Geometry

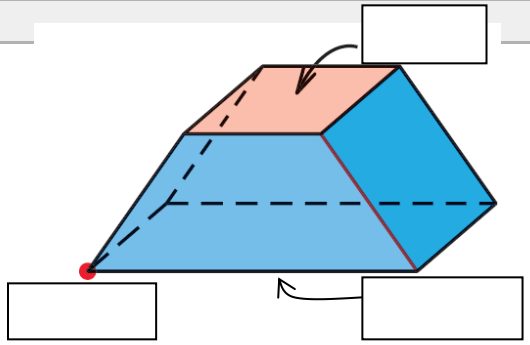
12.1 Explore Solids (12.1, new)

Polyhedron

- Solid with _____ sides
- _____ sides

Parts of Polyhedron

- Face
- Edge
- Vertex



Types of Solids

Prism

- Polyhedron with two _____ surfaces on _____ planes (the 2 ends (_____) are the same)
- Named by _____

Cylinder

- Solid with congruent _____ bases on parallel planes

Pyramid

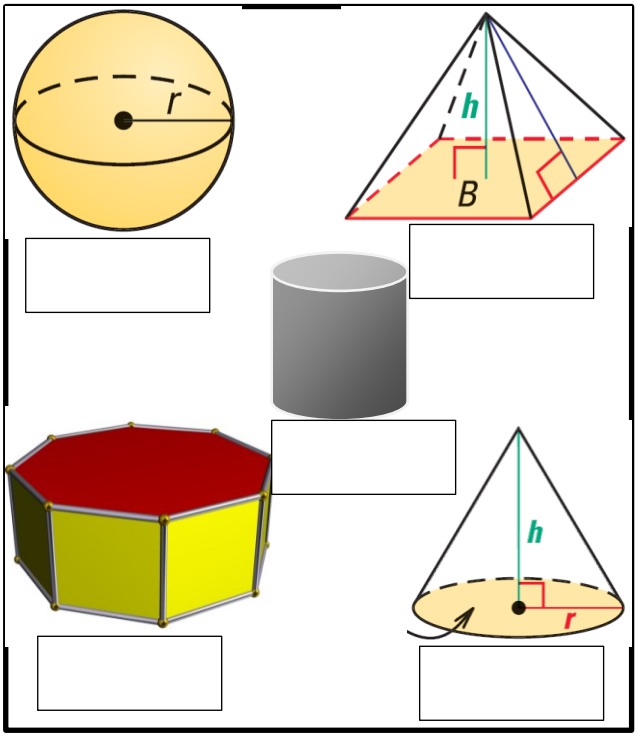
- Polyhedron with all but one _____ intersecting in one _____

Cone

- Circular _____ with the other surface meeting in a _____

Sphere

- All the _____ that are a given _____ from the center



Euler's Theorem

The number of faces (F), vertices (V), and edges (E) of a polyhedron are related by

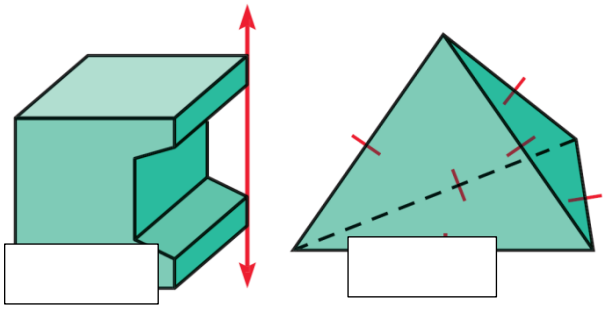
$$F + V = E + 2$$

Convex

- Any two points can be connected with _____ _____

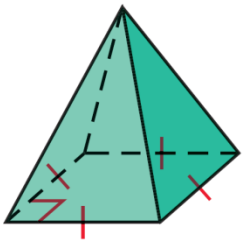
Concave

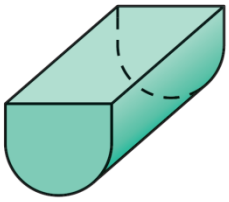
- Not _____
- Has a "**cave**"

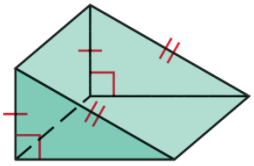


Geometry 12.1 Name: _____

Tell whether the solid is a polyhedron. If it is, name the polyhedron and find the number of faces, vertices, and edges and describe as convex or concave.

