LESSON MAKER PRO

Slice the Cones

Predict the shape made by a plane cutting a right double cone.

HIGH SCHOOL · G.GMD.B.4.a

G.GMD.B.4.a "Identify the shapes of two-dimensional cross-sections of a right double cone."

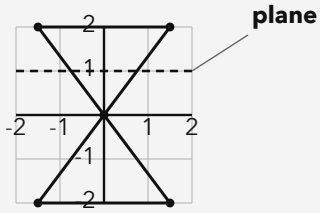
NAME _____ DATE _____

READ THE CUT

A right double cone has two halves that meet at a tip. To identify a cross-section, compare the plane's tilt with the base and sloping side. Then check whether the plane meets one half, both halves, or the tip. In the diagrams, a line shows the plane seen edge-on.

WORKED EXAMPLE

What shape does the plane make where it cuts the double cone?



1. The plane is parallel to the cone's base.
2. It cuts one half above the tip.
3. A base-parallel cut makes a circle.

Answer: Circle

PRACTICE 4 problems

1 A tilted plane cuts only one half of a double cone. It is not parallel to the base or a sloping side. Name the cross-section.

ANSWER _____

2 A plane cuts both halves of a double cone but misses the tip. Name the cross-section.

ANSWER _____

3 A plane is parallel to a sloping side of a double cone and misses the tip. Name the cross-section.

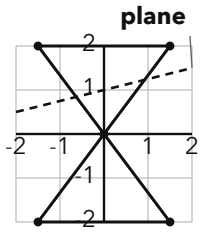
ANSWER _____

4 A plane passes through the tip and the central axis of a double cone. What shape does its intersection make?

ANSWER _____

APPLY IT Show your work

1 A game designer models a pair of opposite light beams as a double cone. The line shows a plane seen edge-on. What shape is the cut?



ANSWER _____

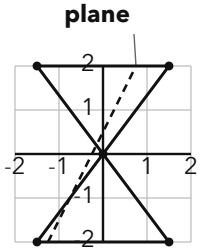
2 A concert animation shows two opposite cones of light. A plane cuts one half, misses the tip, and runs parallel to a sloping side. What shape is its outline?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The plane in this diagram is tilted and misses the tip. Explain why its cut is not an ellipse, then name the shape.



WORK SPACE AND ANSWER

ANSWER KEY

Slice the Cones

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A tilted plane cuts only one half of a double cone. It is not parallel to the base or a sloping side. Name the cross-section.	**Ellipse**
2	A plane cuts both halves of a double cone but misses the tip. Name the cross-section.	**Hyperbola**
3	A plane is parallel to a sloping side of a double cone and misses the tip. Name the cross-section.	**Parabola**
4	A plane passes through the tip and the central axis of a double cone. What shape does its intersection make?	**Two intersecting lines**

PART 2 · APPLY IT

1. **Ellipse** The plane is tilted and cuts only the upper half. It is not parallel to a sloping side, so the cut is an ellipse.
2. **Parabola** A plane parallel to a sloping side cuts the cone in a parabola.

CHALLENGE

The plane cuts both halves, not just one, so the cross-section is a hyperbola.

Accept circle for a base-parallel cut, ellipse for a tilted cut through one half, parabola for a side-parallel cut, and hyperbola for a cut through both halves that misses the tip. For problem 4, accept two crossing straight lines.