

Lesson: Surface Area & Volume 2**Posted by:** Noon, Feb. 26th**Due Date:** Friday, March 2nd at 4:00 p.m.

Objectives: Students will 1) draw nets of polyhedra to calculate surface area as well as calculate the surface area of polyhedra and objects. 2) estimate volume, count cubes to find volume, and convert measurements in cubic centimetres and cubic metres. 3) use the formula $V = \text{area of base} \times \text{height}$ of a prism to calculate the volume of a rectangular or triangular prism. 4) calculate the surface area of a cylinder as well as the volume of a cylinder using the formula $V = \text{area of base} \times \text{height}$.

Section 1: Feb. 26th. You may use a calculator today.

8.2 Surface Areas of Polyhedra

Do you remember how to find areas of different shapes?

If you forget, here's a reminder:

Formulas for Area of Triangles, Quadrilaterals and Circles		
	Area	Shorter Formula
Rectangle	length x width	$l \times w$
Parallelogram	base x height	$b \times h$
Triangle	$\frac{1}{2} \times \text{base} \times \text{height}$	$\frac{1}{2} \times b \times h$ OR $\frac{bh}{2}$ since $\frac{1}{2} \times b \times h = \frac{1}{2} \times \frac{b}{1} \times \frac{h}{1}$
Circle	$\pi \times \text{radius squared}$	r^2



Read the top of page 248.

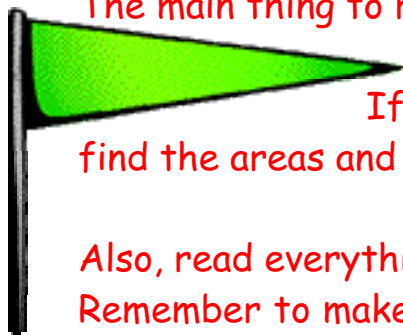
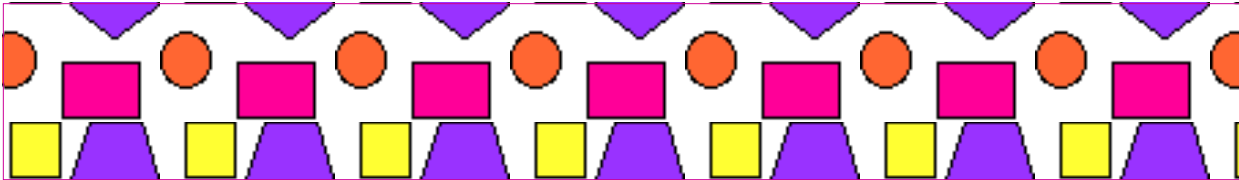


You might wonder what a polyhedra is.... it is the plural of polyhedron which you should remember from last time is a 3-dimensional shape with polygons for sides!

Notice that Jocelyn drew the net (which is a diagram of what the box would look like if it was taken apart), order to help calculate the surface area. The surface area of an object is all the areas of the sides of the object added together.

Now do the Inquire questions 1 and 2 from page 248 in your notebook.

Check your answers:



The main thing to remember is that the surface area of a prism is the sum of all of the area of all of its faces. If you are stuck, draw a diagram of the net, then find the areas and add them together.

Also, read everything carefully, before you start calculating! Remember to make sure that the measurements are in the same units, and that you are answering what you are asked to find.

Now read the example on page 248 carefully. Once you have done that, do #s 1-11 from page 249 in your notebook first before checking your answers at the back of the book! Once you have done that, check your answers with the answers at the back of the book, mark your work, and make corrections. **As always, if you are having difficulty, please ask for help!!!**

Section 2: Feb. 27th

Estimating and Measuring Volume

You should remember that **area** is the number of **squared units** in a 2-dimensional shape. You can find the area of a circle, square, triangle, etc. It is VERY important to remember that area is measured in square units (ie cm^2 , m^2 , km^2 , units^2 , etc.)

Volume, on the other hand is the amount of space occupied by a solid. You can find the volume of a cube, cylinder, triangular prism, rectangular prism, etc. It is also VERY important to remember that volume is measured in cubic units. (ie. cm^3 , m^3 , km^3 , units^3 , etc.)