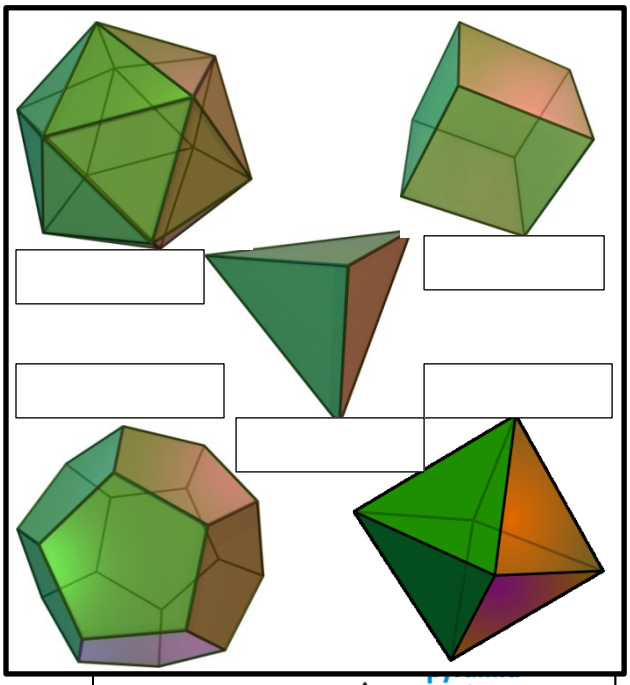






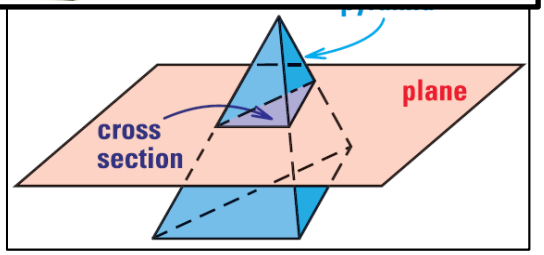
Regular Polyhedron

- Polyhedron with _____ _____ faces
- Only _____ types (**Platonic solids**)
- **Tetrahedron**
  - ___ faces (triangular pyramid)
- **Hexahedron**
  - ___ faces (cube)
- **Octahedron**
  - ___ faces (2 square pyramids put together)
- **Dodecahedron**
  - ___ faces (made with pentagons)
- **Icosahedron**
  - ___ faces (made with triangles)



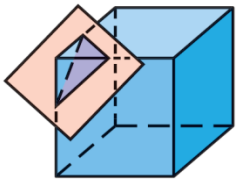
Cross Section

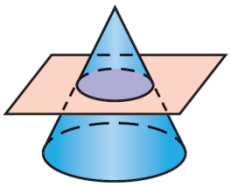
- Imagine slicing a very thin slice of the solid.
- The cross section is the _____ of the thin slice.

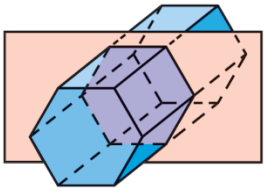


Find the number of faces, vertices, and edges of a regular dodecahedron. Check with Euler's Theorem.

Describe the cross section.





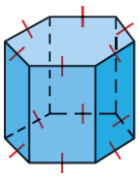


Assignment: Attached worksheet

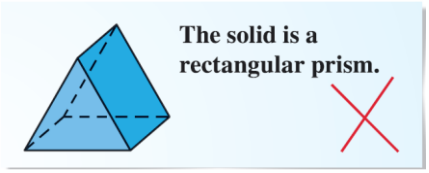
Assignment:

1. State Euler's Theorem in words.

Determine whether the solid is a polyhedron. If it is, name the polyhedron. *Explain* your reasoning.

2. 

3. Describe and correct the error in identifying the solid.



Sketch the polyhedron.

4. Triangular prism

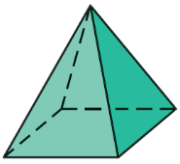
5. Pentagonal pyramid

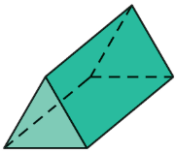
Use Euler's Theorem to find the value of *n*.

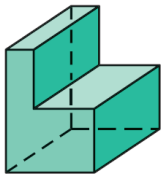
6. Faces: 5
   Vertices: *n*
   Edges: 8

7. Faces: *n*
   Vertices: 12
   Edges: 30

Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

8. 

9. 

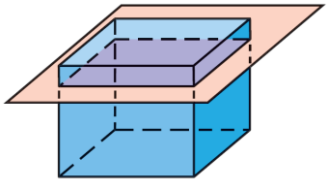
10. 

Determine whether the solid puzzle is *convex* or *concave*.

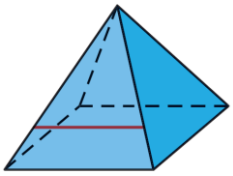
11. 

12. 

Draw and describe the cross section formed by the intersection of the plane and the solid.

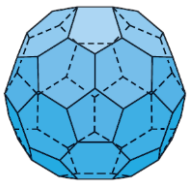
13. 

14. What is the shape of the cross section formed by the plane parallel to the base that intersects the red line drawn on the square pyramid?
    (A) Square
    (B) Triangle
    (C) Kite
    (D) Trapezoid



15. Which two solids have the same number of faces?
    (A) A triangular prism and a rectangular prism
    (B) A triangular pyramid and a rectangular prism
    (C) A triangular prism and a square pyramid
    (D) A triangular pyramid and a square pyramid

16. The solid shown has 32 faces and 90 edges. How many vertices does the solid have? *Explain* your reasoning.



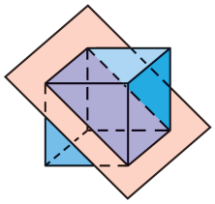
17. The speaker shown at the right has 7 faces. Two faces are pentagons and 5 faces are rectangles.
    a. Find the number of vertices
    b. Use Euler's Theorem to determine how many edges the speaker has.

Describe the shape of the cross section that is formed by the cut made in the food shown.

18. 

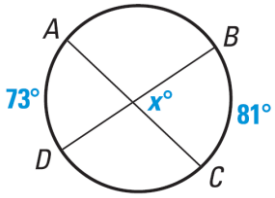
19. 

