## Lesson 1: Solids of Rotation

* Let’s rotate two-dimensional shapes to make three-dimensional shapes.

### 1.1: Which One Doesn’t Belong: Solids

Which one doesn’t belong?

A



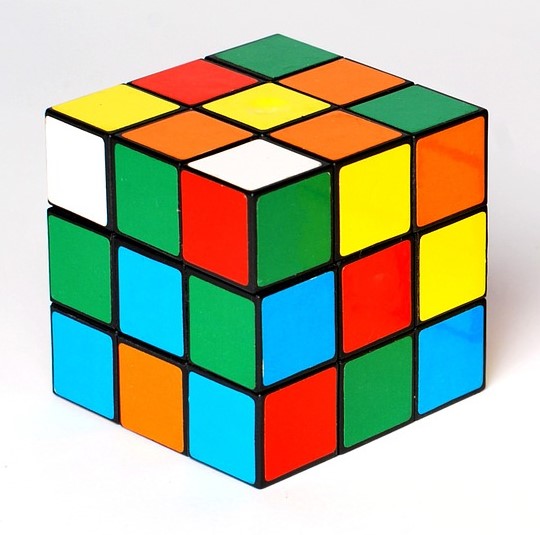
B



C



D



### 1.2: Axis of Rotation

Your teacher will give you a shape. Tape 1 side of the shape to a pencil.

1. Spin the pencil between your hands. What solid is traced out as you rotate the shape? Draw the solid.
2. Predict what solids will be formed by the shapes of other members of your group. Confirm by asking them to rotate their shapes.

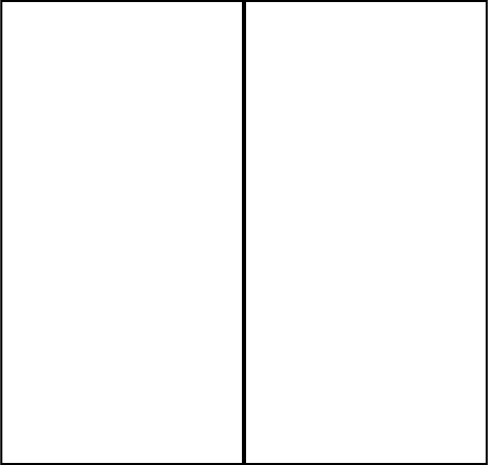
#### Are you ready for more?

1. Graph from to .
2. Sketch the solid of rotation generated by rotating this line using the -axis as the axis of rotation.
3. What figure is made?
4. The object being rotated here is a line, not a two-dimensional object like in the lesson. How does this affect the result of the rotation?

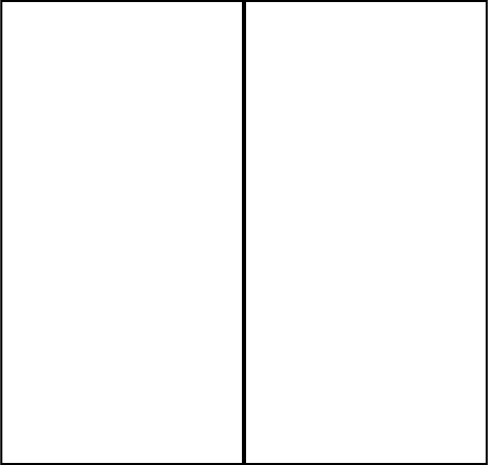
### 1.3: From Three Dimensions to Two

Draw the two-dimensional shape that, when rotated using the given **axis of rotation**, produces each **solid of rotation**. Ignore any non-symmetric aspects of the solid.

