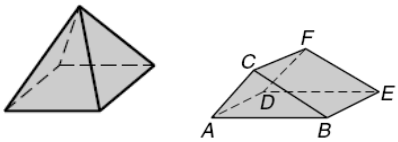
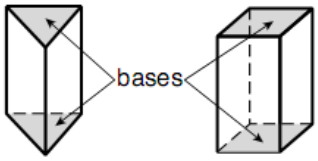
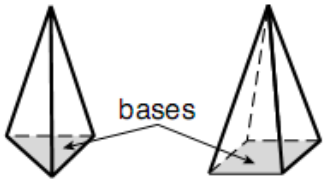
Unit 11: Surface Area and Volume

11.1 Three Dimensional Figures and Cross Sections

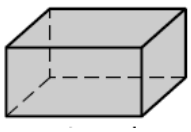
Targets

- I can identify and name three-dimensional figures
- I can identify and name parts of three-dimensional figures (faces, bases, edges, vertices)
- I can identify the shape of cross sections of three-dimensional figures and find the area of the cross sections

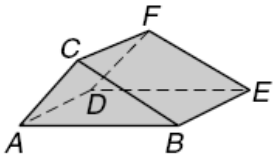
Instruction (Vocabulary)

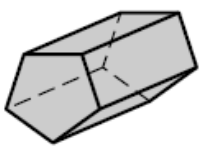
Term/Concept	Definition/Example	Picture
Polyhedron	A **polyhedron** is a _____ with all _____ that are _____.	
Prism	A **prism** is a polyhedron with _____ faces that are _____ and _____.	
Bases	The **bases** of a prism are the ____ _____ _____ faces.	
Pyramid	A **pyramid** is a polyhedron with ____ face that is a _____ and all the other faces meet at a _____ called the _____.	
Naming Prisms and Pyramids	Prisms and pyramids are named by the _____ of their _____.	

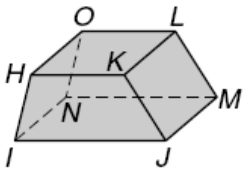
Example 1:
Name each polyhedron.

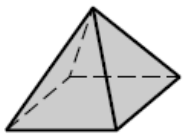
a. 

b. 

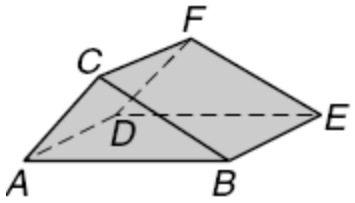
c. 

d. 

e. 

f. 

Example 2:
Name the bases, faces, edges, and vertices of the solid at the right.



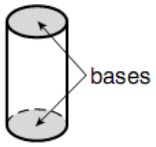
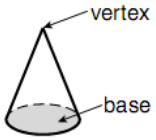
Base(s): _____

Faces: _____

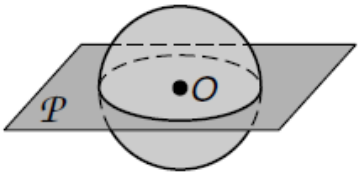
Edges: _____

Vertices: _____

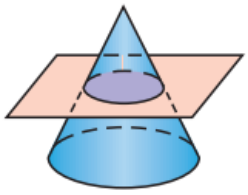
Instruction (Vocabulary)

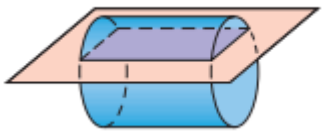
Term/Concept	Definition/Example	Picture
Cylinder	○ A **cylinder** is a solid with congruent _____ _____ that are _____.	
Cone	○ A **cone** has a _____ _____ and a _____.	
Sphere	○ A **sphere** is the set of all points in space that are at a given distance from a given point.	

Vocabulary

Term/Concept	Definition/Example	Picture
Cross Section	○ A **cross section** of a solid is the intersection of the solid with a _____	

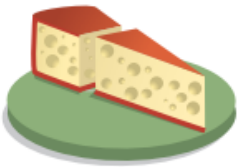
Example 3: Identify the shape of the cross section of each solid pictured below.

a. 

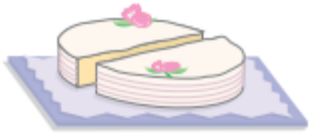
b. 

