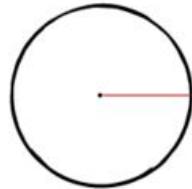
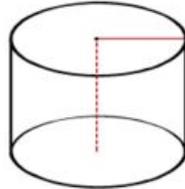


Unit 6

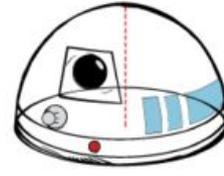
Measurement



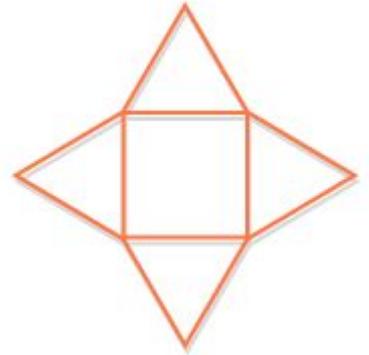
$$A = \pi r^2$$



$$V = \pi r^2 h$$

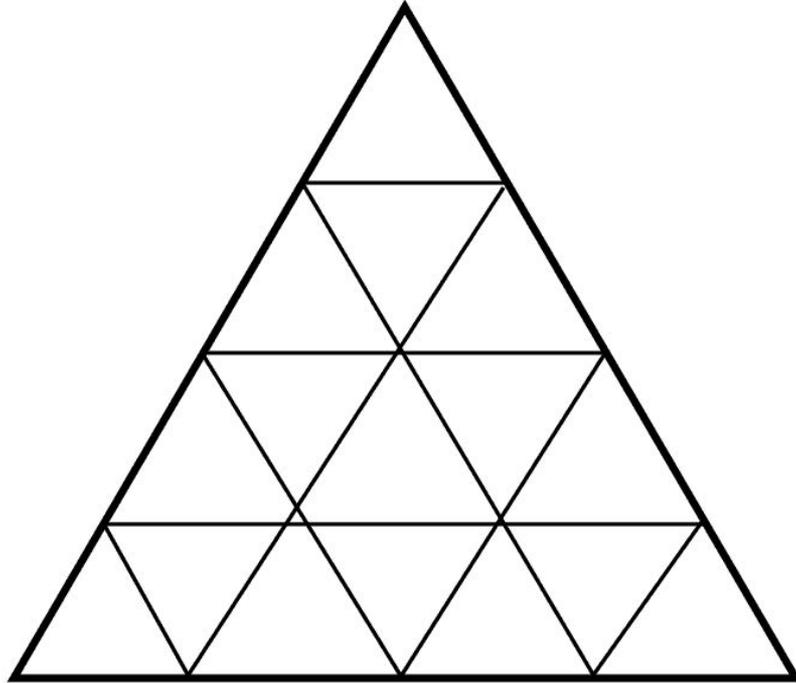


$$V = r^2 d^2$$



DO NOW!

1. How many triangles are in this drawing?



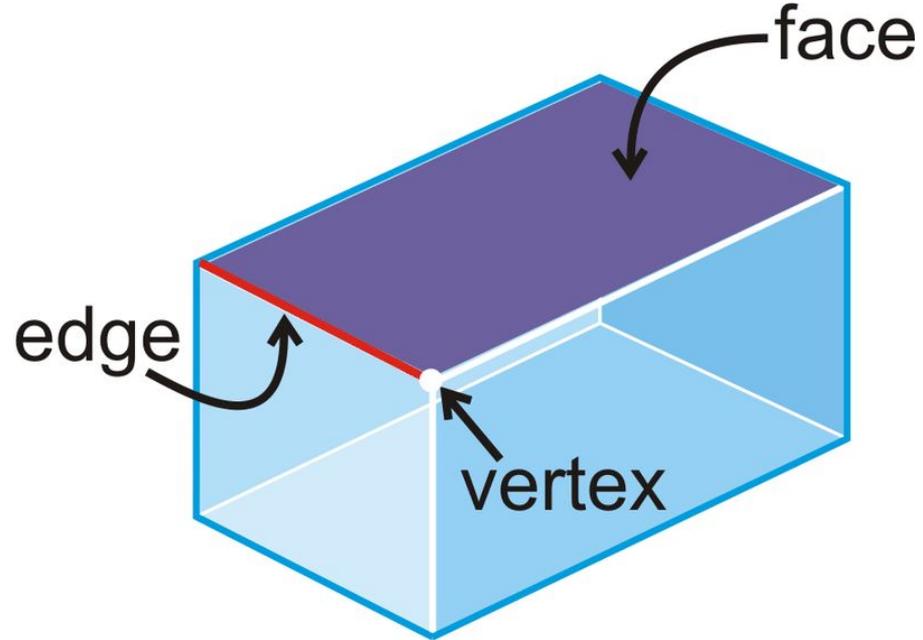
Faces, Vertices and Edges. Oh My!

When examining a 3D shape it is important to be able to identify the number of **faces**, **vertices**, and **edges**.

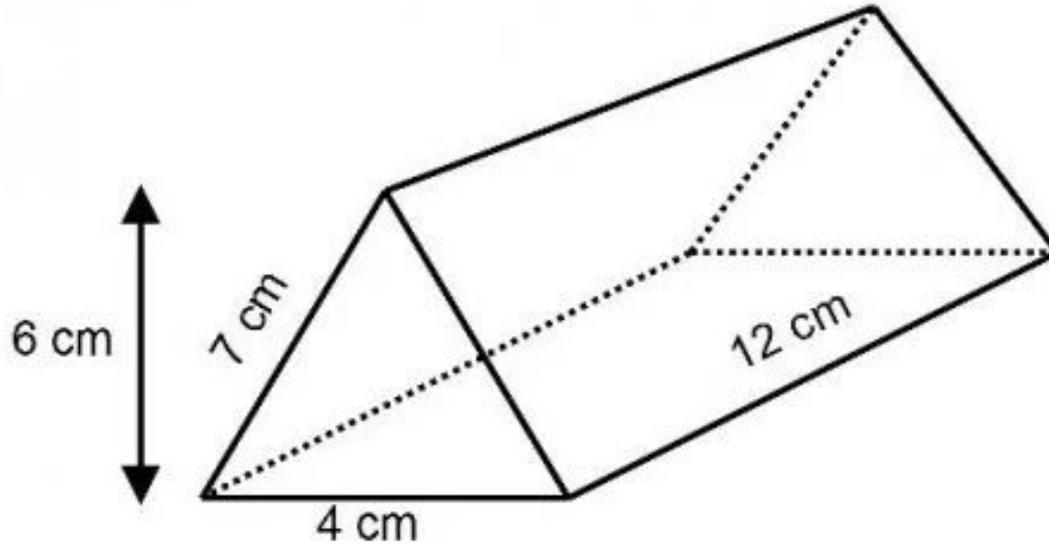
A **face** is any flat surface on the shape. Faces are usually polygons.

A **vertex** is a corner of the shape. Vertices are joined by edges.

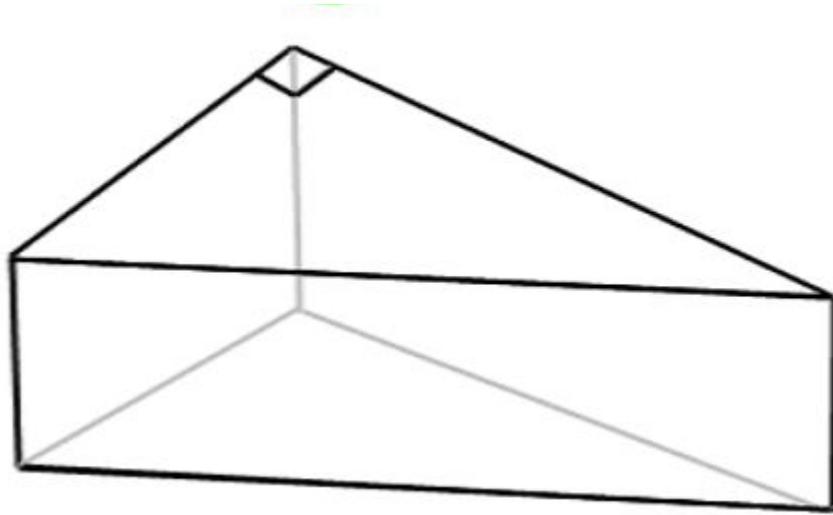
Edges are found on any line where two faces meet.



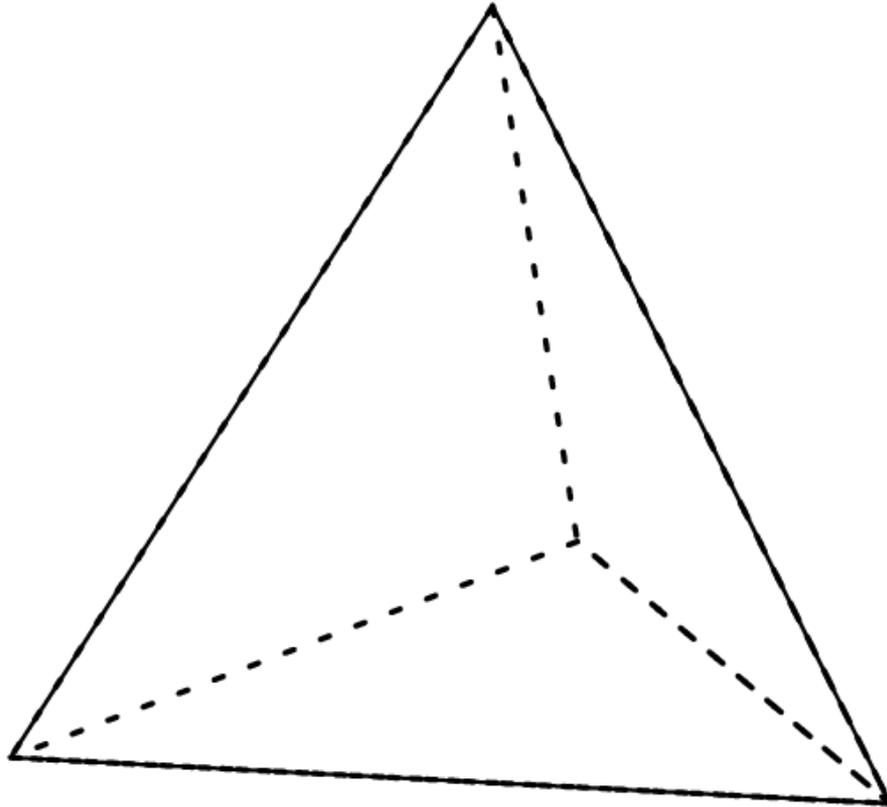
How many edges, vertices and faces?



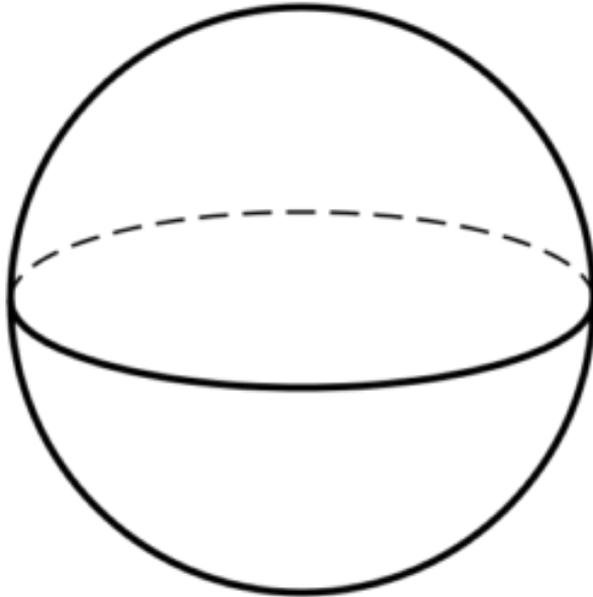
How many edges, vertices and faces?



How many edges, vertices and faces?



How many edges, vertices and faces?



Nets

A **net** is a 2D pattern that you can cut and fold to make a 3D model of a solid shape.

Nets can be made of all kinds of polygons. However, true nets do not contain extra parts to assist with folding.