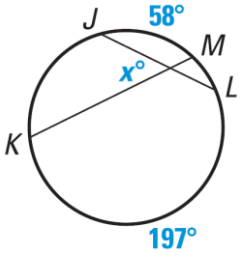
20. The figure at the right shows a plane intersecting a cube through four of its vertices. An edge length of the cube is 6 inches.
    a) Describe the shape formed by the cross section.
    b) What is the perimeter of the cross section?
    c) What is the area of the cross section?



Mixed Review

Find the value of *x*.

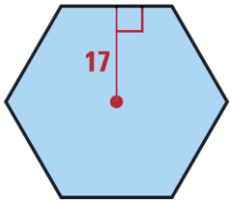
21. 

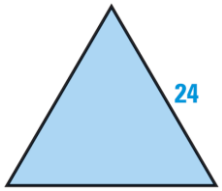
22. 

Use the given radius *r* or diameter *d* to find the circumference and area of the circle. Round your answers to two decimal places.

23. $d = 28$ in.

Find the perimeter and area of the regular polygon. Round your answers to two decimal places.

24. 

25. 

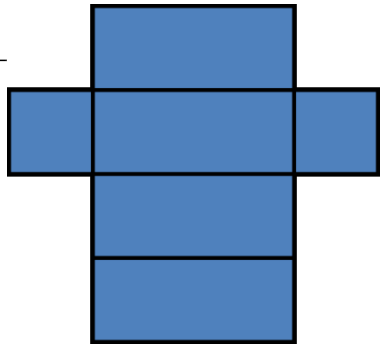
Geometry

12.2 Surface Area of Prisms and Cylinders

Surface Area

- Surface area = _____
  - In order to calculate surface area it is sometimes easier to_____

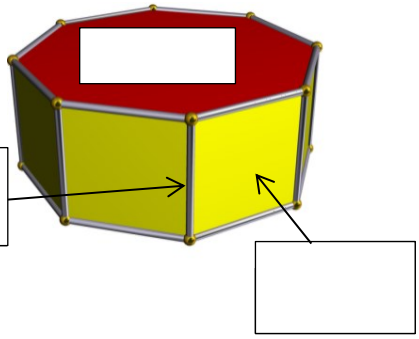
Nets



- Imagine cutting the three dimensional figure along_____
- Start by drawing one surface, then _____.
- To find the surface area, _____of the net.

Parts of a Right Prism

- Bases → parallel congruent surfaces _____
- Lateral faces → the other faces (they are_____)
- Lateral edges → intersections of the lateral faces (they are _____)
- Altitude → segment _____ to the planes containing the two bases with an endpoint on each plane
- Height → _____

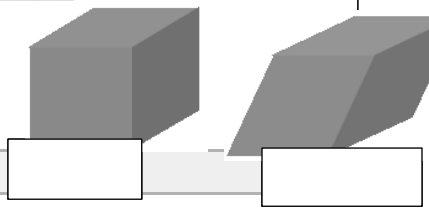


Right prism

- Prism where the lateral edges are _____

Oblique prism

- _____



Surface Area

Lateral Area (L) of Prisms

- Area of the _____
- ***L*** =_____
  - L = _____
  - P = _____
  - h = _____

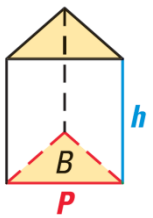
Base Area (B)

- In a prism, both bases are congruent, so you only need to find the area of one base and multiply by two

Surface Area of a Right Prism

S = _____

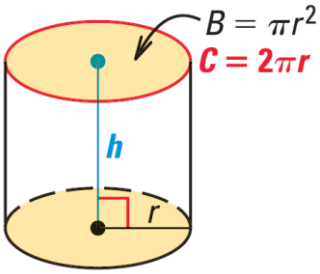
Where *S* = surface area, *B* = base area, *P* = perimeter of base, *h* = height of prism



Draw a net for a triangular prism.

Find the lateral area and surface area of a right rectangular prism with height 7 inches, length 3 inches, and width 4 inches.

Surface Area of Cylinders



- Cylinders are the same as prisms except the bases are _____
  - Lateral Area = L = _____

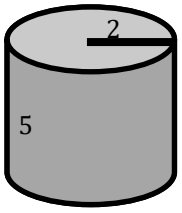
Surface Area of a Right Cylinder

S=_____

Where S = surface area, r = radius of base, h = height of prism

The surface area of a right cylinder is 100 cm^2. If the height is 5 cm, find the radius of the base.

Draw a net for the cylinder and find its surface area.



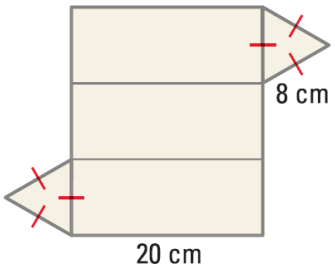
Assignment: Attached worksheet

Geometry 12.2 Name: _____

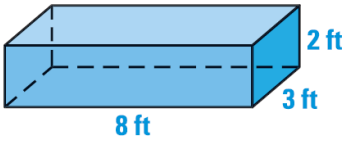
Assignment:

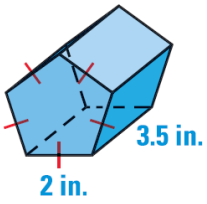
1. *Explain* how the formula $S = 2B + Ph$ applies to find the surface area of both a right prism and a right cylinder.

