8.- Calculate the Weight of an Object

Calculating the weight of a sheet of material

Calculating the weight of a sheet of material is quite simple and involves calculating the area of the sheet and multiplying it by the density of the material corresponding to the thickness of the material (i.e., weight chart)

For calculating the area, you will need to multiply the length by the width of the material.

A= Length x Width

Once you have the area you will need to multiply by the density of the material corresponding to the thickness of the material (i.e., weight chart) :

Weight = Area x Density corresponding to the thickness of the material (i.e., weight chart)
Weight = Area (FT^2) x weight in LBS/FT^2

For example, for a sheet of 1/8" steel measuring 3' x 5' 6" the calculated weight would be :

Weight = Area (FT^2) x weight in LBS/FT^2
Weight = L x W x weight in LBS/FT^2
Weight = 3ft x 5.5 ft x 5.1 LBS/FT^2
Weight = **84.15 LBS**

Weight of Material Chart	
Thickness in inches	Steel lbs./ft2
1/8	5.1

Sample weight of material chart

Weight of Material Chart					
Thickness in inches	Steel lbs/ft2	Lead lbs/ft2	Copper lbs/ft2	Aluminum lbs/ft2	Brass/Bronze lbs/ft2
1/16	2.55	3.68	2.89	0.86	2.78
1/8	5.1	7.36	5.79	1.72	5.56
3/16	7.65	11.04	8.68	2.58	8.34
1/4	10.2	14.72	11.58	3.44	11.13
5/16	12.75	18.4	14.47	4.3	13.91
3/8	15.3	22.08	17.37	5.16	16.69
7/16	17.85	25.76	20.26	6.02	19.47
1/2	20.4	29.44	23.16	6.88	22.25
9/16	22.95	33.12	26.06	7.74	25.03
5/8	25.5	36.8	28.95	8.6	27.81

This is a sample weight chart of multiple metal alloys by thickness that could be used to calculate the weight of a sheet of material.
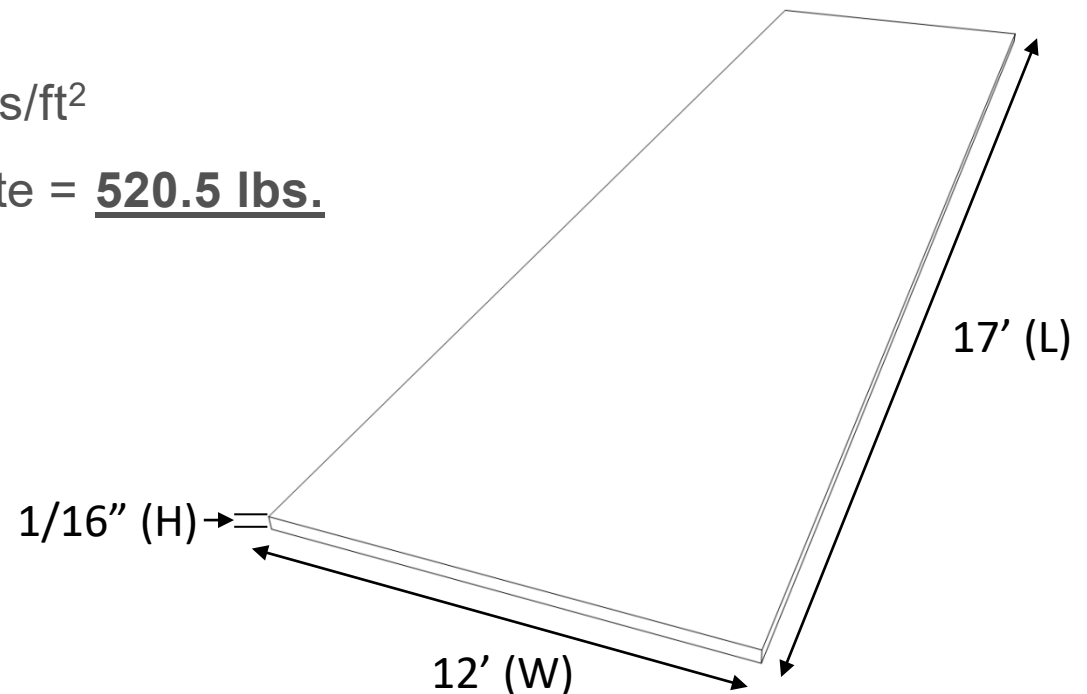
Calculating the Weight of a 1/16" thick Sheet of Steel to be used on a Bulkhead