Your Turn: Identify the shape of the cross section in each of the following foods.

a. Cheese

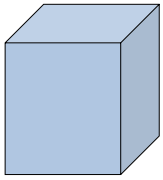


b. Cake

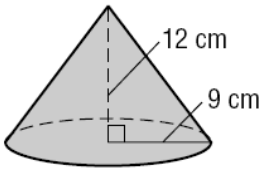


Example 4: Draw the described cross section. Then find the area of the cross section.

a. Parallel to the base of a square prism.

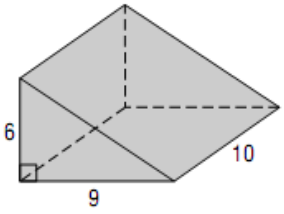


b. Perpendicular to the base of a cone, through the diameter of the base.

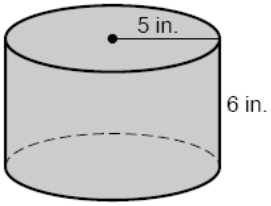


Your Turn: Draw the described cross section. Then find the area of the cross section.

a. Parallel to the base of a triangular prism



b. Perpendicular to the base of a cylinder, through the diameter of the base.

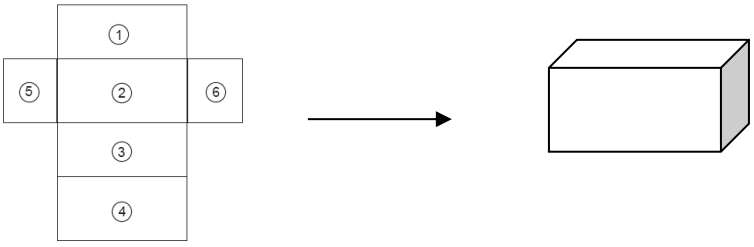
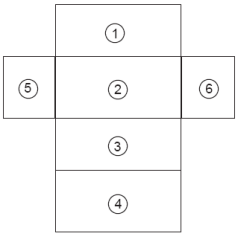


11.2 Nets and Surface Area

Targets

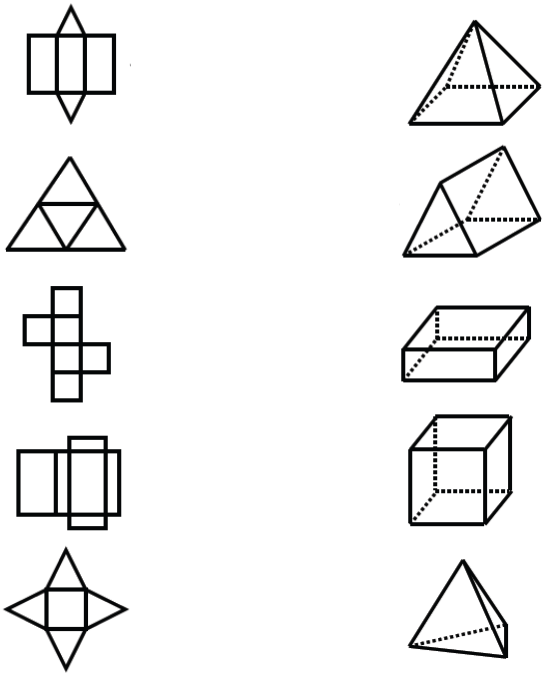
- I can draw two-dimensional models for three-dimensional figures.
- I can find surface area using nets.

Instruction (Vocabulary)

Term/Concept	Definition/Example	Picture
Net	○ A **net** is a ____-dimensional _____ for a three-dimensional solid.	
Surface Area	○ The **surface area** of a solid is the sum of the _____ of each face of the solid.	

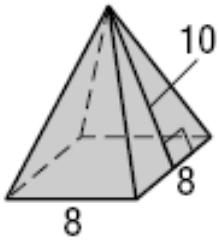
Instruction

Example 1:
Draw a line from each net to the solid it creates.

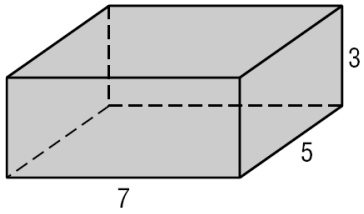


Instruction

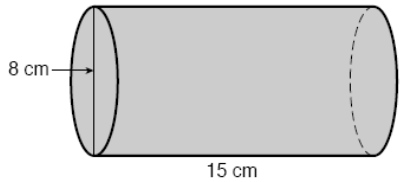
Example 2:
Draw and label a net for the following solid. Then find the solid's surface area.