Read the top of page 250 in your textbook. Then, once you have done that, do Activities 1, 2, and 6. For Activity 6, see below:

- **It is important that you remember how to convert between metric units. See the slide show [ma8.23-metric conversions](#) for help on this.**

$$1000 \text{ mm} = 100 \text{ cm} = 10 \text{ dm} = 1 \text{ m} = 0.1 \text{ dam} = 0.01 \text{ dam} = 0.001 \text{ km}$$

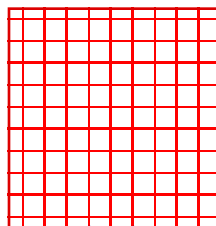
Now, if we are converting between square units, we can use the same conversion chart, only square each thing.

$$(1000 \text{ mm})^2 = (100 \text{ cm})^2 = (10 \text{ dm})^2 = (1 \text{ m})^2 = (0.1 \text{ dam})^2 = (0.01 \text{ dam})^2 = (0.001 \text{ km})^2$$

which is the same as

$$1\,000\,000 \text{ mm}^2 = 10\,000 \text{ cm}^2 = 100 \text{ dm}^2 = 1 \text{ m}^2 = 0.01 \text{ dam}^2 = 0.0001 \text{ dam}^2 = 0.000\,001 \text{ km}^2$$

So, for example, if we have a square that is 1 m by 1 m, we also know that that is 100 cm by 100 cm. (each small square equals 10 cm)



If we were to find the area of that square in metres, we would multiply side by side to get 1 m^2 . In the same way, if we were to find the area of the square in centimetres, we would multiply $100\text{cm} \times 100\text{cm}$ to get $10\,000 \text{ cm}^2$.

Now, if we are converting between cubic units, we can use the same conversion chart, only cube each thing.

$$(1000 \text{ mm})^3 = (100 \text{ cm})^3 = (10 \text{ dm})^3 = (1 \text{ m})^3 = (0.1 \text{ dam})^3 = (0.01 \text{ dam})^3 = (0.001 \text{ km})^3$$

which is the same as

$$1\,000\,000\,000 \text{ mm}^3 = 1\,000\,000 \text{ cm}^3 = 1000 \text{ dm}^3 = 1 \text{ m}^3 = 0.001 \text{ dam}^3 = 0.000\,001 \text{ km}^3$$

Once you are finished all of the above, check your work with the answers at the back of the book, and make corrections where necessary. **If you have any questions, now is the time to ask!!!**

Section 3: Feb. 28th You may use a calculator for the test.

8.3 Volumes of Prisms

Read the top of page 252 in your textbook.

How do you know that the volume of a unit cube is 1 cm^3 (you say this, "one centimetre cubed")?

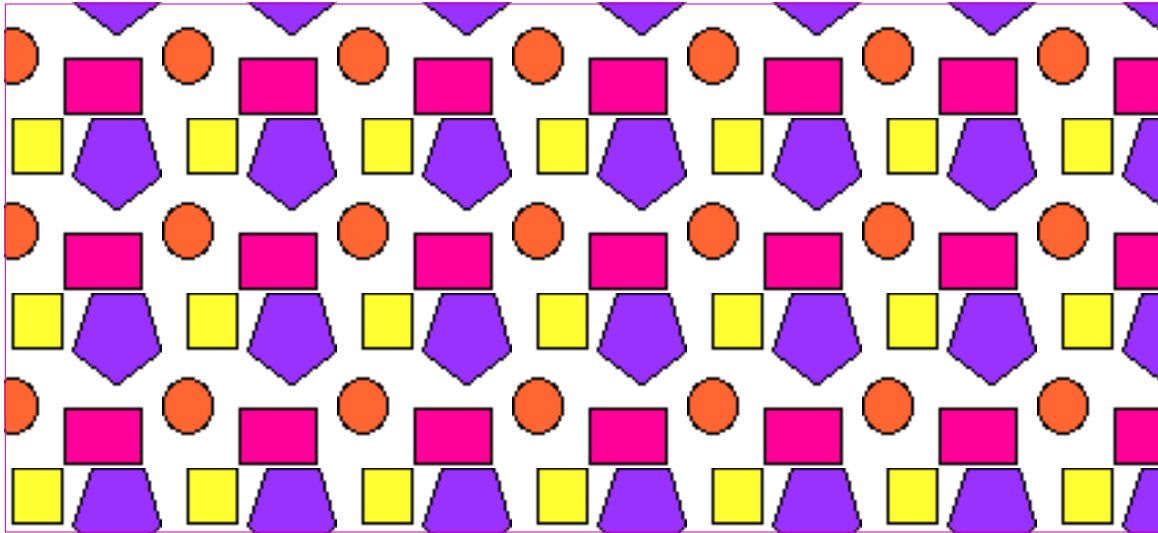
Since the length of each edge is 1 cm, the area of each face is 1 cm^2 , and the volume is 1 cm^3 .

