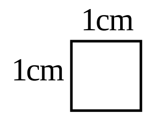
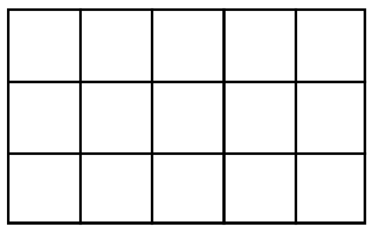
Area

Area is a measure of how much space is occupied by a figure.

Area is measured in **square units.**
For example, one square centimeter (cm^2) is 1cm wide and 1cm tall.



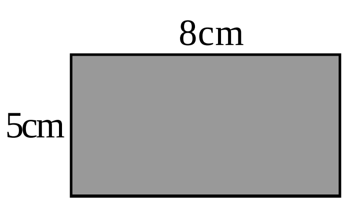
A figure's area is the number of square units it would take to cover the figure. It is easy to see that it would take $15cm^2$ to cover a rectangle that is 3cm by 5cm.

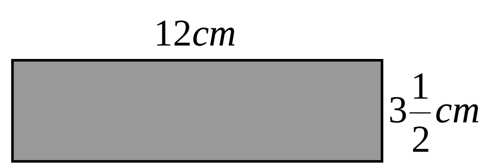


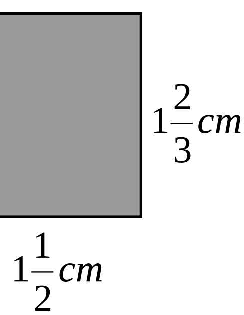
The area of any rectangle is just the length of its base multiplied by its height.

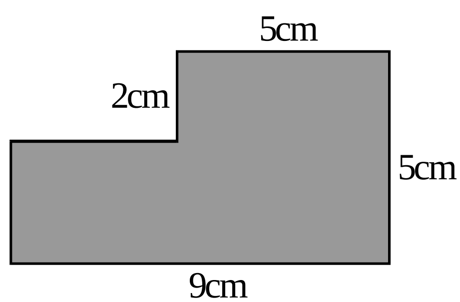
$$A=bh$$

Practice:
Find the area of each shaded region below. Angles are all 90 degrees.

1.


2.


3.


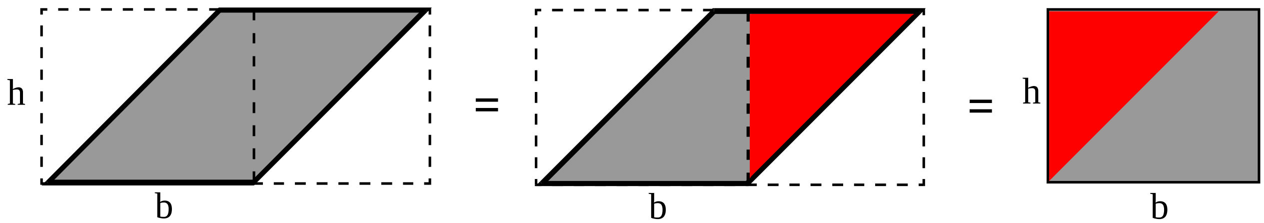
4.


Area and Perimeter

Math 8

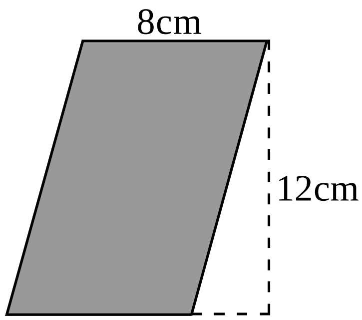
The formula for the area of any **parallelogram** is the same as the formula for the area of a rectangle:

$$A=bh$$



Practice: Find each area.

1.



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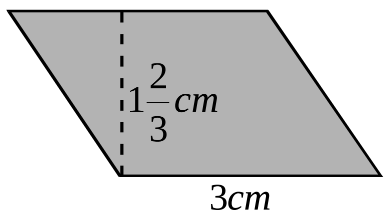
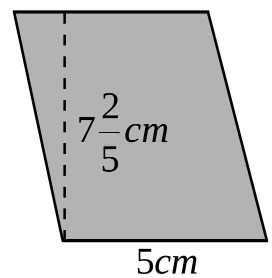


3.

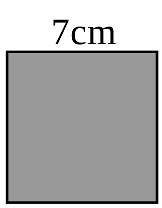


Perimeter is just the distance around a figure.
Perimeter is NOT measured in square units.

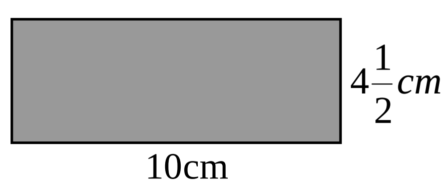
To find the perimeter of a figure, simply add the lengths of its sides.

Practice:
Find the perimeter and area of each shaded region below.

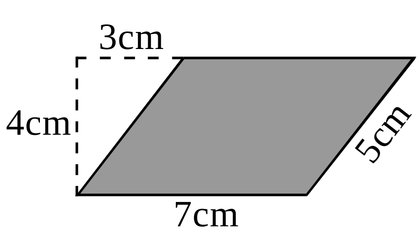
1. (square)



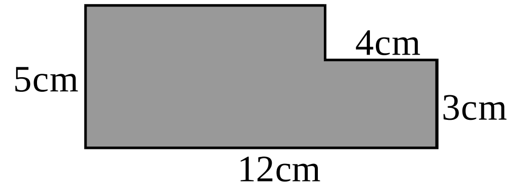
2.



3.



4.



Area: Triangles

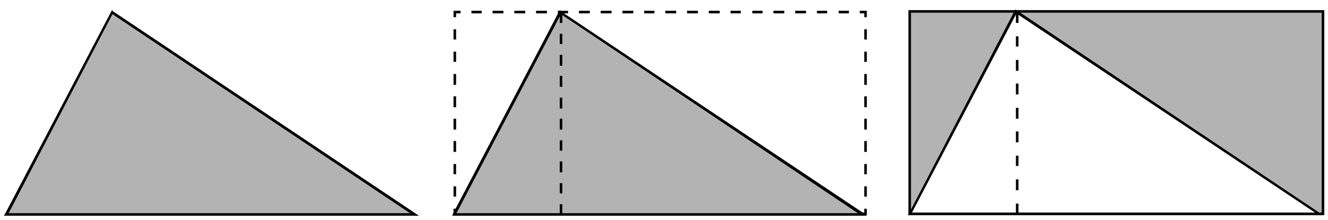
Math 8

Area of a triangle:

The area of a triangle can be found with the following formula:

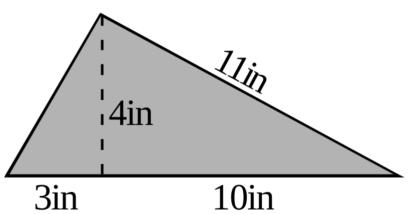
$$A = \frac{1}{2}bh \quad \text{or} \quad A = \frac{bh}{2}$$

Consider the diagram below to see why the formula works.

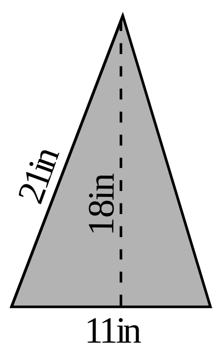


Practice: Find the area of each triangle.

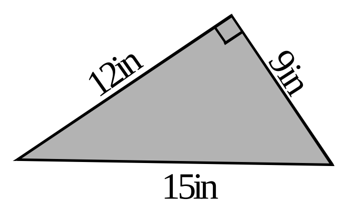
1.



2.

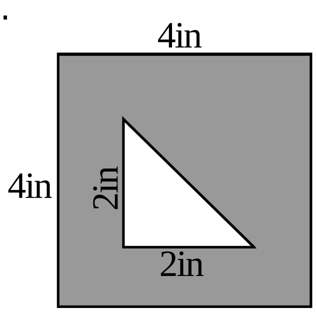


3.

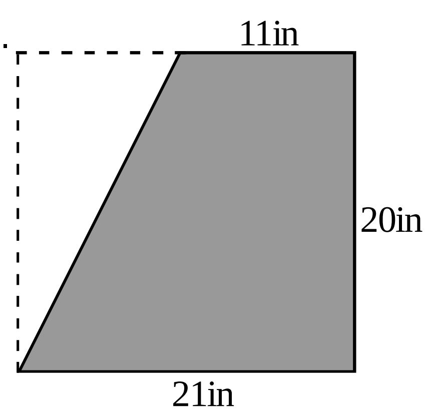


Practice: Find each shaded area:

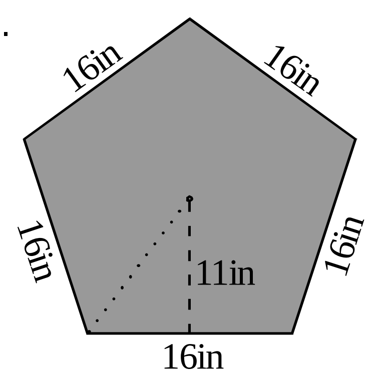
1.



2.



3.



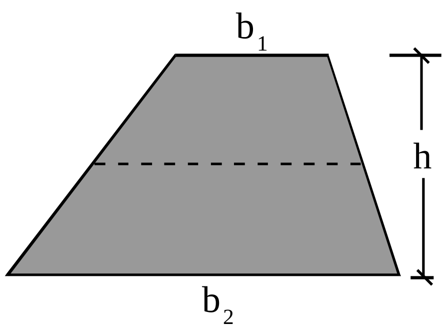
Area: Trapezoids

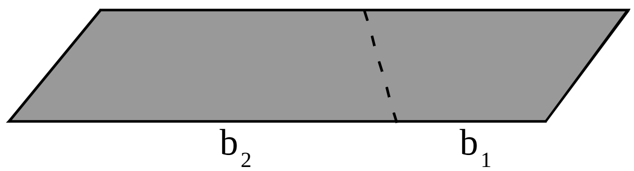
Area of a trapezoid:

The area of a trapezoid can be found with the following formula:

$$\frac{1}{2}h(b_1 + b_2) \text{ or } \frac{h(b_1 + b_2)}{2}$$

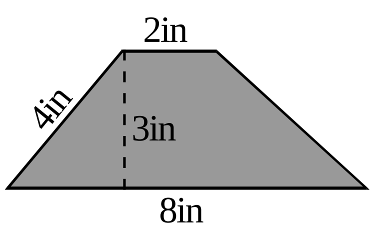
Consider the diagram below to see why the formula works.