Example 3:
Draw and label a net for the following solid. Then find the solid's surface area.



Example 4:
Draw and label a net for the cylinder. Then find the cylinder's surface area.

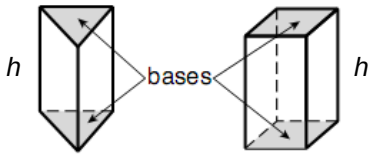
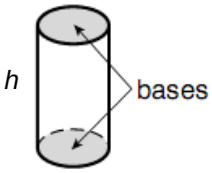


11.3 Volumes of Prisms and Cylinders

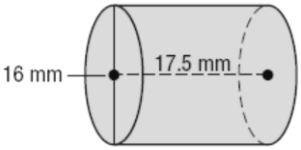
Targets

- I can find volume of prisms
- I can find the volume of cylinders.

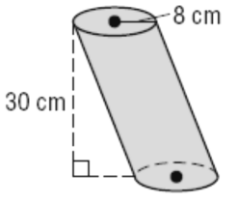
Instruction

Term/Concept	Definition/Example	Picture
Volume of a Prism		
Volume of a Cylinder		

Example 1:
Find the volume of the cylinder.

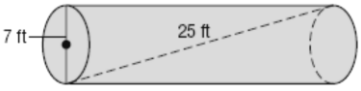


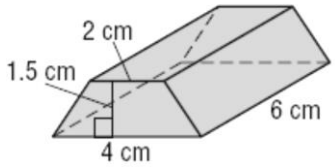
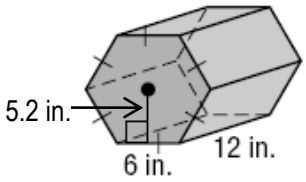
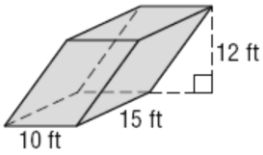
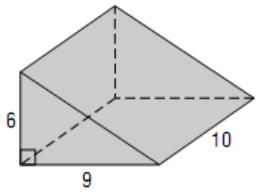
Example 2:
Find the volume of the cylinder.



Your Turn:
Find the volume of a cylinder with a radius of 6 inches and a height of 11.5 inches.

Your turn:
Find the volume of the cylinder.



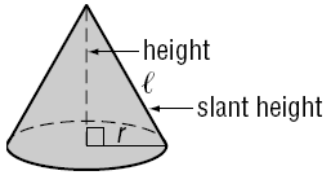
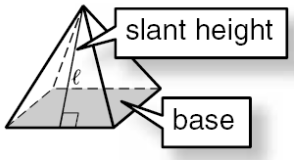
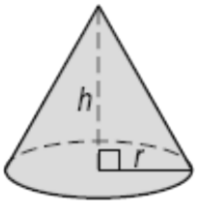
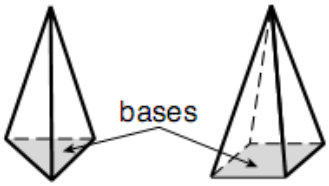
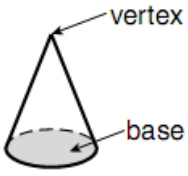
	Example 3: Find the volume of the prism.  	***Example 4:*** Find the volume of the prism. 
	Your turn: Find the volume of the prism.  	***Your turn:*** Find the volume of the prism. 
	Example 5: A prism has a base area of 42 cm^2 and a volume of 735 cm^3. What is the height of the prism?	***Your turn:*** A square prism has a volume of 196 in^3. If the height is 16 in, what are the dimensions of the base?

11.4 Volumes of Pyramids and Cones

Targets

- I can find the volume of pyramids.
- I can find the volume of cones.