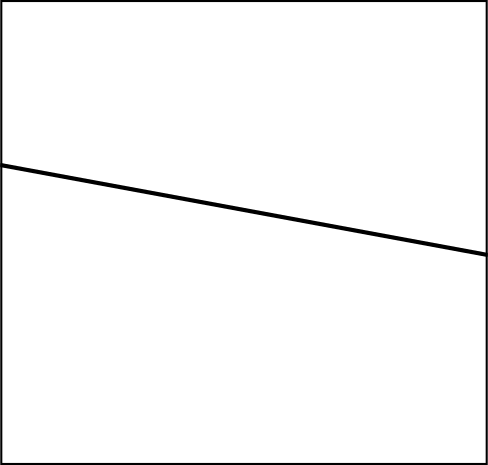




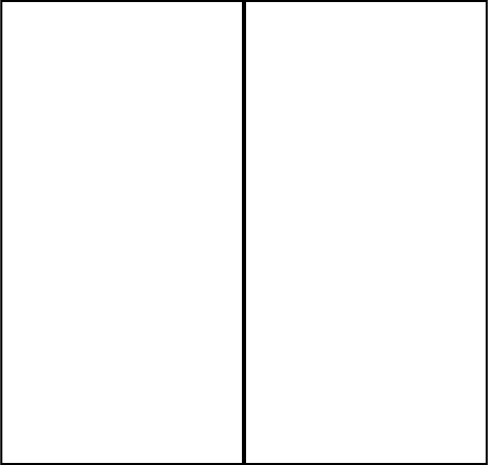






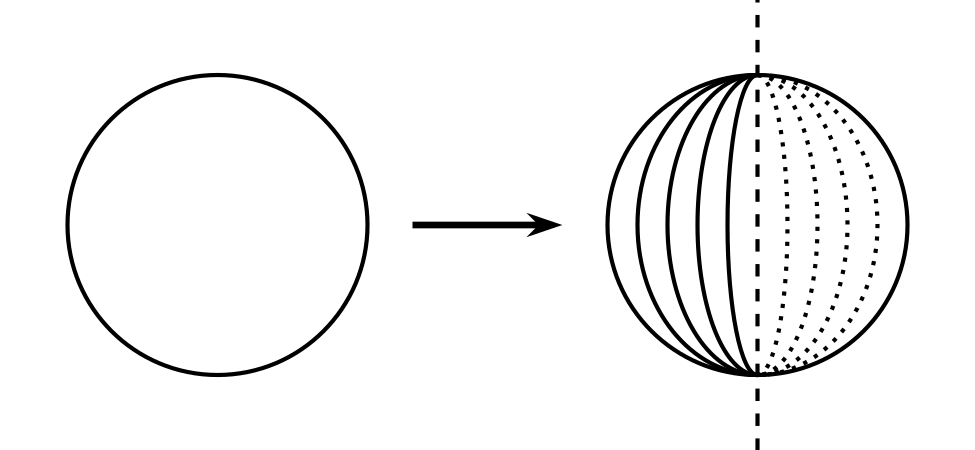




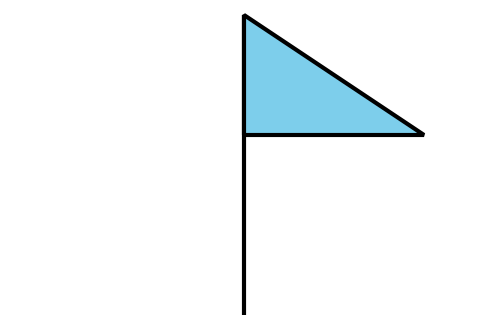


### Lesson 1 Summary

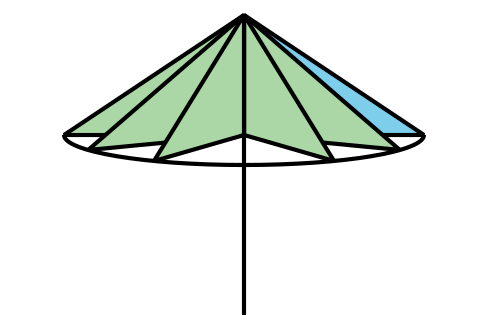
Take a coin and spin it on its edge. Give it good speed and make sure it stays vertical. What shape do you see? When you spin the coin, you should see a sphere.



This triangular flag is made of metal. What shape will you see if the pole is spun quickly?



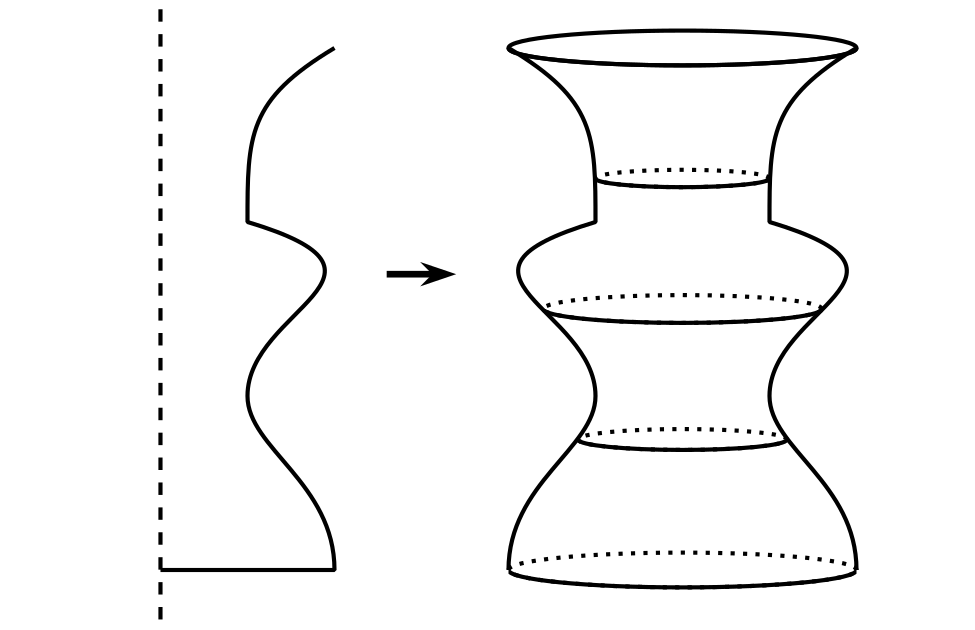
When the flag rotates with the pole, you should see a cone.



In both pictures, the object spins around a line called the **axis of rotation**, and the solid created is called the **solid of rotation**. If you were to spin the flag using a different axis of rotation, you would see a different solid of rotation. This is what it looks like when the flag is rotated using a different axis of rotation.



A machine called a lathe cuts away at a rotating block of material. For example, a lathe could be used to make a decorative sculpture shaped like the figure on the right from a block of wood. The image on the left shows the cross-sectional shape that would remain after the lathe carved away part of the spinning block of wood. If we rotate this two-dimensional shape using the vertical axis shown, it produces the sculpture shape.





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