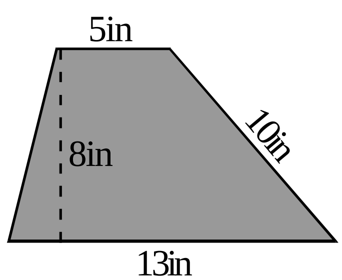


Practice: Find the area of each trapezoid.

1.



2.



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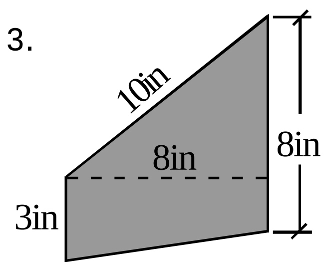


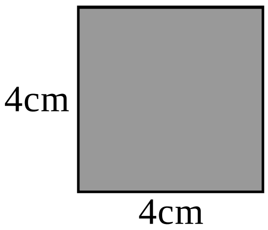
Name__________________________ Period ______

Perimeter and Area

Math 8

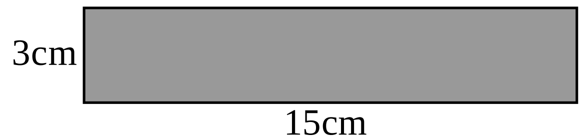
Determine the area and perimeter of each figure below.

1.



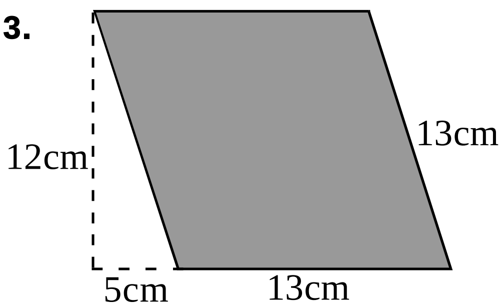
A: ______ P: ______

2.



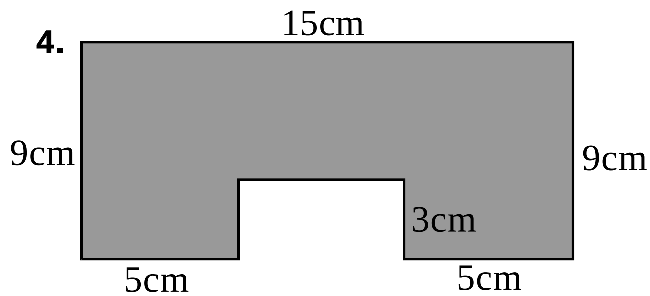
A: ______ P: ______

3.



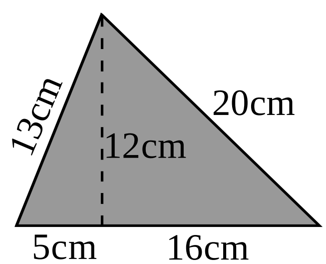
A: ______ P: ______

4.



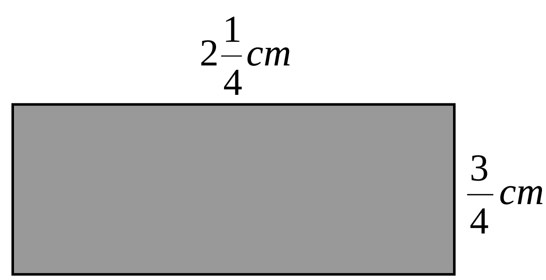
A: ______ P: ______

5.



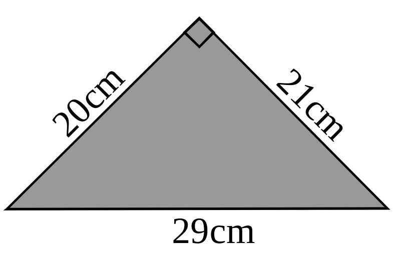
A: ______ P: ______

6.



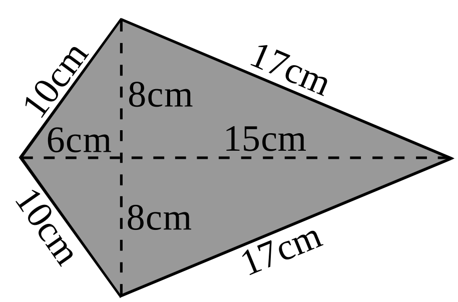
A: ______ P: ______

7.



A: ______ P: ______

8.



A: ______ P: ______

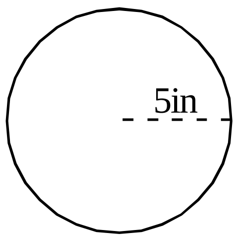
Circles

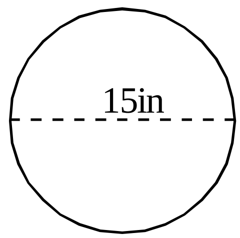
Math 8

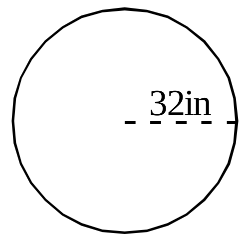
Area and Circumference of a circle:
The **Area** of a circle can be found with the following formula: $A = \pi r^2$
Circumference of a circle looks similar:

$$C = 2\pi r \text{ or } C = \pi d$$

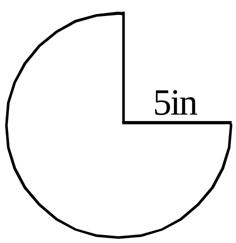
Area and circumference of a circle:
Find the area and circumference of each. Leave your answers in terms of pi.

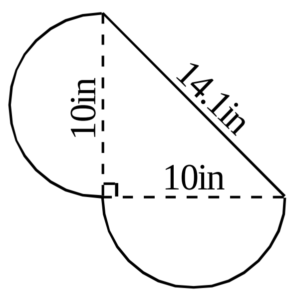
1.


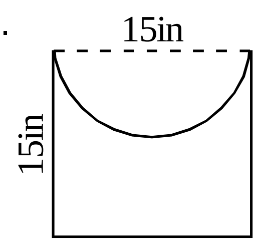
2.


3.


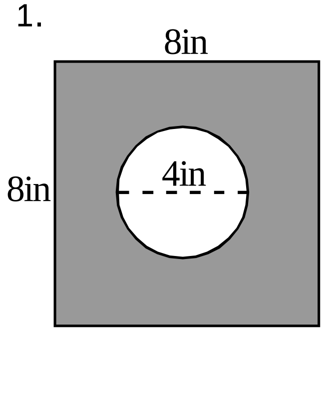
Combinations:
Find the area and perimeter of each. Round decimal answers to the tenth.

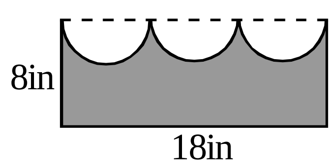
1.


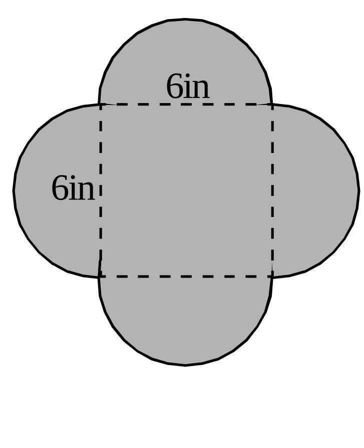
2.


3.


Combinations:
Find the area and perimeter of each. Round decimal answers to the tenth.

1.


2.


3.


Name_________________________ Period _____

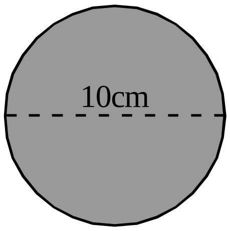
Review

Math 8

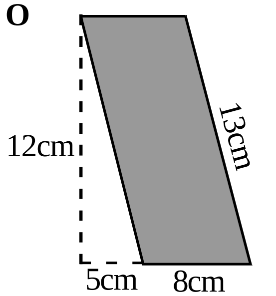
Find the area of each figure.

Order the areas from least to greatest to spell a question. Answer the question that is created. (Drawings are not to scale).

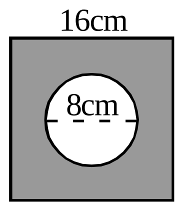
E



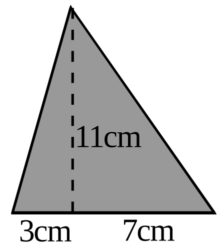
O



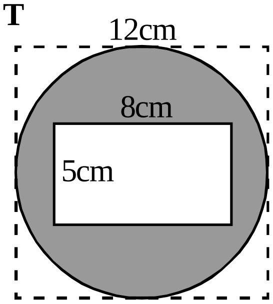
A



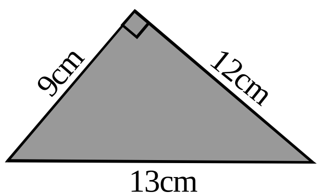
D



T



N



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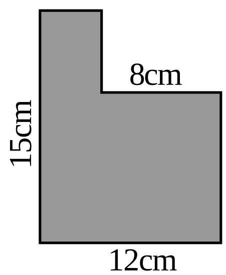

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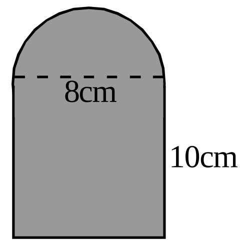
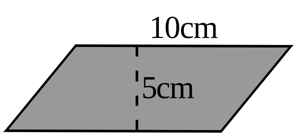


I



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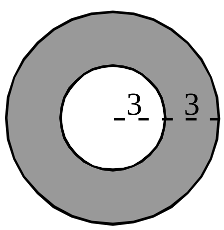
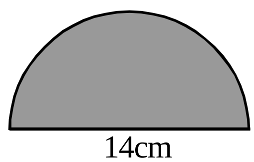
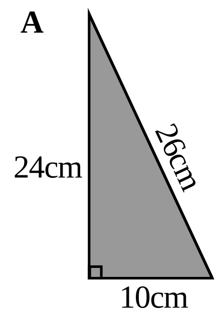


H



A



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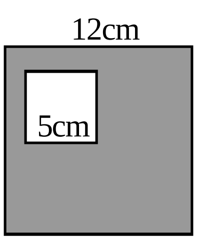

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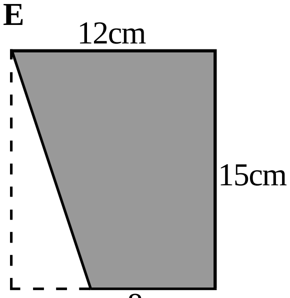

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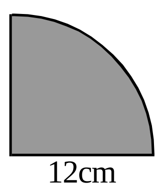
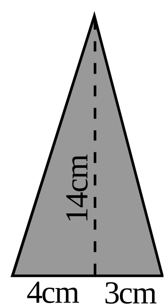


F



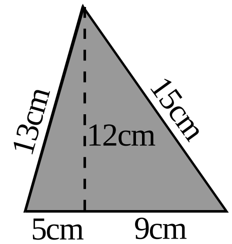
Name__________________________ Period ______

Practice Quiz: Area and Perimeter

Math 8

Find the area and perimeter of each. Include units.
All angles that appear to be right angles are right angles.

