

# THREE RING CIRCLEOUS

## Brief Description:

Three objects are spinning so quickly that you only see a blur. The three objects are: a line that rotates to make a hyperboloid, a cube that rotates to make a combination of cones and hyperboloid, and three ellipses that rotate to make a cylinder. Pushing a button stops the spinning to reveal the object.

## Objectives:

This exhibit encourages students to reason spatially as they observe the three-dimensional shape swept out by a spinning object. Students can predict what shapes are spinning to create the visual image of the solid, or they can figure out what solids those shapes might make if rotated differently.

## Links to Websites:

<http://mathmidway.org/Training/circleous.php>

[http://www.fi.uu.nl/toepassingen/00182/toepassing\\_wisweb.en.html](http://www.fi.uu.nl/toepassingen/00182/toepassing_wisweb.en.html)

<http://scratch.mit.edu/projects/AddZero/152472>

<http://www.georgehart.com/skewers/skewer-hyperboloid.html>

## Vocabulary:

Cone

Cube

Cylinder

Hyperboloid

Lathe

Solid of revolution

## Before:

- ⊙ (Level 3) Play with solid of revolution apps online. Both of these websites allow you to manipulate a two-dimensional shape and see the results of rotating it into a solid.

[http://www.fi.uu.nl/toepassingen/00182/toepassing\\_wisweb.en.html](http://www.fi.uu.nl/toepassingen/00182/toepassing_wisweb.en.html)

<http://scratch.mit.edu/projects/AddZero/152472>

## During:

- ⊙ (Level 2, 3) Here are three questions to ask your students at this exhibit.  
*Can you predict what shape is spinning before anyone hits the button to stop the rotation?*  
*Can you think of other shapes that would make the same solid if spun?* (Example answers: a vertical rod spinning at the edge of the disc would also make a cylinder. A spring shape (helix) would make a cylinder. A straight line could make a cone. A curved rod could make the hyperbolic vase.  
*If you took these same shapes and rotated them a different way, what kinds of solids might you see?* (Example answer: With the rod in different orientations, it could also be a cylinder or two cones touching at their points.)

## After:

- ⊙ (Level 3) Make a hyperbolic sculpture using bamboo skewers.

<http://www.georgehart.com/skewers/skewer-hyperboloid.html>