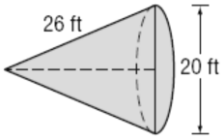
Instruction (Vocabulary)

Term/Concept	Definition/Example	Picture
Slant Height of a cone	The **slant height** ℓ of a cone is the length of any _____ joining the _____ to the edge of the circular _____.	
Slant Height of a pyramid	The **slant height** of a regular pyramid is the _____ of each _____ (triangular face).	
Height	○ The **height** of a cone or pyramid is the length of the _____ that has the _____ as one endpoint and is _____ to the _____.	
Volume of pyramids		
Volume of cones		

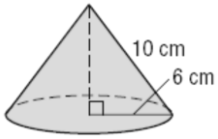
Instruction

Example 1:
Find the volume of a cone that has a radius of 4 inches and a height of 7 inches.

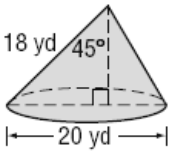
Example 2:
Find the volume of the cone.



Your turn:
Find the volume of the cone.

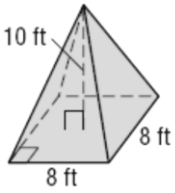


Your turn:
Find the volume of the cone.

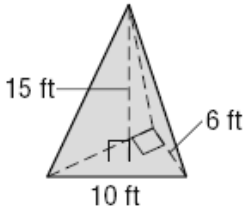


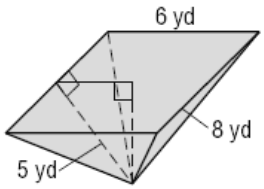
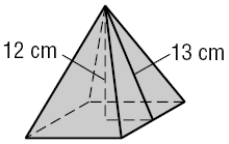
Instruction

Example 3:
Find the volume of the pyramid.



Example 4:
Find the volume of the pyramid.



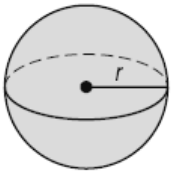
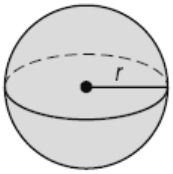
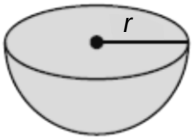
	Your turn: Find the volume of the pyramid.  	***Your turn:*** Find the volume of the pyramid. 
	Example 5: A cone has a volume of 96π m^3 and a height of 8 m. Find the radius of the base.	***Your turn:*** A cone has a volume of 2500π cm^3 and a radius of 5 cm. Find the height of the cone.

11.5 Surface Area and Volumes of Spheres

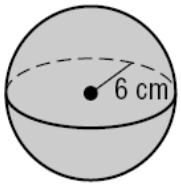
Targets

- I can find the surface area of spheres.
- I can find volume of spheres.

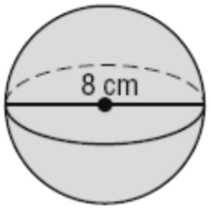
Instruction (Vocabulary)

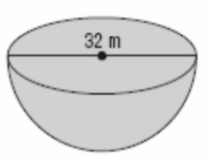
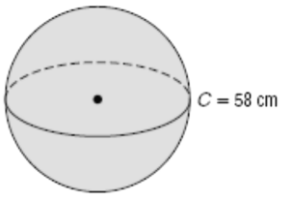
Term/Concept	Definition/Example	Picture
Sphere	○ A **sphere** is the set of all points in space that are at a given distance from a given point.	
Surface Area of a Sphere		
Volume of a Sphere		
Volume of a Hemisphere		

Example 1:
Find the surface area and volume of the sphere.

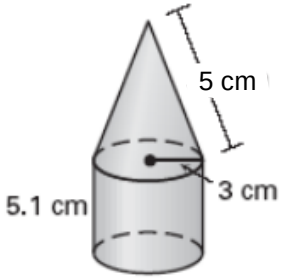
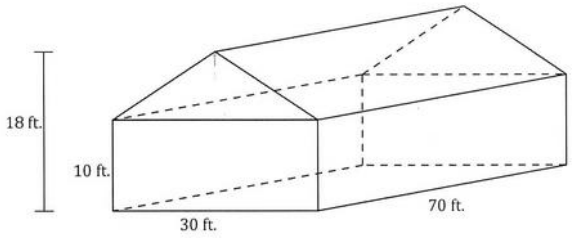


Your turn:
Find the surface area and volume of the sphere.



	Example 2: Find the volume of the hemisphere. 	***Your turn:*** Find the volume of a hemisphere with a radius of 10 in.
	Example 3: A sphere has a circumference of 58 m. What is the surface area of the sphere?	***Your turn:*** Find the volume of the sphere. 
	Example 4: A sphere has a volume of 288π cm^3. What is the surface area of the sphere?	***Your turn:*** A sphere has a surface area of 324π in^2. What is the volume of the sphere?