Find the surface area of the solid formed by the net. Round your answers to two decimal places.

2. 

Find the lateral area and surface area of the right prism. Round your answers to two decimal places.

3. 

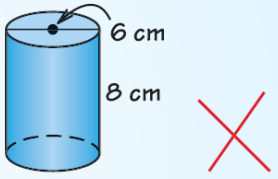
4. 

Find the lateral area and surface area of the right cylinder using the given radius *r* and height *h*. Round your answers to two decimal places.

5. $r = 12$ mm, $h = 40$ mm

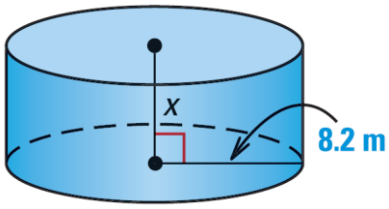
6. *Describe* and correct the error in finding the surface area of the right cylinder.

$$S = 2\pi(6^2) + 2\pi(6)(8)$$
$$= 2\pi(36) + 2\pi(48)$$
$$= 168\pi$$
$$\approx 528 \text{ cm}^2$$



Solve for *x* given the surface area *S* of the right prism or right cylinder. Round your answer to two decimal places.

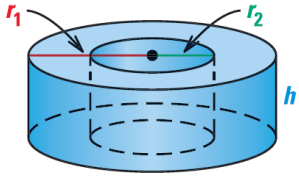
7. $S = 1097$ m^2



8. A triangular prism with a right triangular base has leg length 9 units and hypotenuse length 15 units. The height of the prism is 8 units. Sketch the prism and find its surface area.
9. The radius and height of a right cylinder are each divided by $\sqrt{5}$. What is the change in surface area of the cylinder?
10. Find the height of a cylinder with a surface area of 108π square meters. The radius of the cylinder is twice the height.

11. A bass drum has a diameter of 20 inches and a depth of 8 inches. Find the surface area of the drum.

12. A right cylinder has a radius of 4 feet and height of 10 feet.
    a) Find the surface area of the cylinder.
    b) Suppose you can either *double the radius* or *double the height*. Which do you think will create a greater surface area?
    c) Check your answer in part (b) by calculating the new surface areas.
13. A company makes recycling bins. One type is a right rectangular prism with length 14 inches, width 12 inches, and height 36 inches. The bins are missing a base, so the bins have one open end. How much material is required to make the bin?
14. The ring shown is a right cylinder of radius r_1 with a cylindrical hole of radius r_2. The ring has height h.
    a) Find the surface area of the ring if r_1 is 12 meters, r_2 is 6 meters, and h is 8 meters. Round your answer to two decimal places.
    b) Write a formula that can be used to find the surface area S of any cylindrical ring where $0 < r_2 < r_1$.



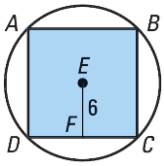
Mixed Review

The sum of the measures of the interior angles of a convex polygon is given. Classify the polygon by the number of sides.

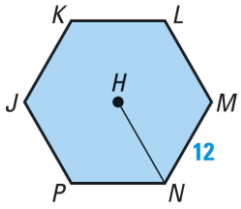
15. 1080°
16. 720°
17. 1800°

Find the area of the regular polygon.

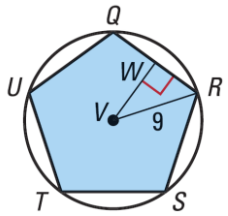
18.



19.



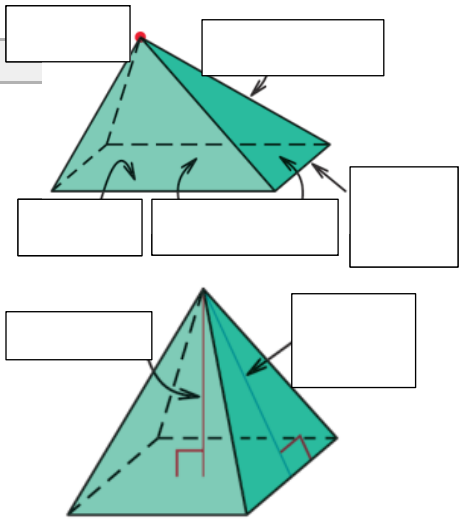
20.



Geometry

12.3 Surface Area of Pyramids and Cones (12.4)

Pyramids



- All faces except one intersect at one point called _____
- The _____ is the face that does not intersect at the vertex
- _____ are faces that meet in the vertex
- _____ are edges that meet in the vertex
- _____ is a segment that goes from the vertex and is perpendicular to the base

Regular Pyramid

- Base is a _____
- The vertex is directly above the _____
- In a regular pyramid, all the lateral faces are _____ _____
- The height of each lateral face is called the _____(ℓ)

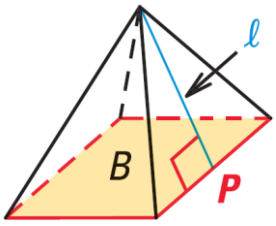
Lateral Area

- L = _____

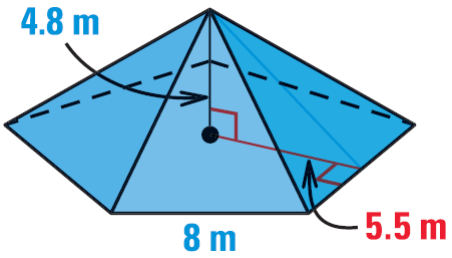
Surface Area of a Regular Pyramid

S =_____

Where B = base area, P = base perimeter, ℓ = slant height

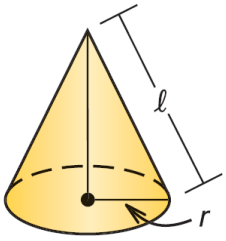


Find the surface area of the regular pentagonal pyramid.



