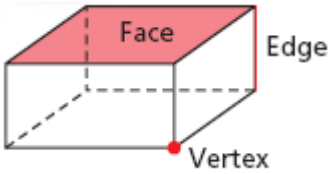
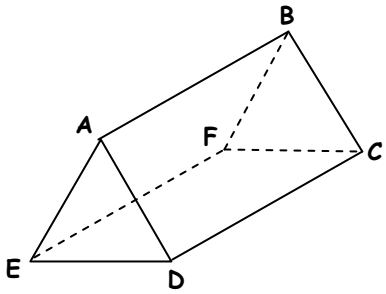
Practice: Space Figures and Cross Sections
Geometry 11-1

Name: _____
Date: _____ Period: _____

Polyhedron
* 3D figure whose surfaces are _____
* each polygon is a _____.
* an _____ is a segment where two faces intersect.
* a _____ is a point where 3 or more edges intersect.



Example 1: List the vertices, edges, and faces of the polyhedron.



There are ___ vertices:

There are ___ edges:

There are ___ faces:

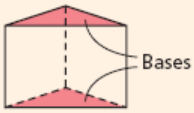
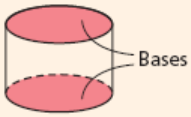
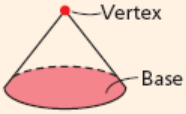
Leonhard Euler (1707-1783), a Swiss mathematician, discovered a relationship among the numbers of faces, vertices, and edges of any polyhedron.

Euler's Formula: $F + V = E + 2$ where F = # of faces
V = # of vertices
E = # of edges

Example 2: Find the number of edges of a polyhedron with 6 faces and 8 vertices.

Note: In two-dimensions, Euler's formula reduces to $F + V = E + 1$
where F is the number of regions formed by V vertices linked by E segments.

Three-Dimensional Figures

TERM	EXAMPLE
A **prism** is formed by two parallel congruent polygonal faces called *bases* connected by faces that are parallelograms.	
A **cylinder** is formed by two parallel congruent circular bases and a curved surface that connects the bases.	
A **pyramid** is formed by a polygonal base and triangular faces that meet at a common vertex.	
A **cone** is formed by a circular base and a curved surface that connects the base to a vertex.	

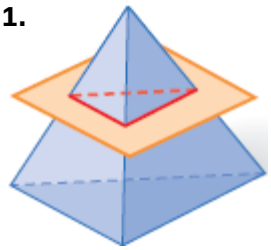
The faces of a prism are all _____ except for ___ bases that are ≅ and || to each other.

The faces of a pyramid are all _____ except for ___ base.

A **cross section** is the intersection of a solid and a plane. You can think of a cross section as a very thin slice of a solid.

Describe each cross section. Then name the solid (disregarding the cross section) and, if it is a polyhedron, find the number of faces, vertices, and edges.

1.

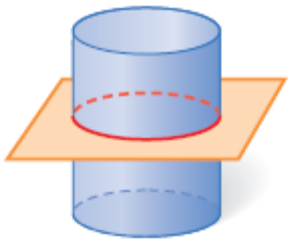


Cross Section:
a triangle

Solid:
Triangular pyramid

F: 4
V: 4
E: 6

2.



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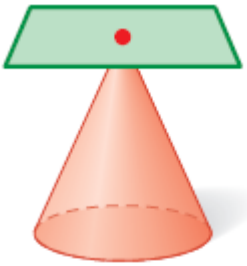

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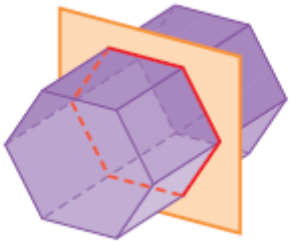

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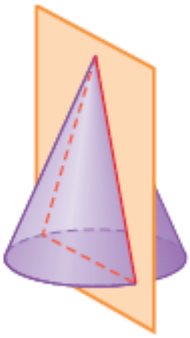

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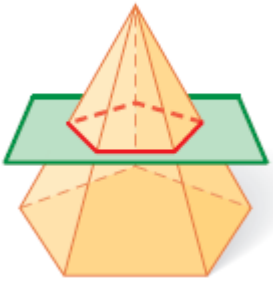

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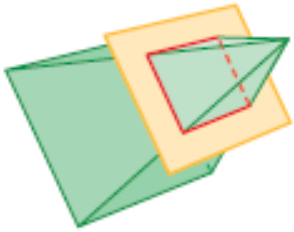

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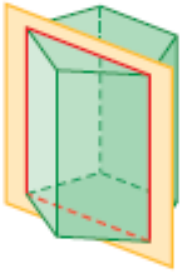

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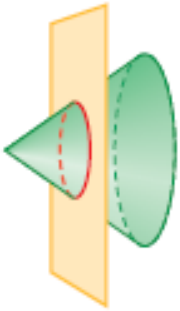

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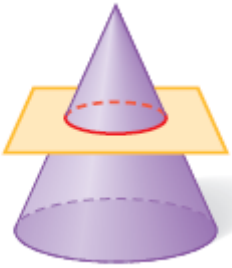

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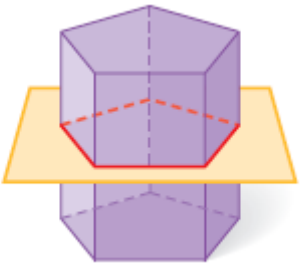

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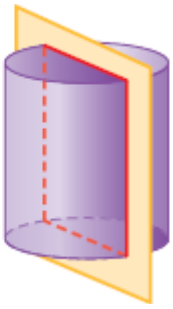
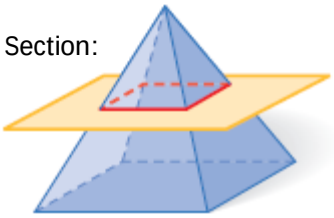


13.

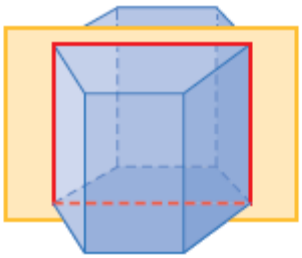
Cross Section:

Solid:



F:
V:
E:

14.



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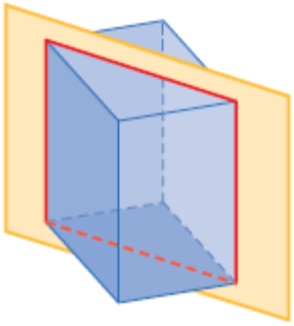


Cross Section:

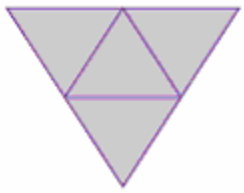
Solid:

F:
V:
E:

Practice: Nets
Geometry 1-2

Name: _____
Date: _____ Period: _____

Describe the three-dimensional figure that can be made from the given net.

1.


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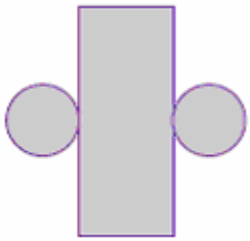

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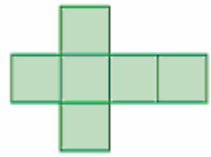

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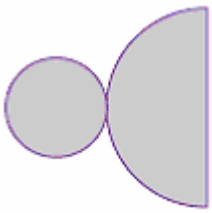

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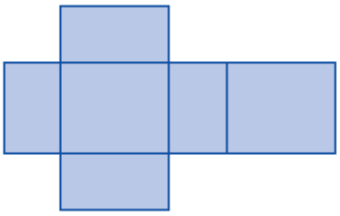

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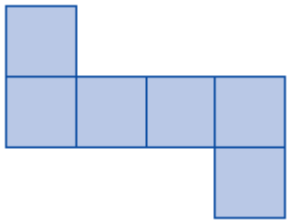

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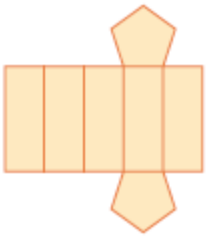

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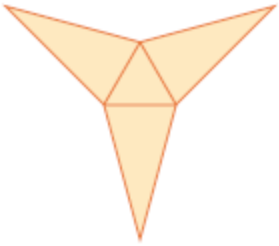

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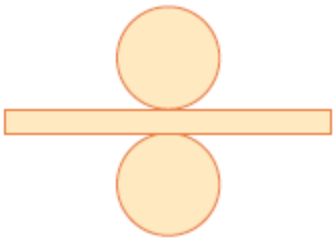

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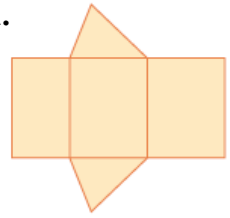

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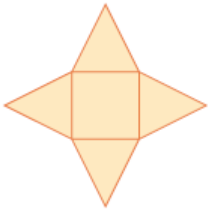
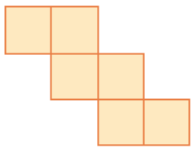
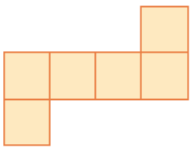
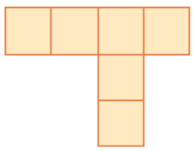


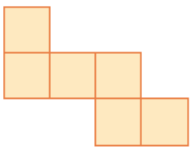
13.


