

## Mysterion Materials List

By Rod and Al Clark

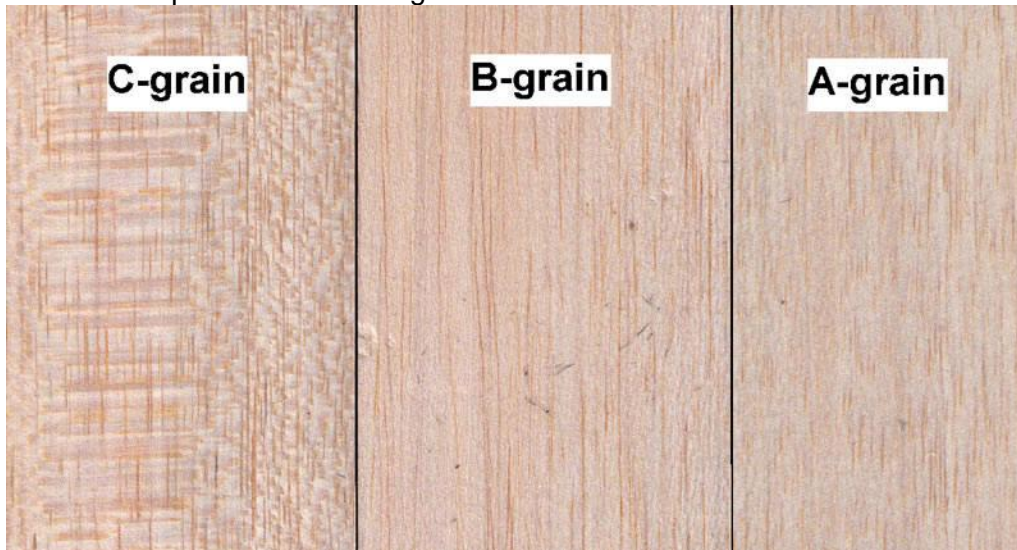
### Wood

First an explanation of the grades or densities of balsa wood is in order:

Grade	Ultra Light	Light	Light Medium	Medium	Medium Hard	Hard
Density in lb/cu.ft	4 - 5.4	5.5 - 6.0	6.1 - 7.5	7.6 - 9.5	9.6 - 12	14 +
	"Contest" grade balsa					

**To determine balsa sheet weight for the various density ranges shown above, see the end of this list for two handy balsa wood sheet size and density nomographs which were also developed by my brother, Rod Clark.** Take a small postage scale (the kind with a weight and clip, not an electronic one) to the hobby shop with you and weigh the balsa sheets; then look at the nomograph to determine the density of the particular sheet you are looking at.

Next is an explanation of balsa grains:



Notice that the C-grain balsa sheet has a mottled appearance and distinct checkerboard pattern. It is very stiff across the sheet and splits easily. Used for sheet balsa wings and tails, flat fuselage sides, wing ribs, formers, and trailing edges. C-grain is usually hard to find in local hobby shops. I mainly use it for sheet tail surfaces.

B-grain grain lines are shorter than A-grain and it is stiffer across the sheet than A-grain. If you look at the narrow edge of the balsa sheet, B-grain will look the same as it does on the wide, flat side. Used for flat fuselage sides, wing ribs, formers, planking gradual curves, and wing leading edge sheeting.

A-grain has long fibers that show up as long grain lines. If you look at the narrow edge of the balsa sheet, A-grain will have a checkerboard appearance. Used for sheet covering rounded fuselages and wing leading edges, planking fuselages, forming tubes, strong flexible spars, and hand launch glider fuselages.

**The following list of wood required was developed by my brother, Rod Clark, who is building a Mysterion.**

Note: balsa grain can be either A or B grain unless otherwise called out below.