Cones

- Cones are just like pyramids except the base is a _____
- Lateral Area = _____



Surface Area of a Right Cone

S =_____

Where r = base radius, ℓ = slant height

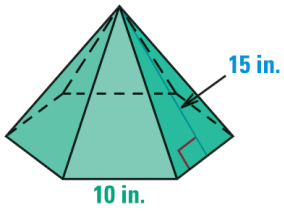
The So-Good Ice Cream Company makes Cluster Cones. For packaging, they must cover each cone with paper. If the diameter of the top of each cone is 6 cm and its slant height is 15 cm, what is the area of the paper necessary to cover one cone?

Assignment: Attached worksheet

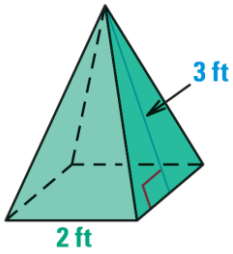
Assignment:

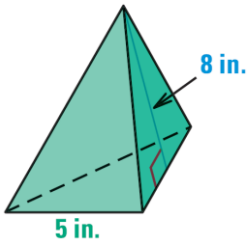
1. *Compare* the height and slant height of a right cone.

Find the area of each lateral face of the regular pyramid.

2. 

Find the lateral area and surface area of the regular pyramid. Round your answers to two decimal places.

3. 

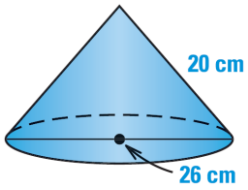
4. 

Find the lateral area of the right cone. Round your answer to two decimal places.

5. 

6. 

Find the surface area of the right cone. Round your answer to two decimal places.

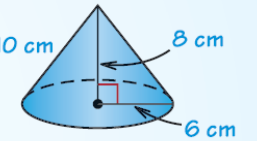
7. 

8. Describe and correct the error in finding the surface area of the right cone.

$S = \pi(r^2) + \pi r^2 \ell$

$= \pi(36) + \pi(36)(10)$

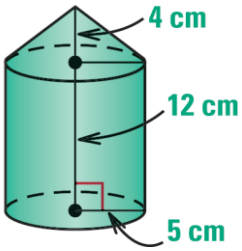
$= 396\pi \text{ cm}^2$

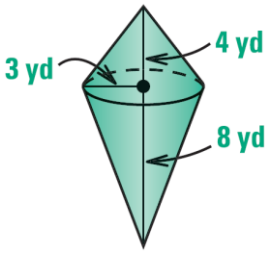


Sketch the described solid and find its surface area. Round your answer to two decimal places.

9. A right cone has a radius of 15 feet and a slant height of 20 feet.
10. A regular pyramid has a slant height of 24 inches. Its base is an equilateral triangle with a base edge length of 10 inches.

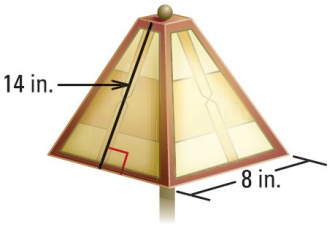
Find the surface area of the solid. The pyramids are regular and the cones are right. Round your answers to two decimal places, if necessary.

11. 

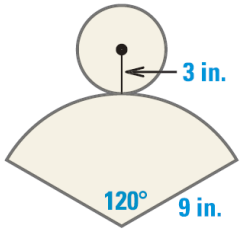
12. 

13. A right cone with a base of radius 4 inches and a regular pyramid with a square base both have a slant height of 5 inches. Both solids have the same surface area. Find the length of a base edge of the pyramid. Round your answer to the nearest hundredth of an inch.

14. A glass lampshade is shaped like a regular pyramid.
    a) Approximate the lateral area of the lampshade shown.
    b) *Explain* why your answer to part (a) is not the exact lateral area.

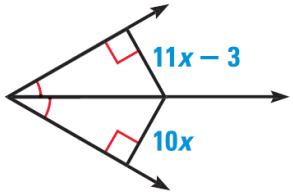


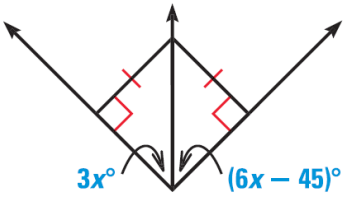
Name the figure that is represented by the net. Then find its surface area. Round your answer to two decimal places.

15. 

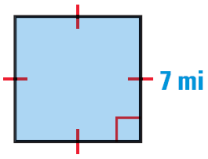
Mixed Review

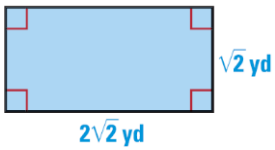
Find the value of x.