Weight of Material Chart				
Thickness in inches	Steel lbs/ft2	Lead lbs/ft2	Copper lbs/ft2	Aluminum lbs/ft2
1/16	2.55	3.68	2.89	0.86
1/8	5.1	7.36	5.79	1.72

Formula = Length x Width x Density

Calculations = 17ft x 12ft x 2.55 lbs/ft^2

Total Weight of 1/16" thick steel plate = **520.5 lbs.**

17' (L)

1/16" (H)

12' (W)

Calculating the weight of a solid object

Calculating the weight of a solid object is quite simple and involves calculating the volume of the object and multiplying it by the density of the material per cubic unit of weight (i.e., weight chart)

For example, let's calculate the weight of a cylinder made of aluminum:

Formula for Volume
$V = \pi \times r^2 \times h$

Calculations for Volume
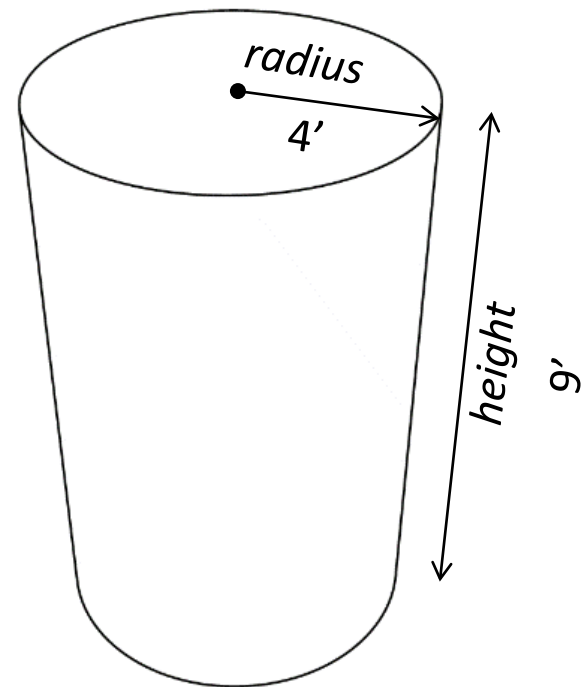$V = 3.14 \times 4^2 \times 9$
$V = 3.14 \times 4 \times 4 \times 9$
$V = \underline{\textbf{452.16 ft}^3}$

Calculations for Weight (W)
W = Volume x Weight per volume (weight chart)
$W = 452.16\ ft^3 \times 165\ lbs./ft^3$
$W = \underline{\textbf{74,606.4 lbs.}}$

Weight of Material Chart	
Material	**Weight (volume)**
Aluminum	165 lbs./ft³

Sample weight of material chart (per volume)

Weight of Material Chart (per volume)			
MATERIAL		WEIGHT	VOLUME
Brass/Bronze		534	lbs/ft3
Aluminum		165	lbs/ft3
Concrete		144	lbs/ft3
Copper		556	lbs/ft3
Lead		706	lbs/ft3
Mud	packed	119	lbs/ft3
	unpacked	108	lbs/ft3
Water	sea	64	lbs/ft3
		8.6	lbs/gallon
	fresh	62.4	lbs/ft3
		8.3	lbs/gallon

This is a sample weight chart of multiple metal alloys by volume that could be used to calculate the weight of a volume of material.

