Solids of Rotation

Let's rotate two-dimensional shapes to make three-dimensional shapes.

2.1 Which Three Go Together: Solids

Which three go together? Why do they go together?

A



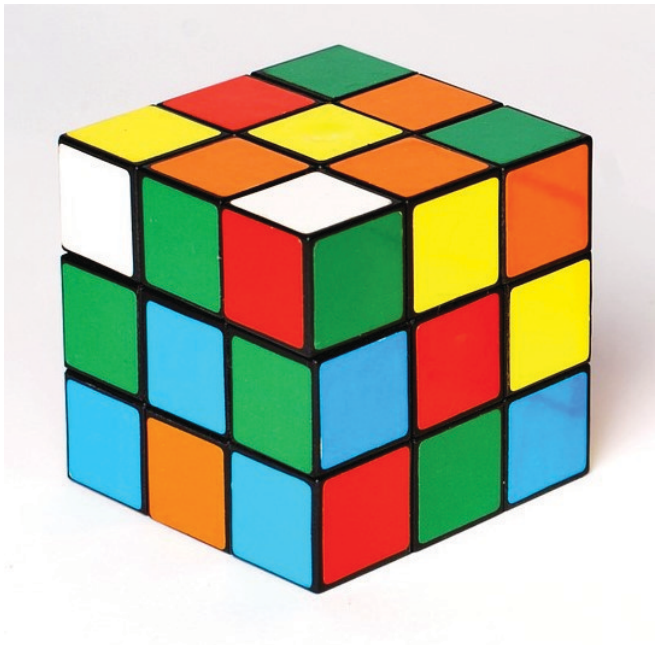
B



C



D



CC BY NC 2024
Illustrative Mathematics®

2.2 Axis of Rotation

Your teacher will give you a shape. Tape one 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 $y = -x + 3$ from $x = 1$ to $x = 3$.

2. Sketch the solid of rotation generated by rotating this line around the y-axis, as the axis of rotation.

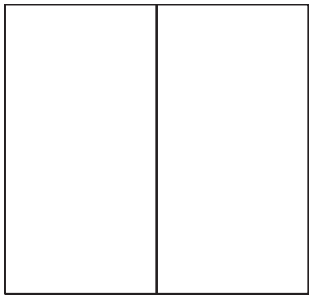
3. What figure is made?

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?

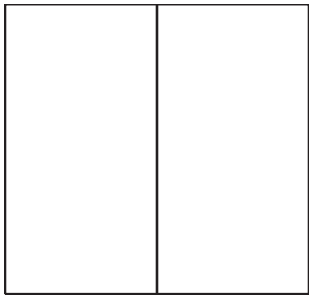
2.3 From Three Dimensions to Two

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

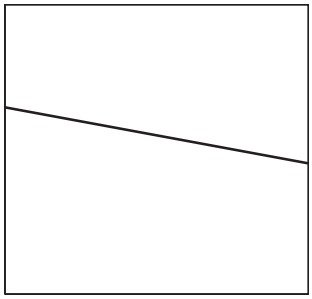




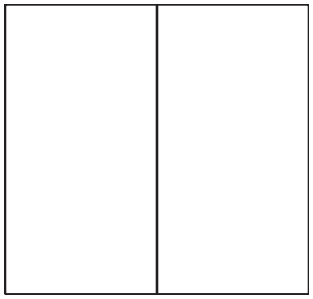






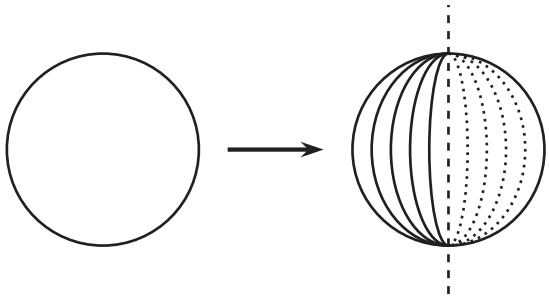




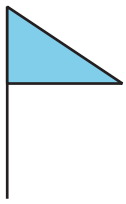


Lesson 2 Summary

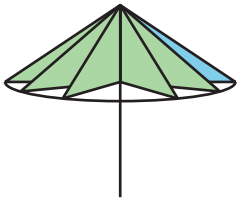
Imagine a coin spinning on its edge. If the coin moves fast enough and stays vertical it would look like a sphere.



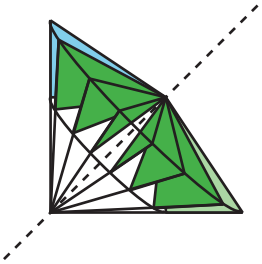
This triangular flag is made of metal. What shape will it make if the pole is spun quickly?



When the flag rotates around the pole, we can see a cone.



In both pictures, the object spins around a line called the **axis of rotation**, and that spinning creates a **solid of rotation**. When the flag spins around a different axis of rotation, it would make 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.

