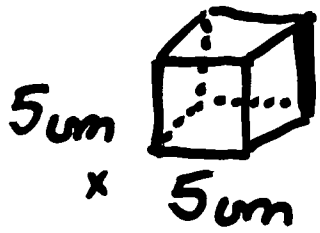
**Surface Area:** To calculate the surface area of a 2-dimensional OR a 3-dimensional object, you must find the area of each FACE of the object.

**Example #1.** A cube (Like a dice)




The definition of a cube implies that all of the faces are equal

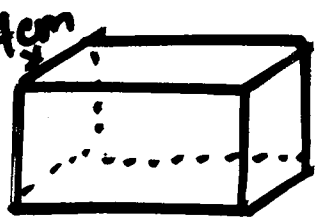
How many faces would a die have? (answer = 6)

1 Face = $5\text{cm} \times 5\text{cm} = 25\text{cm}^2$


$(6) \times 25\text{cm}^2 = \underline{150\text{cm}^2}$ or the area of all (6) faces or all surfaces.

# Surface Area (page 2)

Ex #2.




* you must find the area of each face & add them all together to find the Total Surface area.

A great way to stay organized when doing this would be to do as follows:

Front/back $(5_{cm} \times 10_{cm}) = 50_{cm^2} \times 2 = 100_{cm^2}$

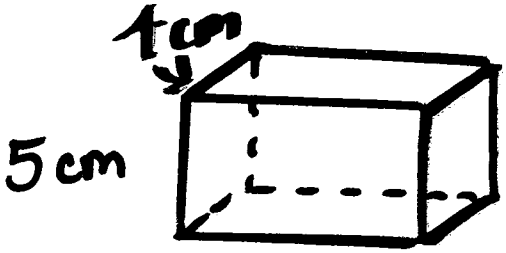
Top/Bottom $(4_{cm} \times 10_{cm}) = 40_{cm^2} \times 2 = 80_{cm^2}$

2 sides $(5_{cm} \times 4_{cm}) = 20_{cm^2} \times 2 = 40_{cm^2}$

The TOTAL Surface area of the Rectangle in Ex #2. is

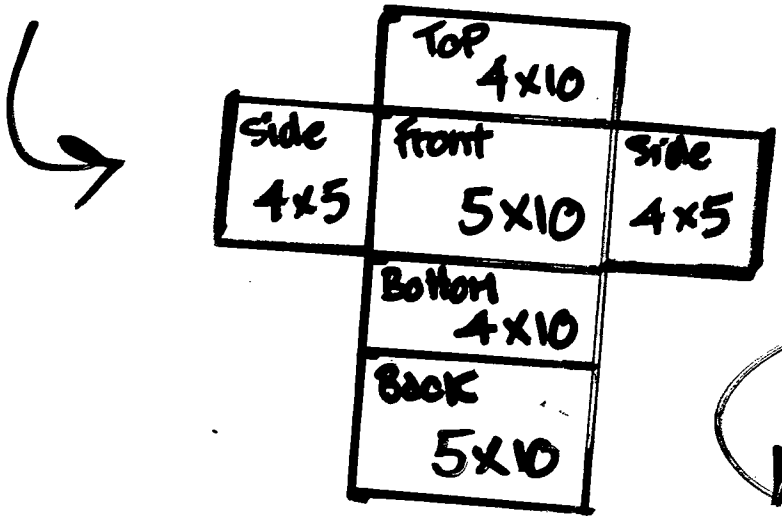
$$\begin{array}{r} 100\ cm^2 \\ 80\ cm^2 \\ +\ 40\ cm^2 \\ \hline \text{S.A.} = 220\ cm^2 \end{array}$$

# Surface Area (page 3)



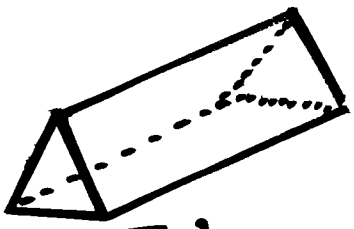

The rectangle when folded out is called a **NET**

ie.



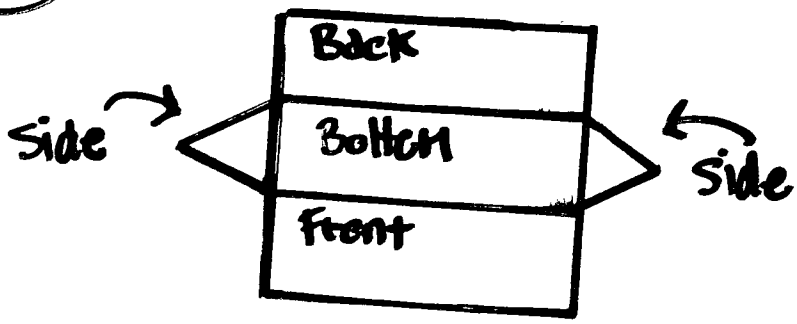

Rectangle has 6 faces

* 3 have different measurements



ie.