14. **Write About It** Which of the following figures is not a net for a cube? Explain.

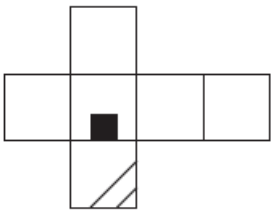
a.


c.


b.


d.


15. Which three-dimensional figure does the net represent?



a.


c.


b.


d.

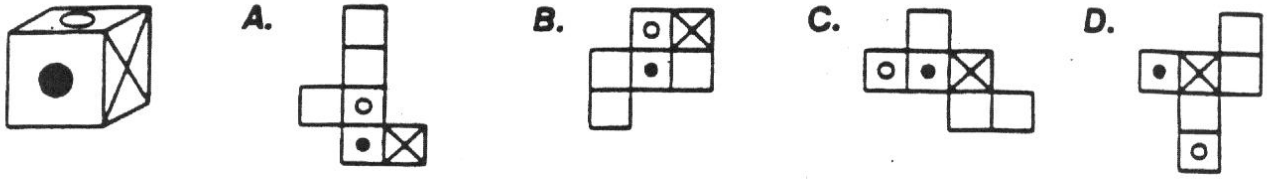

EXTENSION

Name _____

Lesson 12 - 9

Visualizing in Three Dimensions

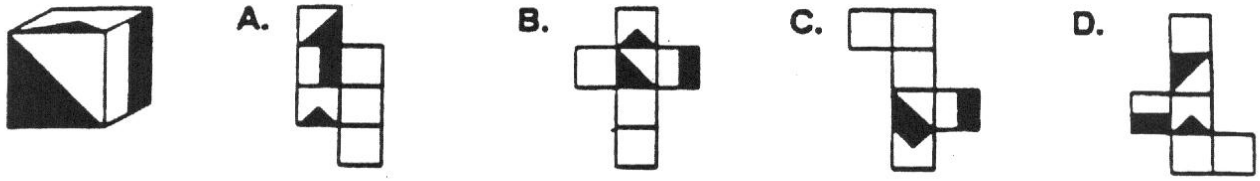
On some aptitude tests you will find questions which ask you to visualize three-dimensional constructions. For instance, you might be asked to "fold" patterns in your mind. In the example below, see if you can guess which pattern, when folded, would produce the box on the left.



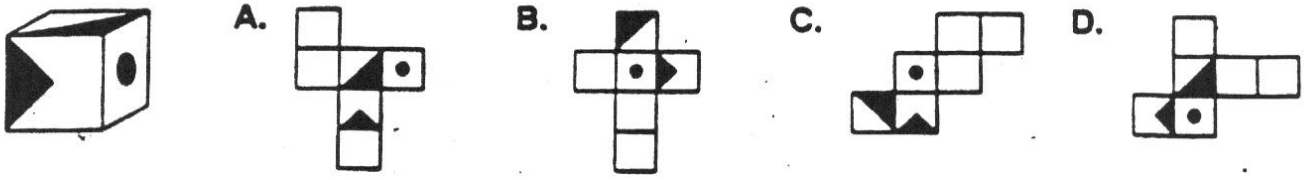
The correct answer is A.

Choose the one pattern from each set that could be folded into the box shown.

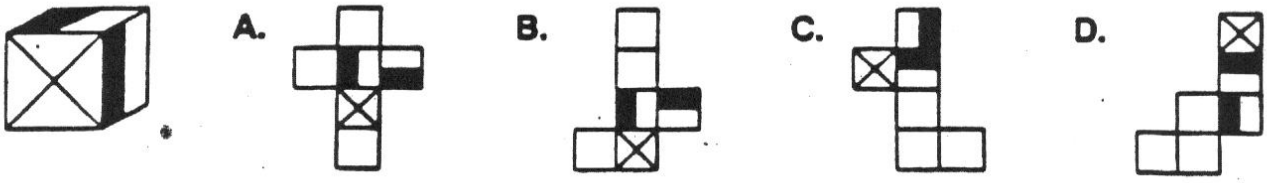
1.



2.



3.



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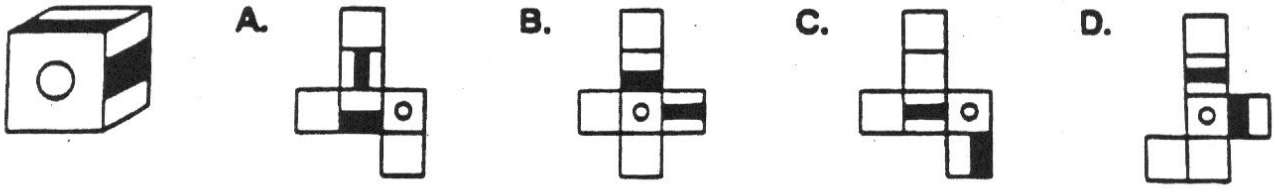

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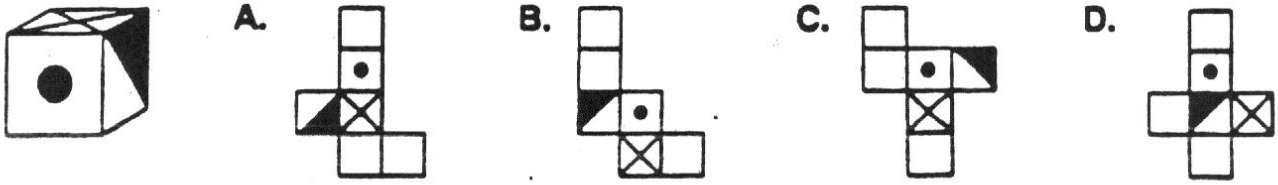


What's my Surface Area? What's my Volume? Name_____

Use the ruler on your TAKS Formula Chart to measure to the **nearest quarter inch** and answer the following questions regarding these nets that will form solids. **Please identify the face(s) you are calling the base(s) by lightly shading it(them).**

(Hint: the base is not what it is sitting on; it is what gives the solid its name.)

Cylinder

Shape of the base: _____

Perimeter of Base (P): _____
(note that here "P" is really circumference)

