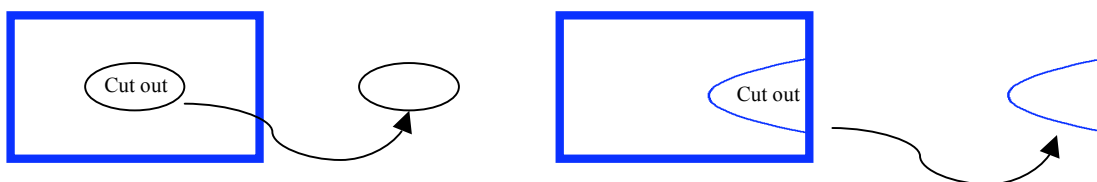


TASK 7.1.1: SLICING THE CONE — STUDENT ACTIVITY**Solutions**

The conic sections were discovered by Menaechmus, a Greek, at about 375 to 325 B.C. He described them as those curves that could be formed by intersecting a cone with a plane.

Using the materials on the Slicing the Cone template, determine which conic is formed by the given intersections.

Start by cutting out each of the rectangles to make templates of the individual conic forming planes. Remove the circle, ellipse, parabola, and hyperbola from the plane as pictured below.



Cut out four semicircles using the circles provided. Roll each semicircle into a cone, securing it with tape.

Use your planes and cones to complete the following statements.

If a plane intersects a cone parallel to the base of the cone, their intersection forms a(n) circle.

If a plane is not parallel to the base of a cone and the plane does not intersect the base of the cone, the intersection of the plane and the cone forms a(n) ellipse.

If a plane intersects a cone perpendicular to the base of the cone, their intersection forms a(n) hyperbola.

If a plane intersects a cone parallel to a line extending from the base to the vertex of the cone and running along the surface of the cone, their intersection forms a(n) parabola.

Math notes

This task provides a hands-on approach to identifying the conic sections as intersections of the plane with a cone.

Teaching notes

Be sure to run a copy of the Slicing the Cone Template on card stock for each group.

Distribute a copy of the task to each student and a copy of the template to each group.

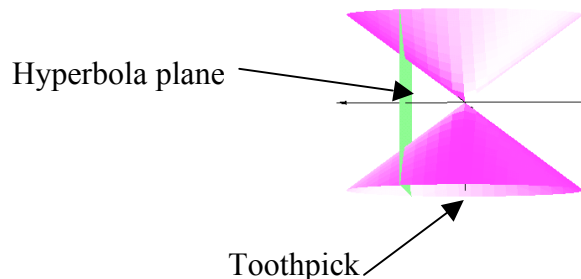
Ask students to cut out the pieces from the template.

Have models of the cones and plane ready to show the class.

There should be no overlap when forming the cone. The cone that is rolled from a semi-circle should have a base with circumference the same size as the circumference of the semi-circle.

Discuss what it would look like for these planes to intersect the cone, i.e. touching all around the opening in the plane.

The students need a double-napped cone to fit the hyperbola plane. They can build one by putting two cones vertex to vertex on a toothpick or piece of spaghetti. If the cones are stuffed with play dough first, the structure will be more secure.



Allow students time to experiment with the models and answer the questions on the task sheet. Then discuss. This short activity allows students to experience intersecting planes through cones.

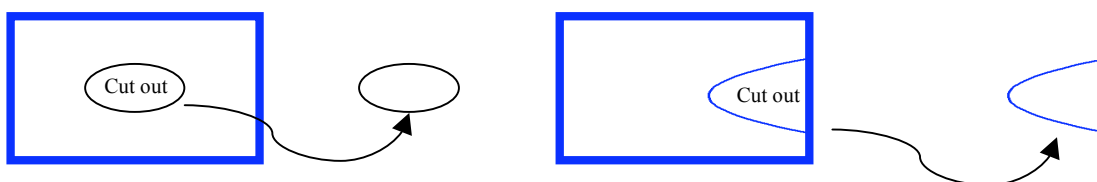
If you have a model of planes slicing a cone, bring it out at this time to act as a visual reminder to the students of this activity.

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Slicing the Cone Template