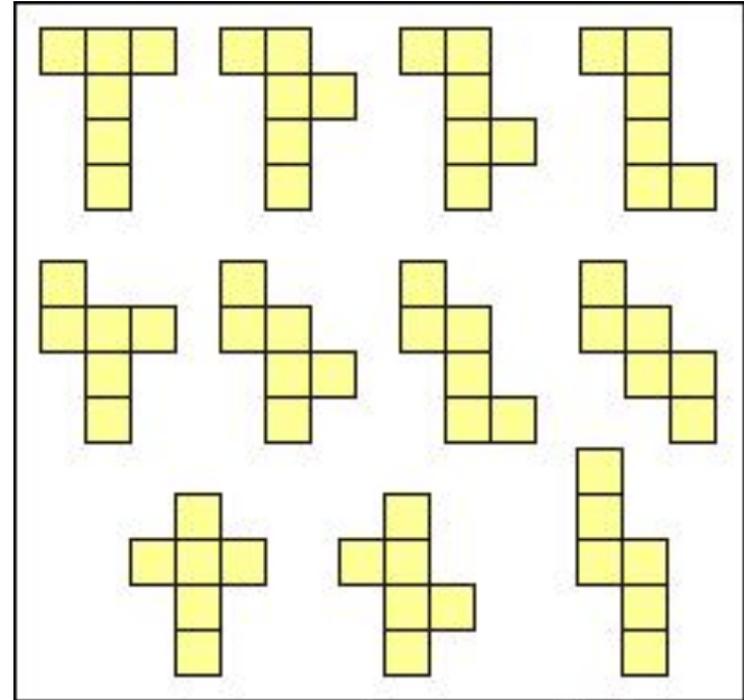


Nets

Nets can look different and still make the same shape. For example there are 11 different nets for a cube.

Nets must however contain the same measurements, vertices, edges and number of faces to be congruent.

Congruent: have the exact same shape and size



Determine if the shapes shown are 'similar', 'congruent' or 'neither'.

1)



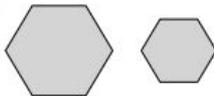
2)



3)



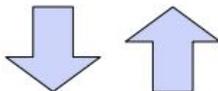
4)



5)



6)



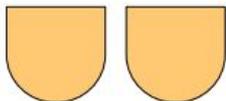
7)



8)



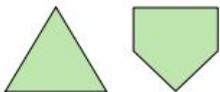
9)



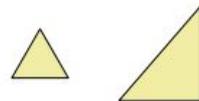
10)



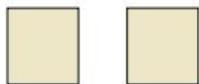
11)



12)



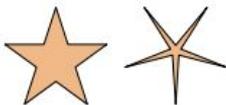
13)



14)



15)



16)



Answers

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

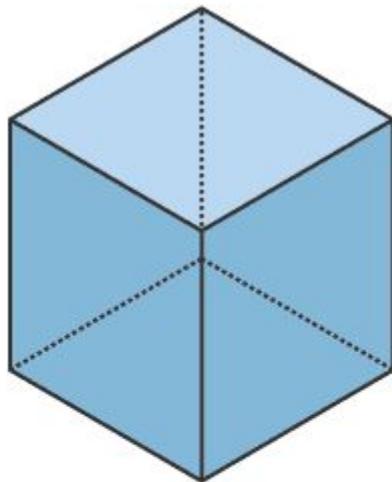
13. _____

14. _____

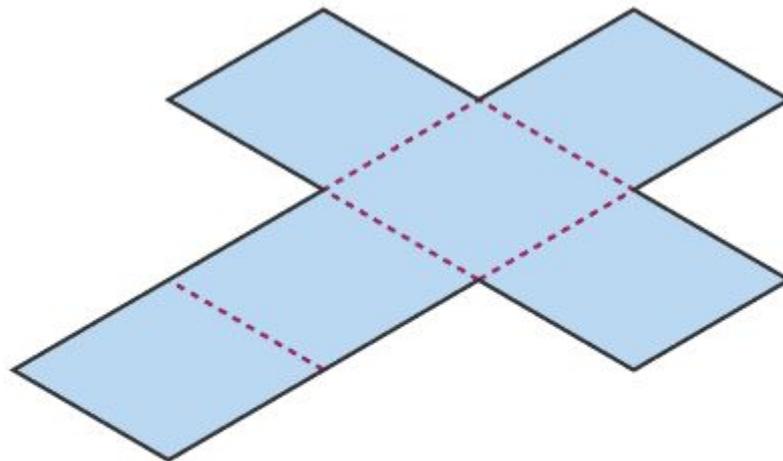
15. _____

16. _____

A cube and net

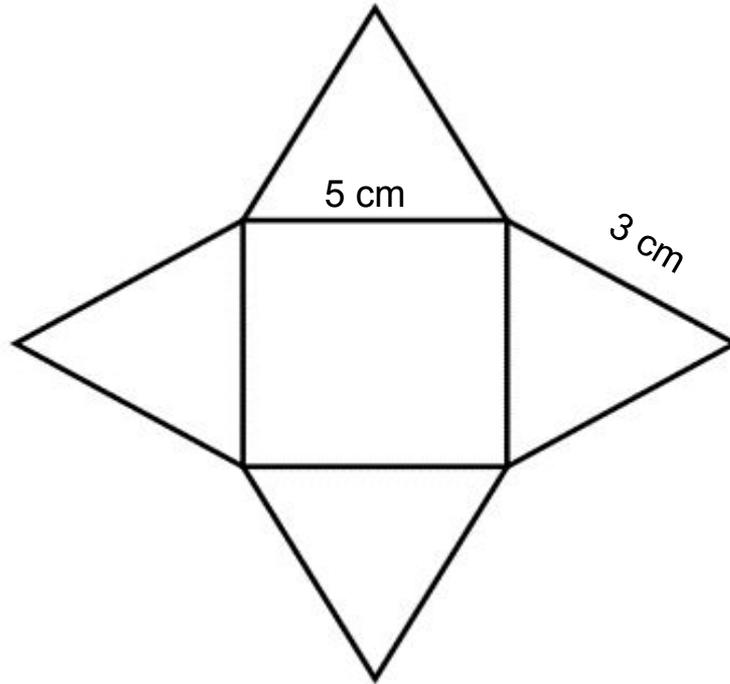


Cube



Net of a cube

Square base pyramid net - Label all edge measurements



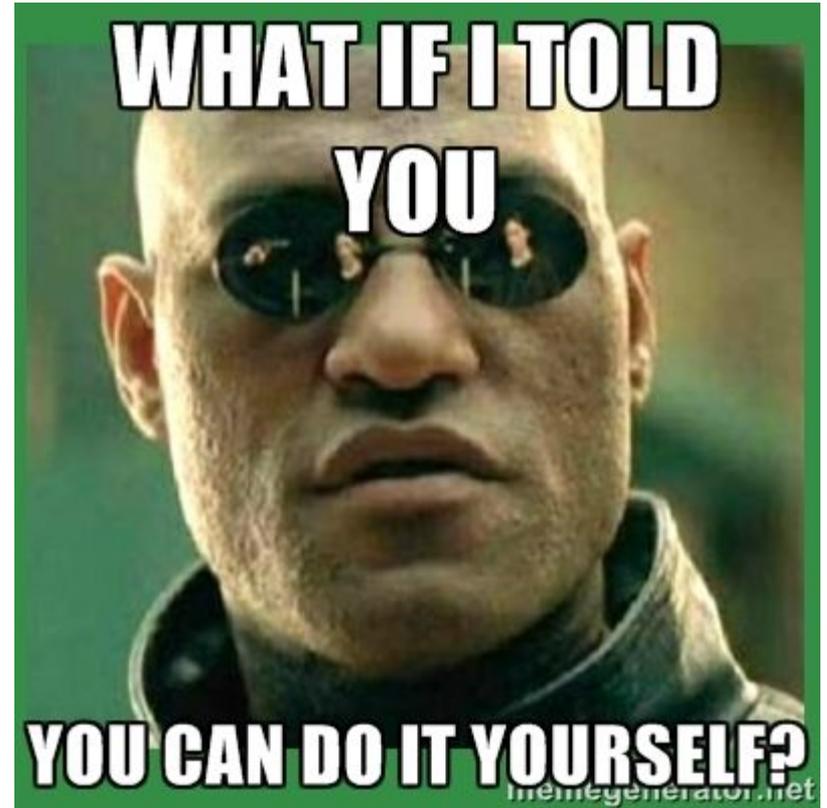
Build your own

From the nets available, build the shape it creates.

What shapes does your net contain?

Can you guess what shape it will create before building?

How many edges, vertices and faces does your shape have?

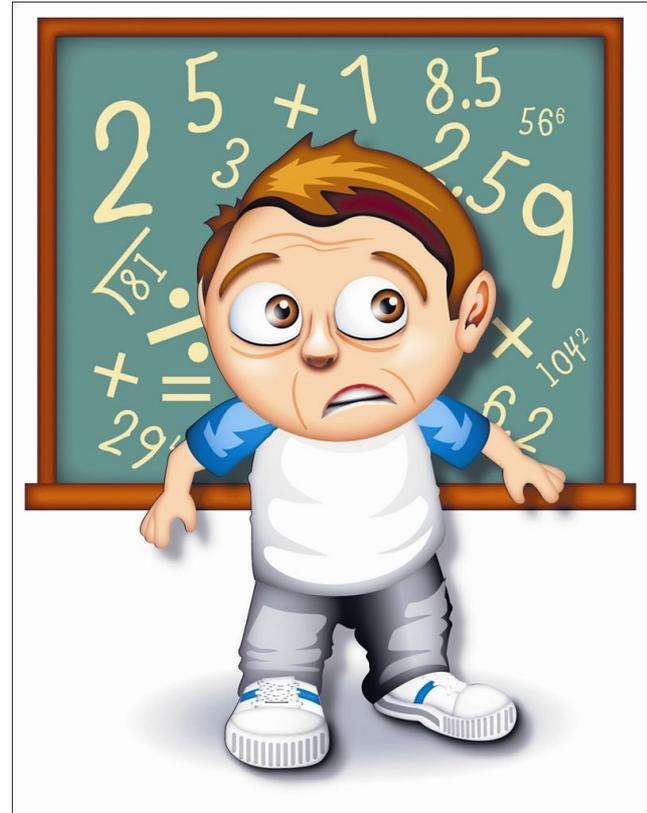


Review

- a) What is a net?

- b) What are vertices, faces and edges?

- c) Are the measurements of a net the same as the shape?