Formula for area of the base: _____

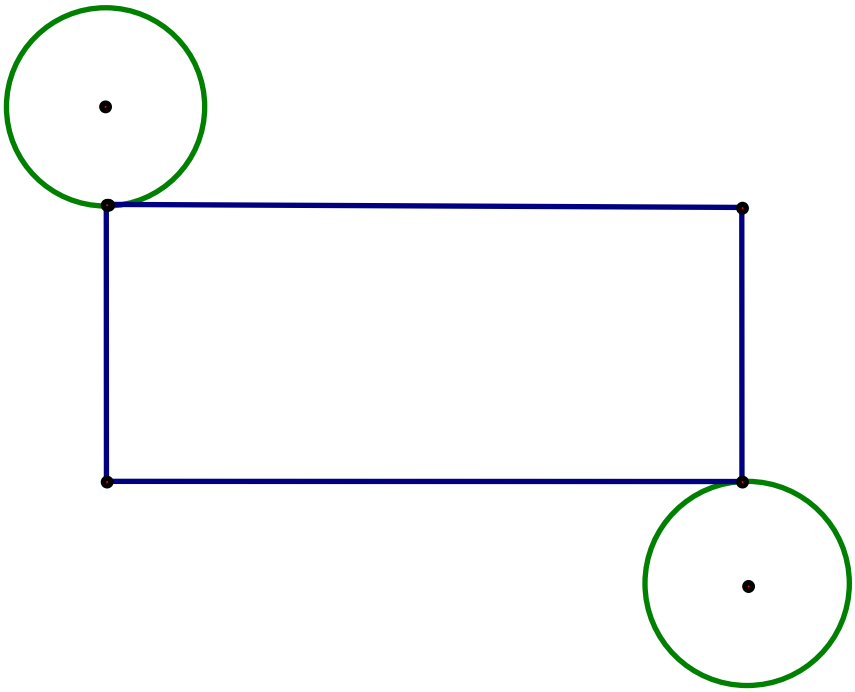
Area of Base (B): _____

Height of solid (h): _____

Surface Area (total): _____

Formula for Volume: _____

Volume of Solid: _____



Pyramid

Shape of the base: _____

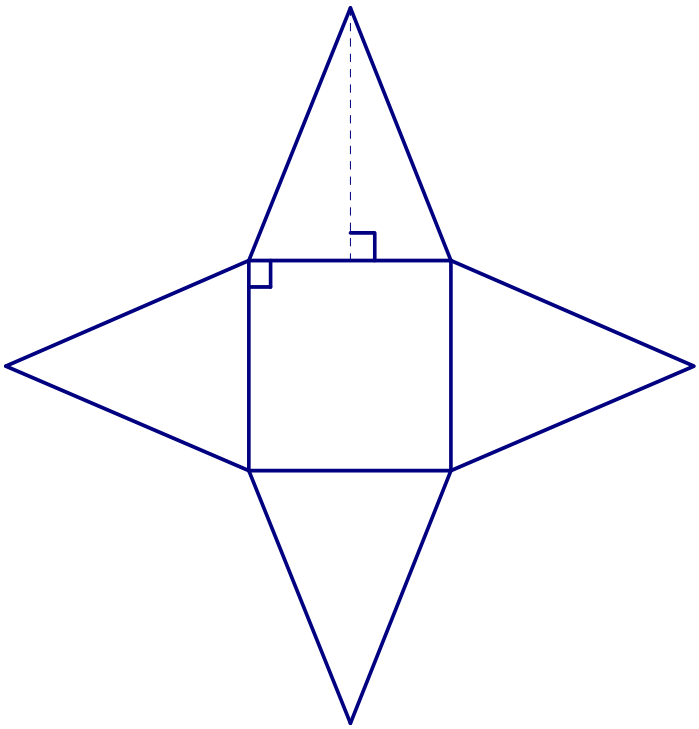
Perimeter of Base (P): _____

Formula for area of the base: _____

Area of Base (B): _____

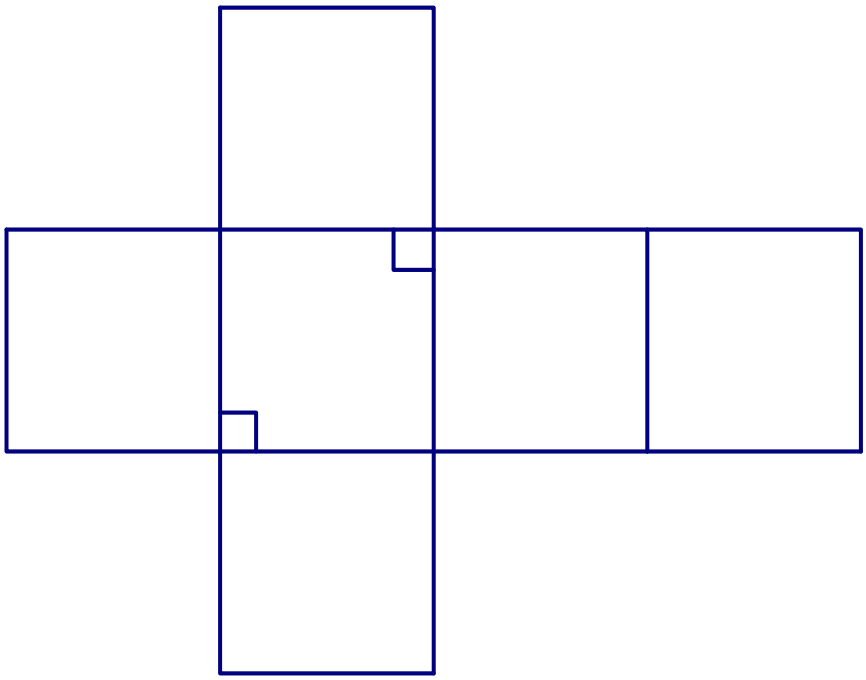
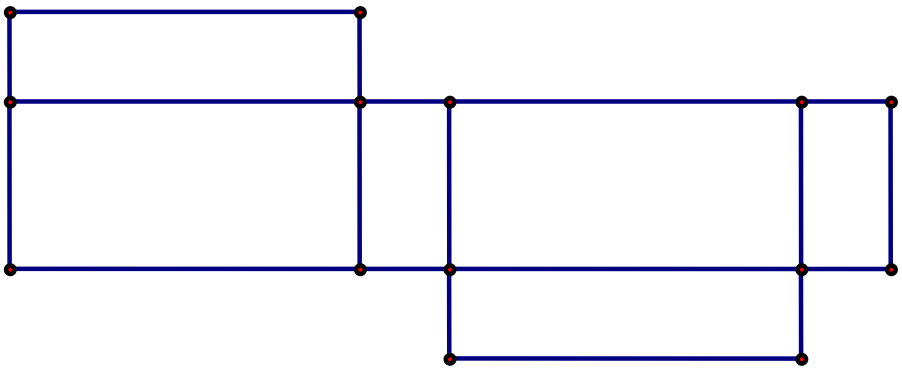
Slant height of solid (*l*): _____

Surface Area (total): _____



Use the ruler on your TAKS Formula Chart to measure to the **nearest tenth of a centimeter** and answer the following questions regarding these nets that will form solids. **Please identify the face(s) you are calling the base(s) by lightly shading it(them).**

(Hint: the base is not what it is sitting on; it is what gives the solid its name.)

Cube Shape of the base: _____ Perimeter of Base (P): _____ Formula for area of base: _____ Area of Base (B): _____ Height of solid (h): _____ Surface Area (total): _____ Formula for Volume: _____ Volume of Solid: _____ (Is your choice of a "base" as crucial in this problem?)	
Rectangular prism Shape of the base: _____ Perimeter of Base (P): _____ Formula for area of base: _____ Area of Base (B): _____ Height of solid (h): _____ Surface Area (total): _____ Formula for Volume: _____ Volume of Solid: _____ (Is your choice of a "base" as crucial in this problem?)	

Notes – Surface Area of Cones, Pyramids, Spheres, Prisms Name_____

Using a ruler, measure to the nearest $\frac{1}{4}$ inch all sides of the net that are needed to find the areas of all polygons and circles.

Cone

Shape of the base: _____

Perimeter of Base (P): _____
(note that here "P" is really circumference)

