## Rotation of Two-Dimensional Solids

## Module 14 Lesson 2

## Review of Two-Dimensional and Three-Dimensional Figures

A Two-Dimensional (2D) shape is a shape that only has two dimensions: width and height.

Examples: Squares, Circles, Triangles, etc are two dimensional objects


A Three-Dimensional (3D) shape is a shape that has three dimensions: width, depth and height.

Examples: Cube, Cylinder, etc are three dimensional objects


## 2D

Three-Dimensional figures can be generated by rotating two-dimensional figures.
"Rotation" means turning around a center.

A three-dimensional object rotates always around an imaginary line called a rotation axis.


## WHAT DID YOU GUESS?

If you guessed cone, you are correct!
A cone is solid revolution of a right triangle around one of its legs.


## WHAT 3D SHAPE IS PRODUCED IF WE ROTATE A SEMI-CIRCLE ?

A sphere is solid revolution of a semicircle around its diameter.

## You try:

Given the shape below, determine the 3D solid formed by rotating the two-dimensional shape about the line given.


## You try:

Given the shape below, determine the 3D solid formed by rotating the two-dimensional shape about the line given.
1.


A square rotated about the above line results
in a right cylinder.
2.


A circle rotated about the above line results in a sphere.

## Another Way to Visualize the Rotation

If you do not want to cut out the shapes, and you still need help visualizing the rotation:

1. Draw your shape and shade the region to be rotated.

2. Next, draw a reflection (mirror image) of the region about the axis or line of rotation.

3. Connect the vertices of the original image and its reflection using curved lines


## Word Problems

A square with area of $100 \mathrm{~cm}^{2}$ is rotated to form a cylinder. What is the volume of the cylinder?

$$
\begin{gathered}
\text { Area }=100 \mathrm{~cm}^{2} \\
s^{2}=100 \\
s=10
\end{gathered}
$$

## Volume $=3.14 r^{2} h$

## Volume $=3.14(5)^{2}(10)$

Volume $\approx 785$

## Word Problems

Given a cone with a radius of 6 ft and a height of 12 ft , find the area of the triangle formed by a perpendicular cross-section down through the cone's center.


$$
\begin{aligned}
& A=1 / 2 b h \\
& A=1 / 2(6)(12)
\end{aligned}
$$

$A=36$ square ft