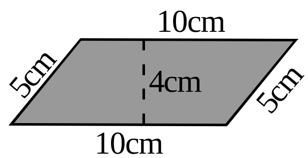
1-2.



1. Area ________

2. Perimeter ________

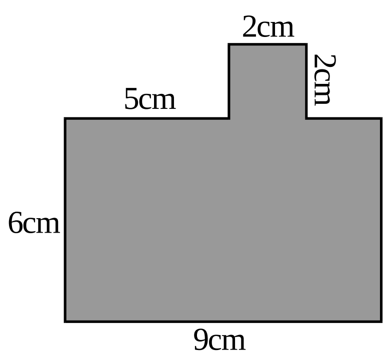
3-4.



3. Area ________

4. Perimeter ________

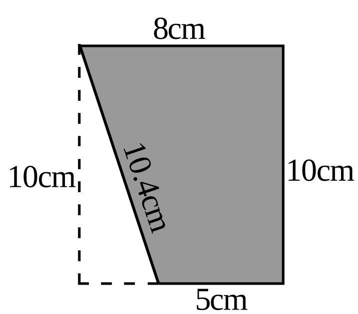
5-6.



5. Area ________

6. Perimeter ________

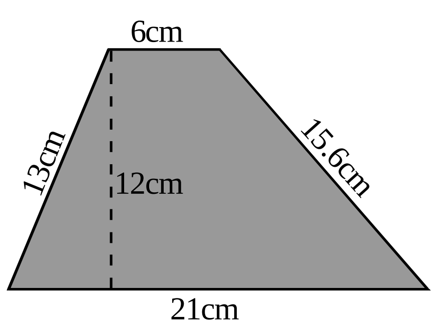
7-8.



7. Area ________

8. Perimeter ________

9-10.



9. Area ________

10. Perimeter ________

Name_________________________ Period _____

Practice Quiz: Area and Perimeter

Math 8

Answer each.

11. What is the formula for the area of a parallelogram?

11. Area = ____________

12. What is the formula for the area of a circle?

12. Area = ____________

13. What is the formula for the area of a trapezoid?

13. Area = ____________

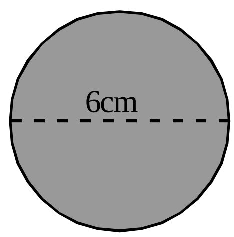
14. What is the formula for the area of a triangle?

14. Area = ____________

15. What is the formula for the circumference of a circle, using the radius (r)?

15. Circumference = ____________

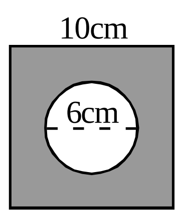
16-17. Answer **in terms of pi.**



16. Area _________

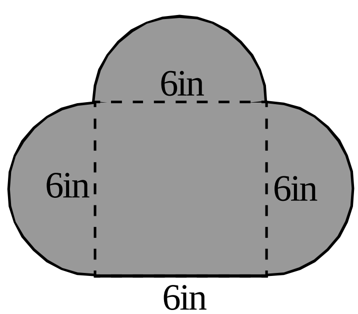
17. Circumference _________

18. **Area.** Round to the tenth.



18. Area _________

19-20. **Area/Perimeter.** Round to the tenth.



19. Area _________

20. Perimeter _________

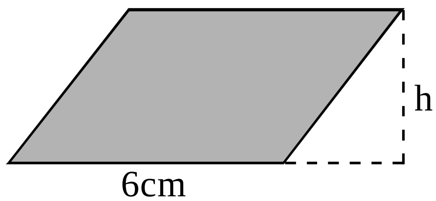
Name________________________ Period _____

Working Backwards: Using Area

Math 8

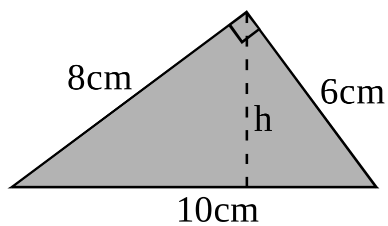
If we know the area of a figure, we can use it to find the dimensions of a figure.

Example:
The area of a parallelogram is $24cm^2$ and its base is 6cm long. What is its height?



This can be especially useful when finding the altitude (height) of a right triangle.

Example:
A right triangle has sides of length 6, 8, and 10cm. What is the height (h) of the triangle marked below?

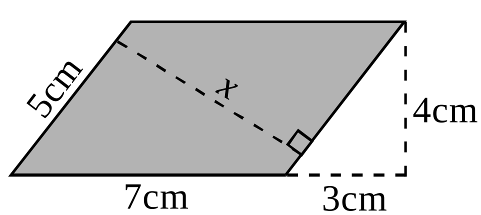


Given the area of a circle, you can find its radius. Write an equation and solve the following:

Example:
Approximate the radius of a circle whose area is $6cm^2$.

Example:
A gallon of paint will cover $400ft^2$. What is the radius of the largest circle that can be painted (and filled-in) with a gallon of paint. Round your answer in feet to the nearest tenth.

Challenge:
Find the length x in the diagram:



Name_________________________ Period _____

Using Area

Math 8

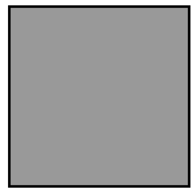
Practice: Solve each.

1-3. Approximate the side length of a square given each area to the tenth:

1. Area = $16cm^2$.

2. Area = $90cm^2$.

3. Area = $2cm^2$.



1. side ________

2. side ________

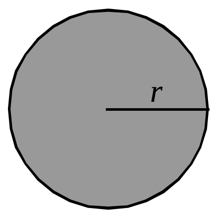
3. side ________

4-6. Approximate the radius of each given the area to the tenth:

4. Area = 4π cm^2.

5. Area = $13cm^2$.

6. Area = $250cm^2$.



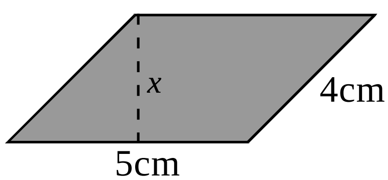
4. radius ________

5. radius ________

6. radius ________

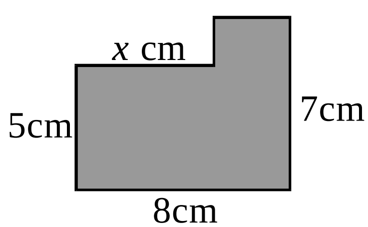
7-9. Find each missing length x. Round decimal answers to the tenth.

7. Area = $14cm^2$.



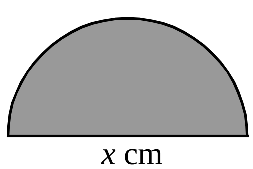
7. x = ________

8. Area = $45cm^2$.



8. x = ________

9. Area = $20cm^2$.



9. x = ________

Name_________________________ Period _____

Using Area

Math 8

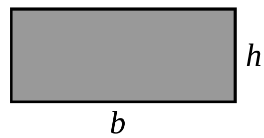
Practice: Solve each.

1-3. Approximate the height of each rectangle given the area and the base. Fractional answers should be left improper and in simplest form.

1. Area = 80cm². b = 8cm

1. h = ________

2. Area = 44cm². b = 5cm



2. h = ________

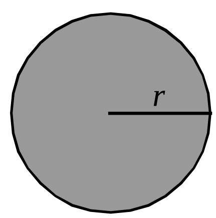
3. Area = 22cm². b = 6cm

3. h = ________

4-6. Approximate the radius of each given the area. Round decimal answers to the tenth. Use 3.14 for pi if you do not have a calculator with a pi button.

4. Area = 9π cm².

4. radius ________



5. Area = 30cm².

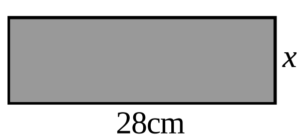
5. radius ________

6. Area = 26.5cm².

6. radius ________

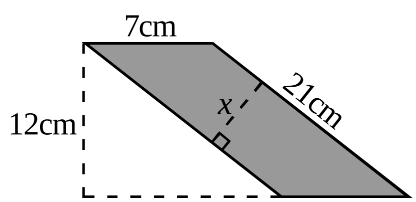
7-9. Find each missing length x. Round decimal answers to the tenth.

7. Area = 140cm².



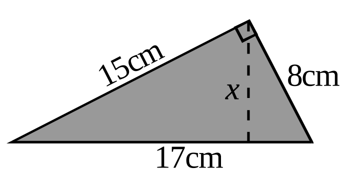
7. x = ________

8. Area = 84cm².



8. x = ________

9. Find x.



9. x = ________

Name__________________________ Period ______

Review: Triangles and Trapezoids

Math 8

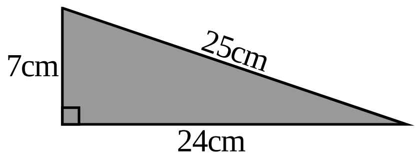
Area of a triangle:

The area of a triangle can be found with the following formula:

$$A = \frac{1}{2}bh \quad \text{or} \quad A = \frac{bh}{2}$$

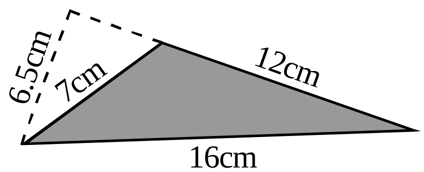
Practice: Find the area of each:

1.



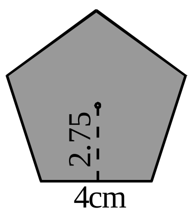
1. Area _________

2.



2. Area _________

3.



3. Area _________

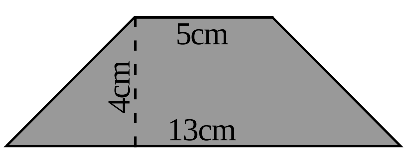
Area of a trapezoid:

The area of a trapezoid can be found with the following formula:

$$\frac{1}{2}h(b_1 + b_2) \quad \text{or} \quad \frac{h(b_1 + b_2)}{2}$$

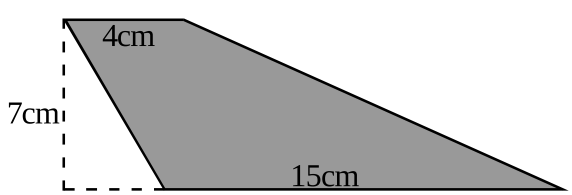
Practice: Find the area of each trapezoid below.