Formula for area of the base: _____

Area of Base (B): _____

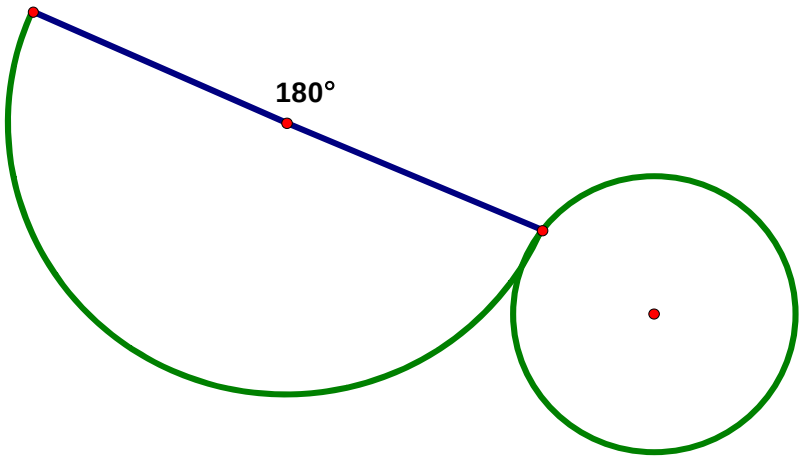
Slant height of solid (*l*): _____

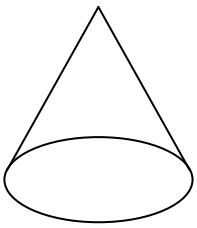
Formula- Surface Area (lateral):_____

Surface Area (lateral): _____

Formula-Surface Area(total): _____

Surface Area (total): _____





Pyramid

Shape of the base: _____

Perimeter of Base (P): _____

Formula for area of the base: _____

Area of Base (B): _____

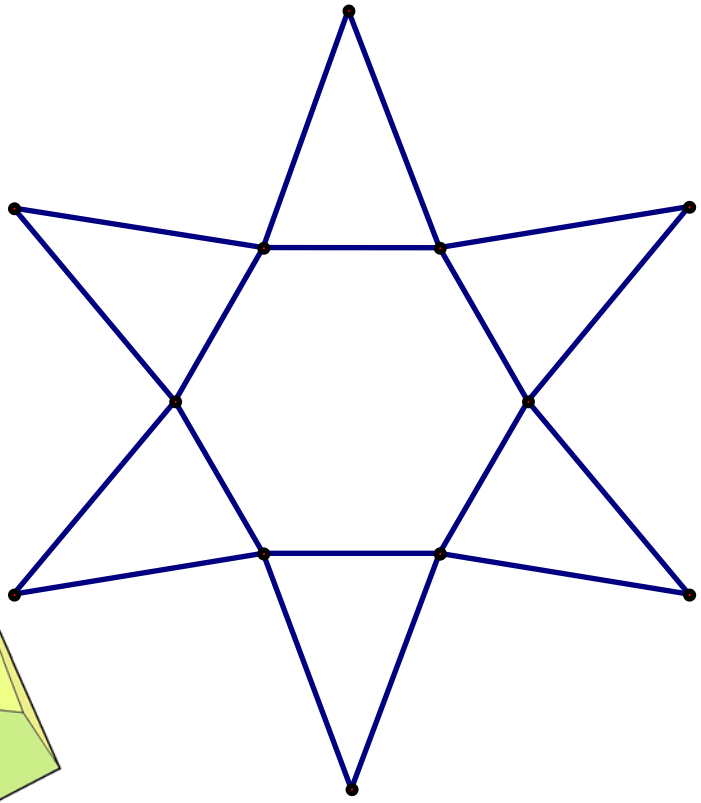
Slant height of solid (*l*): _____

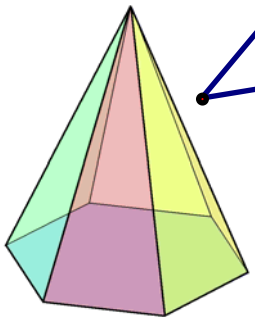
Formula- Surface Area (lateral):_____

Surface Area (lateral): _____

Formula-Surface Area(total): _____

Surface Area (total): _____





Sphere

Shape of the base: _____

Perimeter of Base (P): _____

Formula for area of the base: _____

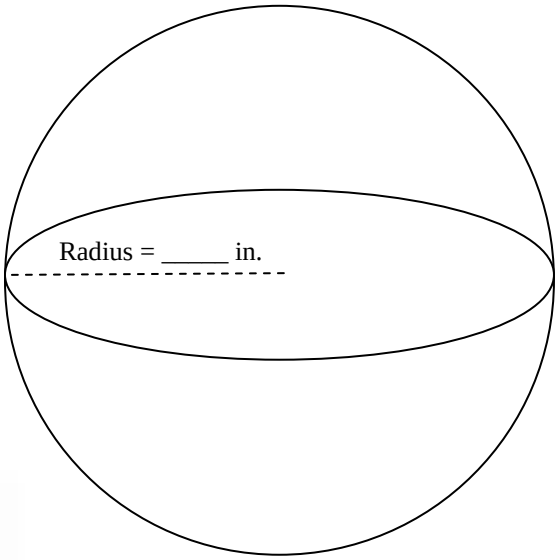
Area of Base (B): _____

Formula-Surface Area: _____

Surface Area of Solid: _____

Formula for Volume: _____

Volume of Solid: _____



Name of this solid _____

Shape of the base: _____

Perimeter of Base (P): _____

Formula for area of the base: _____

Area of Base (B): _____

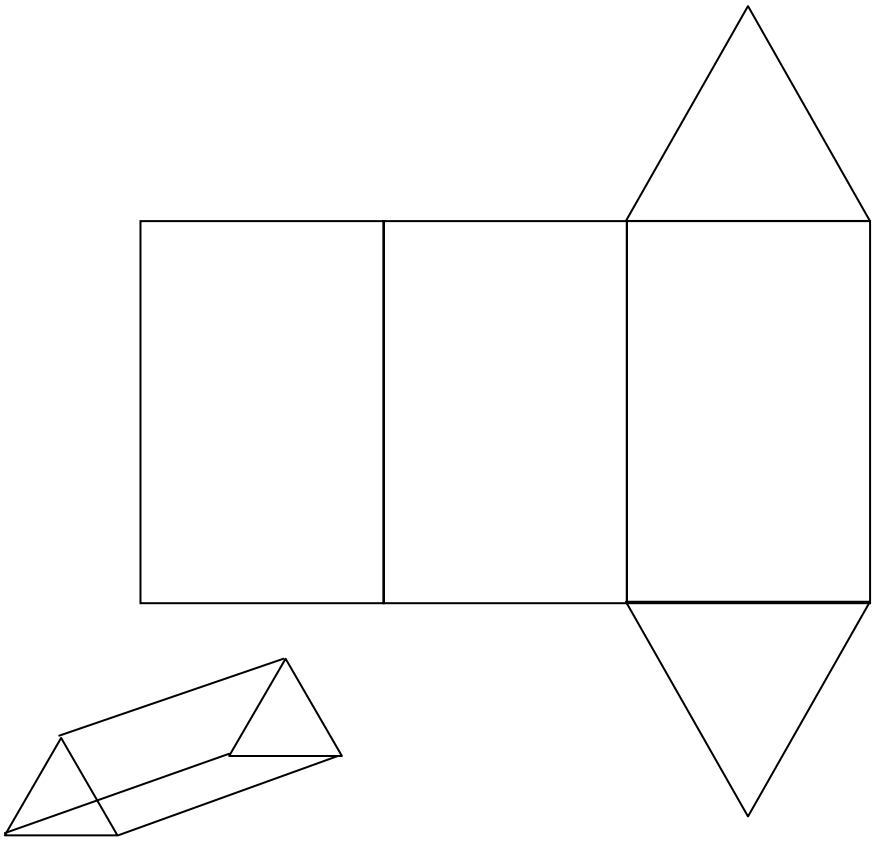
Height of solid (h): _____

Formula- Surface Area (lateral):_____

Surface Area (lateral): _____

Formula-Surface Area(total): _____

Surface Area (total): _____



11-2, 11-3 Surface Areas of Prisms, Cylinders, Pyramids, and Cones

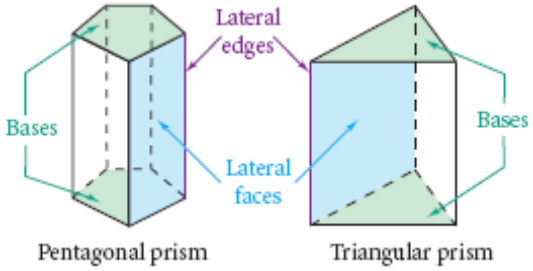
Name: _____

Notes Date: _____ Period: _____

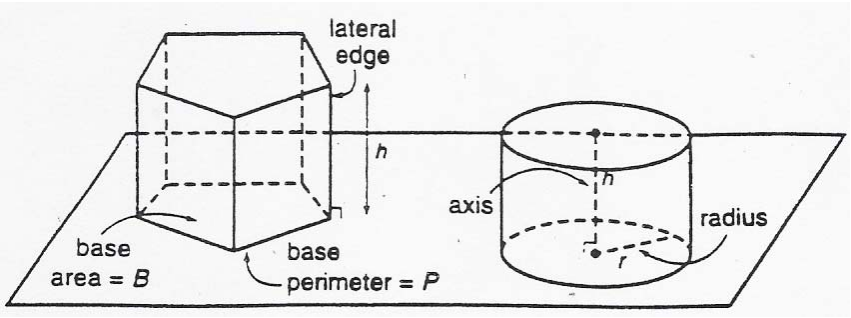
The _____ _____ is the sum of the areas of all the faces of a solid.

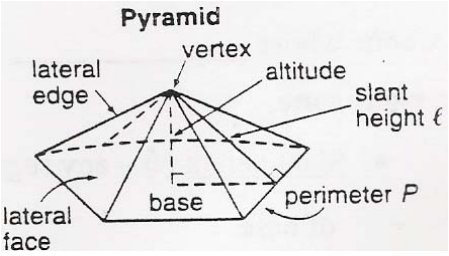
11-2 Prisms and Cylinders

1. The two congruent, parallel faces of a prism are called the _____.
2. The other faces of the prism are called the _____ faces.
3. A _____ edge of a prism is an edge that is not one edge of the base.
4. The _____ of a cylinder is the segment joining the centers of the two circular bases.
5. An _____ of a prism or cylinder is a perpendicular segment that joins the planes of the bases.
6. The _____ of a prism or cylinder is the length of an altitude.
7. The _____ area is the sum of the areas of all lateral faces.
8. Therefore, the surface area of a prism or cylinder is the sum of the _____ area and the two _____ areas.



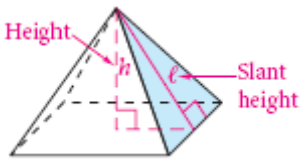
SA = LA + 2B (Prism or Cylinder)

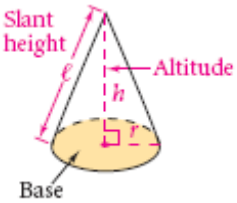




11-3 Pyramids and Cones

1. A _____ has one base that is a polygon and _____ faces that are triangles that meet at a common vertex.
2. A _____ pyramid has a base that is a regular polygon (All sides and angles of the polygon are congruent).
3. The _____ of a pyramid or cone is the length of the perpendicular segment from the vertex to the plane of the base.
4. The _____ height of a pyramid or cone is the length of the altitude of a lateral face.
5. Since pyramid or cone has only one base, the surface of area of a pyramid or cone is the sum of the _____ area and the _____ area.

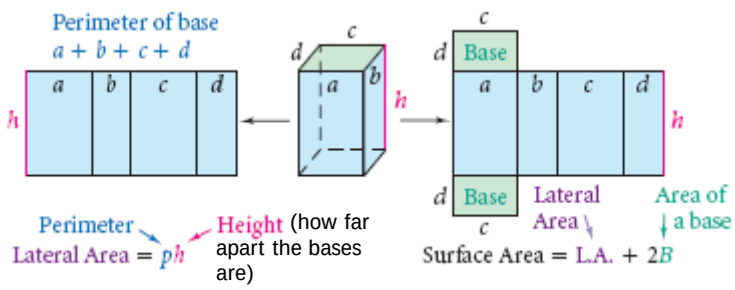


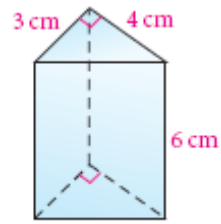


SA = LA + B (Pyramid or Cone)

11-2, 11-3 Surface Areas of Prisms, Cylinders, Pyramids, and Cones

Formulas for Prism





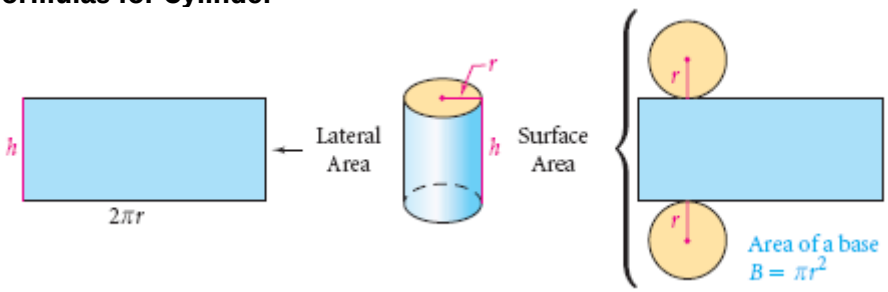
Ex. 2, p. 609

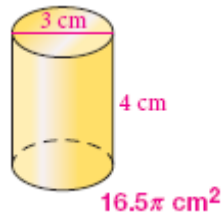
LA = _____ = _____ = _____
formula — substitute with values and solve — answer with units