11.6 Volumes of Composite Figures

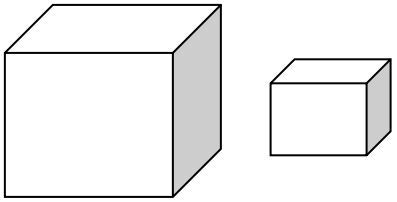
Targets	○ I can find the volume of composite figures.
	Example 1: Find the volume of the figure below. 
	Your turn: Andrea needs to purchase a new air conditioner for her house. She wants one that is big enough to cool the whole house but not too big because then she would waste money on cooling costs in the summer. Find the volume of her house. 

11.7 Volumes and Surface Areas of Similar Figures

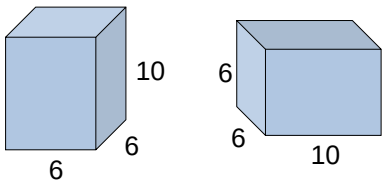
Targets

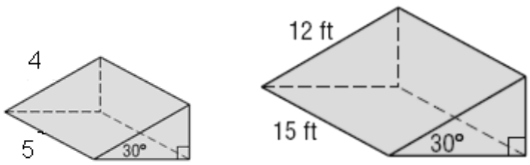
- I can identify properties of similar solids.
- I can find the volume and surface area of similar solids.

Instruction (Vocabulary)

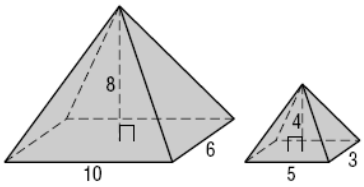
Term/Concept	Definition/Example	Picture
Similar Solids	Similar solids are solids that have the same _____, but not necessarily the same _____.	
Scale Factor of Similar Solids	If 2 solids are similar with a scale factor of a:b, then • corresponding lengths have a ratio of _____ • the surface areas have a ratio of _____ • the volumes have a ratio of _____.	

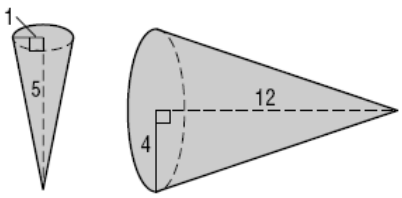
Example 1: Determine whether each pair of solids is congruent, similar or neither.

a. 

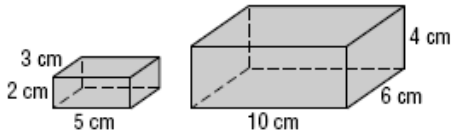
b. 

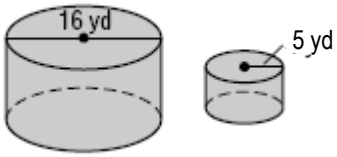
Your turn: Determine whether each pair of solids is congruent, similar or neither.

a. 

b. 

Example 3:
Find the scale factor for each pair of similar figures. Then find the ratio of their surface areas and the ratio of their volumes.





Scale Factor: _____

Ratio of SA: _____

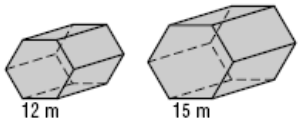
Ratio of Vol.: _____

Scale Factor: _____

Ratio of SA: _____

Ratio of Vol.: _____

Example 4:
The two prisms are similar.

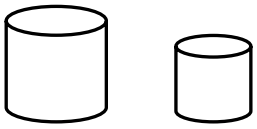


a. If the height of the smaller prism is 10 m, find the height of the larger prism.

b. If the surface area of the smaller prism is 280 m^2, find the surface area of the larger prism.

c. If the volume of the smaller prism is 400 m^3, find the volume of the larger prism.

Your turn:
Two cylinders are similar. One has a height of 8 cm and the other has a height of 6 cm.



a. If the radius of the larger cylinder is 11 cm, find the radius of the smaller cylinder.

b. If the surface area of the smaller cylinder is 325 cm^2, find the surface area of the larger cylinder.

c. If the volume of the larger cylinder is 1345 cm^3, find the volume of the smaller cylinder.