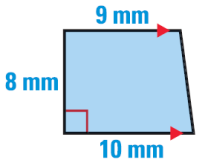
16. 

17. 

Find the area of the polygon.

18. 

19. 

20. 

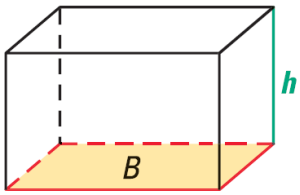
Geometry

12.4 Volume of Prisms and Cylinders (12.2)

Volume of a Prism

V =_____

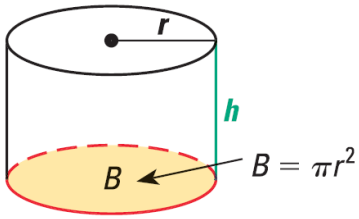
Where B = base area, h = height of prism



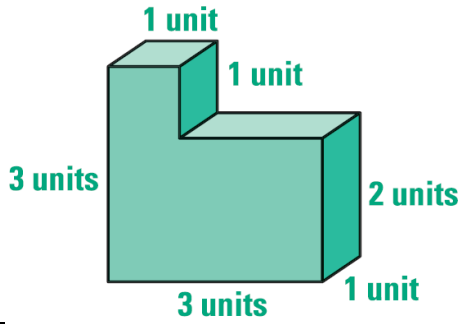
Volume of a Cylinder

V =_____

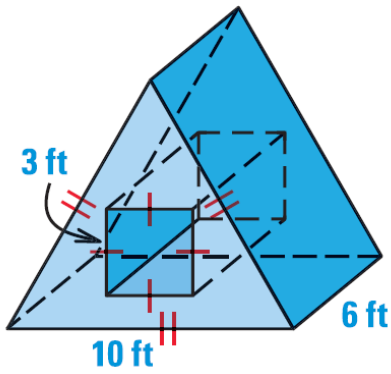
Where r = radius, h = height of cylinder



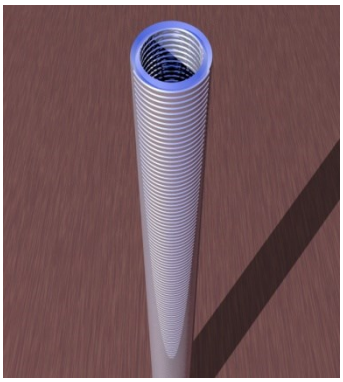
Find the volume of the figure.



Find the volume.



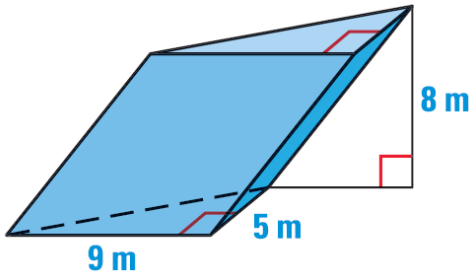
There are 150 one-inch washers in a box. When the washers are stacked, they measure 9 inches in height. If the inside hole of each washer has a diameter of ¾ inch, find the volume of metal in one washer.



Cavalieri's Principle

If two solids have the same _____ and the same _____at every level, then _____.

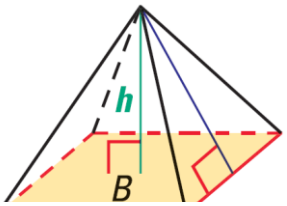
Find the volume.



Assignment: 632 #2, 4, 6, 8, 10, 12, 14, 15, 16, 18, 20, 22, 26, 28, 30, 37, 38, 40, 49, 50 = 20 total

Geometry

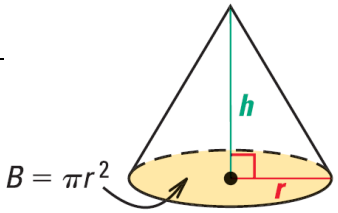
12.5 Volume of Pyramids and Cones (12.3, 12.4)



Volume of a Pyramid

$V =$_____

Where B = base area, h = height of pyramid

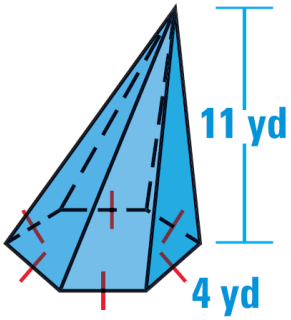


Volume of a Cone

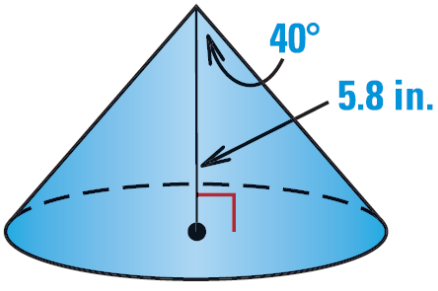
$V =$_____

Where r = radius, h = height of cone

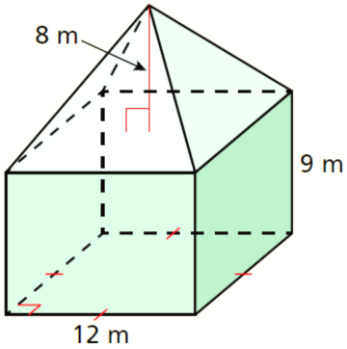
Find the volume.