B = _____ = _____ = _____

SA = _____ = _____ = _____

Formulas for Cylinder





$LA = Ph = 2\pi rh$ $\qquad$ $SA = LA + 2B$, or $SA = 2\pi rh + 2\pi r^2$

Prob. 9 p. 612

LA = _____ = _____ = _____

B = _____ = _____ = _____

SA = _____ = _____ = _____

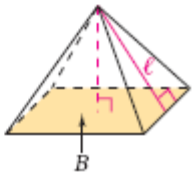
Formulas for a Regular Pyramid

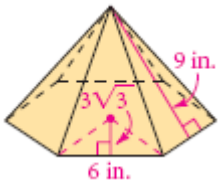
The lateral area of a regular pyramid is half the product of the perimeter of the base and the slant height.

$$L.A. = \tfrac{1}{2}p\ell$$

The surface area of a regular pyramid is the sum of the lateral area and the area of the base.

$$S.A. = L.A. + B$$





Ex. 1 p. 618

LA = _____ = _____ = _____

B = _____ = _____ = _____

SA = _____ = _____ = _____

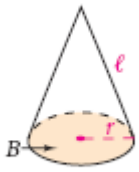
Formulas for a Cone

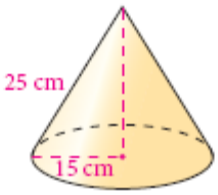
The lateral area of a right cone is half the product of the circumference of the base and the slant height.

$$LA = \tfrac{1}{2}P\ell = \tfrac{1}{2}(2\pi r)\ell = \pi r\ell$$

The surface area of a right cone is the sum of the lateral area and the area of the base.

$$SA = \tfrac{1}{2}P\ell + B = \pi r\ell + \pi r^2$$





Ex. 3 p. 619

LA = _____ = _____ = _____

B = _____ = _____ = _____

SA = _____ = _____ = _____

Answers to
Pg 611 # 2-10 evens, 16, 19, 21, 26, 32, 34, 37
Pg 620 # 1, 2, 4, 7, 8, 12, 14, 20, 23, 24, 29, 30, 41, 42

Pg 611

2. 216 ft^2
4. a) right hexagonal prism. b) 240 cm^2. c) $48\sqrt{3}$ cm^2. d) $240 + 48\sqrt{3}$ cm^2.
6. LA= 96 in^2, SA= 108 in^2
8. 40π cm^2
10. 101.5π in^2
16. 20 cm
19. 4080 mm^2
21. a) 94 $units^2$ b) 376 $units^2$ c) 4:1 d) 438 $units^2$, 1752 $units^2$, 4:1 e) The surface area becomes 4 times as large.
26. a) A(3, 0, 0), B(3, 5, 0), C(0, 5, 0), D(0, 5, 4) b) 5. c) 3. d) 4. e) 94 $units^2$
32. a) $r \approx 1.2$ in, h = 6 in b) About 54 in^2
34. $84 + 20\pi$ m^2
37. a) 4 faces: 0, 3 faces: 8, 2 faces: 12, 1 face: 6, 0 faces: 1. b) 1728 in^2

Pg 620

1. 408 in^2
2. 138 m^2
4. 204 m^2
7. 834,308 ft^2
8. 144π cm^2
12. 31 m^2
14. The lateral edge PC is the hypotenuse of the right triangle ΔPRC, so the lateral altitude PR is shorter than the hypotenuse.
20. 28 in^2
23. 1580.6 ft^2
24. The cylinder, since the LA of the cylinder is 48π in^2 and the LA of the 2 cones is 30π in^2.
29. 471 ft^2
30. 45 m^2
41. LA= $100\sqrt{5}$ cm^2, SA= $100 + 100\sqrt{5}$ cm^2
42. LA= $25\pi\sqrt{5}$ cm^2, SA= $25\pi + 25\pi\sqrt{5}$ cm^2

Answers to
Pg 627 # 2, 8, 12, 15, 17-19 all, 22, 25, 35, 36, 38, 40
Pg 634 # 6, 8, 12, 16, 18, 19, 22, 26, 27, 33

Pg 627

2. 80 in^3
8. 22.5 in^3
12. 144 cm^3
15. 501 in^3
17. $26/9 \approx 2.89$ cm
18. 5 in
19. 6 ft
22. 96 ft^3
25. 80 $units^3$
35. 140.6 in^3
36. a) 730 in^2. b) 528 in^2. c) 756 in^3. d) 476 in^3.
38. 2827 cm^3
40. The volume of B is twice the volume of A.

Pg 634

6. 300 in^3
8. about 363.6 m^3
12. $22/3\ \pi$ $in^3 \approx 23$ in^3
16. 123 in^3
18. 10,368 ft^3
19. They are equal; both volumes are $1/3\ \pi\ r^2 h$
22. 3
26. Cube: 8 $units^3$, Cone: $2/3\ \pi$ $units^3$, Pyramid: 8/3 $units^3$
27. a) $120\ \pi$ ft^3. b) $60\ \pi$ ft^3. c) $240\ \pi$ ft^3.
33. a) Volume of frustum = Volume of whole cone ($1/3\ \pi R^2 H$) – Volume of missing cone ($1/3\ \pi r^2 h$). b) Use similar Δs to find height of the missing cone. Volume is about 784.6 in^3

Answers to Pg 640 # 2, 6, 8, 12, 17, 18, 23, 24, 27, 28, 32, 37, 38, 40, 42, 43, 58-63 all

2. 400π in^2
6. 576π in^2
8. 62 cm^2
12. $500/3\ \pi$ $ft^3 \approx 524$ ft^3
17. 98.784π $m^3 \approx 310$ m^3
18. 451 in^2
23. Yes; the volume of the frozen yogurt is $85\ 1/3\ \pi$ cm^3, and the volume of the cone is 64π cm^3
24. C
27. 1.7 lb
28. 8 in. sphere; the volume of the three spheres is 13.5π and the large sphere is $85\ 1/3\ \pi$.
32. $500/3\ \pi$ mm^3
37. a) $1372/3\ \pi$ in^3. b) $686/3\ \pi$ in^3. c) 11 in.
38. a) about 8.9 in^2. b) The answer is less than the actual SA since the dimples on the golf ball add to the SA.
40. SA = 22π cm^2, V = $46/3\ \pi$ cm^3
42. SA = 22π cm^2, V = $14/3\ \pi$ cm^3
43. The small ball weighs 75 lb, the large ball weighs 253 lb.
58. 16 m^3
59. 19 in^3
60. 19,396 mm^3
61. 10.5 cm
62. 27 cm
63. 67.5 cm^2

Answers to Pg 648 # 2-14 evens, 17-19 all, 22-29 all (omit # 25), 34-36 all

2. yes, 3 : 2
4. no
6. no
8. 6 : 7
10. 2 : 5
12. 180 m^3
14. 175 in^2
17. 6000 toothpicks
18. 74 oz
19. a) It is 64 times the smaller prism. b) It is 64 times the smaller prism.
22. Yes, 60. Hint: the prisms are rotated. Find the similarity ratio of the largest sides of each prism.
23. About 1000 cm^3
24. No; an increase in the side lengths does not always create proportional ratios.
26. 27 ft^3
27. a) 3 : 1. b) 9 : 1.
28. a) 11 : 14. b) 121 : 196.
29. 864 in^3
34. a) 144 coats. b) 1728 meals.
35. a) 100 times. b) 1000 times. c) His weight is 1000 times but his bones can only support 600 times.
36. a) 384 cm^3. b) 16 : 1. c) SA of Pyramid A is 384 cm^2, SA of Pyramid B is 24 cm^2.

11-4, 11-5 Volumes of Prisms, Cylinders, Pyramids, and Cones

Name: _____

Notes Date: _____ Period: _____

11-4 Volumes of Prisms and Cylinders

The _____ is the measure of the amount of space contained in a solid. Units used to measure volume include _____, _____, _____, and _____.
The volume of an object is the number of _____ cubes that fill the space within the object.

What is the area of the base of a solid comprised of 2 rows of unit cubes by 3 columns of unit cubes?

How many unit cubes currently fill the space inside the object?

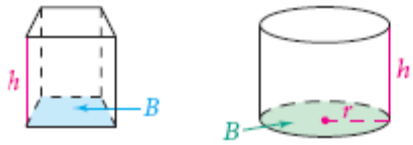
If you place a second layer of cubes on top of the base in the same fashion, how many cubes currently fill the space inside the object?

If you place a third layer of cubes on top of the base in the same fashion, how many cubes currently fill the space inside the object?

If you place a fourth layer of cubes on top of the base in the same fashion, how many cubes currently fill the space inside the object?

The volume of a prism or cylinder is the product of the area of a base and the height of the prism or cylinder.

V = Bh

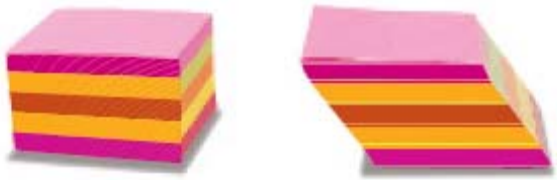


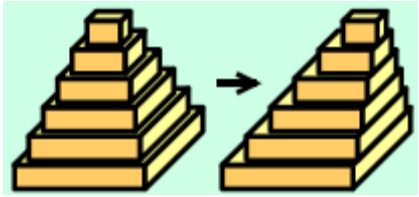
The height (h) is the perpendicular distance between the bases, which is not necessarily vertical.
Warning: The formula for the base (B) depends on the SHAPE of the base!