4.



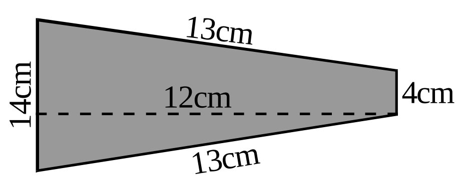
4. Area _________

5.



5. Area _________

6.



6. Area _________

Name________________________ Period _____

Review: Circles

Math 8

Area and Circumference of a circle:

The **Area** of a circle can be found with the following formula: $A = \pi r^2$

Circumference of a circle looks similar:

$$C = 2\pi r \text{ or } C = \pi d$$

Practice: Find the area and circumference for each circle described below.
Leave answers in terms of pi.

7-8. A circle of radius 4cm.

7. Area ________

8. Circumference ________

9-10. A circle of diameter 18cm.

9. Area ________

10. Circumference ________

11-12. A circle of radius 9cm.

11. Area ________

12. Circumference ________

Practice: Find the area and perimeter/circumference for each circle described below.
Round decimal answers to the tenth.

13-14. A circle of radius 10cm.

13. Area ________

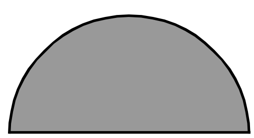
14. Circumference ________

15-16. A circle of diameter 7cm.

15. Area ________

16. Circumference ________

17-18. A semi-circle of diameter 4cm

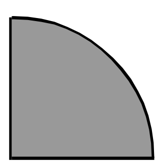


4cm

17. Area ________

18. Perimeter ________

19-20. A quarter-circle of radius 4cm



4cm

19. Area ________

20. Perimeter ________

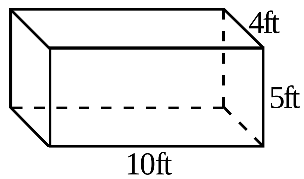
Name__________________________ Period _____

Surface Area

Math 8

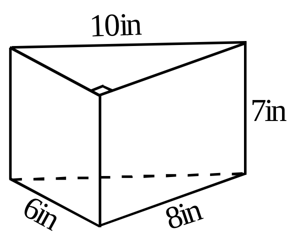
Surface Area is the sum of the areas of all faces which enclose a solid.

Rectangular Prisms are easiest. A rectangular prism has six rectangular faces. To find its surface area, just add the area of all its faces.



Rectangular Prism:
Two ends: 4 x 5 x 2 = 40ft^2
Front and back: 10 x 5 x 2 = 100ft^2
Top and bottom: 10 x 4 x 2 = 80ft^2
Surface area = 40 + 100 + 80 = 220ft^2

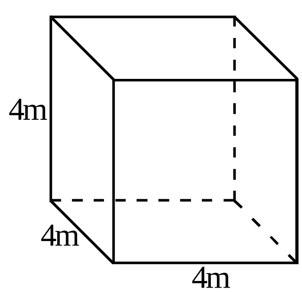
Other Prisms:
Prisms can have bases which are not rectangular. Still, it is easy to just add the area of all the faces of a prism to find its surface area.



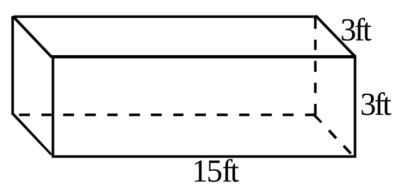
Triangular Prism:
Top and Bottom Triangles: 2 x (6 x 8)/2 = 48in^2
Front Right: 8 x 7 = 56in^2
Front Left: 6 x 7 = 42in^2
Back: 10 x 7 = 70in^2
Surface Area: 48 + 56 + 42 + 70 = 216in^2

Practice:
Find the surface area of each.

1.



2.



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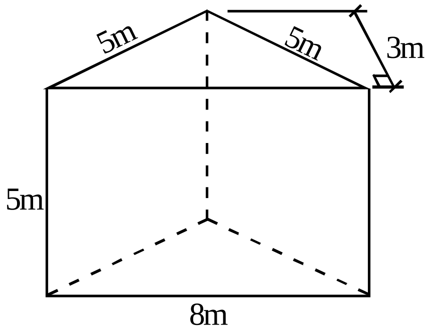

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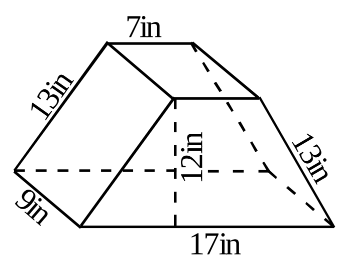


Name___________________________ Period ______

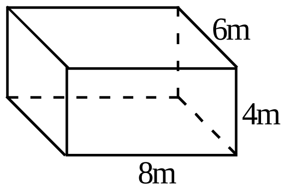
Surface Area

Math 8

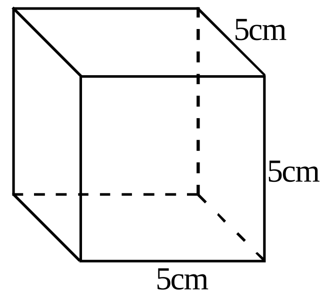
Practice:

Find the surface area of each.

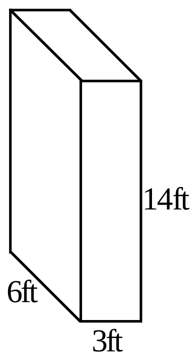
1.



2.



3.



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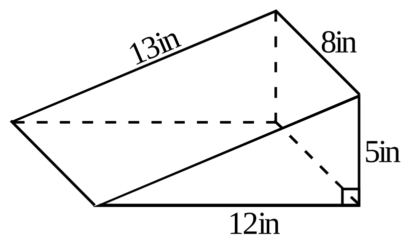
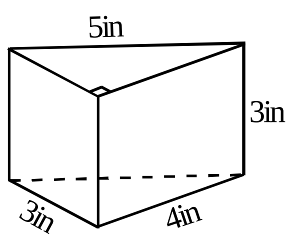
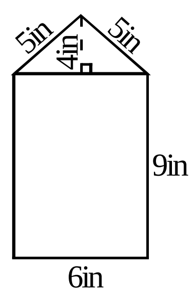


5.



6.



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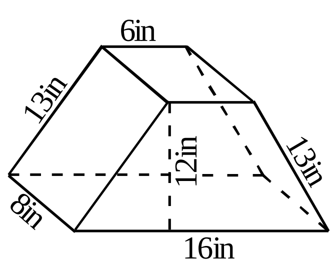

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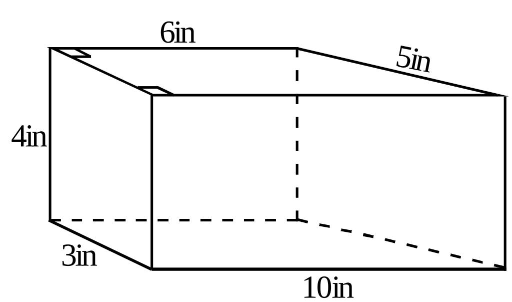
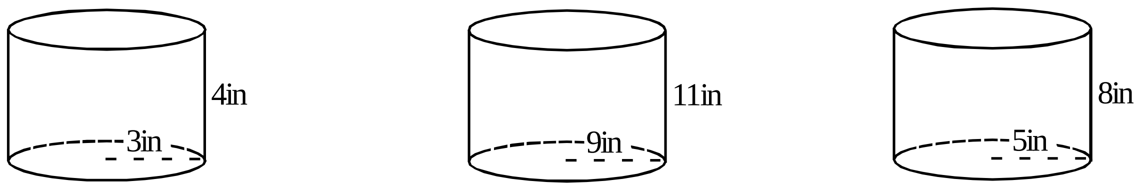


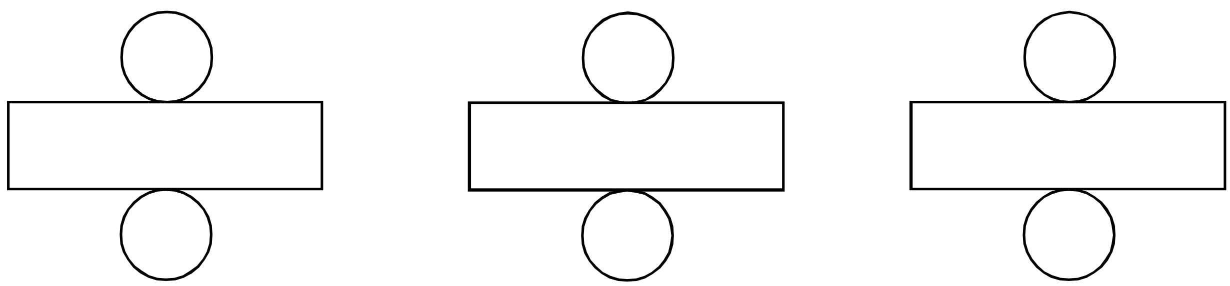
Name__________________________ Period ______