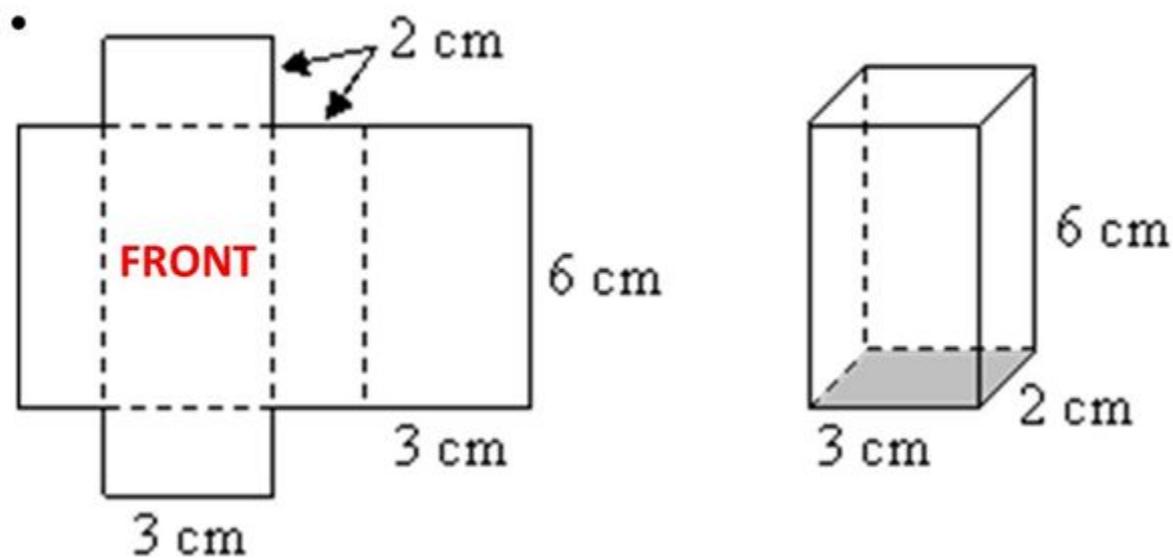


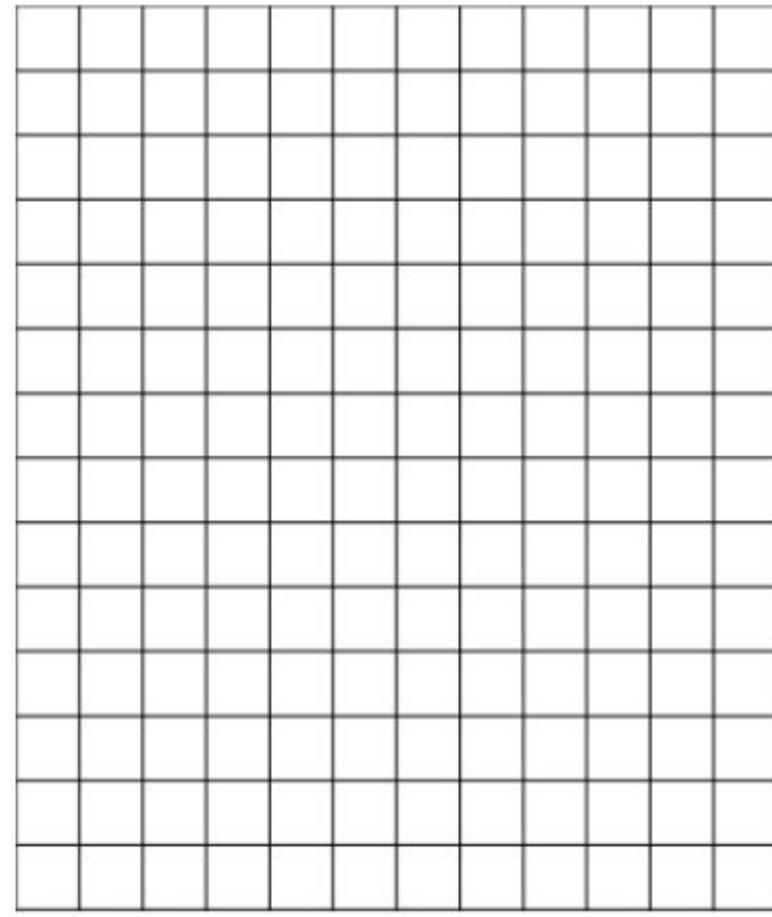
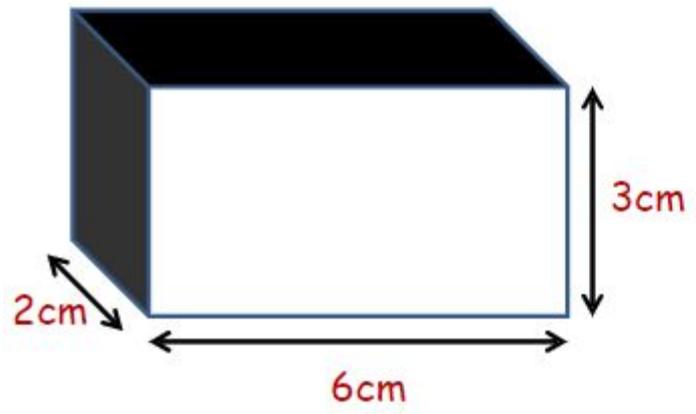
Drawing Nets

Steps:

- 1) Label the faces of your 3-D shape
- 2) Draw the base
- 3) Draw the sides
- 4) Draw the top
- 5) Count to ensure you have included every face

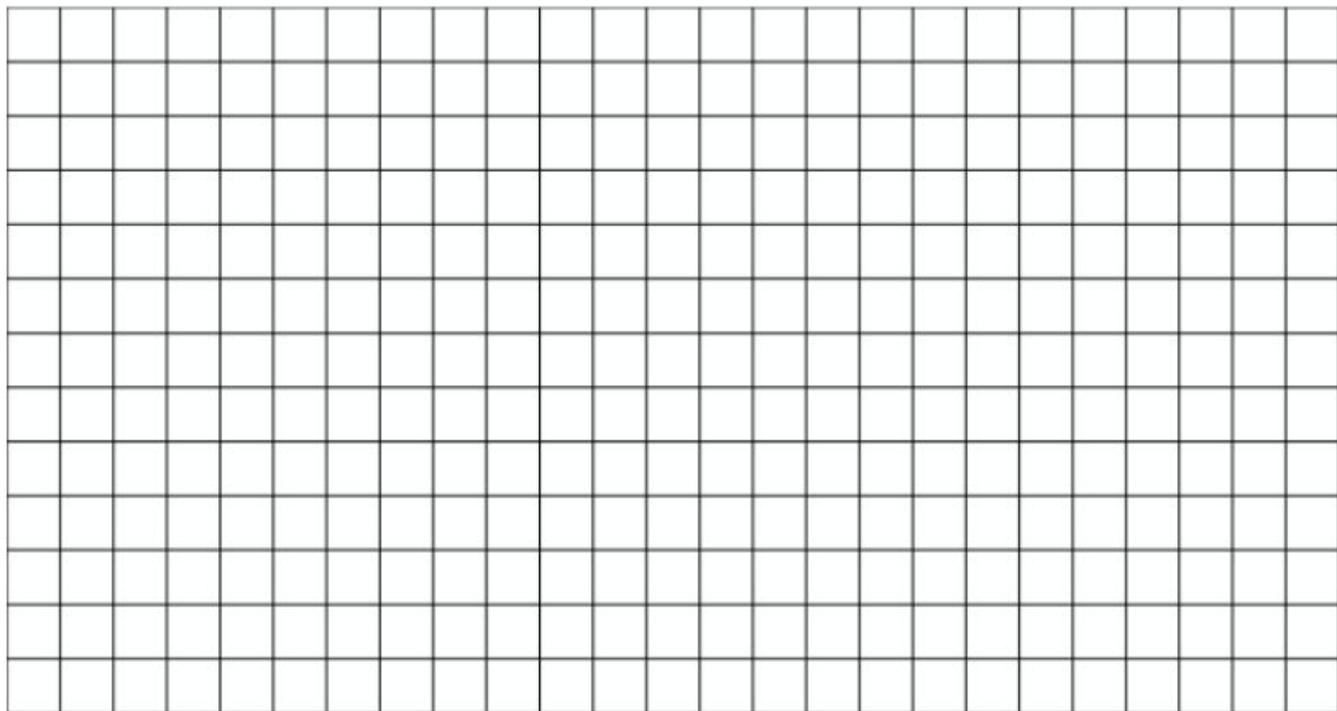
Creating a Net of a Rectangular Prism



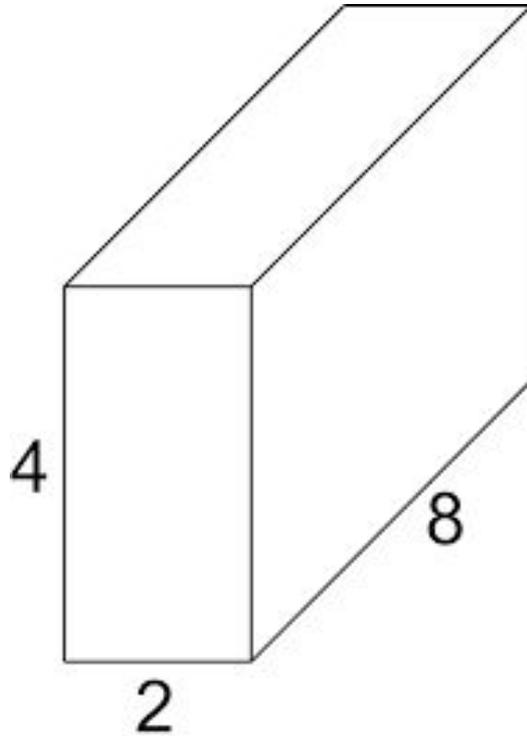


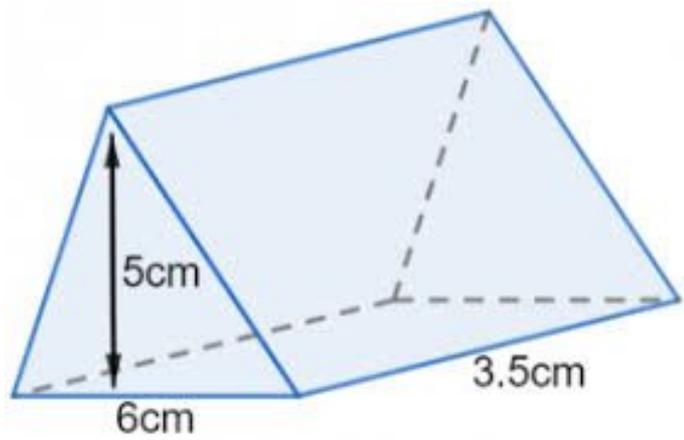


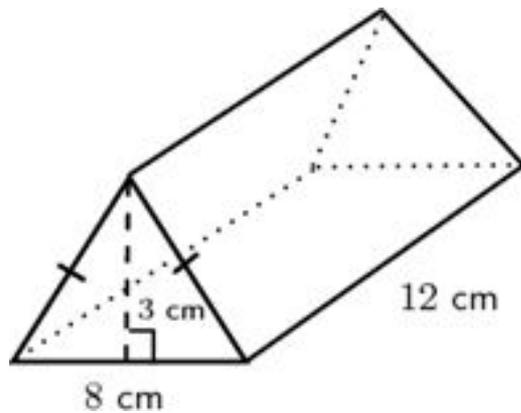
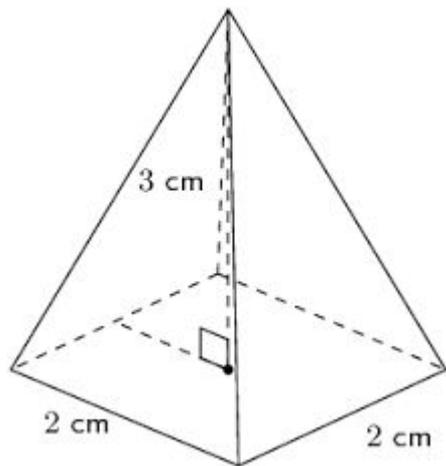
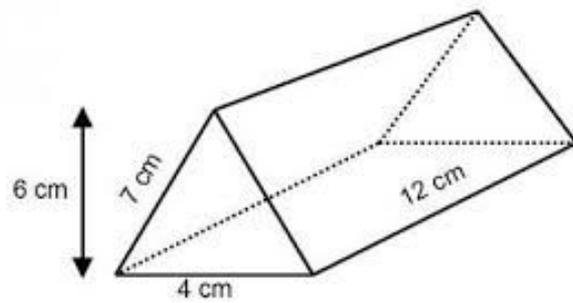
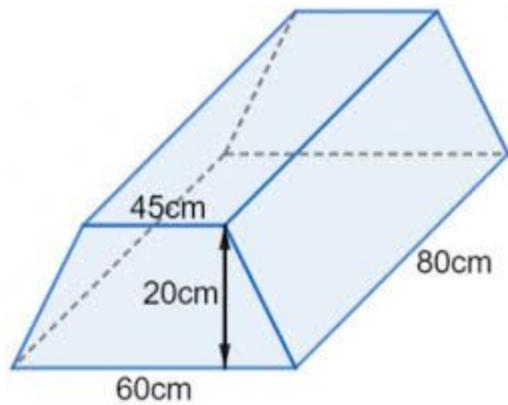
Q2



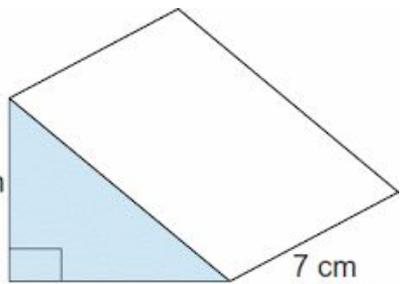
Do NOW! Draw to scale using a ruler.



