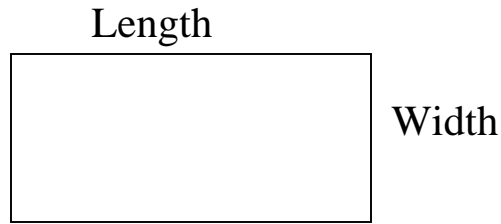


## FORMULAS REQUIRED FOR H&R

### Area of a Rectangle.

Length x Width

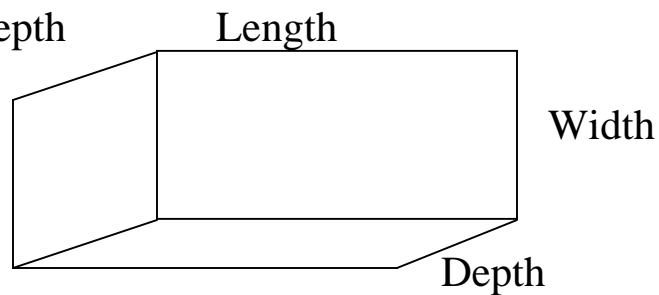
LW



### Volume of a Cube.

Length x Width x Depth

LWD



### Area of a Triangle.

=

$$\frac{BH}{2} = \frac{B \times H}{2} \quad B = \text{Base} \quad H = \text{Height}$$

### Volume of a Triangle.

=

$$\frac{BHL}{2} \quad L = \text{Length}$$

#### **Triangles**

Right Angle

Acute: - All Angles under 90°

Obtuse: - One Angle over 90°

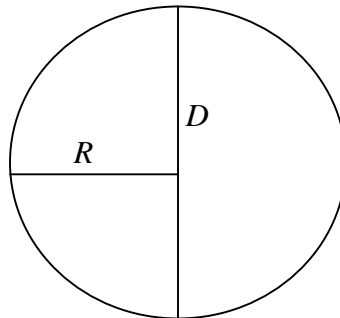
### Circumference of a Circle.

=

$$2\pi R = 2 \times \pi \times R$$

or  $\pi D = \pi \times D$

Circumference is always  
3.142 times greater  
Than the Diameter



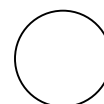
R = Radius (r)

D = Diameter (d)

$\pi = 3.142$  (constant)

**Circumference**

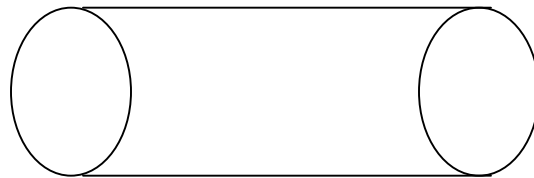
=



### Area of a Circle

$$= \pi r^2: \text{ - or } \pi \times r \times r = \text{Area.}$$

### Volume of a Cylinder



$$= \pi r^2 / \text{height (length): or } \pi \times r \times r \times h(l) = \text{Volume.}$$

### Surface Area of a Cylinder

= The AREA of the two ends + the SURFACE AREA of the height (length)

$$= \pi r^2 \times 2 + \pi d \times h(l)$$
$$\pi \times r \times r \times 2 + \pi \times d \times h(l)$$

**ALWAYS MULTIPLY/DIVIDE “FIRST” THEN ADD/SUBTRACT**

### Area of a Sphere

$$\text{Surface Area} = 4\pi r^2 = 4 \times \pi \times r \times r = \text{Surface Area}$$

### Volume of a Sphere

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

## Volume to Mass

Water: - One gallon weighs 10lbs, and one cubic foot weighs 62.5lbs  
6.25 Gallons per cubic foot.

Steel: - ½ inch thick plate, one foot square weighs 20.4lbs (20.4 x 24) =  
One cubic foot of steel weighing 490lbs.

When calculating weight are they asking for the weight of a cubic foot OR  
The weight of a thickness of metal: - ½", ¾" 1" or 1½" Thick

**ALL VESSELS/PIPE WILL HAVE A CERTAIN THICKNESS OF METAL, AND SO WILL HAVE 2 DIAMETERS/RADIUS INSIDE & OUTSIDE TO HELP CALCULATE MASS WEIGHT.**

### Two Ways to Solve Formulas:

**1. WHATEVER YOU DO TO ONE SIDE OF AN EQUATION YOU MUST ALSO DO TO THE OTHER SIDE.**

### **2. TRANSPOSING**

#### Adding or Subtracting

eg.  $A - 10 = 14$

*add 10 to each side of the equation*

$$A - 10 + \mathbf{10} = 14 + \mathbf{10}$$

Simplify:  $A = \mathbf{24}$

A shortcut is to see that:

*+ or - moved to the other side of the = sign changes + to - OR - to +*

By moving a number to to the other side of the equation you isolate the variable and **solve** the equation.

$$A - 10 = 14$$

Move -10 to the other side and change the sign

$$A = 14 + 10$$

$$\text{Simplify: } A = 24$$

Multiplying or dividing:

$$\frac{3C}{4} = 6$$

Multiply each side by 4

$$4 \times \frac{3C}{4} = 6 \times 4 \quad \text{Simplify}$$

$$3C = 24 \quad \text{Divide Each side by 3}$$

$$\frac{3C}{3} = \frac{24}{3} \quad \text{Simplify}$$

$$C = 8$$

Again a short cut is to move  $\times$  or  $\div$  to the other side of the  $=$  sign (change it to the opposite sign), and at the same time move either above or below the divide line from its present location:

$$\text{eg. } \frac{4 \times 30}{B} = 60 \quad (\text{Transpose B to give})$$

$$4 \times 30 = 60 \times B \quad (\text{Transpose 60 to give})$$

$$\frac{4 \times 30}{60} = B$$

$$\text{Simplify: } B = 2$$