Find the volume.



Find the volume of the composite solid.

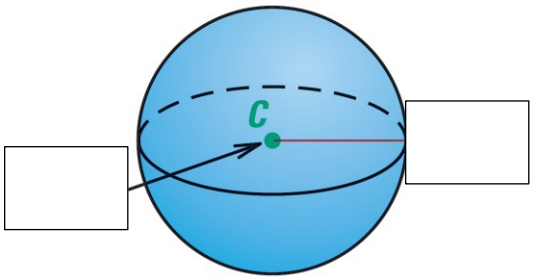


Assignment: 639 #1, 2, 4, 8, 9, 10, 14, 16, 645 #5, 6, 8, 10, 13, 14, 17, 24, 25, 27, 29, 31 = 20

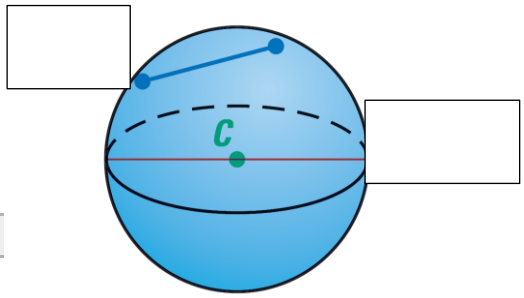
Geometry

12.6 Surface Area and Volume of Spheres (12.5)

Parts of a Sphere

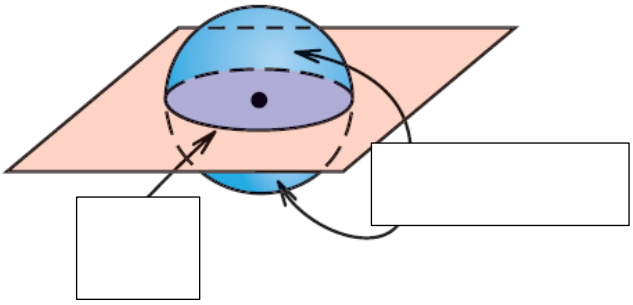


- **Sphere**
  - All points _____
- **Radius**
  - Segment from _____
- **Chord**
  - Segment that connects _____
- **Diameter**
  - Chord that contains _____
- **Tangent**
  - Line that intersects the sphere _____ _____



Intersections of a Plane and a Sphere

- Point
  - _____
- Circle
  - _____
- Great Circle
  - _____ _____ (like equator)
  - Shortest _____ two points on sphere
  - Cuts sphere into two _____



Surface Area of a Sphere

S =_____

Where r = radius

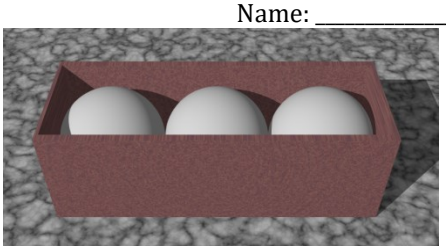
Volume of a Sphere

V =_____

Where r = radius

Geometry 12.6 Name: _____

Find the volume of the empty space in a box containing three golf balls. The diameter of each is about 1.5 inches. The box is 4.5 inches by 1.5 inches by 1.5 inches.



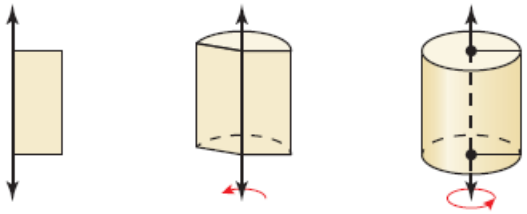
Assignment: 652 #2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 42, 44, 45, 46, 48 = 20 total

Geometry

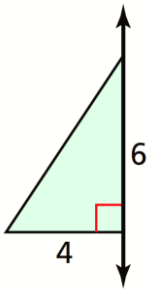
12.7 Solids of Revolution (12.7)

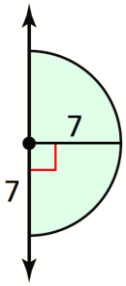
Solid of Revolution

- _____-dimensional figure form by _____ a _____-dimensional shape around an _____
- The axis is the axis of _____.

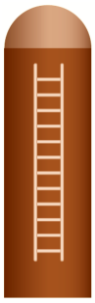


Sketch the solid produced by rotating the figure around the axis.

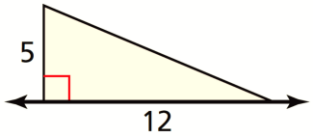




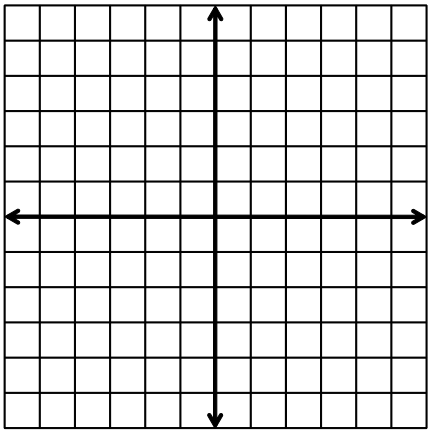
Sketch a two-dimensional shape and an axis of revolution that can form the grain silo shown.