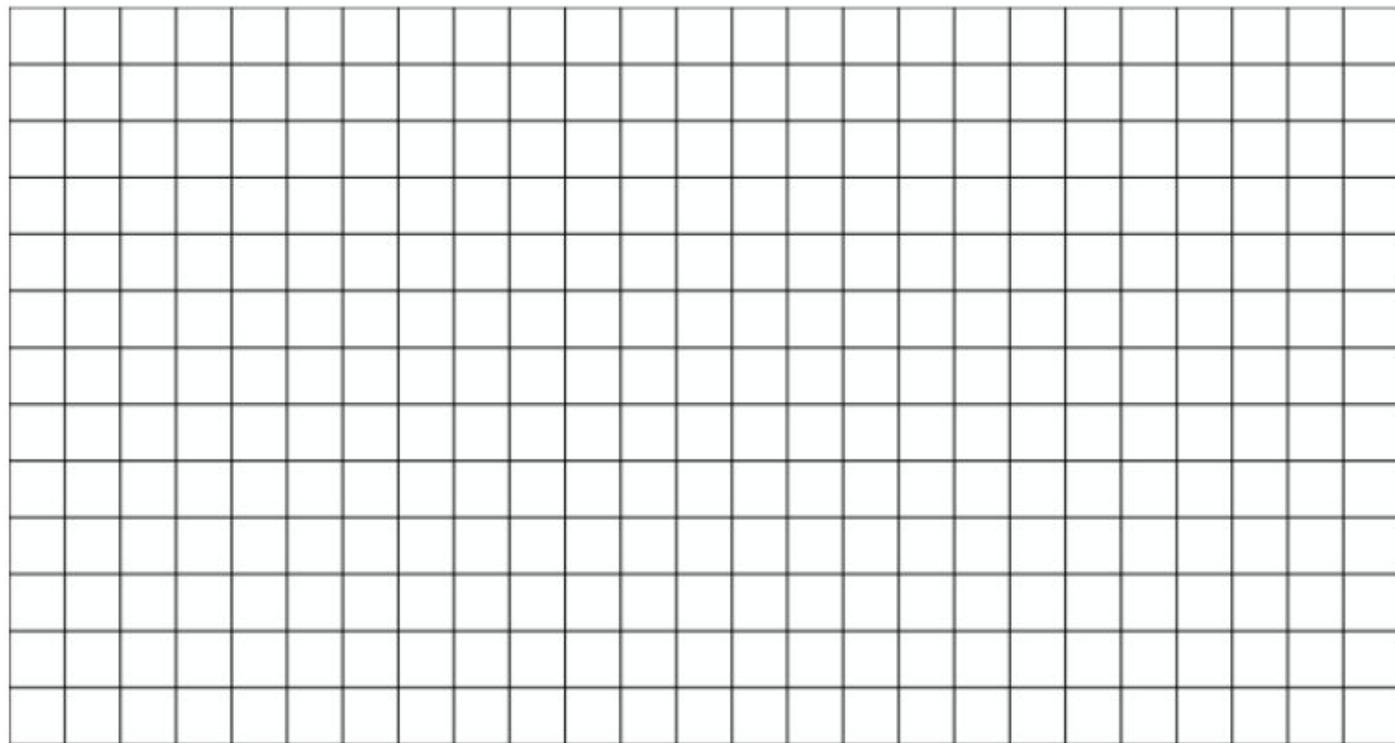




3 cm



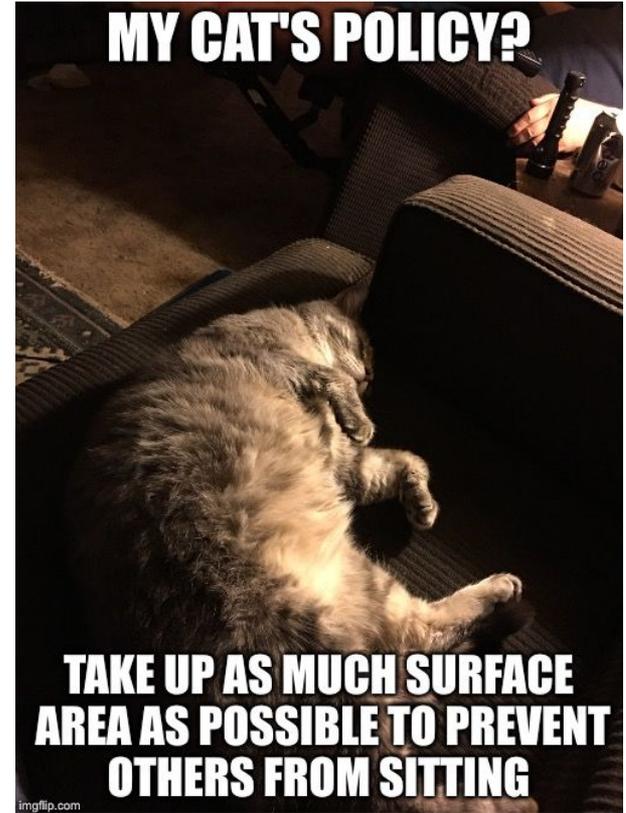
4 cm



Surface Area

The **surface area** of a shape is the total area of the surface of a three-dimensional object.

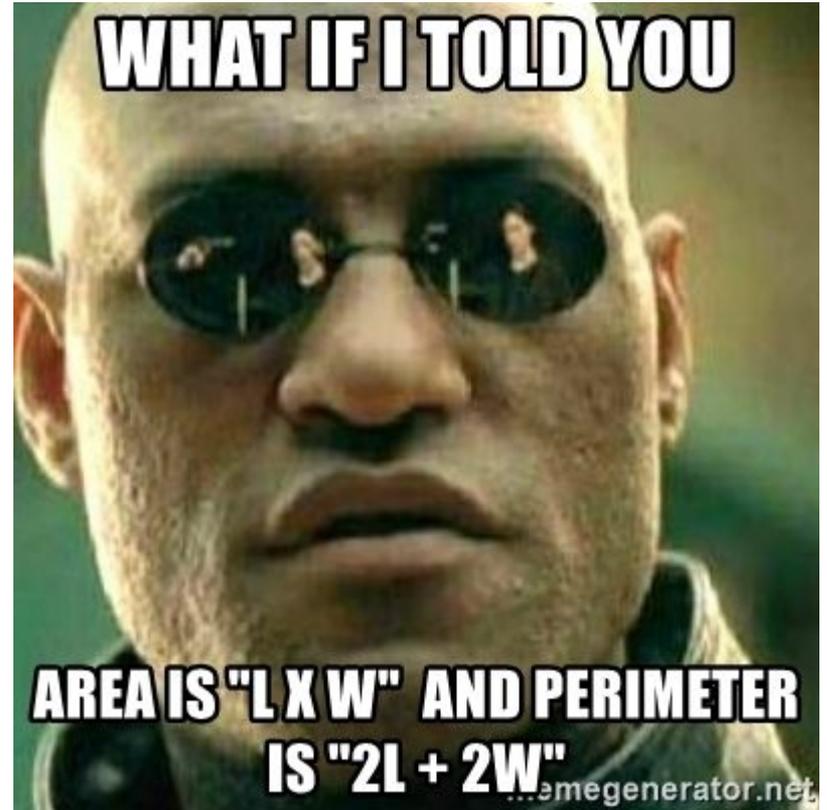
To find the surface area of a shape, simply find **the areas of all faces and add them together.**



Remember!

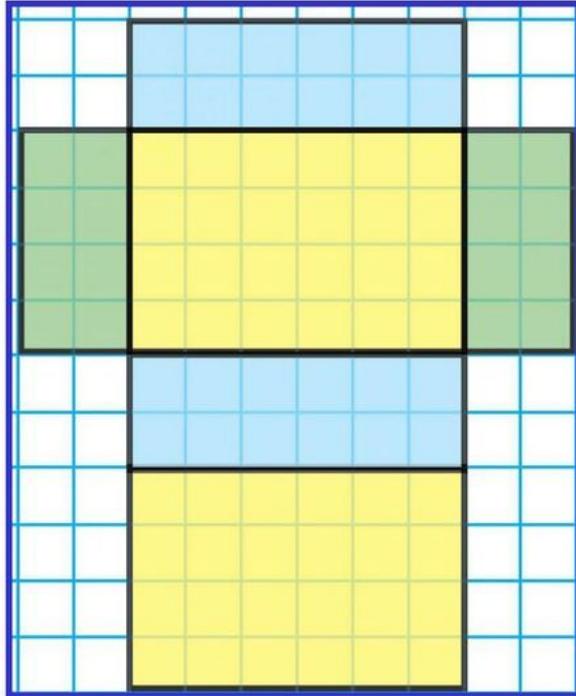
The areas of both rectangles and squares can be found by multiplying the base and height. That is;

$$A = \text{base} \times \text{height}$$

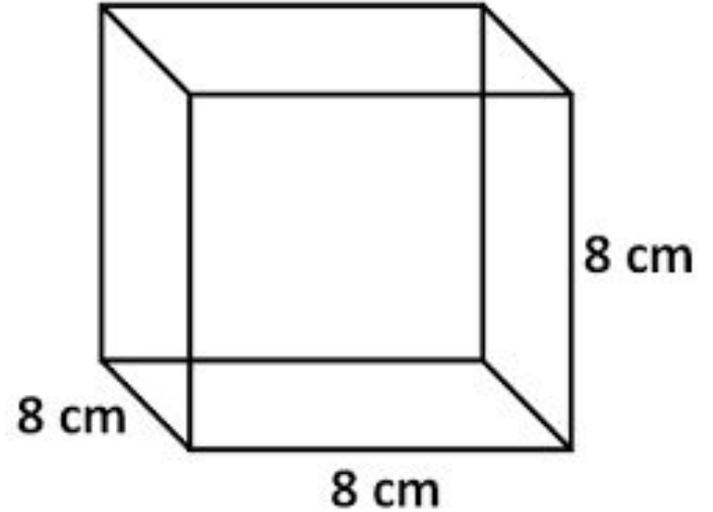


LET'S BUILD A RECTANGULAR PRISM . . .

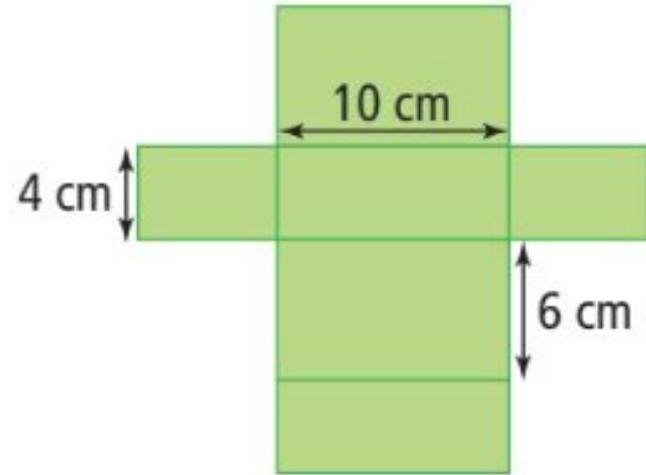
“Surface Area Net Activity”
(teacher will give directions)



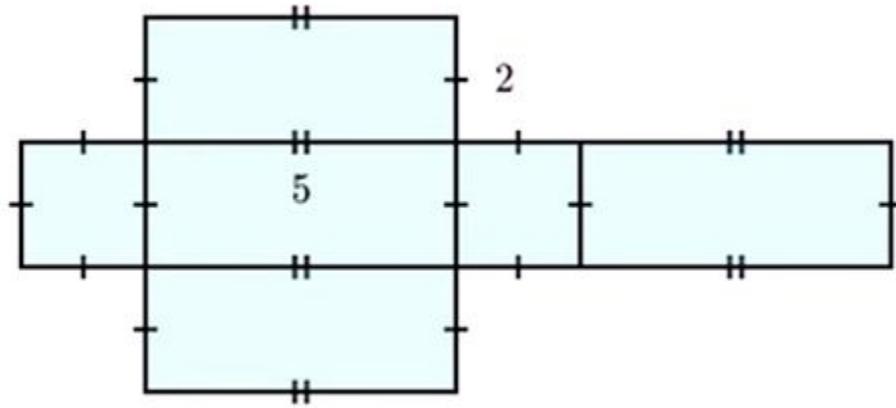
What is the surface area of the cube?



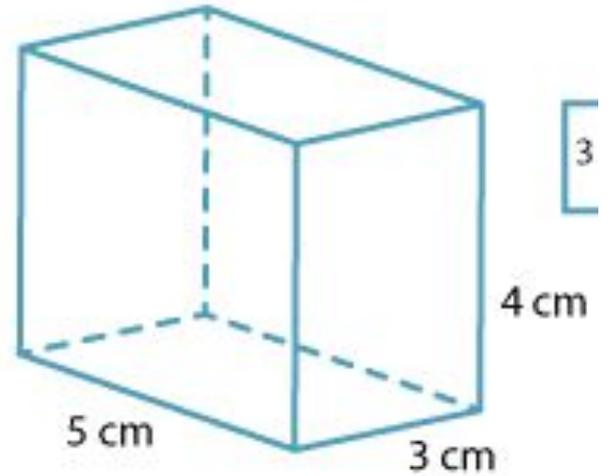
What is the surface area of the prism below?



What is the surface area of the prism?



What is the surface area of the prism below?



Keiko has two gift boxes that each measure 8" x 9" x 2". How much wrapping paper does she need to cover the two boxes?

Volume

Volume is the **measure of the amount of space inside of a solid figure**, like a cube, ball, cylinder or pyramid.

It's units are always "**cubic**", and can often be found by multiplying the area of the base by the height.

“WHERE ARE YOU?!
AND I’M SO SORRY!”