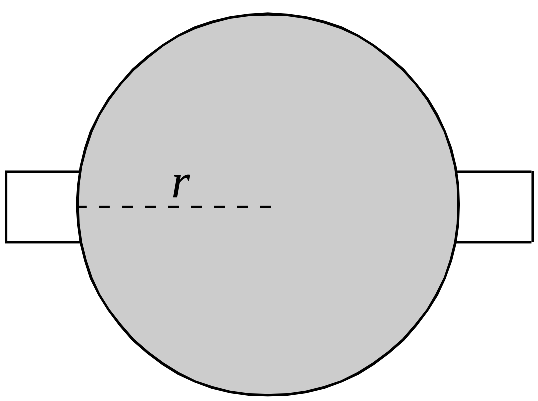
Surface Area: Cylinders

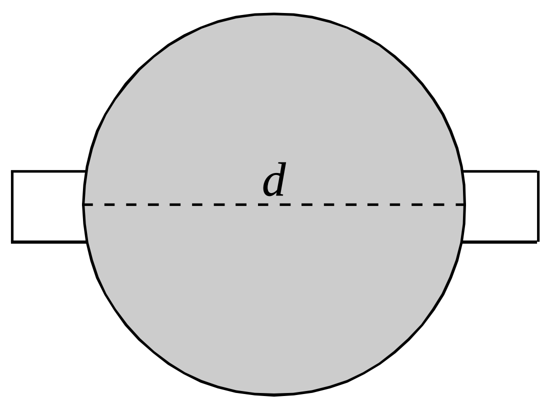
Math 8

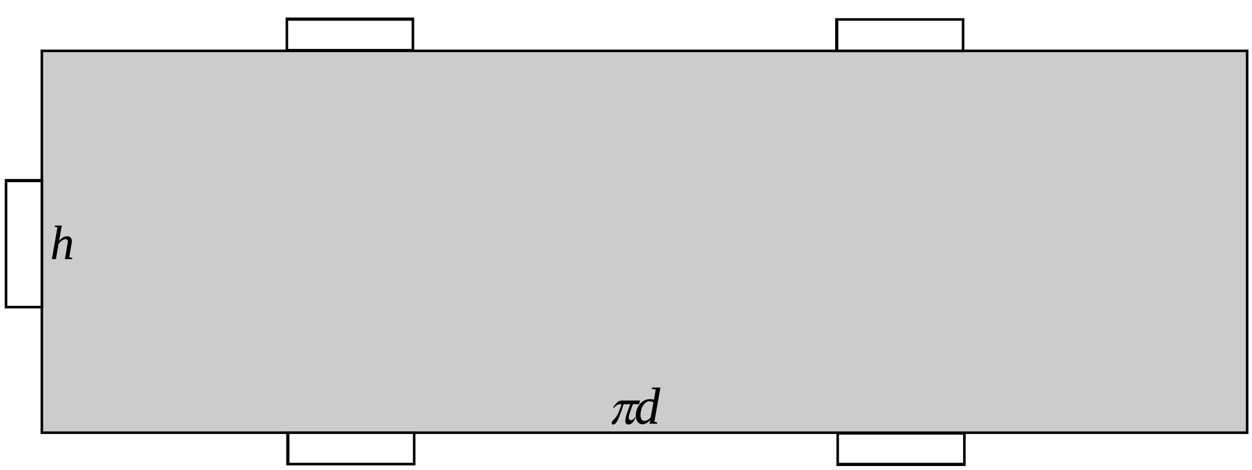
Cut-out the three pieces below the dotted line and use them to build a cylinder.
Use this model to write the formula for the surface area of a cylinder, then use the formula to find the surface area of each figure below:











Name_________________________ Period _____

Surface Area: Cylinders

Math 8

Find the surface area of each:

1. A cylinder with a height of 10cm and diameter of 5cm. Express your answer in terms of pi.

1. ______________

2. A cylinder with a height of 4cm and radius of 5cm. Express your answer in terms of pi.

2. ______________

3. The lateral surface area of a cylinder does not include the top and bottom. What is the lateral surface area of a cylinder whose height and diameter are each 12cm?

3. ______________

4. The lateral surface area of a certain cylinder is equal to the area of its bases (the circles on top and bottom). If the radius of the cylinder is 4cm, what is its height?

4. ______________

Name________________________ Period _____

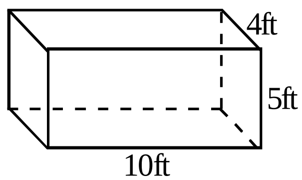
Volume

Math 8

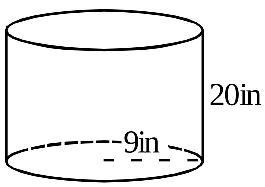
Volume: The formula used to find the volume of a prism or cylinder:

$$V = Bh$$

Where B is the area of the base and h is the height.



The base can be any of the six faces. We will use the 10 x 4 side. The volume is the area of the base times the height: (10 x 4) x 5 = 200ft^3.



The base is a circle of area $\pi(9)^2 = 81\pi$.
Multiply this by the height to get $20(81\pi) = 1620\pi$ in^3.
As a decimal, this equals 5,089.4 in^3, but we often leave answers in terms of pi to avoid rounding.

Practice:

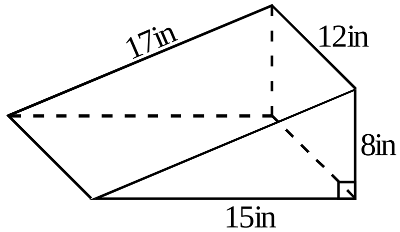
1. What is the surface area and volume of a 4 by 6 by 7 rectangular prism?

SA:____________in^2 V:____________in^3

2. Find the surface area and volume of a 3-inch tall cylinder with a 7-inch radius?

SA:____________in^2 V:____________in^3

3. What is the surface area and volume of the triangular prism below?



SA:____________in^2 V:____________in^3

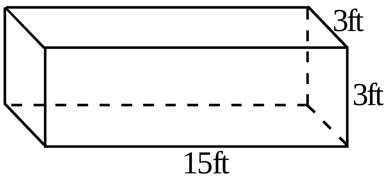
Name________________________ Period _____

Surface Area and Volume

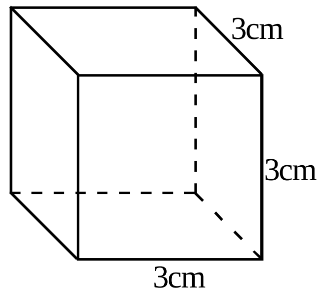
Math 8

Determine the surface area and volume of each. These problems require careful notes. COMPLETE THE WORK ON A SEPARATE SHEET and round all decimal answers to the tenth.

1.



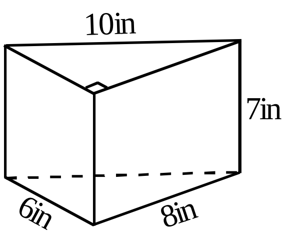
2.



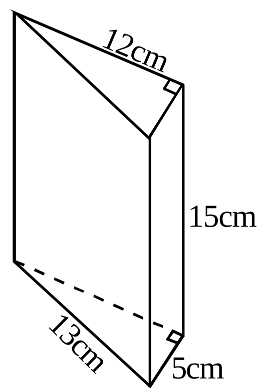
1. SA: _____ Vol. _____

2. SA: _____ Vol. _____

3.



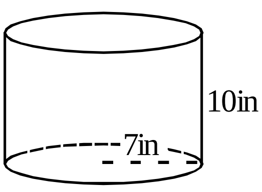
4.



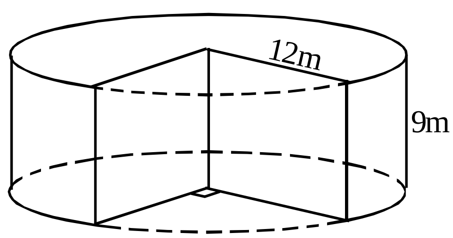
3. SA: _____ Vol. _____

4. SA: _____ Vol. _____

5.



6.



note:
The portion removed is 1/4 of the total volume.

5. SA: _____ Vol. _____

6. SA: _____ Vol. _____

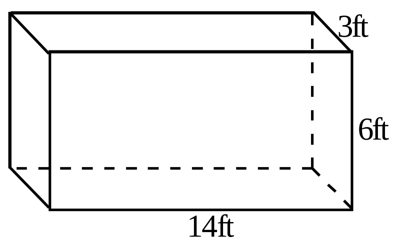
Name________________________ Period _____

Surface Area and Volume Review

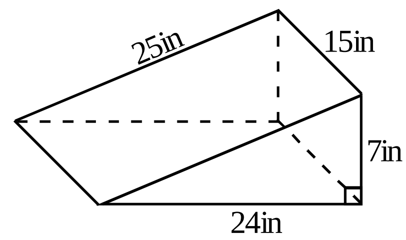
Math 8

Determine the surface area and volume of each.
Round all decimal answers to the tenth.

1.



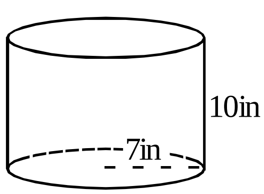
2.



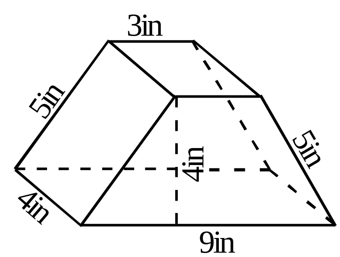
1. SA: _____ Vol. _____

2. SA: _____ Vol. _____

3.



4.



3. SA: _____ Vol. _____

4. SA: _____ Vol. _____

Name________________________ Period _____

Surface Area and Volume Review

Math 8

Solve each:

5. Find the surface area and volume of a cube whose edges are 4cm long.

5. S.A. ______________

Vol. ______________

6. A triangular prism is 3cm tall and has a base whose area is 6cm^2.
What is its volume?

6. Vol. ______________

7. A cylinder has a radius of 5cm and a height of 6cm.
Find its surface area and volume.

7. S.A. ______________

Vol. ______________

8. A circular above-ground swimming pool is 5 feet deep and has a radius of 12 feet.

A. How many cubic feet of water will the swimming pool hold?

8A. ______________

B. There are about 7.5 gallons in a cubic foot. How many gallons does the pool hold?

8B. ______________

C. Your garden hose can fill the pool at a rate of 6 gallons per minute. How long will it take to fill the pool with a garden hose? Express your answer to the nearest hour.

8C. ______________

D. A rubber liner covers all of the interior walls of the pool as well as the bottom of the swimming pool. What is the total area of the liner?

8D. ______________

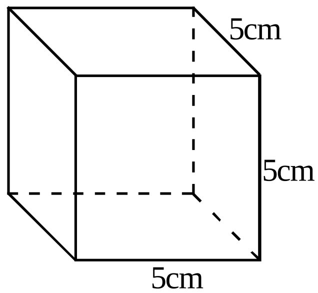
Name___________________________ Period ______

Area and Volume Practice Quiz

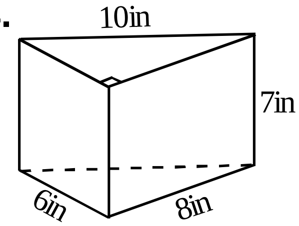
Math 8

Determine the surface area and volume of each.
Round all decimal answers to the tenth.

1-2.

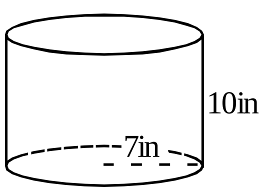


3-4.

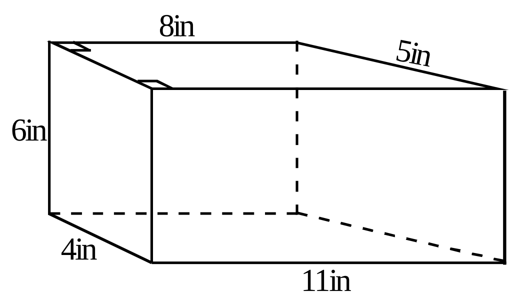


1. SA: ______ 2. Vol. ______ 3. SA: ______ 4. Vol. ______

5-6.



7-8.



