

Cross Sections of Prisms and Pyramids

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

Each answer names the cross section, explains why, and gives the dimensions and areas in bold. If your shape differs, redraw the solid and the plane, and decide whether the plane misses the apex of a pyramid.

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

Problem 1 Slice a Prism Flat

A prism has the same dimensions at every height, so the slice copies the base.

A rectangle

Problem 2 Slice a Pyramid Flat

Each parallel slice of a rectangular pyramid has four right angles but is smaller than the base.

A rectangle (smaller than the base)

Problem 3 Stand the Plane Up

The slice has the prism's height as one side and a base edge as the other, with four right angles.

A rectangle

Problem 4 Through the Apex

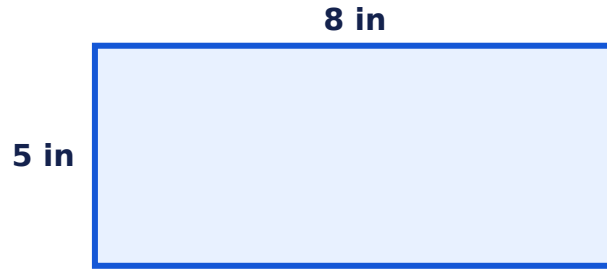
The slice runs from two base points up to the apex.

A triangle

Problem 5 Prism Parallel Slice Area

The slice copies the base: 8 in by 5 in. Area: $8 \times 5 = 40$.

8 in by 5 in; 40 square inches



The slice is 8 in by 5 in.

Problem 6 Gift Box Vertical Slice

The cut copies the 12-by-4 face. Area: $12 \times 4 = 48$.

12 in by 4 in; 48 square inches

Problem 7 Cereal Box Slice

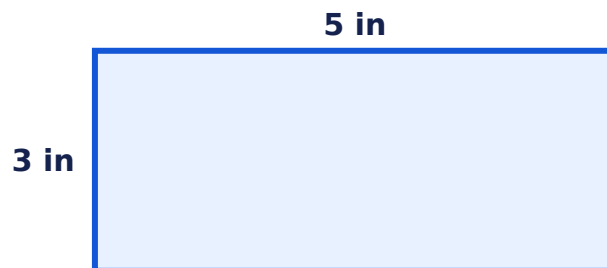
The slice is 2.5 in by 10 in. Area: $2.5 \times 10 = 25$.

25 square inches

Problem 8 Halfway Up the Pyramid

Scale factor: $6 \div 12 = \frac{1}{2}$. Dimensions: $10 \times \frac{1}{2} = 5$ and $6 \times \frac{1}{2} = 3$. Area: $5 \times 3 = 15$.

5 in by 3 in; 15 square inches



The slice is 5 in by 3 in.

Problem 9 Near the Top

Scale factor: $3 \div 12 = \frac{1}{4}$. Dimensions: $10 \times \frac{1}{4} = 2.5$ and $6 \times \frac{1}{4} = 1.5$. Area: $2.5 \times 1.5 = 3.75$.

2.5 in by 1.5 in; 3.75 square inches

Problem 10 Triangle Along the Length

The base of the triangle is the base length 10 in, and its height is the pyramid height 12 in.
Area: $\frac{1}{2} \times 10 \times 12 = 60$.

Base 10 in, height 12 in; 60 square inches

Problem 11 Triangle Across the Width

The triangle has base 6 in and height 12 in. Area: $\frac{1}{2} \times 6 \times 12 = 36$.

Base 6 in, height 12 in; 36 square inches

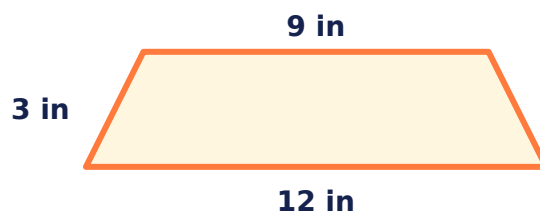
Problem 12 Match the Slice

(a) The slice has four right angles: rectangle. (b) Two base points meet at the apex: triangle. (c) The cut removes the tip, leaving two parallel sides: trapezoid. (d) Smaller copy of the base: rectangle.

(a) rectangle, (b) triangle, (c) trapezoid, (d) rectangle

Problem 13 A Trapezoid Slice

Area of a trapezoid = $\frac{1}{2}(b_1 + b_2)h = \frac{1}{2}(12 + 9)(3) = \frac{1}{2} \times 21 \times 3 = 31.5$.



The trapezoid slice.

31.5 square inches

Problem 14 When Is the Slice a Square?

A cut parallel to the base copies the base: 6 in by 6 in, a square. A cut perpendicular to the base has the height 10 in as one side and 6 in as the other, so it is a 6-by-10 rectangle, not a square.

Only cuts parallel to the base: 6 in by 6 in squares

Problem 15 Slicing a Bread Loaf

The cut is perpendicular to the length, so the cross section is 4 in by 4 in: a square with area 16 sq in. Slices: $16 \div 0.5 = 32$.

A square of 16 square inches; 32 slices

Problem 16 Glass Museum Floor

The floor is $18 - 9 = 9$ ft below the apex, so the scale factor is $9 \div 18 = \frac{1}{2}$. Dimensions: 12 ft by 8 ft. Area: 96.

12 ft by 8 ft; 96 square feet

Problem 17 Two Tent Triangles

First triangle: $\frac{1}{2} \times 10 \times 6 = 30$. Second triangle: $\frac{1}{2} \times 8 \times 6 = 24$. Difference: $30 - 24 = 6$.

The first triangle, by 6 square feet

Problem 18 Aquarium Water Level

The water surface is parallel to the base: $40 \times 16 = 640$ sq in. The wet cross section is 40 by 12: 480 sq in. Volume: base area $\times$ depth = $640 \times 12 = 7,680$.

640 sq in; 480 sq in; 7,680 cubic inches

Problem 19 Two Cuts in a Concrete Block

Cut 1: $18 \times 8 = 144$ sq in. Cut 2: $18 \times 6 = 108$ sq in. Difference: $144 - 108 = 36$.

Cut 1, by 36 square inches

Problem 20 Glass Paperweight

4 cm below the apex: scale $4 \div 10 = 0.4$, so 3.2 cm by 2.4 cm, area 7.68 sq cm. Check: $48 \times 0.4^2 = 48 \times 0.16 = 7.68$.

5 cm below the apex: scale 0.5, so 4 cm by 3 cm, area 12 sq cm.

7.68 square centimeters; 12 square centimeters