Calculate the weight of a rectangular shape of concrete

Formula for Volume

$V = l \times w \times h$

Calculations for Volume

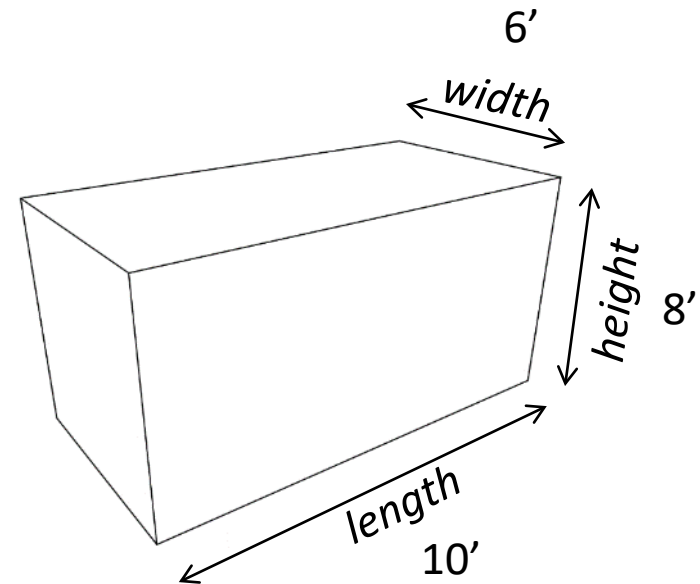$V = 10' \times 6' \times 8'$

$V = \underline{\textbf{480 ft}^3}$

Formula for Weight (W)

$W = Volume \times Weight\ per\ volume\ (weight\ chart)$

Calculations for Weight

$W = 480\ ft^3 \times 144\ lbs/ft^3$

$W = \underline{\textbf{69,120 lbs.}}$

6'

width

height   8'

length   10'

Weight of Material Chart (per volume)			
MATERIAL		WEIGHT	VOLUME
Brass/Bronze		534	lbs/ft3
Aluminum		165	lbs/ft3
Concrete		144	lbs/ft3

Calculate the weight of a solid Aluminum cylinder

Formula for Volume

$V = ¶ \times r^2 \times h$

Calculations for Volume

$V = 3.14 \times 2^2 \times 6.5$

$V = 3.14 \times 2 \times 2 \times 6.5$

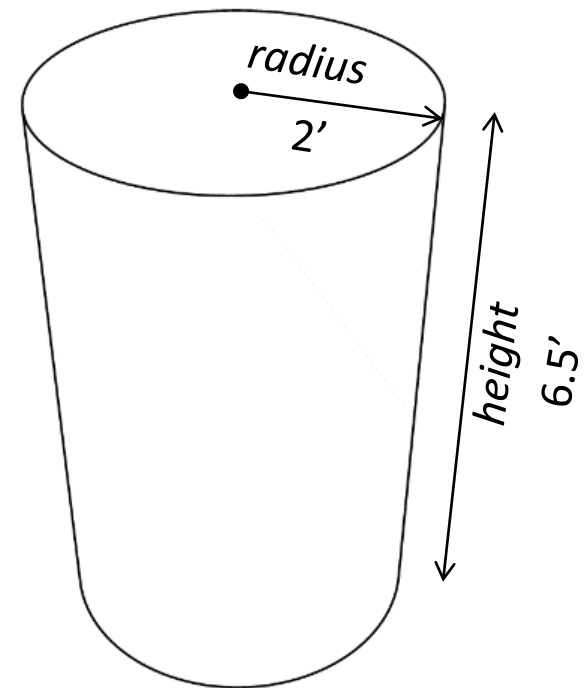$V = \underline{\textbf{81.64 ft}^3}$

Calculations for Weight (W)

$W = Volume \times Weight\ per\ volume\ (weight\ chart)$

$W = 81.64\ ft^3 \times 165\ lbs./ft^3$

$W = \underline{\textbf{13,470.6 lbs.}}$

Weight of Material Chart (per volume)			
MATERIAL		WEIGHT	VOLUME
Brass/Bronze		534	lbs/ft3
Aluminum		165	lbs/ft3
Concrete		144	lbs/ft3

radius

2'

height

6.5'