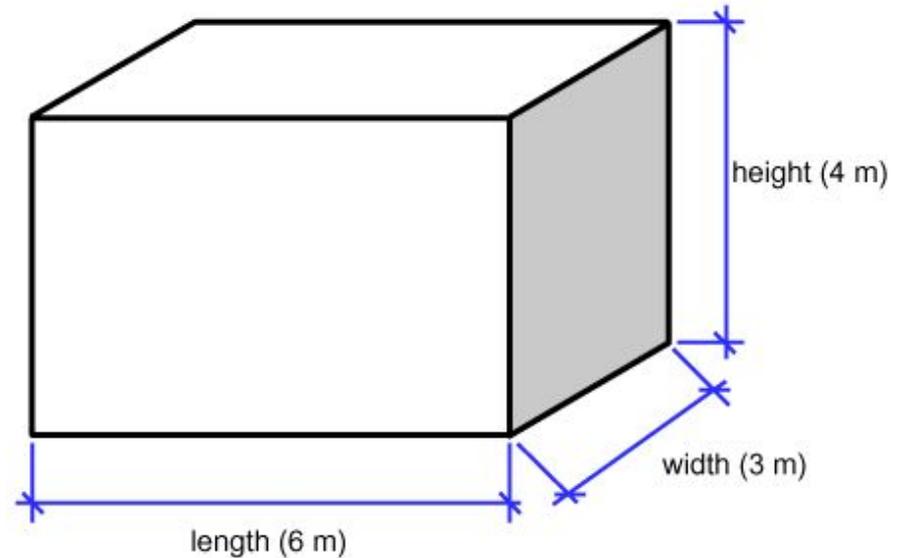


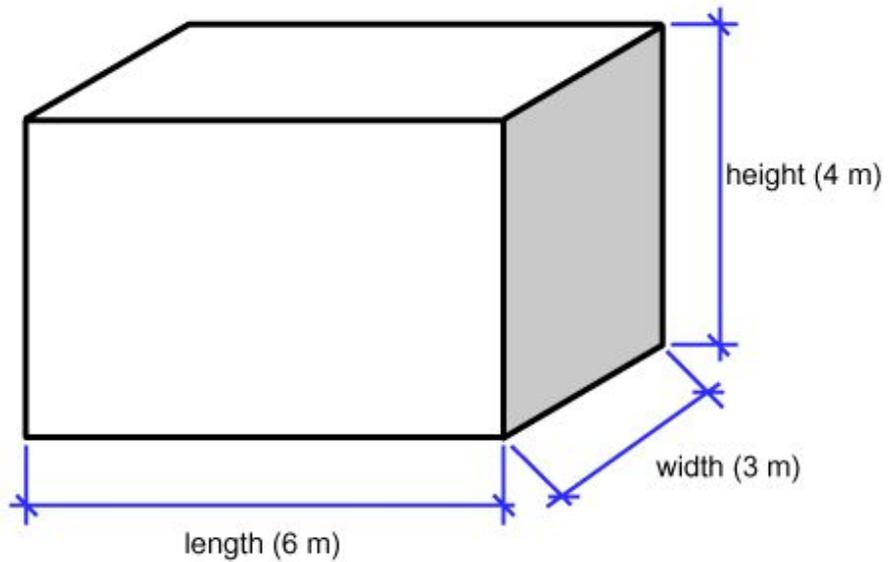
Rectangular Prism Volume

The volume of a rectangular prism or a cube can be found by **finding the area of the base and multiplying by the height of the cube.**

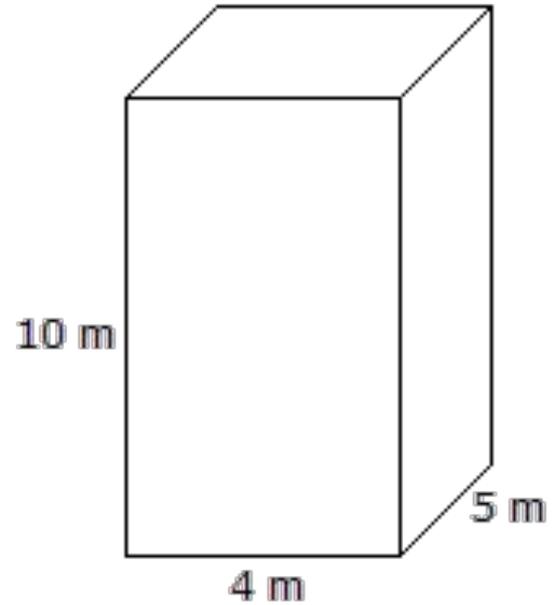
That is;

Volume = length x width x height

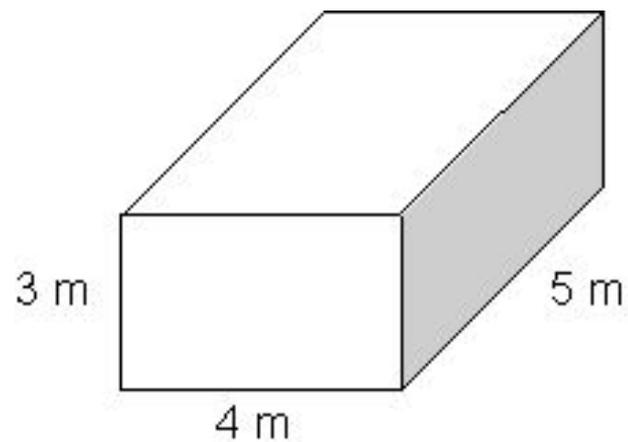




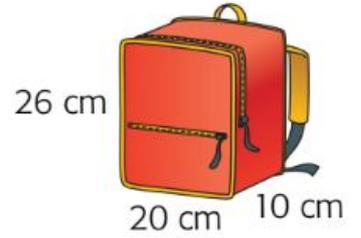
Find the volume



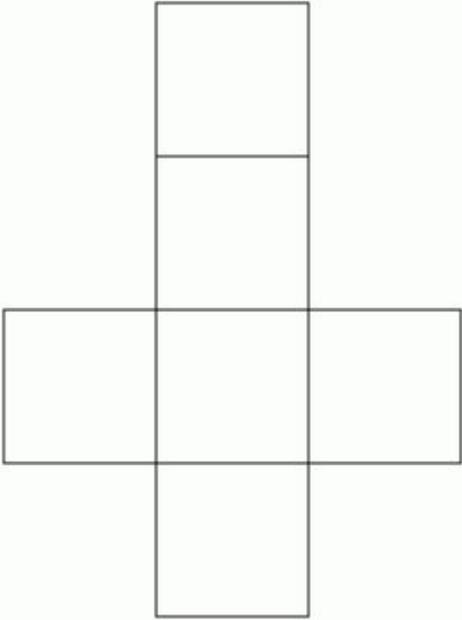
Find the volume



Which backpack holds the most?



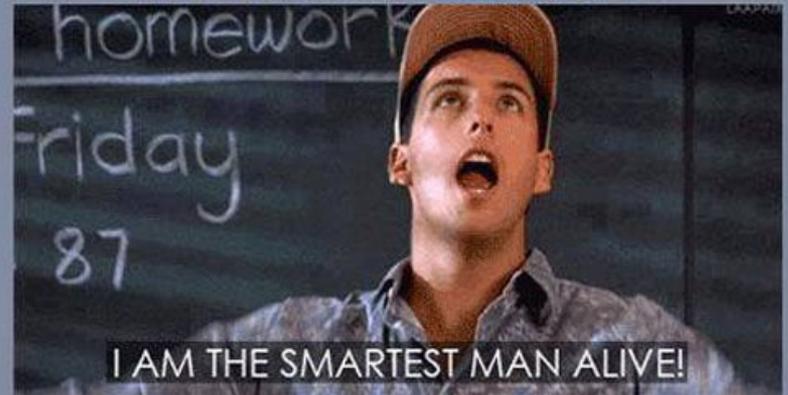
What is the volume of a cube with surface area 24 cm^2 ?



Review

- a) What is surface area?
- b) How do you find surface area?
- c) How do you find the area of a triangle?

That moment when you understand something in math class:

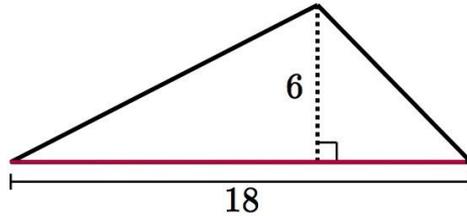


Do NOW!

AND for an EXTRA! Explain WHY the formula is $b \cdot h$ DIVIDED by 2

What is the area of the triangle?

$$\text{Area} = \frac{1}{2} b \cdot h$$

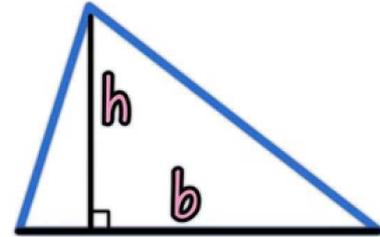


units²

Remember!

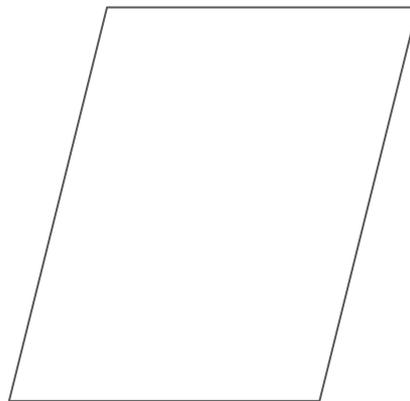
The area of a triangle can be found by multiplying the base and height and dividing by 2. That is;

$$A = \frac{bh}{2}$$

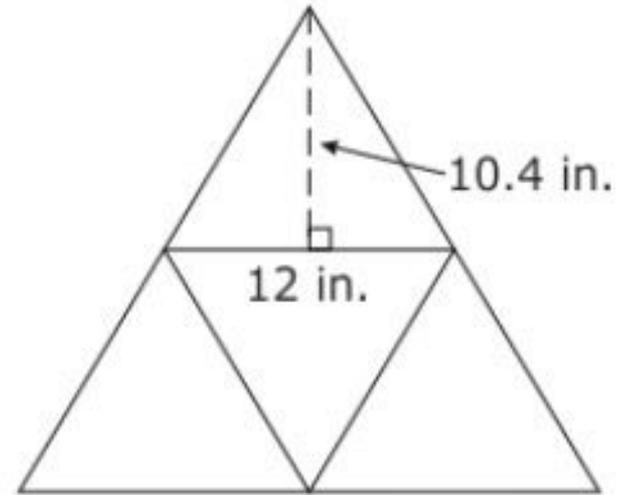


$$\text{Area} = \frac{1}{2} \times b \times h = \frac{bh}{2}$$

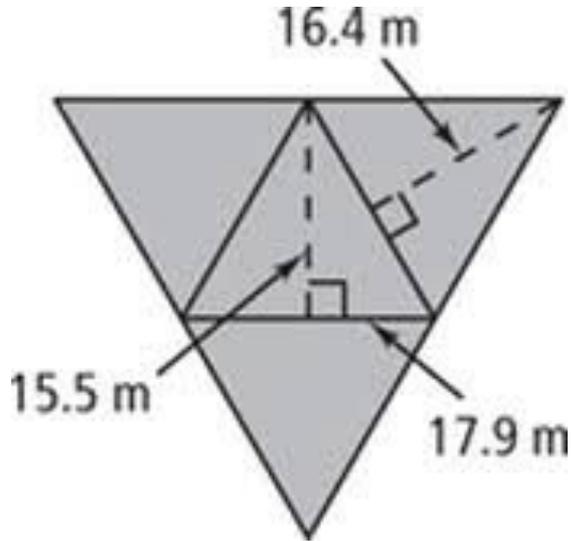
Why?



What is the surface area of the triangular pyramid?



What is the surface area of the triangular pyramid?

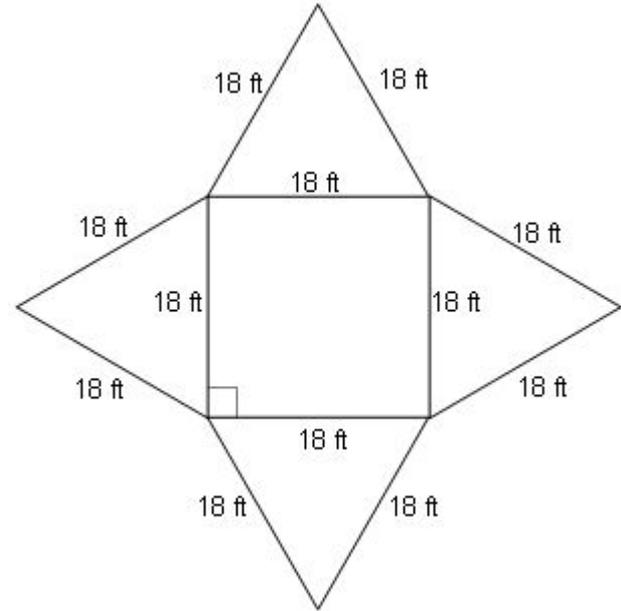


Surface area and distractors

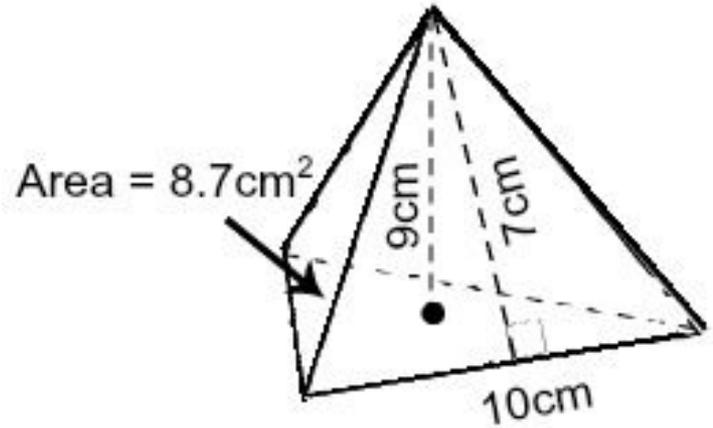
There are many different measurements possible for objects and the shapes that create them.