Area of rectangle or parallelogram = _____ Area of triangle = _____

Area of trapezoid = _____ Area of rhombus or kite = _____

Area of circle = _____ Area of regular polygon = _____





The first stack forms a right prism. The second forms an _____ prism. The stacks have the same height. The area of every cross section parallel to a base is the area of one sheet of paper. The stacks have the same volume. These stacks illustrate the following principle:

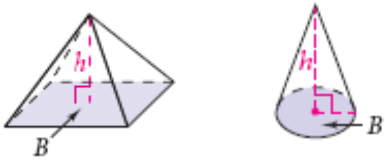
Cavalieri's Principle

If two space figures have the same height and the same cross-sectional area at every level, then they have the same volume.

11-5 Volumes of Pyramids and Cones

The volume of a pyramid or cone is _____ the product of the area of the base and the height.

$$V = \frac{1}{3}Bh$$



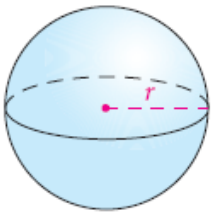
11-6 Surface Areas and Volumes of Spheres

Name: _____

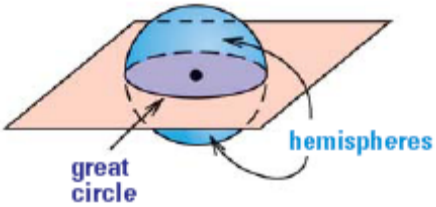
Notes Date: _____ Period: _____

Review: **Area of a circle** = _____ **Circumference of a circle** = _____

11-6 Surface Areas and Volumes of Spheres



A _____ is the set of all points in space equidistant from a given point called the _____. A _____ is a segment that has one endpoint at the center and the other endpoint on the sphere. A _____ is a segment passing through the center with endpoints on the sphere.



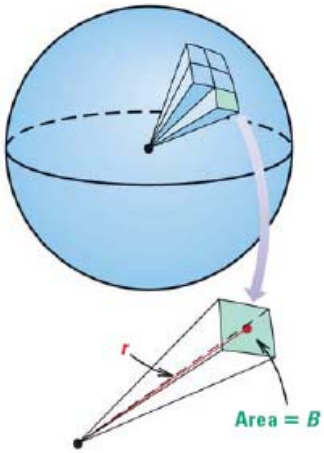
If a plane intersects a sphere, the intersection is either a single point or a circle. If the plane contains the center of the sphere, then the intersection is a _____ _____ of the sphere. The circumference of a great circle is the circumference of the sphere. Every great circle of a sphere separates the sphere into two congruent halves called _____.

A baseball is a model of a sphere. The surface area of a baseball is sewn from two congruent shapes, each of which resembles two joined circles, as shown.

So the entire covering of the baseball consists of four circles, each with radius *r*. The area of a circle with radius *r* is _____. So, the area of the covering can be approximated by _____.

Surface Area of a Sphere $S = 4\pi r^2$

Fill a sphere with a large number (*n*) of small pyramids. The vertex of each pyramid is the _____ of the sphere. The height of each pyramid is the _____ of the sphere. The sum of the areas of the bases of the *n* pyramids approximates the _____ _____ of the sphere. The sum of the volumes of the *n* pyramids should approximate the _____ of the sphere.



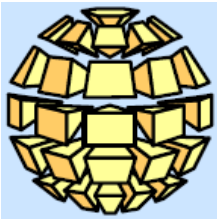
Volume of each pyramid = $\boxed{}$

Sum of the volumes of *n* pyramids $\approx n \cdot \frac{1}{3}Br$ Substitute *r* for *h*.

$= \frac{1}{3} \cdot (nB) \cdot r$

$\approx \frac{1}{3} \cdot (4\pi r^2) \cdot r$ Replace *nB* with the surface area of a sphere.

$= \boxed{}$



Volume of a Sphere $V = \frac{4}{3}\pi r^3$

Challenge:

	Cylinder	Cone	Sphere	Hemisphere
# of bases?				
# of faces?				
# of vertices?				
# of edges?				
Has a perimeter?				

* Euler's Formula does not apply since these are not polyhedrons (A polyhedron is a 3D figure whose surfaces are polygons).

Class Exercises Answer Key:
1. 144π, or about 452.39 sq ft
2. 121.5π, or about 381.70 cubic inches
3. S = 247.78 in^2
   V = 164.22 in^3
4. about 20,944 ft^3
5. about 98,321,312 mi^2
6. a) 6.99 cm. b) 613.12 cm^3 or 613.99 cm^3
7. a) about 8.65 in^3. b) 29.47 in^3or 29.49 in^3
8. a) about 10,306 cm^3. b) 82,447.96 cm^3. c) 8 : 1
9. a) SA of Torrid Zone is about 80,925,856 mi^2. SA of Earth is about 197,359,488 mi^2. b) about 41%

11-6 Surface Areas and Volumes of Spheres

Class Exercises (from McDougal Littell pages 838-844) Show all work on a separate sheet of paper!

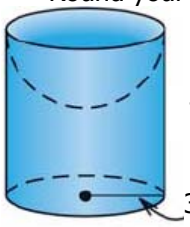
1. In an extreme sport called *sphereing*, a person rolls down a hill inside an inflatable ball surrounded by another ball. The diameter of the outer ball is 12 feet. Find the surface area of the outer ball.

To keep your answer in terms of π, input the #s in the calculator without the π, and write π next to your answer at the end.

2. The soccer ball has a radius of 4.5 inches. Find its volume.

There are two ways to type ^{3} in the calculator:
[^] [3] or [MATH] [3]

3. Find the volume and the surface area of the solid (a cylindrical ice cream container with ice cream scooped out of the top in the shape of a bowl). Round your answer to two decimal places.



First write the strategy, then replace with formulas, then substitute with values.
V = V[cylinder] – ½ V[sphere]
$= \pi r^2 h - \frac{1}{2}(4/3)(\pi r^3)$
SA = LA[cyl] + B[cyl] + ½ S[sph]
$= 2\pi rh + \pi r^2 + \frac{1}{2}(4\pi r^2)$

4. A grain silo has the dimensions shown. The top of the silo is a hemispherical shape. Find the volume of the grain silo.

5. The circumference of Earth is about 24,855 miles. Find the surface area of the Western Hemisphere of Earth.

Use the circumference formula to solve for r.
Circumference = $2\pi r = 24855$
$r = 24855 / (2\pi)$
Make sure you put () around the whole denominator in the calculator. Then instead of rounding the answer for r, use ANS by pressing [2nd] [(-)]. Type (1/2)*4*π*ANS ^{2}

6. A ball has volume 1427.54 cubic centimeters.

a. Find the radius of the ball. Round your answer to two decimal places.

To get the cube root $\sqrt[3]{}$ in the calculator, press [MATH] [4]
Or press [^] (1 / 3)

b. Find the surface area of the ball. Round your answer to two decimal places.

7. Tennis balls are stored in a cylindrical container with height 8.625 inches and radius 1.43 inches.

a. The circumference of a tennis ball is 8 inches. Find the volume of a tennis ball.

b. There are 3 tennis balls in the container. Find the amount of space within the cylinder not taken up by the tennis balls.

8. A partially filled balloon has circumference 27π centimeters. Assume the balloon is a sphere.

a. Find the volume of the balloon.

b. Suppose you double the radius by increasing the air in the balloon. Find the new volume.

c. What is the ratio of this volume to the original volume?

9. The Torrid Zone on Earth is the area between the Tropic of Cancer and the Tropic of Capricorn, as shown. The distance between these two tropics is about 3250 miles. You can think of this distance as the height of a cylindrical belt around Earth at the equator, as shown.

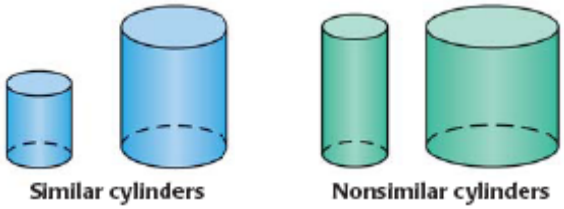
a. Estimate the surface area of the Torrid Zone and the surface area of Earth. (Earth's radius is about 3963 miles at the equator.)

b. A meteorite is equally likely to hit anywhere on Earth. Estimate the probability that a meteorite will land in the Torrid Zone.

Name: _____
Date: _____ Period: _____

Notes and Lab
11-7 Areas and Volumes of Similar Solids

_____ _____ have the same shape and all their corresponding dimensions are proportional. The ratio of corresponding linear dimensions, such as height or radii, of two similar solids is the _____ _____.



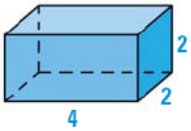
Any two cubes are similar, and any two spheres are similar. Why?