Remember, to write measurements cubed, you can either use ^ which means "to the power of". (ie. 1 cm^3) You can also select **superscript** from the Style menu above when you type in Apple works, then type the 3. (ie. 1 cm^3)

Now do Inquire questions 1-4 (If you have someone you can work together with, that would be great). For #4, just discuss the answer with your partner... you don't need to discuss it with your classmates unless you wish to.

For #4, how did you find the volume of the tens rod? the hundreds flat? the thousands cube?

You could have done it any of the following ways:

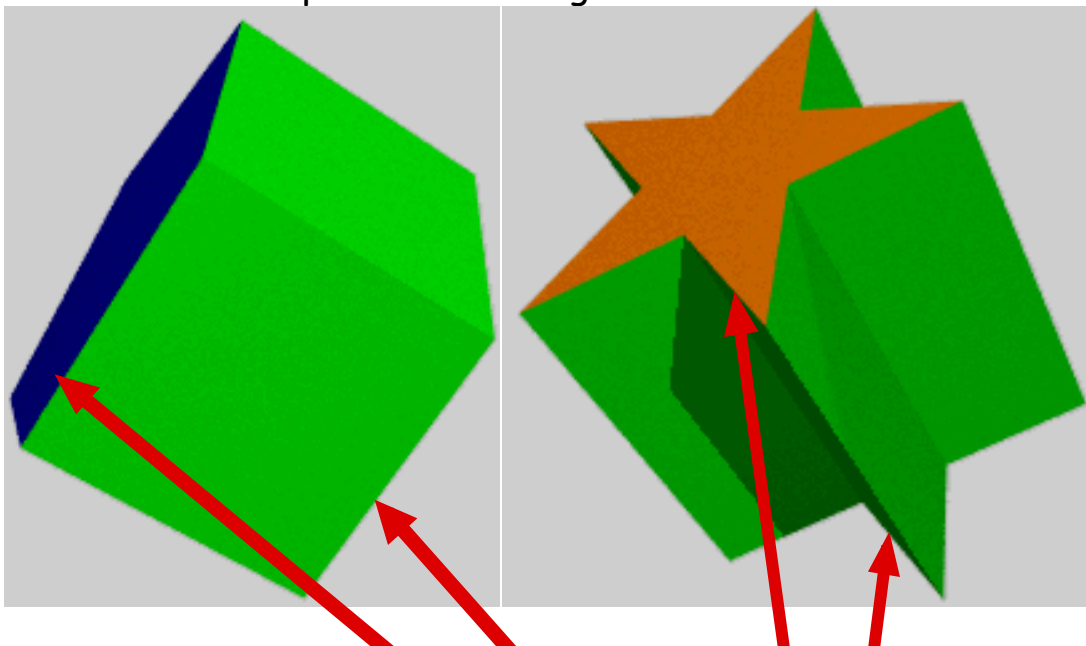


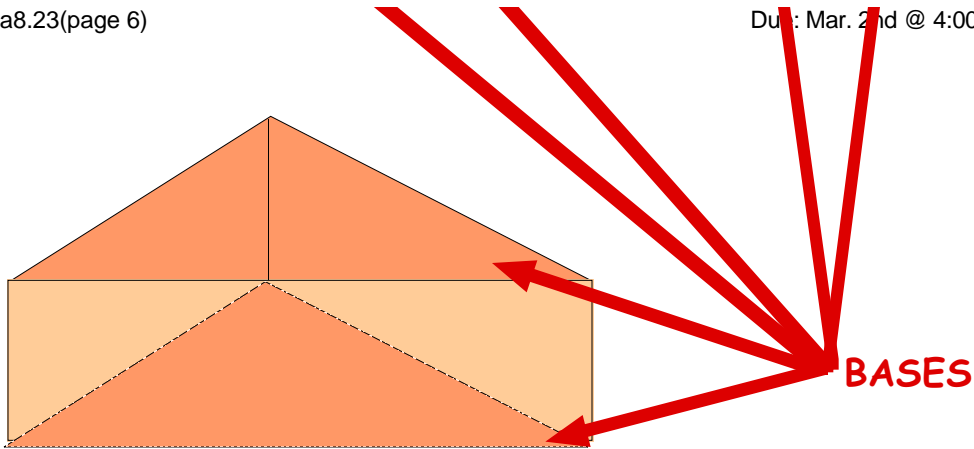
In order to find the volume of a right prism, you will need to

- 1) Calculate the base area (which is often referred to as **B** ... a capital B means the area of the Base) of the prism or cylinder
- 2) Multiply the base area (B) by the height (h) of the prism.

So, the Volume of a right prism or cylinder = $B \cdot h$

It is important to remember that the Base of a prism is one of the sides that is parallel and congruent to the other side.