When finding surface area it is important to be aware of which measurements are important. It is sometimes helpful to visualize the net of the object to do so.

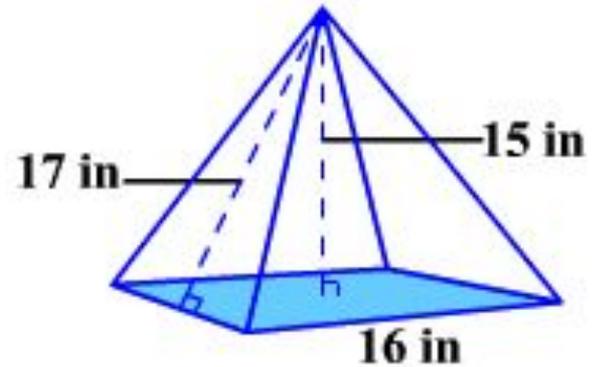
Do we have the information needed to calculate the surface area?



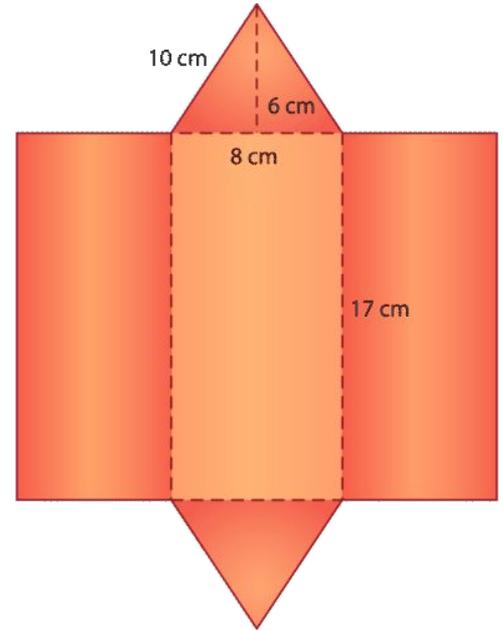
What is the surface area of the triangular pyramid?



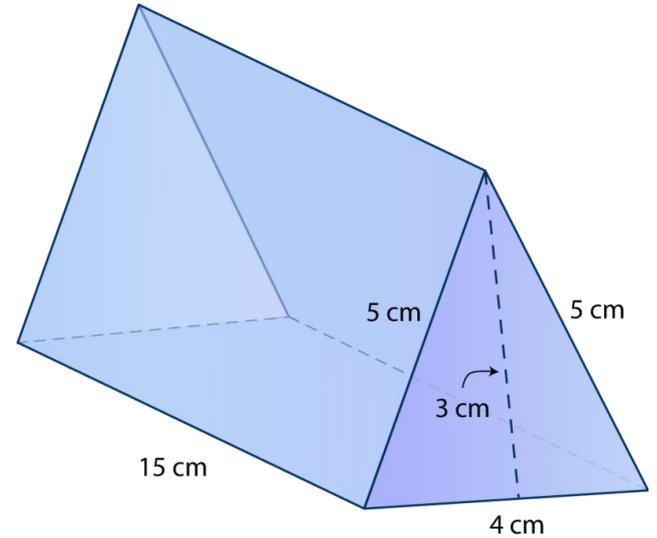
What is the surface area of the square pyramid?



What is the surface area of the triangular prism?



What is the surface area of the triangular prism?



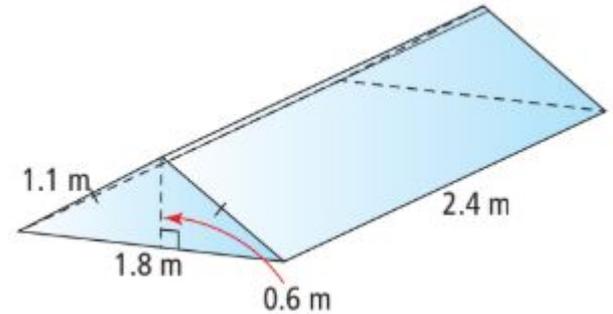
Review

- a) How do you find surface area?
- b) What is a distractor?
- c) What is the Pythagorean Theorem?

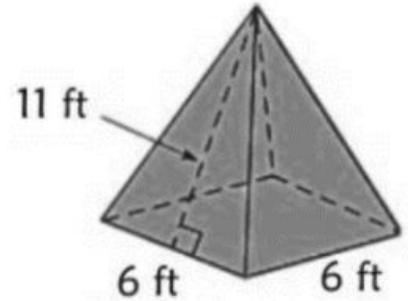


Ethan is hosting games night this weekend. He bought ten packages of playing cards. Each package measures $9\text{ cm} \times 6.5\text{ cm} \times 1.7\text{ cm}$. What is the surface area of ten packages of cards?

Robert wants to build a glass greenhouse. The greenhouse will have all glass sides and no bottom. The greenhouse dimensions are shown below, how much glass will Robert need to build the greenhouse?



John has enough paint to cover 175 square feet. He wants to paint this entire square pyramid, including the base. Does he have enough paint? How much more does he need, or how much does he have left over?



Remember!

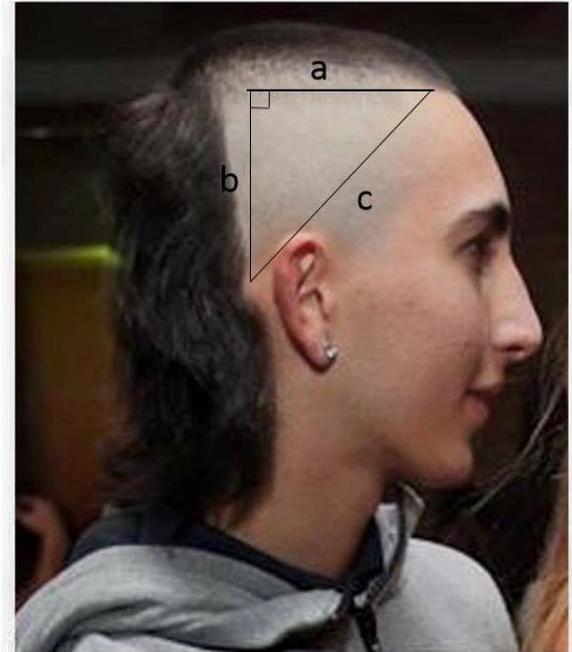
The Pythagorean Theorem can be used to find the sides of a right triangle. The theorem states that the square of the hypotenuse of a right triangle is equal to the sum of the square of the other two sides. Or more simply;

$$a^2 + b^2 = c^2$$

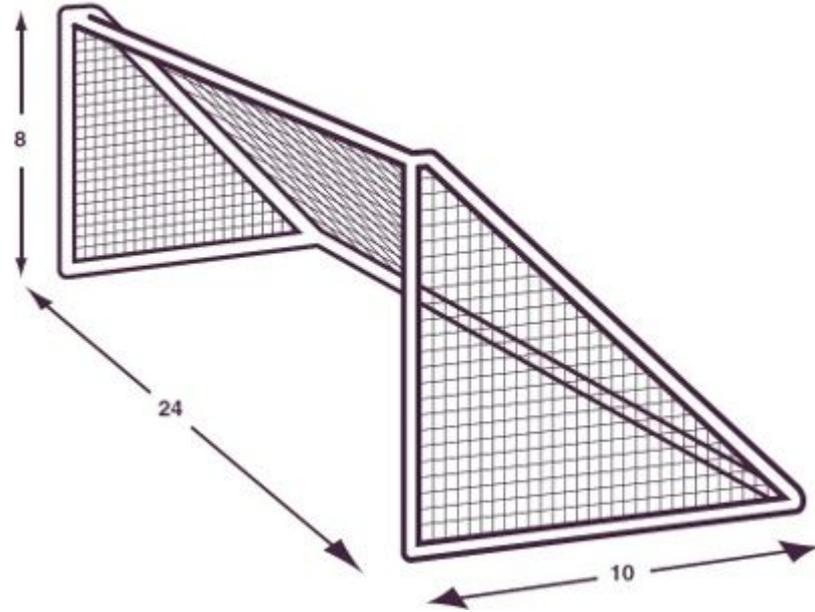
Barber: What you want

Moey: Pythagoras theorem cuz

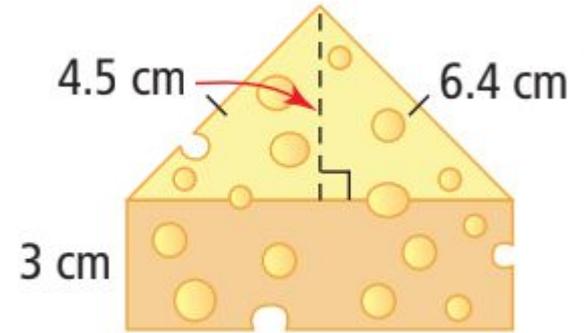
Barber: Say no more



How much netting is needed for the soccer net?



Cheese is sometimes packaged in a triangular box. How much cardboard would you need to cover this piece of cheese if you do not include overlapping?



Volume of a triangular prism

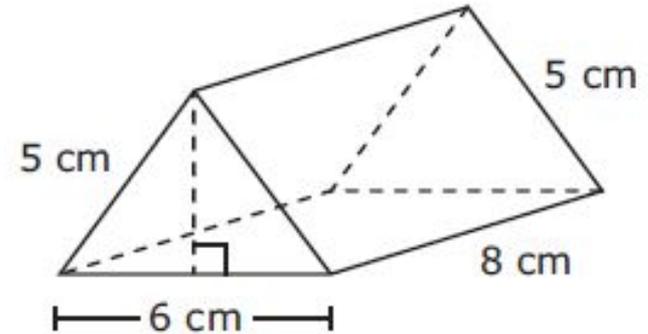
The volume of a triangular prism can be found by finding the area of the base and multiplying by the height.

In the case of a triangular prism the base is considered to be the triangle, and the height is the distance between.

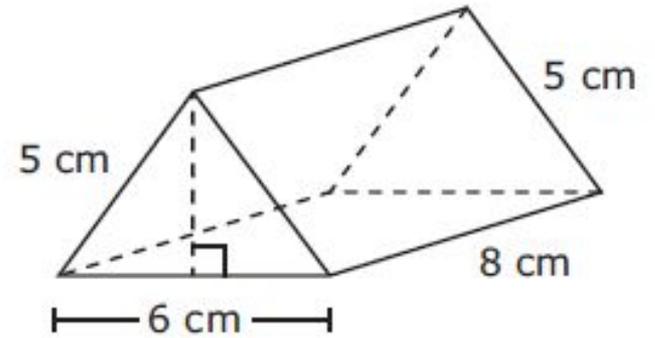
That is;

Area =

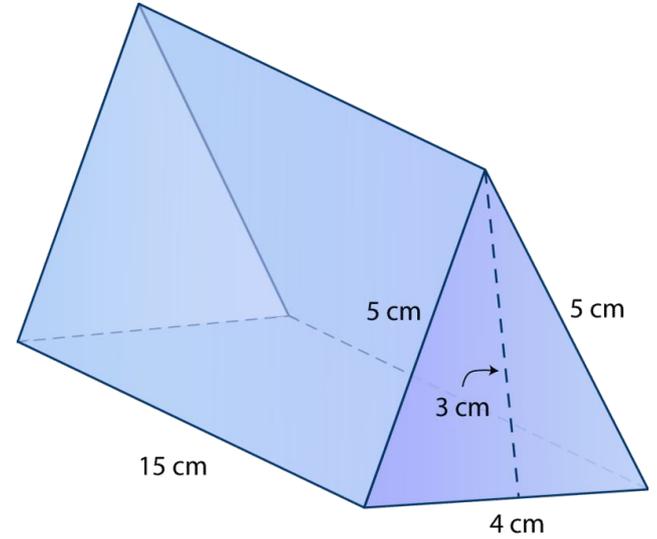
Volume =



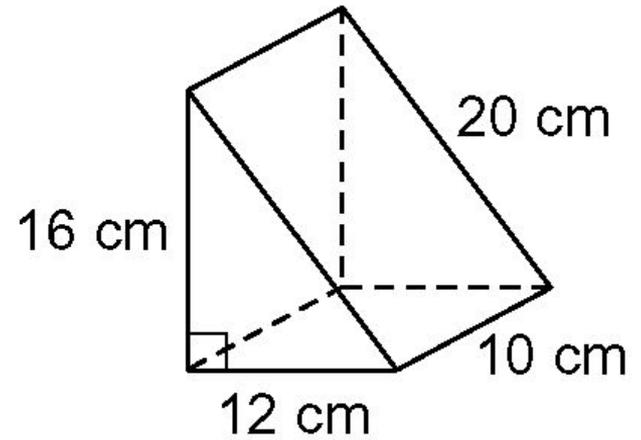
Find the Volume



Find the Volume



Find the Volume

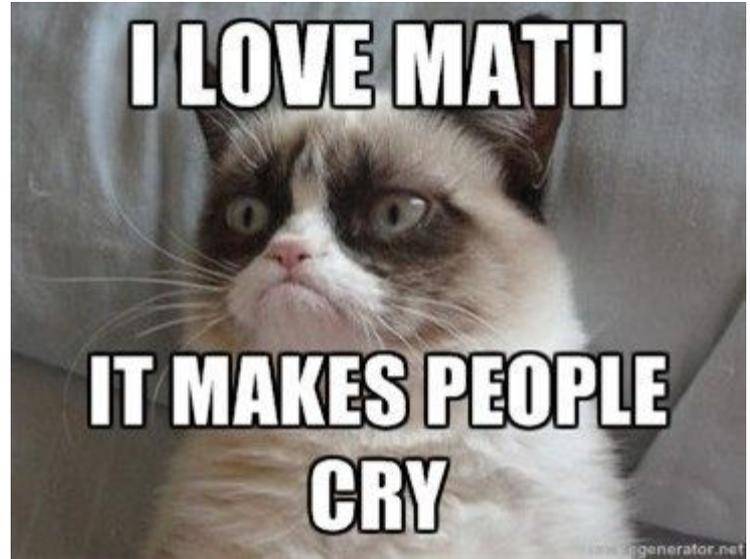


Review

- a) How do you find surface area?