Class Exercises Answer Key:
1.
2. about 8.04 fl oz
3. SA ≈ 68.49 in^2. V ≈ 42.93 in^3.
4. 5 : 3
5. a) 3 : 5. b) 3 units. c) 125 units^3.
6. a) The larger ball of yarn is a better buy. b) $12.00
7. SA ≈ 273 in^2. V ≈ 73.61 in^3.
8. SA ≈ 85.6 m^2. V ≈ 48.83 m^3.
9. a) 144 in. b) 3920.4 in^2. c) 1.5 in^3.

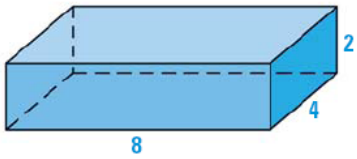
Identify Similar Solids:

Tell whether the given right rectangular prism is similar to the right rectangular prism shown at the right.

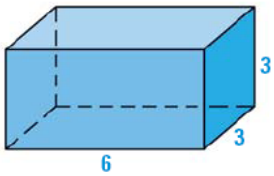
Given:



a.



b.

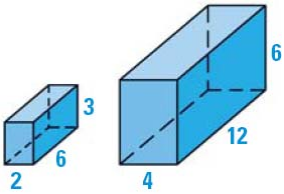


a) Ratio of lengths: widths: heights: b) Ratio of lengths: widths: heights:

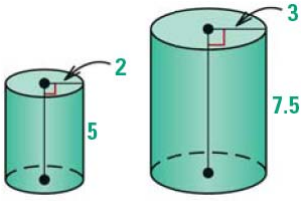
Use the following pairs of similar solids to complete the table below.

Pair 1: take 9 cubes to compare 1 unit cube (A) with another cube (B) made by doubling all dimensions.

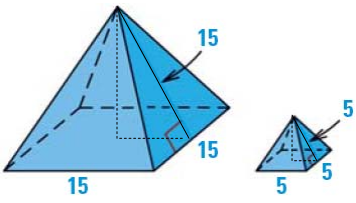
Pair 2:



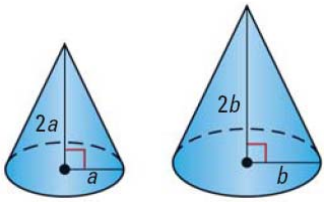
Pair 3:



Pair 4:



Pair 5:



* Easiest way to find the ratio (most simplified fraction) is to divide the #s in the calculator and press MATH 1.
If both numbers have π then cancel both π's and just divide the #s.

	Similarity ratio of A to B	Surface Area of A	Surface Area of B	Ratio of Surface Areas	Volume of A	Volume of B	Ratio of Volumes
Pair 1						8	
Pair 2	1 : 2						
Pair 3			63π				
Pair 4				9 : 1			
Pair 5	a : b						

Areas and Volumes of Similar Solids

If the similarity ratio of two similar solids is *a* : *b*, then

the ratio of their corresponding areas is _____ : _____ , and the ratio of their volumes is _____ : _____ .

11-7 Areas and Volumes of Similar Solids

Class Exercises (from McDougal Littell pages 846-853) Name: _____

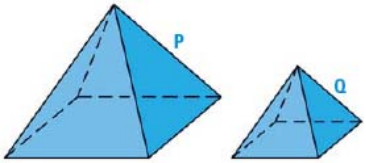
SHOW ALL WORK on a separate sheet of paper. Date: _____ Period: _____

1. Two similar prisms have heights 4 cm and 10 cm.
a) What is their similarity ratio?
b) What is the ratio of their surface areas?
c) What is the ratio of their volumes?

2. The heights of two similar coffee mugs are 3.5 inches and 4 inches. The larger mug holds 12 fluid ounces. What is the capacity of the smaller mug?

3. The cans shown are similar with a scale factor of 87 : 100. S = 51.84 in.^{2} and V = 28.27 in.^{3} for the smaller can. Find the surface area and volume of the larger can.

4. The pyramids are similar. Pyramid P has a volume of 1000 cubic inches and Pyramid Q has a volume of 216 cubic inches. Find the scale factor of Pyramid P to Pyramid Q.



5. Cube C has a surface area of 54 square units and Cube D has a surface area of 150 square units.
a) Find the scale factor (similarity ratio) of C to D.

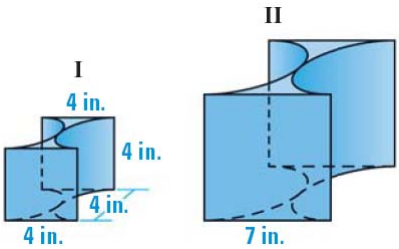
b) Find the edge length of C.

c) Use the scale factor to find the volume of D.

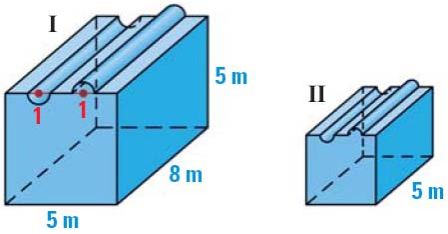
6. A store sells balls of yarn in two different sizes. The diameter of the larger ball is twice the diameter of the smaller ball. If the balls of yarn cost $7.50 and $1.50, respectively, which ball of yarn is the better buy?

b) Calculate the new price for the larger ball of yarn so that neither ball would be a better buy than the other.

7. Solid I is similar to Solid II. Find the surface area and volume of Solid II.



8. Solid I is similar to Solid II. Find the surface area and volume of Solid II.



9. The scale factor of the model car at the right to the actual car is 1 : 18.
a) The model has length 8 inches. What is the length of the actual car?

b) Each tire of the model has a surface area of 12.1 square inches. What is the surface area of each tire of the actual car?

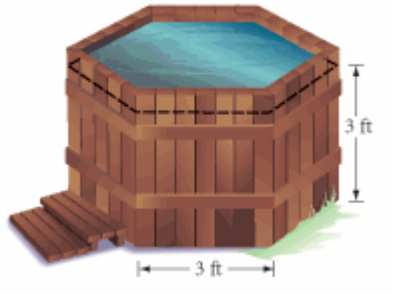
c) The actual car's engine has volume 8748 cubic inches. Find the volume of the model car's engine.

Review for Pre-AP Test 4-1
Geometry chapter 11 and 1-2, 10-4, 10-8

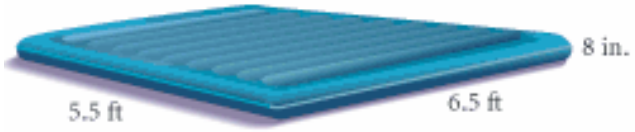
Name: _____
Date: _____ Period: _____

Show all work. Give exact answers (in simplest radical form or in terms of π) unless specifically stated to round. Write the correct units with your answer. Circle your answer.

1. You have a hot tub in the shape of a regular hexagon. Each side of the regular hexagon is 3 ft and the height of the hot tub is 3 ft. What is the maximum volume of the hot tub in gallons? (1 cubic foot = 7.48 gallons)



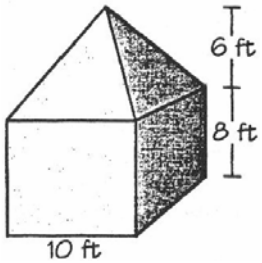
2.



A king-size waterbed mattress measures 5.5 feet by 6.5 feet by 8 inches deep. If the mattress were completely filled with water, how much does the water in the mattress weigh in pounds? (Water weighs 63 pounds per cubic foot).

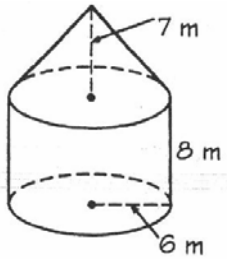
If the waterbed can be filled at a rate of 20 gal./min, how long will it take to fill the waterbed? (1 cubic foot = 7.48 gallons)

10. The floor of the tent is a square. Find the lateral area of the tent.



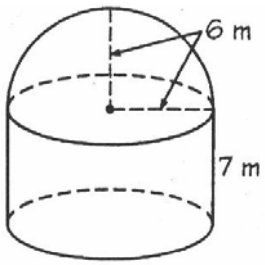
Find the volume of the tent.

11. Find the surface area of the figure.



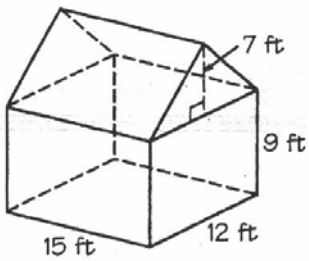
Find the volume of the figure.

12. Find the surface area of the figure.



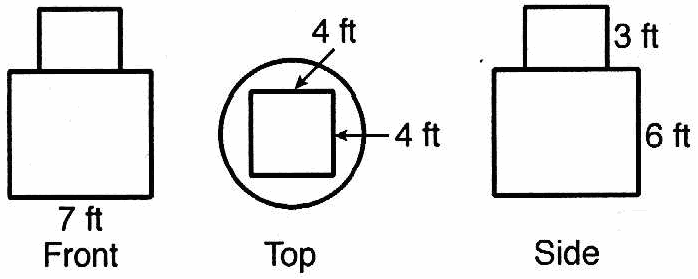
Find the volume of the figure.