5. SA: ______ 6. Vol. ______ 7. SA: ______ 8. Vol. ______

Name__________________________ Period ______

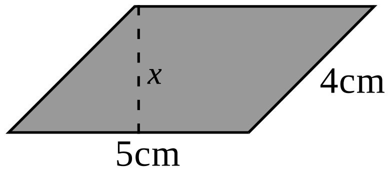
Area and Volume Practice Quiz

Math 8

Solve each.

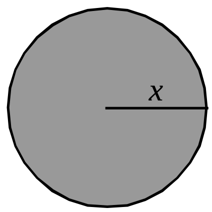
9-11. Find each missing length x. Round decimal answers to the tenth.

9. Area = 14cm^2.



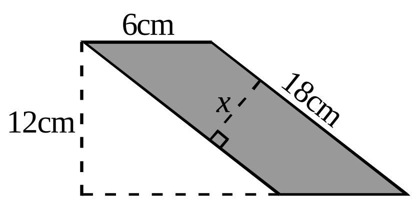
9. x = ________

10. Area = 30cm^2.



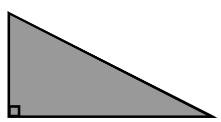
10. radius x =________

11. Area = 72cm^2.



11. x = ________

12. A right triangle has side lengths of 8cm, 15cm, and 17cm. What is its area?



12. ______________

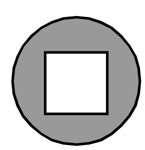
13. A circle has a circumference of 10π cm. Express the circle's area in terms of pi.

13. ______________

14. The lateral surface area of a cylinder does not include the circles on top and bottom. What is the lateral surface area of a cylinder whose height is 6cm and whose diameter is 8cm?

14. ______________

15. The sides of the square shown are 3cm long, and the radius of the circle is also 3cm. What is the area of the shaded region? Round your decimal answer to the tenth.



15. ______________

Name________________________ Period _____

Pyramid/Cone Volume

Math 8

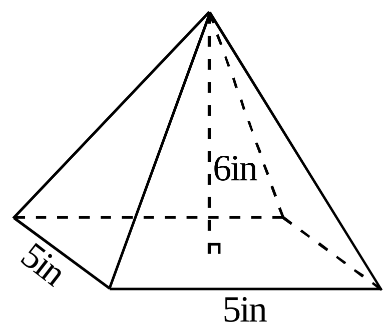
The formula used to find the volume of a pyramid or cone:

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

Where B is the area of the base and h is the height.

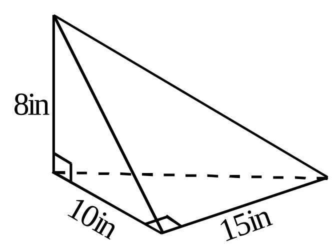
Practice:
Find the volume of each solid.

1. (square-based pyramid)



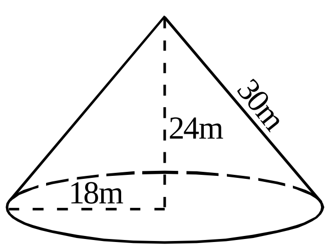
1. ______

2. (triangle-based pyramid)



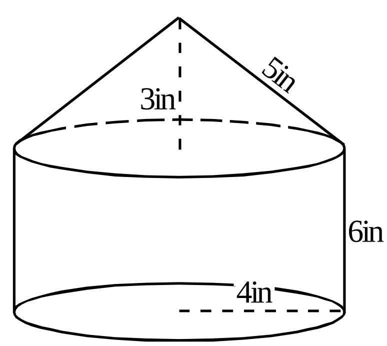
2. ______

3. (cone)



3. ______

4. (cone on top of a cylinder)



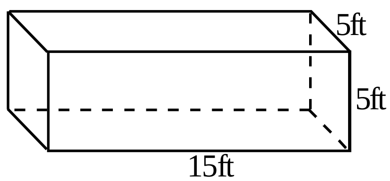
4. ______

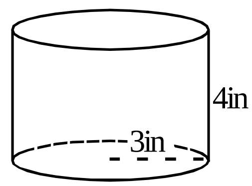
Name________________________ Period _____

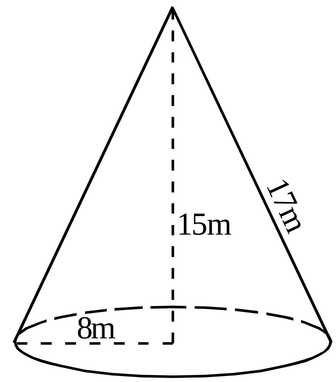
Volume Practice

Math 8

Determine the volume of each solid below:
Round all answers to the hundredth.
Work on a separate sheet.



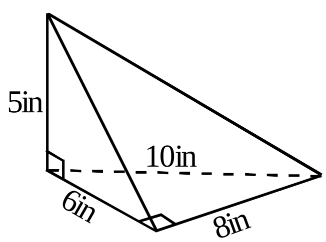


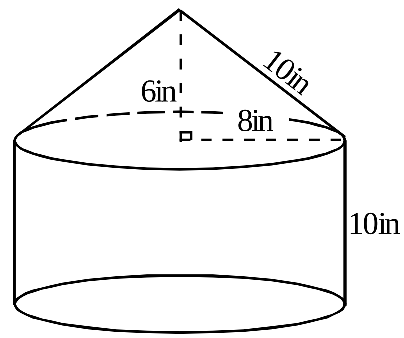


1.V = ________

2. V = _______

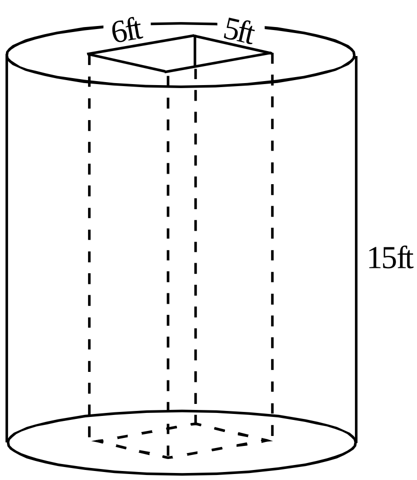
3. V = ______





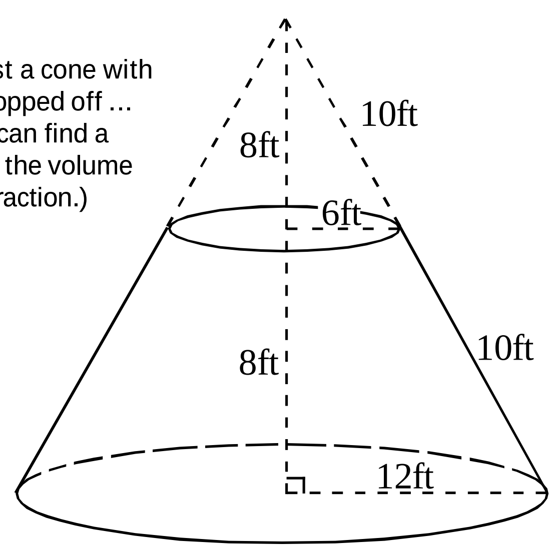
4. V = ________ (80in^2 is incorrect)

5. V = ________



cylinder diameter = 10ft

(This is just a cone with the top chopped off … see if you can find a way to get the volume using subtraction.)



6. V = ________

7. V = ________

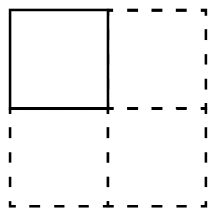
Name_________________________ Period _____

Changing Dimensions

Math 8

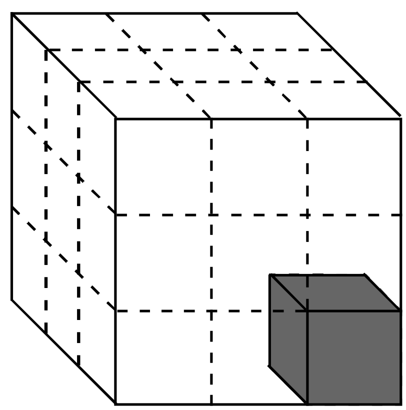
Changing the dimensions of an object effects the area and volume. Here are some easy examples:

Ex: A square is enlarged so that the length of each side is doubled. If the area of the original square was 7 square inches, what will be the area of the enlarged square?



2 x 2 = 4 times bigger (28in^2).

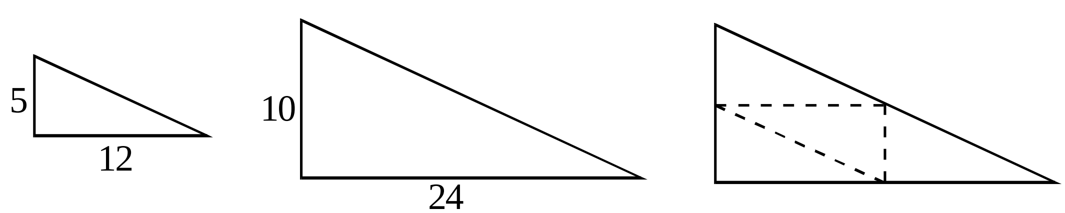
Ex: A cube has one-inch edges. How many times larger is the volume of a cube with edges that are three times longer?



3 x 3 x 3 = 27 times bigger.

It is easy to see with a square or even a rectangle, but the same concept applies to all shapes and figures. If you increase the dimensions of an object, the area or volume increases by the product of those increases.

For example, if you double the base and height of a triangle, how many times greater will the area be?



This principle applies to ALL shapes.

Name_________________________ Period _____

Changing Dimensions

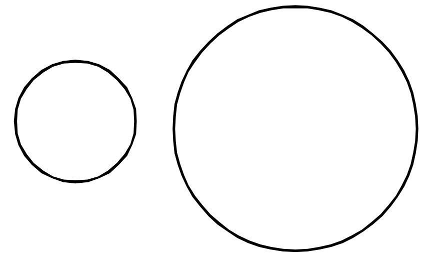
Math 8

Some more difficult shapes:

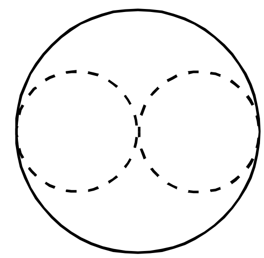
Circles.

What happens when you double the radius of the circle? Does its area double? Try a few examples.

Look at the example below. Does the large circle look like it has only twice the area of the smaller circle?