Calculating the Weight of a 1/16" thick Copper Pipe

Formula = ¶ x Diameter x Height x Density

Calculations = 3.14 x 4ft x 10ft x 2.89 lbs/ft^2

Total Weight of 1/16" thick copper pipe = **362.98 lbs.**
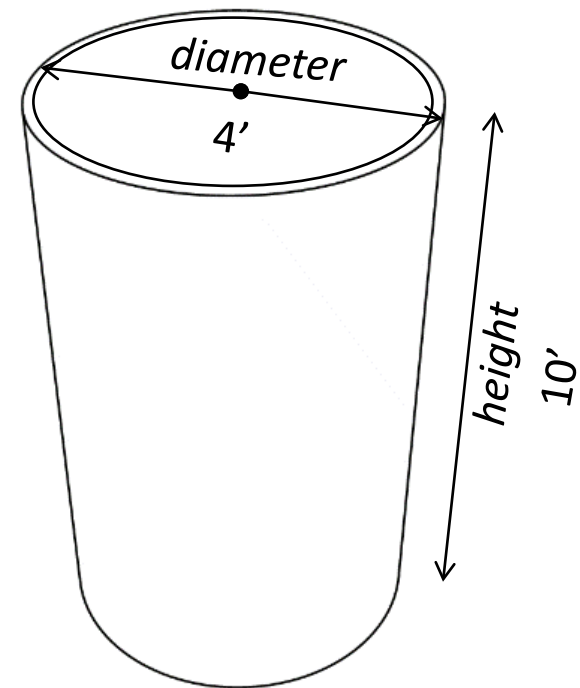
diameter 4'
height 10'

Weight of Material Chart				
Thickness in inches	Steel lbs/ft2	Lead lbs/ft2	Copper lbs/ft2	Aluminum lbs/ft2
1/16	2.55	3.68	2.89	0.86
1/8	5.1	7.36	5.79	1.72

Calculate the weight of a ½" thick solid Steel plate

Practice problem

Weight Chart

Thickness in inches	Steel lbs/ft2	Lead lbs/ft2	Copper lbs/ft2	Aluminum lbs/ft2	Brass/Bronze lbs/ft2
1/2	20.4	29.44	23.16	6.88	22.25

Formula for Area

$A = L \times W$

Calculations for Area

$A =$ _____ x _____

$A =$ _____

Calculations for Weight (W)

$W = Area \times Weight\ per\ thickness\ (weight\ chart)$

$W =$ _____ x _____

$W =$ _____

10' (L)

½" (H)

4' (W)