13. Find the surface area of the figure.

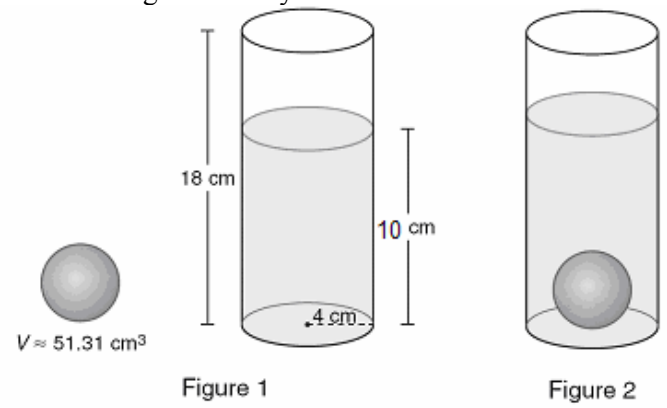


Find the volume of the figure.

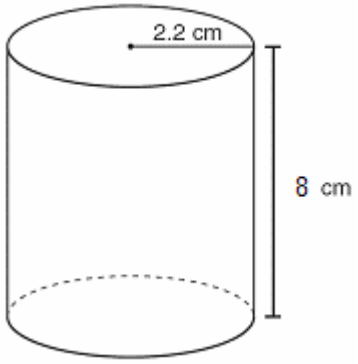
16. What is the volume of the 3-D figure shown?



17. Calculate the height of the water after the ball is submerged in the cylinder.



18. If Suzie has a rectangular block of wax that is 20 cm by 15 cm by 18 cm, how many candles can she make if each candle is shaped as shown?



19. You have a cube whose sides measure 4 cm. If you quadruple every side of the cube, how do the surface area and volume of the new cube compare with the original cube?

20. You have a balloon with a certain amount of air. If you blow air into the balloon so that the new volume is eight times the original, what happens to the surface area of the balloon? Assume the balloon is a sphere.

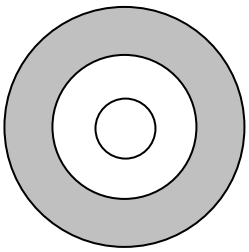
21. a) Find the similarity ratio of two spheres with volumes of 32π m^3 and 500π m^3.

b) What is the radius of the smaller sphere?

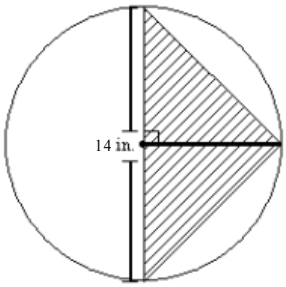
22. The volumes of two similar solids are 54 ft^3 and 250 ft^3. The surface area of the smaller solid is 58.5 ft^2. Find the surface area of the larger solid.

1. 524.707 gal. **2**. 1501.5 lbs.; 8.914 min. **10**. ($20\sqrt{61} + 320$) ft^2 ; 1000 ft^3 **11**. SA = $(132\pi + 6\sqrt{85}\,\pi)$ m^2; V = 372π m^3
12. SA = 192π m^2 ; V = 396π m^3 **13**. SA = $750 + 30\sqrt{85}$ ft^2; V = 2250 ft^3 **16**. $73.5\pi + 48$ ft^3. **17**. 11.0 cm
18. 44. **19**. SA will be 16 times; V will be 64 times **20**. 4 times **21**. 2 : 5 ; 2.884 m. **22**. 162.5 ft^2

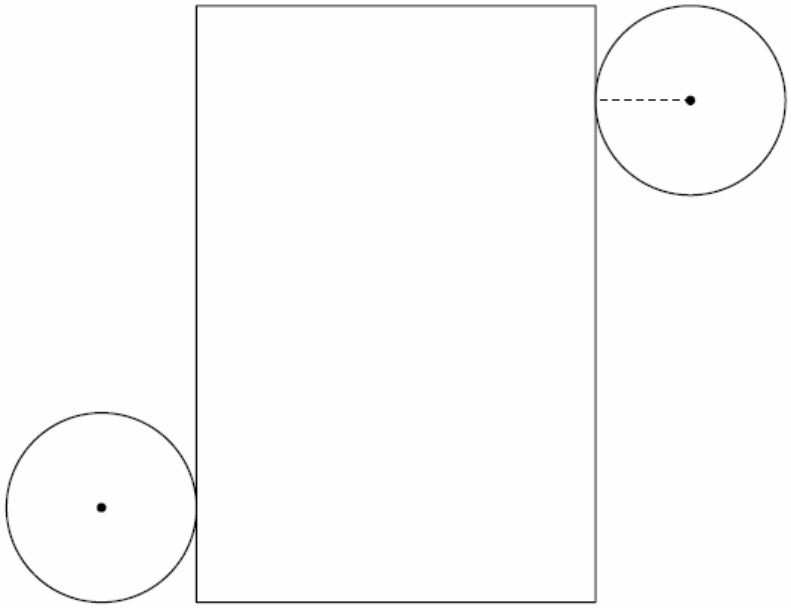
23. What is the probability of a dart landing in the shaded area? The smallest circle has a radius of 6 cm; the radius of the largest circle is four times the radius of the smallest circle; and the radius of the medium circle is $\frac{2}{3}$ the radius of the largest circle.



24. Find the probability that a point chosen at random will lie in the shaded area. The diameter of the circle is 14 in.



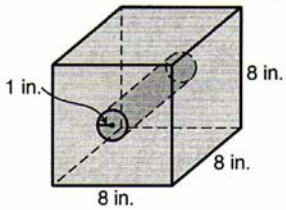
25. The net of a cylinder is shown below. Use the ruler on the Mathematics Chart to measure the dimensions of the cylinder to the nearest tenth of a centimeter. Calculate the surface area. _____



26. The total surface area of the cylinder is approximately 88 cm^2. The lateral surface area is about 63 cm^2. Find the approximate area of one base and the diameter of the base.

If this net was folded into a cylinder, which edge would be the height of the cylinder? Mark it on the diagram. Measure it in centimeters (to the nearest tenth) _____ and inches (to the nearest quarter inch) _____.

27. **A builder drills a hole through a cube of concrete, as shown in the figure. This cube will be an outlet for a water tap on the side of a house. Complete Exercises 11–14 to find the surface area of the figure. Round to the nearest tenth if necessary.**



Find the surface area of the cube. _____

Find the lateral area of the cylinder. _____

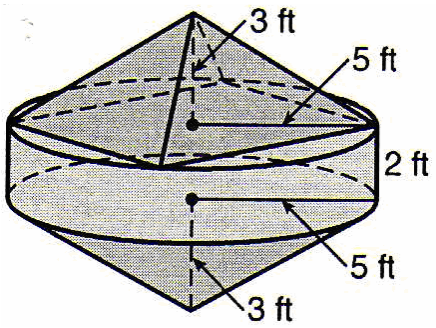
Find twice the base area of the cylinder. _____

The surface area of the figure is the surface area of the prism plus the lateral area of the cylinder minus twice the base area of the cylinder. Find the surface area of the figure. _____

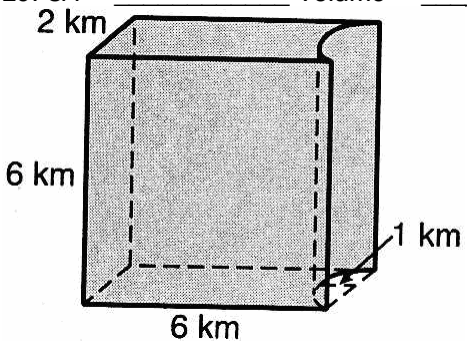
Answers: **23**. 5/9 or 55.556%. **24**. 31.831%. **25**. ? **26**. Base is 12.5 cm^2, diameter is 3.989 cm. **27**. ? **28**. SA = 248.538 ft^2, Vol = 50 + 75π ft^3. **29**. SA = 123.708 km^2, Vol = 62.575 km^3.

Find the surface area and volume of each composite solid below.

28. SA = _____ Volume = _____



29. SA = _____ Volume = _____



Rally Table Cards – Effects of changing dimensions on area, surface area and volume.

# 31 A traffic cone has a surface area of 36 π. If the height and radius of a traffic cone are both divided by 3, what is the surface area of the new cone? 	# 32 A statue has a volume of 54 ft^3 and a height of 6 feet. A similar statue is 2 feet tall. What is the volume of the smaller statue? 	# 33 The dimensions of a family-size can of soup are 1.5 times the dimensions of a regular can of soup. If the label of the regular can has an area of 45 cm^2, what is the area of the label on the family-size can? 
# 34 At Johnny's Pizzeria, they sell a Large pizza with an area of 64 in^2. They want to make an Extra Large pizza with a radius that is twice that of the Large pizza. What is the area of the Extra Large pizza? 	# 35 Marshall's rectangular garden has an area of 360 ft^2 and he wants to expand its size by tripling the length and the width. What is the area of his expanded garden? 	# 36 The height of a pyramid with a volume of 225 ft^3 is reduced by a scale factor of $\frac{1}{5}$. What is the volume of the reduced pyramid? 
37) If the length and width of a rectangular gift box is halved and the height remains the same, by what factor does the volume of the box decrease?	38) If the radius of a can of soda is doubled and the height remains the same, how much more soda will the larger can hold than the smaller can?	39) If the height of a rectangular gift box is tripled and the other dimensions remain the same, by what factor does the volume of the box increase?

Answers: **31**. 4 π units^2. **32**. 2 ft^3. **33**. 101.25 cm^2. **34**. 256 in^2. **35**. 3240 ft^2. **36**. 45 ft^3. **37**. ¼ times. **38**. 4 times. **39**. 3 times.