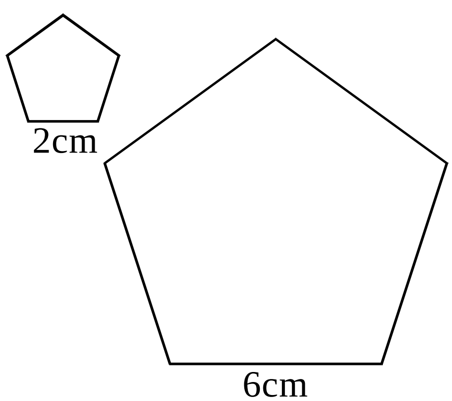
When we increase the radius of a circle by a factor x, the area is increased by a factor x^2. In the formula for area, the radius is squared. Think of this as increasing not only the height, but the height AND width of the circle, or doubling two dimensions.

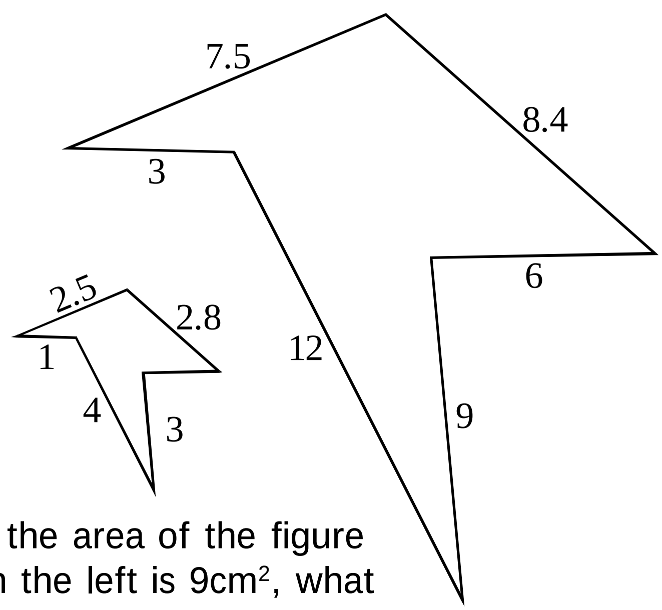


Other shapes.

Look at the following regular figures. Each has had its side lengths tripled. What do you think has happened to the area of each figure?

Pentagon Area Calculator:
http://www.math-prof.com/AreaVolume/Pentagon.aspx





If the area of the figure on the left is $9cm^2$, what is the area of the figure on the right?

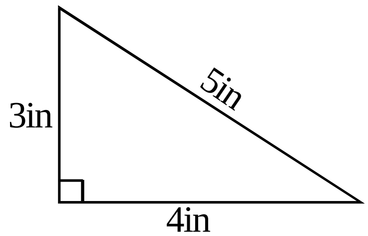
Name_________________________ Period _____

Changing Dimensions

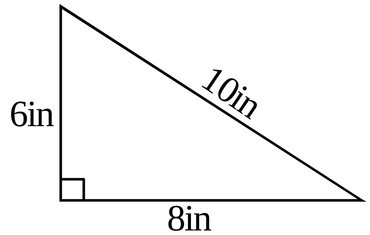
Math 8

Complete the following area problems:

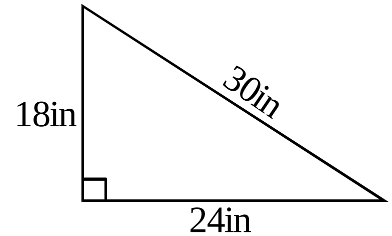
1.



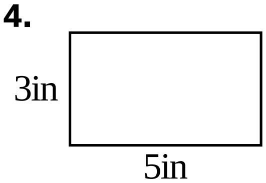
2.



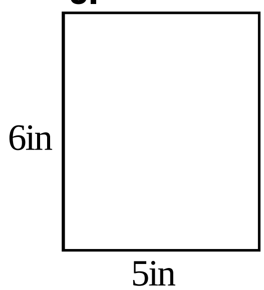
3.



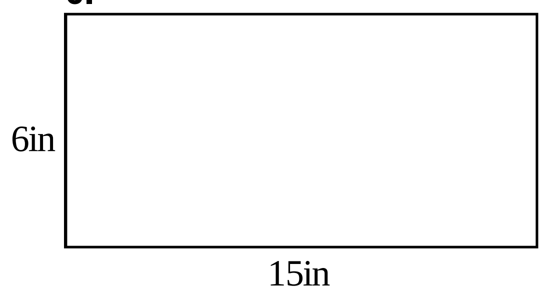
4.



5.

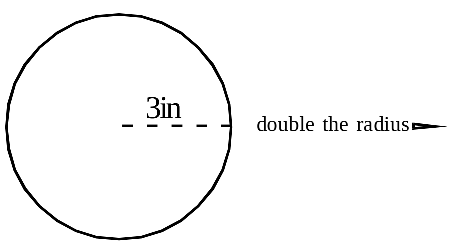


6.

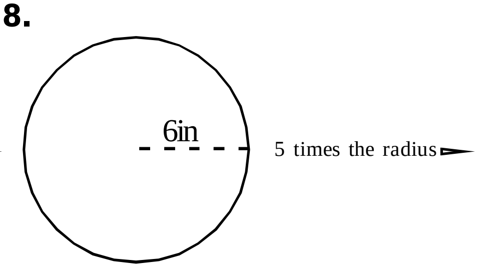


Leave answers below in terms of Pi.

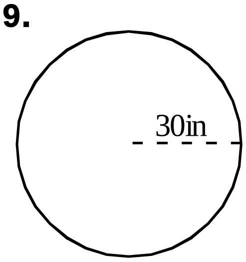
7.



8.



9.



Complete the following area problems:

10. What happens to the area of a square when you:

a. Double the side lengths. b. Triple the side lengths. c. Halve the sides.

_______________________ ____________________ __________________

11. What happens to the volume of a cylinder when you:

a. Double the radius only. b. Triple the height only.

_______________________ ____________________

c. Double the radius and triple the height.

____

12. A rectangle has an area of 12cm². What will the area be if you:

a. Triple all sides. b. Multiply all sides by 1.5.

_______________________ _______________________

Name________________________ Period _____

Changing Dimensions. THINK!

Math 8

Practice: Solve each.

1. A rectangular prism is 3x4x5 inches. How many times greater is the volume of a 6x8x15 rectangular prism? (If you are not sure, find each volume and divide).

2. When the sides of an equilateral triangle are 6 inches long, the area of the triangle is approximately 15.6 square inches. What would be the approximate area of an equilateral triangle whose sides are 12 inches long? (round to the tenth)

3. A large circle has 81 times the area of a small circle. If the radius of the large circle is 45 inches, what is the radius of the small circle? (Think, how many times greater is the *radius* of a large circle whose area is 81 times larger than a smaller circle?)

4. The radius and height of a cylinder are tripled. What effect does this have on the cylinder's volume? (As an example, try finding the volume of a cylinder whose radius and height are 1cm, then find the volume of a cylinder whose radius and height are 3cm. Leave your answers in terms of pi. What happened to the volume? Is it 3 times bigger? 6 times? 9 times? 18? 27? 81?)

5. A circle has an area of 25π cm^2. If the radius of the circle is increased by 20%, by what percent will the area of the circle increase? (Think ... what is the radius of the original circle. What will be the new radius? The new area? It really doesn't matter how big the circle is, but if you use an example it might make more sense to you in the beginning).

7. The length, width, and height of a rectangular pyramid are all multiplied by 5 to create a new pyramid. How many times larger is the new pyramid than the original?

8. The dimensions of a cube are increased by 50% (1.5 times). If the original cube had a volume of $16in^3$, what is the volume of the new cube?

Name________________________ Period _____

Changing Dimensions

Math 8

Practice:
The examples in part a should help you solve each problem b below.

1a. How many times greater is the volume of a cube that has 6-inch sides than a cube that has 2-inch sides?

1b. A cube has a volume of $5cm^3$. What would be the volume of a cube whose edge lengths are three times as long?

2a. One right triangle has sides that are 3, 4, and 5cm long. A larger triangle has sides that are 12, 16, and 20cm long. How many times greater is the area of teh large triangle than the small one?

2b. An equilateral triangle whose sides are 4cm long has an area of about $6.9cm^2$. What is the approximate area of a triangle whose side lengths are 16cm long?

3a. How many times greater is the area of a circle whose radius is 14cm than a circle whose radius is 10cm?

3b. You want to double the area of a circle. Approximately what percent should be added to the radius of the circle?

4a. The square base of a pyramid has sides that are 3cm long. The pyramid is 4cm tall. Another square-based pyramid has 6-inch sides and is also 4cm tall. How many times greater is the volume of the larger pyramid?

4b. A pyramid with a rectangular base has a volume of $20cm^3$. If the length and width of the base are doubled, what will be the volume of the new pyramid?

Name________________________ Period _____

Changing Dimensions

Math 8

Practice:
Solve each.

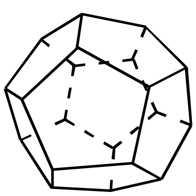
1. The area of a circle is $30in^2$. If you triple the circle's radius, what will its new area be?

2. When a hexagon has 2-inch sides, its area is about $10.4in^2$. What will be the approximate area of a hexagon whose sides are 10 inches long??

3. A rectangular prism has a volume of $17cm^2$. If you double the length and width, but leave the height unchanged, what will be the volume of the new prism?

4. If you want to double the area of a square, by what percent should you increase the length of its sides.
hint: Try using a 10-inch square, double its area, and find the length of the sides of the new square. Use new/original to approximate the percent.

5. The volume of the regular dodecahedron below with an edge length of 4-inches is about 490 in^3. What would be the volume of a regular dodecahedron whose edges are a foot long?



6. The volume of a cone is $3in^3$. What would be the volume after each modification below? (each part refers to the original figure).

a. Double the radius only. ________________

b. Triple the height only. ________________

c. Double the height and triple the radius. _______________

d. Increase the height and radius by 50%. _______________

7. If you want to double the volume of a cube, by what percent should you increase the edge length? (Try some examples).

a.20% b.23% c.26% d.30% e.40%

Changing Dimensions

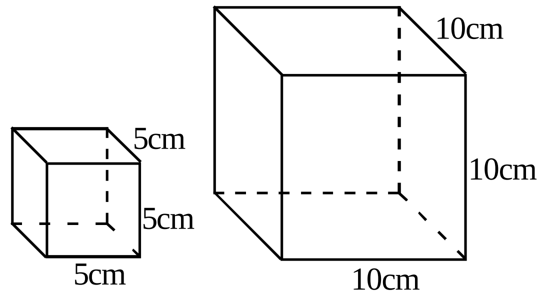
Math 8

What works for a cube works for any other three-dimensional object.