- b) What is the difference between radius and diameter?

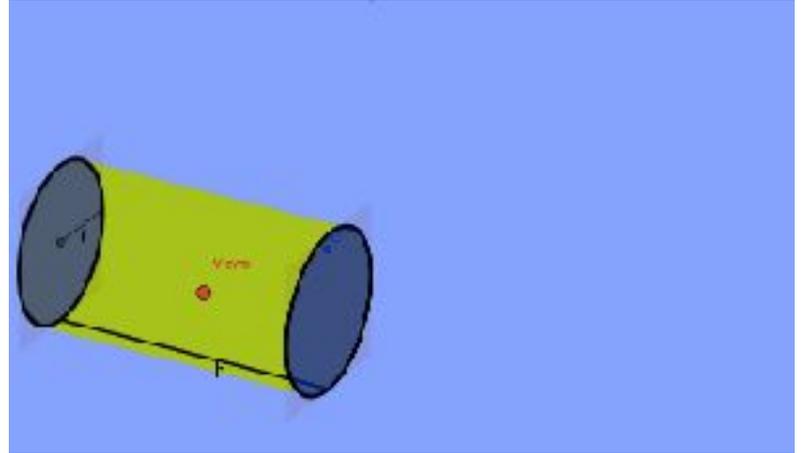
- c) What shapes make up a cylinder?



Cylinders

A cylinder is a three-dimensional shape that is round with the top and bottom in the shape of a circle.

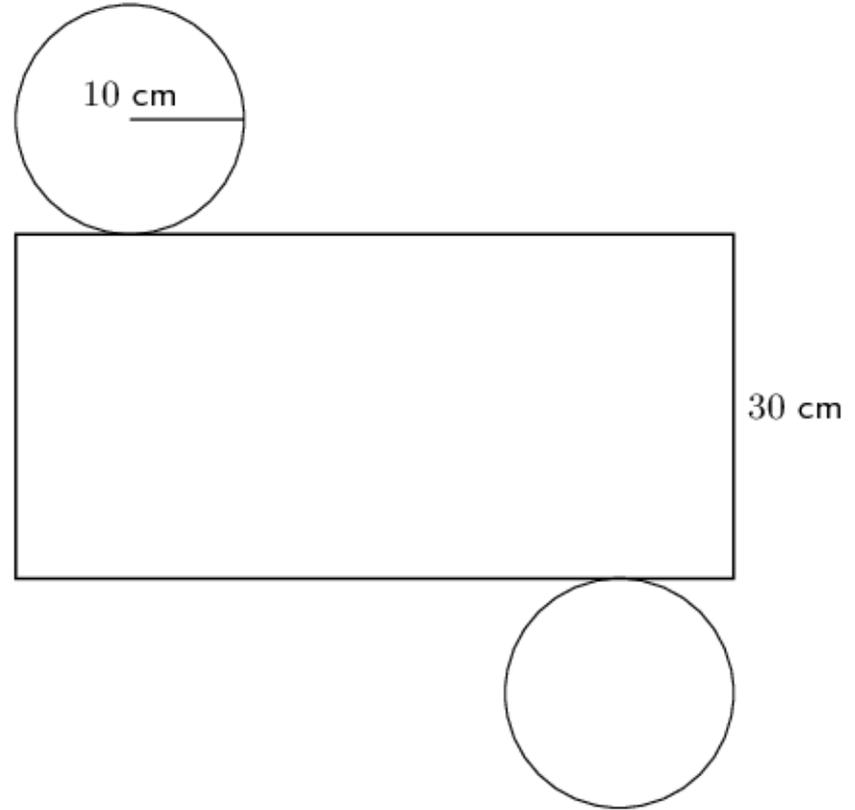
The two circles of a regular cylinder are always the same dimension. It can be hard to picture, but unrolled a cylinder contains two circles and one rectangle.



Cylinders

Because of the shapes in the net of a cylinder we can calculate the surface area by finding the area of the rectangle, and areas of the two circles.

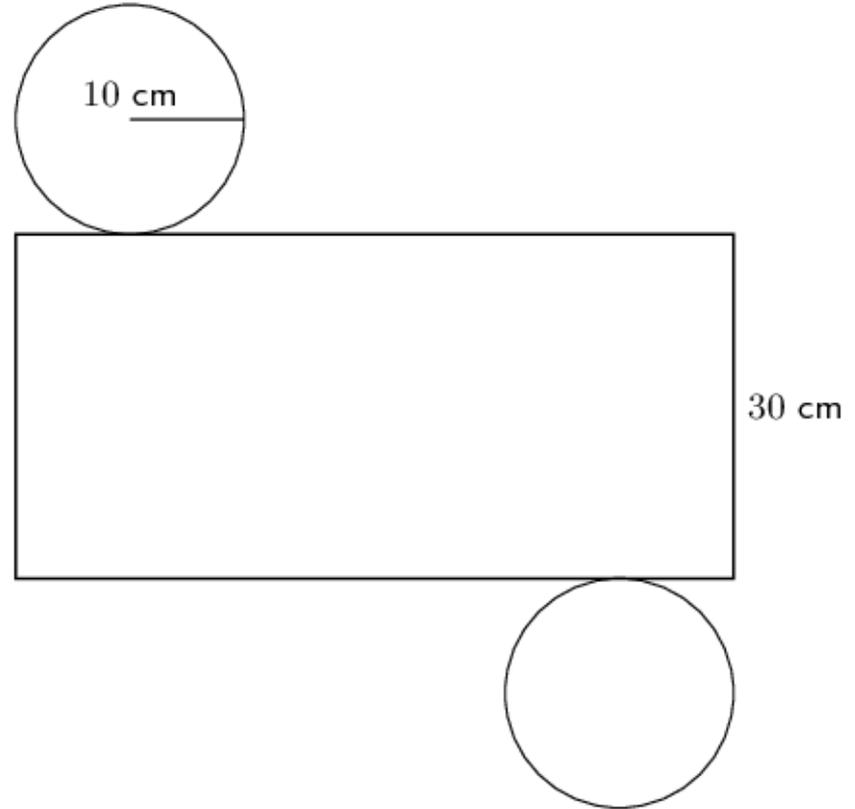
Unfortunately to find the length of the rectangle we often need to find the circumference of the circles.



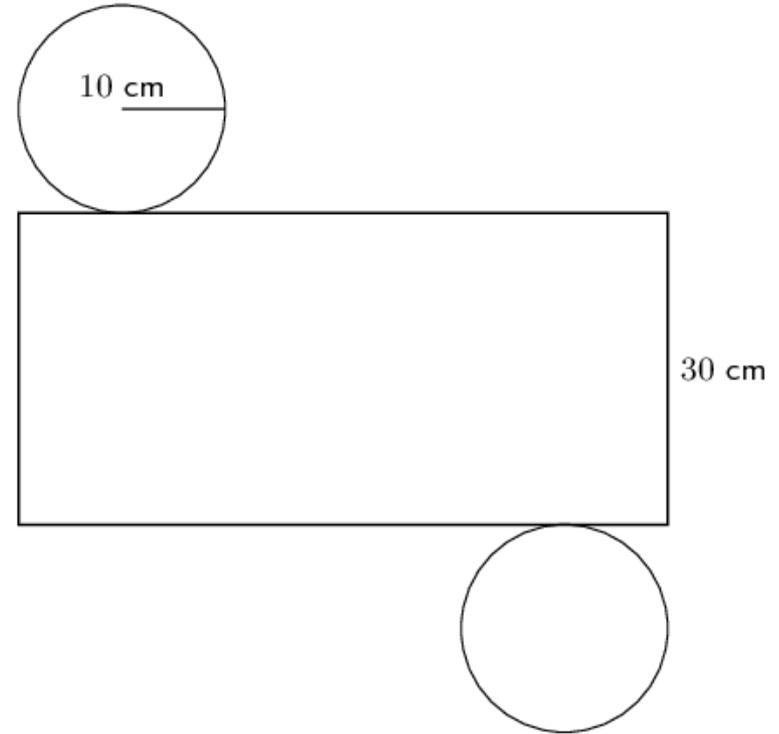
Cylinders

To find the surface area of a cylinder we;

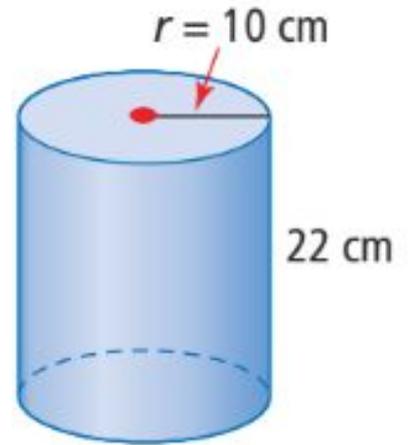
- 1) Find the area of the circles
- 2) Find the circumference of the circles
- 3) Using the circumference of the circles, find the area of the rectangle



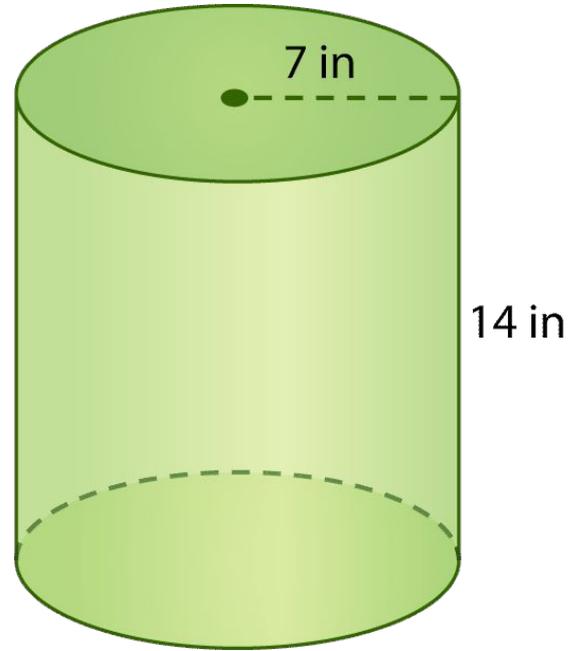
Find the surface area of the cylinder



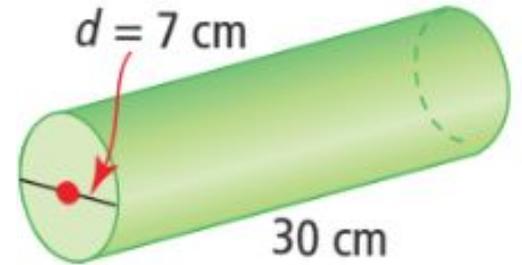
Find the surface area of the cylinder



Find the surface area of the cylinder



Find the surface area of the cylinder

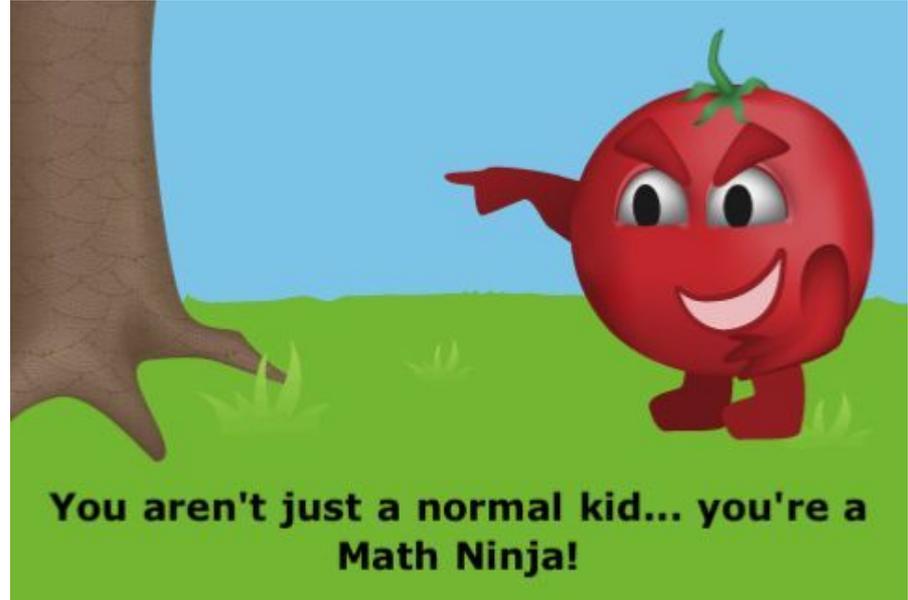


Review

- a) What shapes make up a cylinder?

