Density Practice Name: KEY

1) You are creating a box with a lid out of ¼" birch plywood. The box is 4 feet by 3 feet and 2 feet tall. The density of birch plywood is 0.021 lbs/in^3. How much will the finished box weigh?

$SA = 2(4 \cdot 3) + 2(3 \cdot 2) + 2(4 \cdot 2)$

$SA = 24 + 12 + 16$

$SA = 52\ ft^2$

Convert SA to square inches: $52 \cdot 144 = 7488\ in^2$

Volume of Material Used for Box $= 7488 \cdot \frac{1}{4} = 1872\ in^3$

Mass of Material $= 1872\ in^3 \cdot \frac{0.021\ lbs}{1\ in^3} = 39.31\ lbs$

2) A 55-gallon drum is 33" tall and made out of 18-gauge steel. The diameter of the steel drum is 23.5". 18-gauge steel is 0.05" thick and steel weighs about 490 lbs/ft^3. What is the weight of the empty drum?

$SA = 2\pi(11.75)(33) + 2\pi(11.75)^2$

$SA = 2436.31 + 867.47$

$SA = 3303.78\ in^2$

Volume of Material Used for Drum $= 3303.78 \cdot 0.05 = 165.19\ in^3$

Convert Volume to cubic feet: $\frac{165.19}{1728} = 0.096\ ft^3$

Mass of Material $= 0.096\ ft^3 \cdot \frac{490\ lbs}{1\ ft^3} = 46.8\ lbs$

3) A plastic drum has a base diameter of 23.3". The drum is 34.8" tall. The plastic is 2.2 mm thick and weighs 51.6 lbs/ft^3. Find the weight of the empty drum.

$SA = 2\pi(11.65)(34.8) + 2\pi(11.65)^2$

$SA = 2547.33 + 852.77$

$SA = 3400.1\ in^2$

Convert width of material to inches $= 2.2\ mm \cdot \frac{0.04\ inches}{1\ mm} = 0.088\ in$

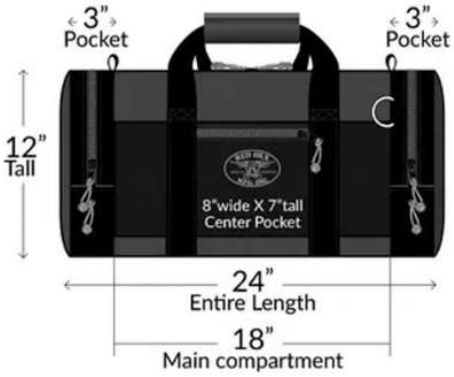
Volume of Material Used for Drum $= 3400.1 \cdot 0.088 = 299.21\ in^3$

Convert Volume to cubic feet: $\frac{299.21}{1728} = 0.173\ ft^3$

Mass of Material $= 0.173\ ft^3 \cdot \frac{51.6\ lbs}{1\ ft^3} = 8.93\ lbs$

Density Practice Name: KEY

4) The bag below has been designed to be constructed out of 1/16" nylon. Find the weight of the empty bag if nylon has a density of 0.041185 lbs/in^3.



$SA = 2\pi(6)(24) + 2\pi(6)^2$

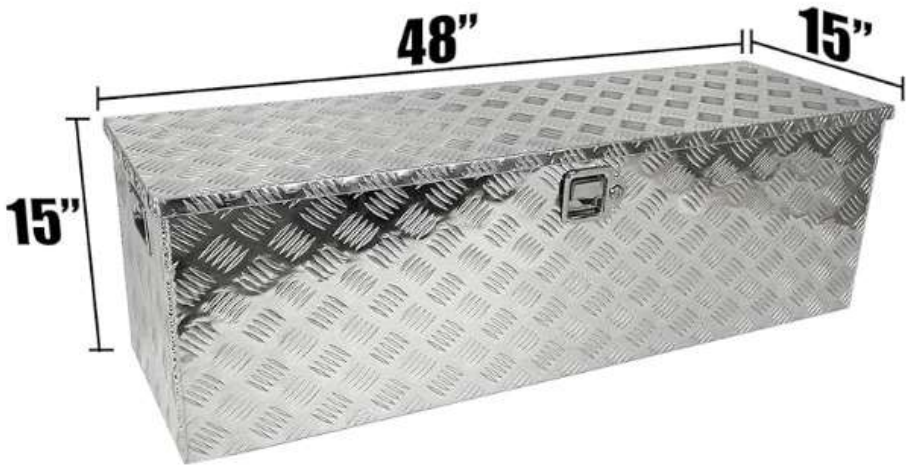
$SA = 904.78 + 226.19$

$SA = 1130.97\ in^2$

Volume of Material Used for Bag $= 1130.97 \cdot \frac{1}{16} = 70.69\ in^3$

Mass of Material $= 70.69\ in^3 \cdot \frac{0.041185\ lbs}{1\ in^3} = 2.91\ lbs$

5) The box below is to be constructed out of 1/8" aluminum. Aluminum has a density of 2.7 g/cm^3. Find the weight of the empty box.



$SA = 2(15 \cdot 15) + 2(48 \cdot 15) + 2(48 \cdot 15)$

$SA = 450 + 1440 + 1440$

$SA = 3330\ in^2$

Volume of Material Used for Box $= 3330 \cdot \frac{1}{8} = 416.25\ in^3$

Convert Volume to cubic feet: $\frac{416.25}{1728} = 0.2409\ ft^3$

Convert Density to lbs/ft^3: $\frac{2.7g}{cm^3} \cdot \frac{0.0022lb}{1g} \cdot \frac{1cm^3}{0.061\ in^3} \cdot \frac{1728in^3}{1ft^3} = 168.27\ lb/ft^3$

Mass of Material $= 0.2409\ ft^3 \cdot \frac{168.27\ lbs}{1\ ft^3} = 40.54\ lbs$