Example:
If you double the edge length of a cube, what effect will this have on the:

Surface Area? ___________

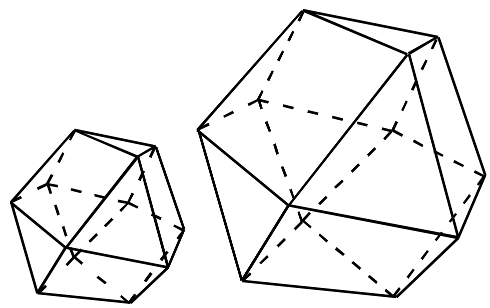
Volume? ___________



Example:
If you double the edge length of the shape below (a cuboctahedron), what effect will this have on the surface area and volume?

Surface Area? ___________

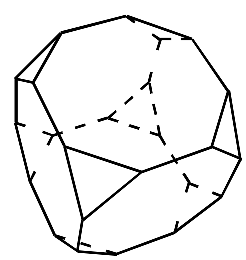
Volume? ___________



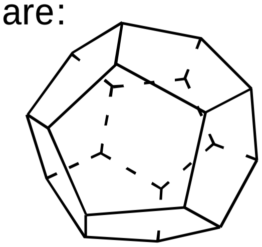
What if you:
Triple the edge lengths?
Increase the edge lengths by 40%?

Practice:

1. The volume of a truncated cube (below) is $10cm^3$. What is the volume of a truncated cube whose edge lengths are:
   a. Twice as long?
   b. Five times as long?
   c. 50% longer? (Round to the hundredth.)
   d. 20% smaller? (Round to the hundredth.)



2. The surface area of the dodecahedron below is $20cm^2$. What is the surface area of a dodecahedron whose edge lengths are:
   a. Twice as long?
   b. Five times as long?
   c. 50% longer? (Round to the tenth.)
   d. 20% smaller? (Round to the tenth.)

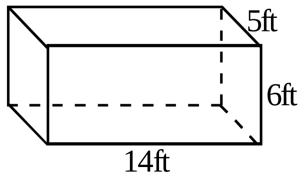


Name_________________________ Period _____

Dimensions Practice Quiz

Math 8

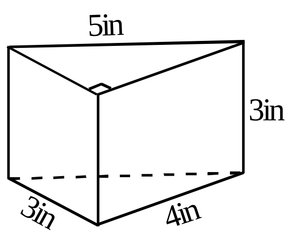
Determine the SURFACE AREA of each figure below.
Round to the tenth. Figures not to scale.



1. What is the volume of the prism above? **1.** ________

2. What is the surface area of the prism above? **2.** ________

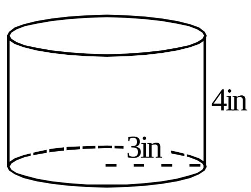
3. What would the volume be if all three dimensions were doubled? **3.** ________



4. What is the volume of the prism above? **4.** ________

5. What is the surface area of the prism above? **5.** ________

6. What would the surface area be if all three dimensions were tripled? **6.** ________



7. In terms of pi, what is the surface area of the cylinder above? **7.** ________

8. In terms of pi, what is the volume of the cylinder above? **8.** ________

9. If the radius is doubled and the height remains unchanged,
how many times greater will the volume of the new cylinder be? **9.** ________

Name________________________ Period _____

Dimensions Practice Quiz

Math 8

Solve each problem involving changing dimensions:

10. A small pizza has a radius of 10 inches, and a medium pizza has a radius that is 20% larger. How much more pizza do you get with the medium pizza than with the small pizza? Express your answer as a percent.

10. ___________

11. A rectangular prism has a volume of $5cm^3$. If you triple the length, width, and height, what will the volume of the enlarged prism be?

11. ___________

12. When the radius of a circle is multipled by 4, the area of the new circle is 40 in^3. What was the area of the original circle?

12. ___________

13. The volume of a rectangular pyramid is $7m^3$. What is the volume of a pyramid that is twice as tall, three times as long, and four times as wide?

13. ___________

14. A cube has edges that are 6 centimeters long. How many times greater is the volume of a cube with 9 centimeter sides? Do not round your answer.

14. ___________

Area and Volume Word Problems

Math 8

Many word problems involve comparing the volume between objects.

Example:
A large cylindrical plastic pitcher is 12 inches tall and has an 8-inch diameter. You use this pitcher to fill a small rectangular fish tank that is 24 inches long and 14 inches wide. How many pitchers will it take to fill the tank to a depth of 16 inches?

Example:
A palette of bricks is 29 inches wide, 24 inches long, and 27 inches tall. Each brick is 3.625” by 2.25” by 8”. How many bricks are in a palette?

Other problems may require that you solve for a missing variable.

Example:

The formula for the surface area of a sphere is $A = 4\pi r^2$. What is the radius of a sphere whose surface area is 36π square inches?

Example: The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$.

If a trapezoid has a height of 8cm, a long base of 12cm, and an area of 76cm^2, what is the length of its short base?

Practice:

1. Cheese is made in large cylindrical shape and then cut into rectangular blocks. About how many 1” by 2” by 4” blocks can be cut from a cheese cylinder that is 18” tall with a 15” radius? (Assume for the problem that no cheese is wasted when the blocks are cut from the cylinder.)

Challenge: The formula for the area of an octagon is $A = 2s^2(1 + \sqrt{2})$.

If the area of an octagon is 391.1cm^2, how long are its sides?

Name_________________________ Period _____

Area/Volume Word Problems

Math 8

Solve each:

1. A large box contains smaller boxes of tissues. The small tissue boxes are 3” tall, 5” wide, and 9” long. The large box is 27” wide, 25” long, and 24” tall. How many boxes of tissues are in the large box?

1. ________

2. The formula for the volume of a cylinder is $\pi r^2 h$. What is the height of a cylinder whose radius is 6 inches and whose volume is 180π square inches?

2. ________

3. A ream of paper is 8.5 inches wide, 11 inches long, and 3 inches tall. How many reams are contained within a box that is 17 x 11 x 15?

3. ________

4. What is the side length of a square whose area is 54cm^2? Round to the tenth.

4. ________

5. A manufacturer is shipping boxes in an 18-wheeler. The truck is 40 feet long, 8 feet wide, and 10 feet tall. The boxes are 24 inches wide, 30 inches long, and 12 inches tall. How many boxes will fit in the truck.

5. ________

6. You want to know how many windows (actually, pieces of glass) are on a building. The building is made entirely of glass, and each piece of glass is 10 feet tall and 8 feet wide. The building is a rectangle 56 feet wide, 80 feet long, and 240 feet tall. How many panes of glass were needed to construct the building, assuming the building is covered entirely in glass (except for the roof).

6. ________

7. Thomas has an enormous stamp collection. He has wallpapered one wall of his house with stamps that are square with sides that are one and one-quarter inches long. How many stamps were used to cover the wall, which is 10 feet tall and 25 feet long?

7. ________

Name________________________ Period _____

Area/Volume Word Problems

Math 8

Practice: Solve each.

8. The formula for the area of a hexagon with side length s is $A = \frac{3s^2\sqrt{3}}{2}$.

a. What is the area of a hexagon of side length 6?

8a. ________

b. What is the side length of a hexagon of area 40cm^2?

8b. ________

9. Ice cream is sold in a cylinder that is 8 inches tall and has a 3-inch radius. A perfect scoop of ice cream is a perfect sphere with a 2-inch diameter. The formula for the volume of a sphere is

$$V = \frac{4}{3}\pi r^3$$

a. How many scoops of ice cream are in the container?

9a. ________

b. If an ice-cream cone is 3" tall with a 1" radius, how many cones could be filled (just to the top) with the container?

9b. ________

c. Suppose you wanted to fill each cone and add 1/2 scoop (a hemisphere) on the top of each. How many ice cream cones couls be made with the container full of ice cream?

9c. ________

Density = Mass/Volume

Math 8

Density is a measure of how much matter is in a given volume.
You have probably seen the formula for density in science:

$$d = \frac{m}{v}$$

The densities we will use will be in grams per cm³.

Example:
A core sample is a cylindrical tube of material cut from the earth. A core sample of stone cut from Mount Mitchell is 2 meters long (200cm), has a radius of 10cm, and a mass of 170 kilograms (440,000 grams). What is its density in grams/cm^3?

You can also use a known density to determine the mass of an object.

Example:
You are building a sand castle at the beach. You fill a bucket of wet sand at the water's edge and carry it to where you are building your castle. Wet sand has a density of 1.9 g/cm^3.

a. How much does your bucket weigh in kilograms (1kg = 1,000g) if it is 20cm tall and has a 11cm radius?

b. There are 2.2 pounds in a kilogram. How many pounds does your bucket weigh?

Practice:

1. What is the density in g/cm^3 of an object that has a volume of 18cm^3 and a mass of 24g?

2. What is the density of a cylindrical jar of peanut butter 12cm tall with a 8cm diameter that weighs 748 grams?

3. Granite has a density of 2.7g/cm^3. You want a granite countertop installed on the island in your kitchen. The countertop is 2cm thick, 1.3m wide, and 2m long. How many kilograms will the countertop weigh? (note: 1m = 100cm)

Name________________________ Period _____

Area/Volume Word Problems

Math 8

Calculate each density in g/cm^3.
Round to the tenth.
1kg=1,000g. 1m = 100cm.

1. Mass = 80g, Volume = $115cm^3$.

1. ________

2. Mass = 1,230g, Volume = $1{,}980cm^3$.

2. ________

3. Mass = 50g, Volume = $42cm^3$.

3. ________

4. Mass = 2.5**kg**, Volume = $1{,}870cm^3$.

4. ________

5. A cube has 6cm edges and a mass of 562 grams.

5. ________

6. A cylinder is 3cm tall, has a 2cm radius, and weighs 190 grams.

6. ________

7. A wood board that is 6cm wide, 18cm tall, and 2**m** long, weighing 18**kg**.

7. ________

8. A lead cone that is 5cm tall and has a 3cm radius, weighing 535 grams.

8. ________

Calculate each mass in grams.
Round to the tenth.
1kg=1,000g. 1m = 100cm.

9. Silver has a density of $10.5g/cm^3$. A silver dollar has a 1.8cm radius and is 1/4 cm thick. How many grams does it weigh? Check your answer here:
http://wiki.answers.com/Q/What_is_the_weight_of_silver_dollar

9. ________

10. A typical can of soup has a radius of 7cm and a height of 11cm. Its density is about $1.05g/cm^3$. How much does a can of soup weigh in grams? (note: You should know from the can drive that a can weighs about a pound. 453g = 1lb ... make sure your answer is somewhat close to this)

10. ________

11. A gold brick is 5cm tall, 8cm wide, and 20cm long. Gold has a density of $1.932g/cm^3$. How many grams should the gold brick weigh if it is pure gold? 11b. Gold costs about $36 per gram. How much is the gold brick worth?

11. ________ **11b.** ________