- b) What are the formulas for circumference and area?

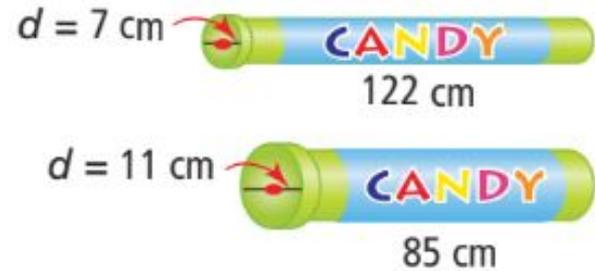
- c) What is the difference between area and circumference?



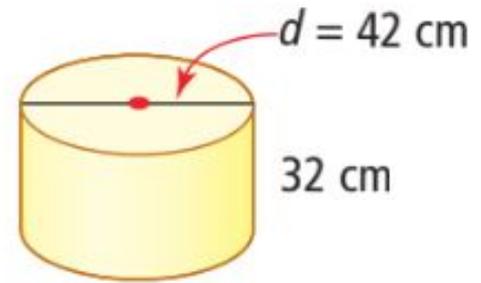
Paper towel is rolled around a cardboard tube.
Calculate the outside surface area of the tube.



Kaitlyn and Hakim each bought a tube of candy. Both containers cost the same amount. Which container required more plastic to make?



Anne wants to re-cover the cylindrical stool in her bedroom. How much material does she need if there is no overlap and she does not cover the bottom of the stool?



A can of frozen juice that is 6.7 cm in diameter and 11.8 cm high is made of a cardboard tube, and a metal top and metal bottom. Suppose 24 cans are recycled. How much cardboard is recycled?

Coins can be stored in a plastic wrapper similar to a cylinder. A roll of dimes contains 50 coins. Each dime has a diameter of 17.5 mm and a thickness of 1 mm. Calculate the minimum surface area of the plastic wrapper.

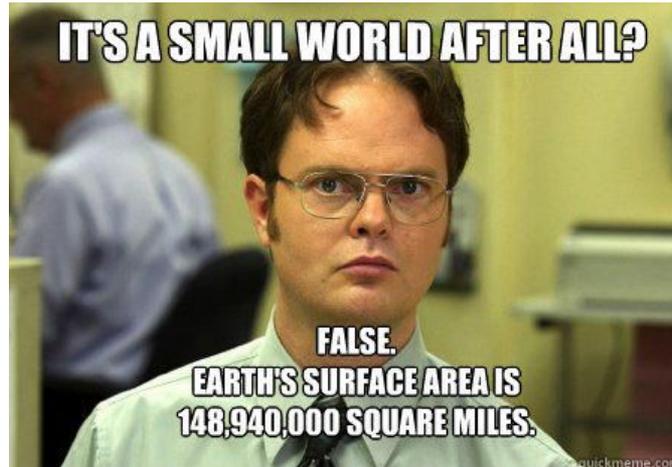
Practice!

Pages 198-199 Questions # 2, 4, 8

Page 206 Questions # 6, 7, 8, 11a

Pages 212-213 Questions # 1, 2, 4, 5, 10

Pages 216 Questions # 2, 3, 5, 6

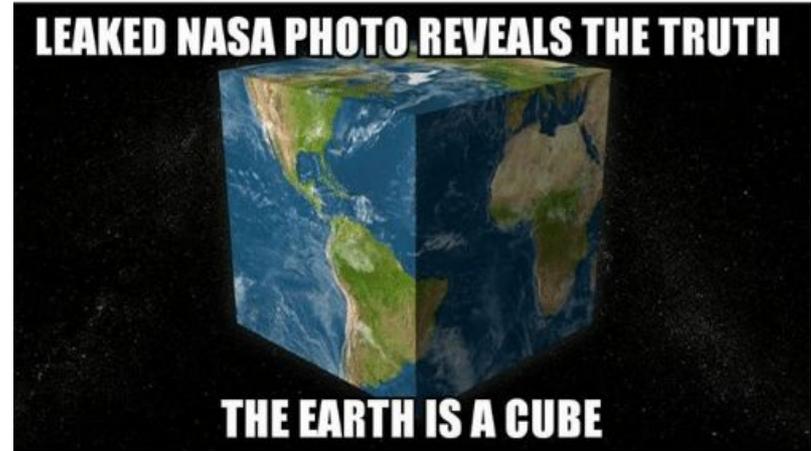


Review

- a) What is surface area?

- b) What is a net?

- c) What does it mean to have a measurement like cm^3 ?

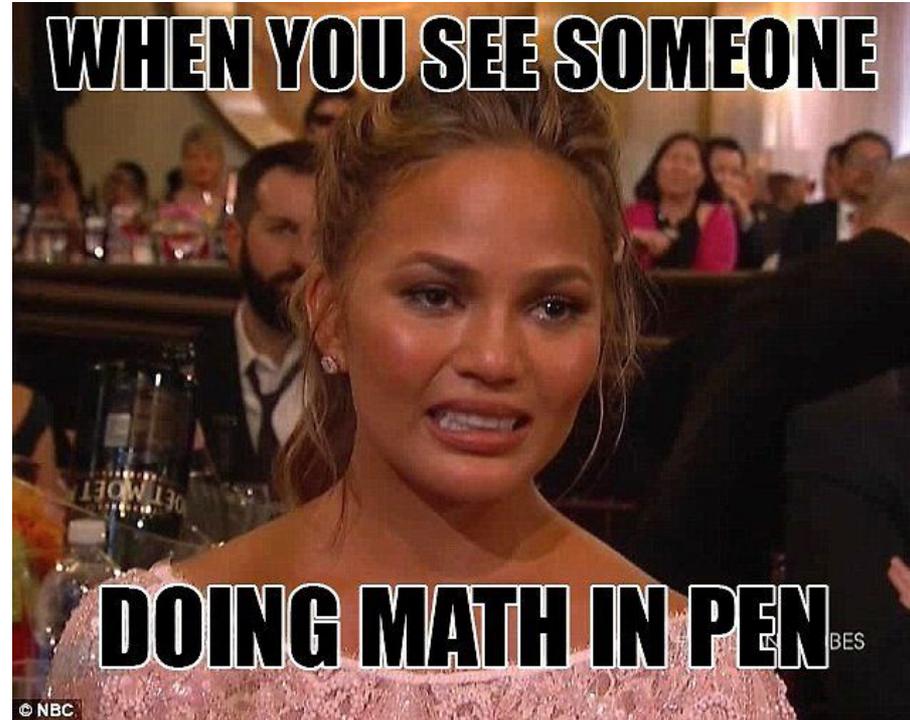


Review!

- a) What shapes make up a cylinder?

- b) What is the difference between surface area and volume?

- c) How do you find most volumes?



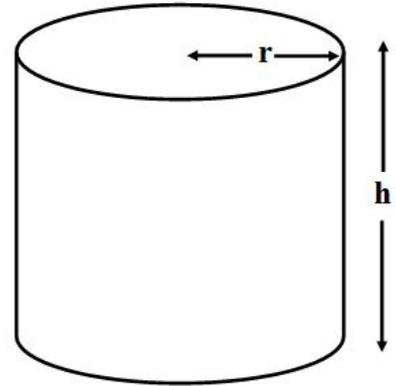
Volume of a cylinder

The volume of a cylinder can be found by finding the area of the base and multiplying by the height.

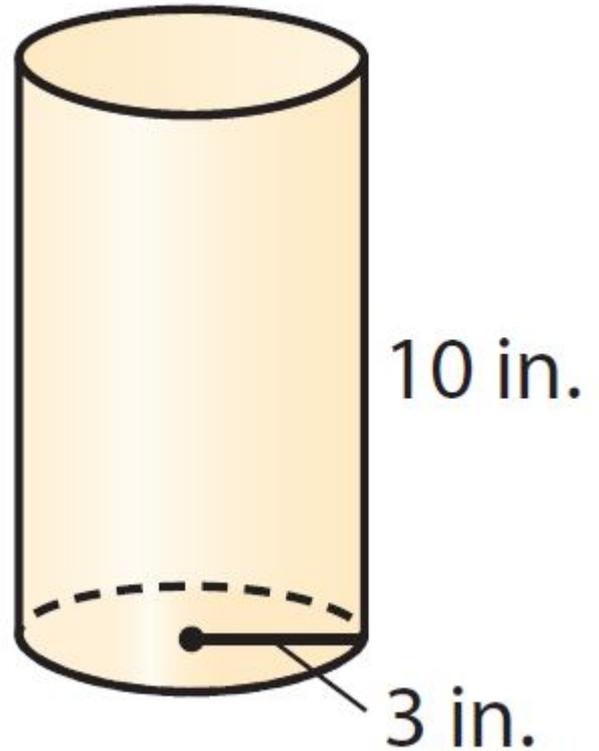
In this case the base is a circle so it is important to remember the formula for area of a circle;

A =

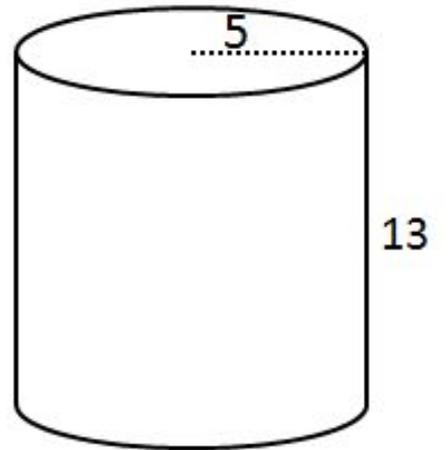
$$V = \pi r^2 h$$



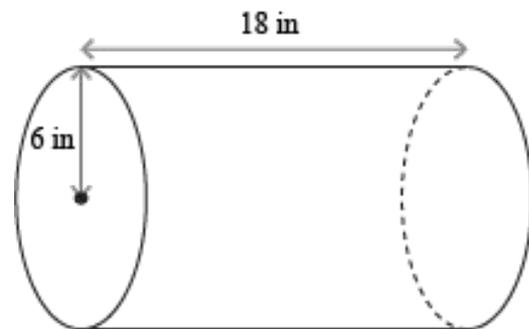
Find the volume



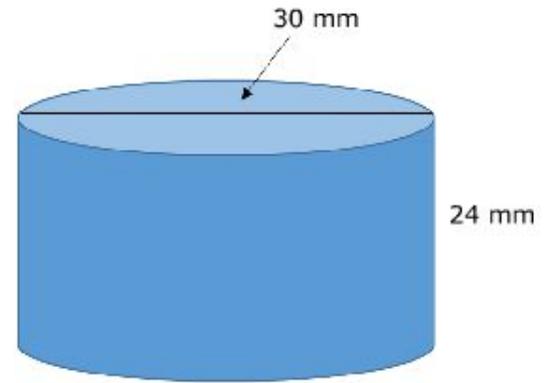
Find the volume



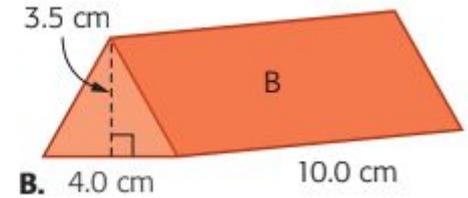
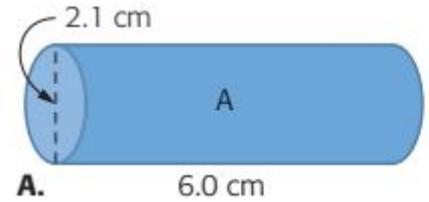
Find the volume



Find the volume



Which container holds more?



Practice!

Page 220 Questions #1, 3, 5, 9, 13

Page 225 Questions #1, 2, 3, 9

Pages 233-234 All questions

Pages 238 All questions

