cross section.



Cut through the apex.

Problem 5 Prism Parallel Slice Area (medium)

A solid block measures 8 in by 5 in by 6 in. Find the sides and the area of the slice made parallel to the bottom.

Problem 6 Gift Box Vertical Slice (medium)

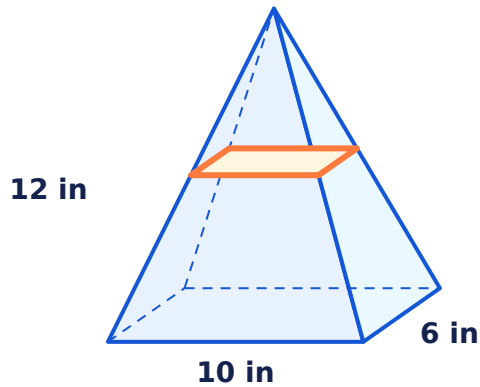
A gift box measures 12 in by 9 in by 4 in. An upright cut is made parallel to the 12-by-4 face. Find the sides and the area of the cut face.

Problem 7 Cereal Box Slice (medium)

A cereal box measures 7 in by 2.5 in by 10 in. An upright cut is made parallel to the 2.5-by-10 end. Find the area of the cut face.

Problem 8 Halfway Up the Pyramid (medium)

A rectangular pyramid has a 10 in by 6 in base and a height of 12 in. A plane parallel to the base cuts it 6 in below the apex. Find the dimensions and area of the slice.



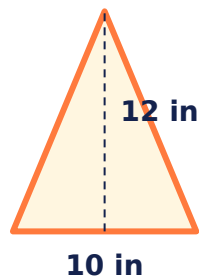
Cut 6 in below the apex.

Problem 9 Near the Top (medium)

For the same pyramid (base 10 in by 6 in, height 12 in), a plane parallel to the base cuts 3 in below the apex. Find the dimensions and area of the slice.

Problem 10 Triangle Along the Length (medium)

The pyramid has a 10 in by 6 in base and a height of 12 in. A vertical plane through the apex is parallel to the 10 in edges. Find the dimensions and area of the triangle.



Triangular slice.

Problem 11 Triangle Across the Width (medium)

For the same pyramid, a vertical plane through the apex is parallel to the 6 in edges. Find the dimensions and area of the triangle.

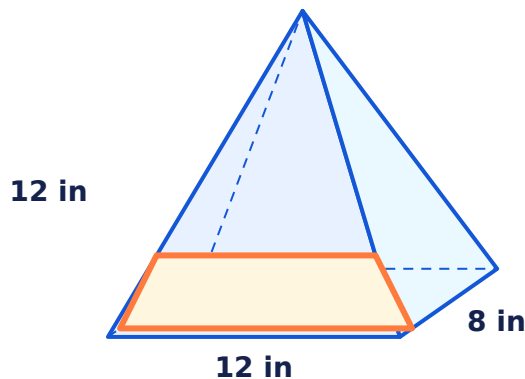
Problem 12 Match the Slice (medium)

Name each cross section as a rectangle, a triangle or a trapezoid: (a) a prism cut perpendicular to its base; (b) a pyramid cut vertically through its apex; (c) a pyramid cut vertically, missing

the apex; (d) a pyramid cut parallel to its base.

Problem 13 A Trapezoid Slice (hard)

A rectangular pyramid has a 12 in by 8 in base and a height of 12 in. A vertical plane parallel to a 12 in edge is 1 in from that edge. The slice is a trapezoid with parallel sides of 12 in and 9 in and a height of 3 in. Find its area.



Vertical cut that misses the apex.

Problem 14 When Is the Slice a Square? (hard)

A rectangular prism has a 6 in by 6 in base and a height of 10 in. Which cuts, parallel or perpendicular to the base, can give a square? Give the dimensions.

Problem 15 Slicing a Bread Loaf (medium)

A loaf of bread measures 14 in by 4 in by 4 in. Each cut goes straight across the loaf, perpendicular to its length. Name the shape of the cut face, find its area, and find how many 0.5 in slices the loaf makes.

Problem 16 Glass Museum Floor (medium)

A museum has a glass pyramid with a 24 ft by 16 ft base and a height of 18 ft. A floor is built 9 ft above the base, parallel to it. Find the dimensions and area of the floor.

Problem 17 Two Tent Triangles (medium)

A pyramid tent has a 10 ft by 8 ft base and a height of 6 ft. A vertical plane through the apex is parallel to the 10 ft edges, and a second one is parallel to the 8 ft edges. Which triangle has the larger area, and by how much?

Problem 18 Aquarium Water Level (hard)

An aquarium measures 40 in by 16 in by 20 in and holds water 12 in deep. Find the area of the water's surface, the area of the wet part of an upright slice parallel to the 40-by-20 side, and the volume of the water.

Problem 19 Two Cuts in a Concrete Block (hard)

A concrete block measures 18 in by 8 in by 6 in. Cut 1 runs parallel to the bottom. Cut 2 is upright and runs parallel to the 18-by-6 side. Which cross section has the larger area, and by how much?

Problem 20 Glass Paperweight (hard)

A glass pyramid has an 8 cm by 6 cm base and a height of 10 cm. Find the area of a slice parallel to the base that is 4 cm below the apex, and of one that is 5 cm below the apex.