Tri-angular Prism




5 faces

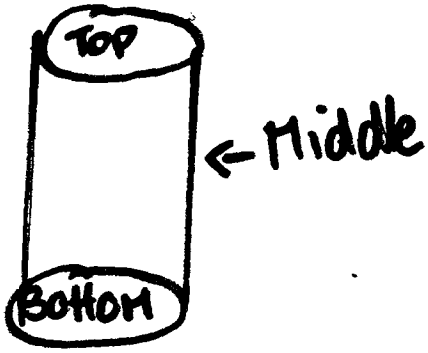
* only 2 different measurements

# Surface Area (Page 4)

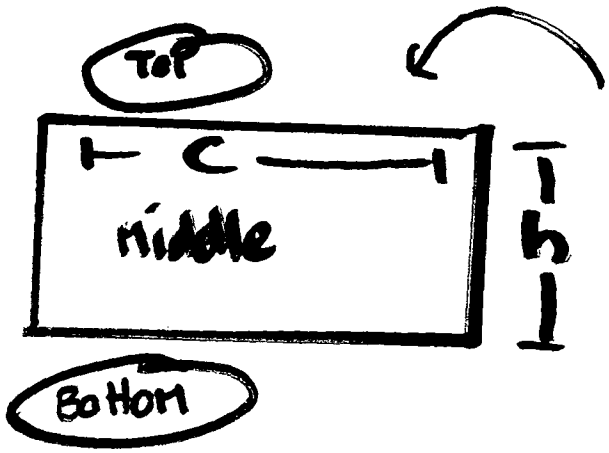
To find the surface area of a cylinder, you must find the areas for the top & bottom (both the same)

AND the middle or the part that forms the tube.

ie'




* If the middle tube is cut down the center and spread open, it forms a rectangle.




. The top will equal the circumference of the top or bottom (as circumference is the distance all the way around)

AND . The side will be the height of the cylinder

**Volume**: Volume (by definition) refers to the amount of space an object occupies.

Volume will always be measured in $(\text{units})^3$

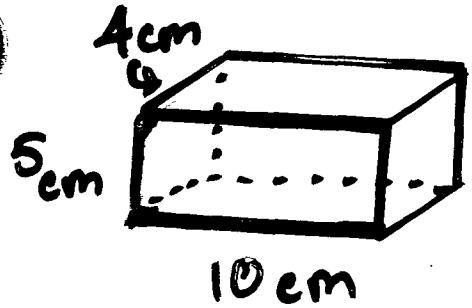
(ie.) For a rectangle: use (Length x Width) x height
cm cm cm

this would be the area of the base of the rectangle.

∴, Multiply the base $(cm^2)$ x height (cm)

= _____ $(cm)^3$

ie.

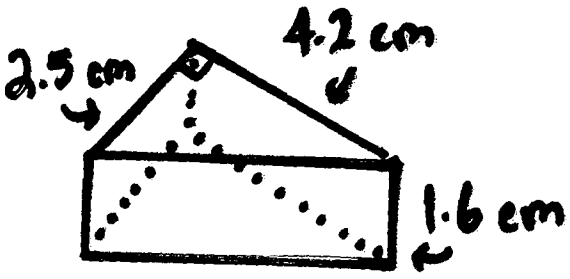



If Volume = (area of the base) x (height),

then: (4 x 10) x (5)

$40cm^2 \times 5cm = 200 cm^3$

# Volume (Page 2)




To calculate the volume of a Triangular Prism, you first must determine what face should be identified as the base.

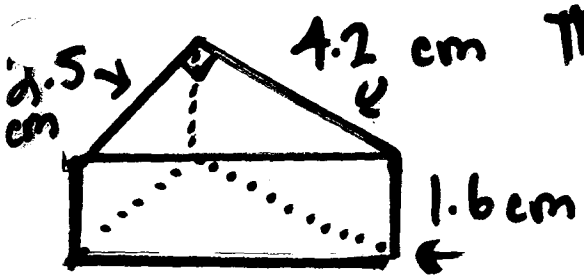
The base should be <u>1 face that doesn't change in size or shape</u> as it (rises) or moves through the entire prism.

So for the example shown above, the base must be the top or bottom triangle as the sides would change in size and in shape as they move towards a corner

Steps:

1. Find or identify the base
2. Calculate the area of the base in $(\text{units})^2$ $cm^2$
3. Multiply (the area of the base) x (height) cm

# Volume (Page 3)




The area of the base in this case is a triangle:

$$A = \frac{(\text{base} \times \text{height})}{2}$$

$$A = \frac{(2.5\,\text{cm} \times 4.2\,\text{cm})}{2}$$

$$A = \frac{(10.5\,\text{cm}^2)}{2} = 5.25\,\text{cm}^2$$

The volume will be:

$$(\text{area of base of Prism}) \times (\text{height of Prism})$$

$$\text{cm}^2 \qquad\qquad \text{cm}$$

$$\therefore (5.25\,\text{cm}^2) \times (1.6\,\text{cm}) = 8.4\,(\text{cm})^3$$

# Volume (page 4)

To determine the ~~area~~ Volume of a cylinder, you must find the area of the base (in this case either the top or bottom) → because the circle that forms the top or bottom runs all of the way through the cylinder without changing its size or its shape.

ie. the cylinder is like a stack of the same size/shape Poker Chips (all neatly stacked on top of each other)


If the radius for the top/bottom = 10 cm, & the height of the cylinder = 15 cm, then:

Area of a circle (X) height of cylinder

$A = \pi(r)^2$

$314\text{cm}^2 = 3.14(100)$

15 cm

$4710\text{cm}^3$ = Volume