Sketch and describe the solid produced by rotating the figure around the given axis. Then find its surface area.



Sketch and describe the solid that is produced when the region enclosed by $x = 0$, $y = 0$, and $y = x + 2$ is rotated around the x-axis. Then find the volume of the solid.

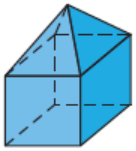


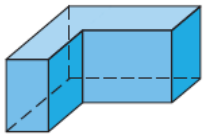
Assignment: 665 #2, 4, 6, 7, 8, 10, 12, 14, 16, 18, 20, 22, 23, 24, 26, 33, 35, 36, 37, 38 = 20 total

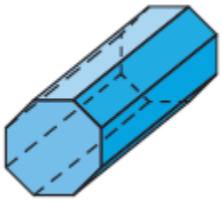
Name: _____

Geometry Chapter 12 Review

Find the number of faces, vertices, and edges of the polyhedron. Check your answer using Euler's Theorem.

1. 

2. 

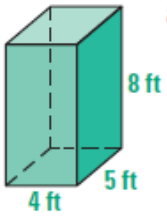
3. 

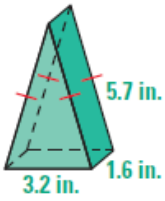
Use Euler's Theorem to find the value of *n*.

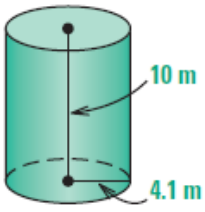
4. Faces: 12
   Vertices: 10
   Edges: *n*

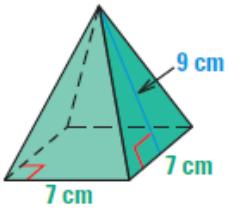
5. Faces: *n*
   Vertices: 4
   Edges: 6

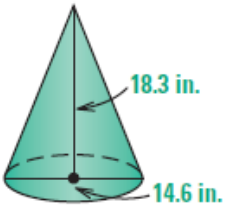
Find the surface area of the solid. The pyramids are regular and the prisms, cones, and cylinders are right. Round your answer to two decimal places, if necessary.

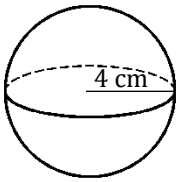
6. 

7. 

8. 

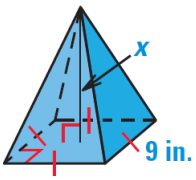
9. 

10. 

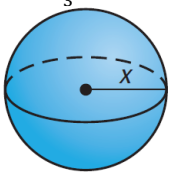
11. 

Solve for *x* given the volume *V* of the right solid. Round your answers to the <u>nearest</u> unit.

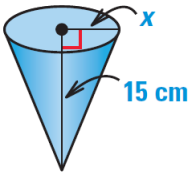
12. $V = 324\ in.^3$



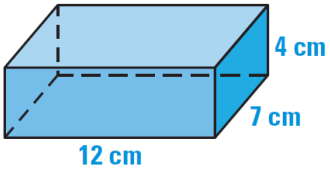
13. $V = \frac{32\pi}{3}\ ft^3$



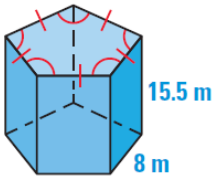
14. $V = 180\pi\ cm^3$

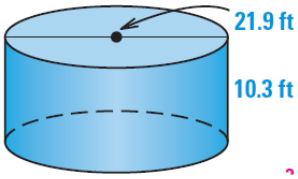


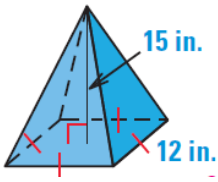
Find the volume of the solid. The pyramids are regular and the prisms, cones, and cylinders are right. Round your answer to two decimal places, if necessary.

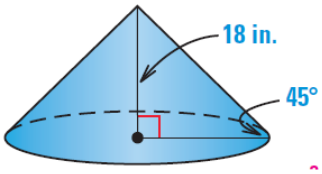
15. 

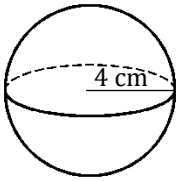
Name: _____

16. 

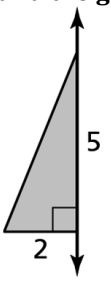
17. 

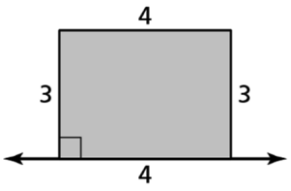
18. 

19. 

20. 

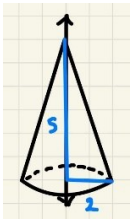
Sketch the solid produced by rotating the figure around the given axis.

21. 

22. 

Answers

1. 9, 9, 16
2. 8, 12, 18
3. 10, 16, 24
4. 20
5. 4
6. 184 ft^2
7. 40.87 $in.^2$
8. 363.23 m^2
9. 175 cm^2
10. 619.26 $in.^2$
11. 201.06 cm^2
12. 12 in.
13. 2 ft
14. 6 cm
15. 336 cm^3
16. 1706.71 m^3
17. 3879.85 ft^3
18. 720 $in.^3$
19. 6107.26 $in.^3$
20. 268.08 cm^3
21. Cone with radius 2 and height 5



22. Cylinder with radius 3 and height 4