Calculate the weight of a 1/8" thick Steel pipe

Practice problem

Formula for Area

$A = \pi * d * h$

Calculations for Area

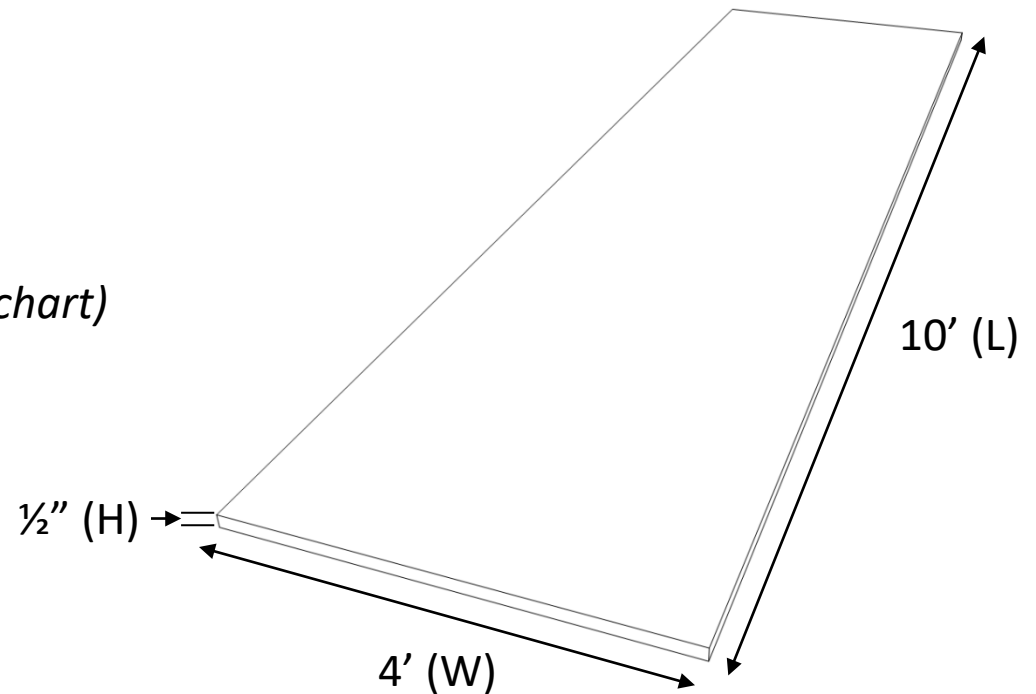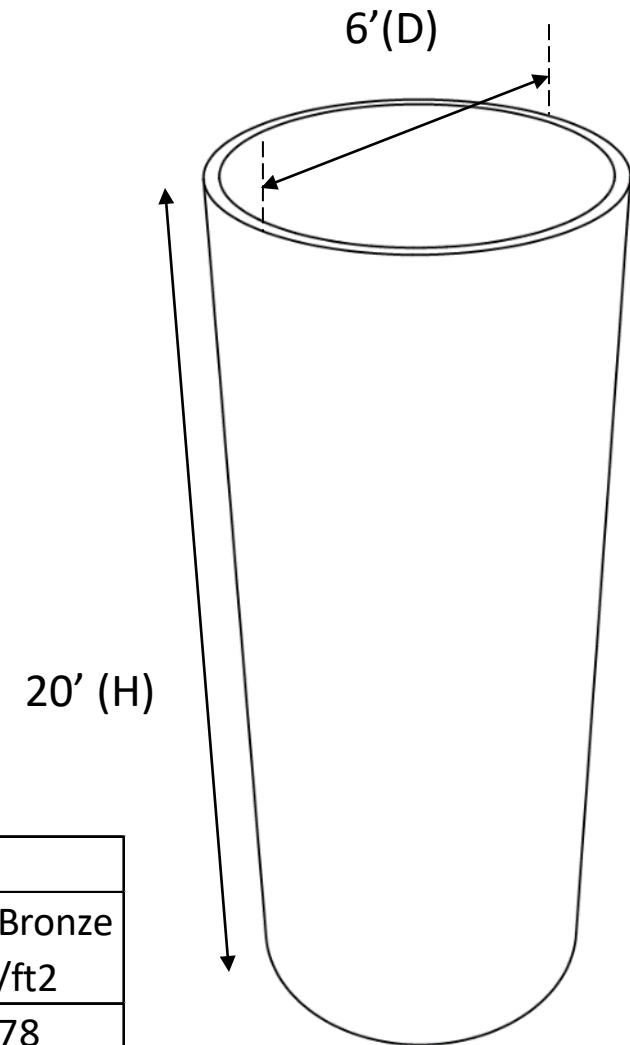$A = \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$

$A = \underline{\hspace{2cm}}$

Calculations for Weight (W)

W = Area x Weight per thickness (weight chart)

$W = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$

$W = \underline{\hspace{2.5cm}}$

6'(D)

20' (H)

Weight Chart

Thickness in inches	Weight of Material Chart				
	Steel lbs/ft2	Lead lbs/ft2	Copper lbs/ft2	Aluminum lbs/ft2	Brass/Bronze lbs/ft2
1/16	2.55	3.68	2.89	0.86	2.78
1/8	5.1	7.36	5.79	1.72	5.56