Now do Inquire question #5.

Check your answers:



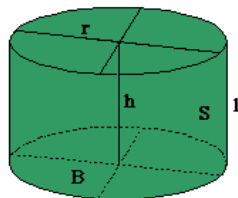
NOTICE: It is essential that you always put units in!!! Also, make sure all measurements are in the same units first before figuring out areas and volumes!!!

Now read the example on page 252. Notice how they set up how they figure their answer. You should set your answers up in a similar, organized fashion! Once you have done that, Do #s 1-9, 10a, 12 (except comparing your answers), and 13 (except comparing your answers) from page 253 in your notebook. As always, check your answers with those provided at the back of the book.

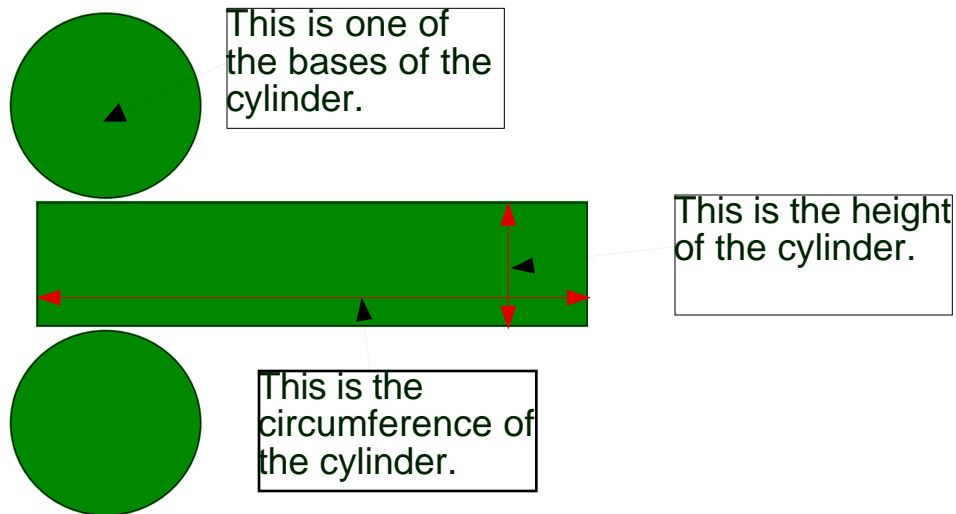
Section 4: March 1st You may use a calculator today.

8.4 Surface Area and Volume of a Cylinder

Finding the surface area of a cylinder is similar to finding the surface area of prisms... you want to find the areas of each of the ends and the side, and add the areas together. If, for example, we have the following cylinder,



the net would look something like this.



In order to find the surface area of the cylinder, you would need to find the circumference of the base to find the length of the rectangle, then multiply by the height of the cylinder to find the area of the area of the rectangle. Once you have done that, you can find the area of one of the bases, then multiply by 2 to find the combined areas of the bases, and add that to the area of the rectangle, and



...you have the surface area of the cylinder!!!

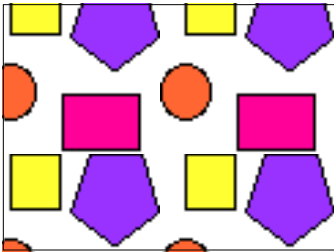
To find the volume of a cylinder, you do the same as what you did with the prisms...

- 1) Calculate the base area (which is often referred to as **B** ... a capital B means the area of the Base) of the cylinder
- 2) Multiply the base area (B) by the height (h) of the cylinder!!!

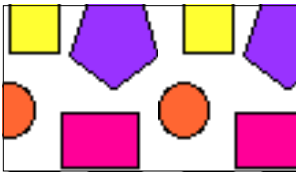
So, the Volume of a cylinder = **B (area of base)•h**

Now try both sets of Activity and Inquire questions on page 254. Check your answers below:

Inquire #1



Inquire #2



Note:
Whenever finding areas or volumes with lots of steps (or any problems with many steps for that matter), write each step in order, a new step on a new line, so your information is organized, and easy to follow. This will help you greatly in the future!!! =) (It will also help you to make fewer mistakes!)
Mrs. Hollands

Now do #s 1-8 from pages 254 and 255 in your notebook. If you have any problems, now is the time to ask. Once you are finished with that, check your work with the answers at the back of the book, and make corrections where necessary.

Section 5: March 2nd You may use a calculator today.

Your Assignment

Go to ma8.23-assignment, and do what it says there.

Have an awesome weekend!

-Mrs. H (& Mr. Fisher)

Remember: from now on, you will be sending your assignments to Mr. Fisher.