Dimensions	Density	Grain	Qty	Item	Amount of sheet or stick used
<b>Balsa sheet:</b>					
1/16" x 3" x 36"	Medium	A	1	Fuse doublers - vert grain	14"
				Fuse bottom - cross grain	13" (5 pieces)
	Medium		4	Wing ribs 4-10	(33 x 1" + 11 x 1") x 2 wings
				Wing D-tube sheeting	22.3" x 2.7" x 2 (top & bottom) x 2 wings
			Wing root sheeting	5.1" x 5" x 2 (top & bottom) x 2 wings 22.5" x 0.75" x 2 (top & bottom) x 2 wings	
	Medium+		2	Wing TE sheeting	22.3" x 0.25" x 2 (top & bottom) x 2 wings
				Rib cap strips	22.2 x 0.4" x 2 wings
				Sub-leading Edge	3" x 0.75" x 2 (top & bottom) x 2 wings
				End rib sheeting	2.35" x 1" x 4 places x 2 wings
	Medium/Hard		1	Spar webbing (ribs 6-11)	
1/16" x 4" x 36"	Medium	1	2 Fuse doublers - horiz grain	28"	
			2 Stab doublers	5.25"	
3/32" x 3" x 36"	Med, Med-	A	1	Turtle Deck sides	24.5"
3/32" x 3" x 36"	Medium+	1	Fuse bottom	21.5" (2" wide X 0.2" wide)	
			Spar webbing (ribs 3-6)	2.35" x 1" x 3 places x 2 wings	
1/8" x 3" x 36"	Light/Med-	1	Turtle Deck floor	25" (only 2" wide at one end)	
			Turtle Deck formers T1-T5	4"	
	Med+/Hard		Hatch top	11.5" x 2.7"	
	Med+/Hard		Hatch locators	1.9" x 1/2" + 1.9" x 3/8"	
	Medium		Wing ribs 1,2,2A,3,11	31" x 1.1" x 2 wings	
1/8" x 4" x 36"	Medium	B	2	2 Fuse sides	36"
3/16" x 4" x 36"	Med, Med+	1	Turtle Deck top	20" x 0.8"	
	Med, Med+		Cowl top and sides	3.2 x 5.7"	
3/16" x 3" x 36"	Light/Med	1	Rudder bottom piece	3" x 0.75"	
	Light/Med		Vert Stab bottom piece	3.4" x 1.25"	
	Light		Fin fairings	3.9" x 1.9"	
3/16" x 3" x 36"	Medium/Hard	1	Horiz Stab	35.2" x 0.8" + 10.6" x 0.8" + 2.4" x 1.25"	
3/8" x 3" x 36"	Med/Med-	1	Ailerons	23" x 1.25" x 2 wings	
			Cowl bottom	2.5" x 2.5" (sanded 3/8" wood)	
3/4" x 3" x 36"	Medium+	1	Hatch sides	11.5" x 2.2"	
			Cowl corner pieces		

**Balsa Sticks:**

1/8" sq. x 36"	Hard	2	Fuse rear bottom longerons	21.5"
1/8" x 1/4"	Hard	1	Fuse vertical stiffeners	10" (cut from Hatch top sheet?)
1/8" x 3/16"	Hard	2	Trailing edge	22.6" x 2 wings
3/16" sq. x 36"	Light medium/medium	1	Vert Stab & Rudder Horiz Stab & Elevator	9" 11.5"
3/16" x 1/2" x 36"	Light Medium	1 2	TE of rudder Horiz Stab & Elev, V Stab, Rud	10" (can come from light sheet) 1" + 17" + 19"
1/4" x 1/2" x 36"	Hard	2	Wing leading edge Wing tube spacers	22.2" x 2 wings 4.6" x 2 per wing x 2 wings
1/2" x 36" triangular	Medium	1	Fuse front bottom longerons	29"

**Spruce Sticks:**

1/8" x 1/4" x 36"		4	Wing spar caps Servo rails - fuse Adder to spar caps	22.3" x 2 per wing x 2 wings 6.6" 4.6" x 2 per wing x 2 wings
3/16" x 1/4"		1	Horiz Stab joiner & horn slot	5" (can use 1/4" sq and sand down, or glue 2 1/8x1/4)

**Birch Plywood:**

1/32" x 12" X 24"		1	Fuse bottom Control horns Wing root rib cap	15" x 2.7" 1" x 6" (3 horns, doubled plywood) 8.6" x 1.1"
1/16" x 6" x 12"		1	Wing bolt insets	1" sq.
1/8" x 6" x 12"		1	F1 former Wing retainer screw doubler	3.4" x 2.2" 1.1" x 1.5" x 2

**Lite-Ply Plywood:**

1/8" 12" x 24"		1	F2, F3 formers Battery shelf F1A hatch end Canopy former	2.3 sq. ; 3.5" x 1.6" 14.4" x 2.3" 2" x 5/8" 2.1" x 2.2"
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## Hardware

- 1 E-Flite 480 BL 1020 Kv brushless outrunner motor
- 1 BB Model Aluminum Turbo Spinner 45/4/8 for 4mm motor shaft (source Esprit Models [www.espritmodel.com](http://www.espritmodel.com))
- 1 Aeronaut CAM 10X6 folding prop (source Esprit Models [www.espritmodel.com](http://www.espritmodel.com))
- 4 .25 dia X 5/8 long circuit board standoffs, tapped 4-40 (note these are shortened to 9/16 long for the model)  
Check your local electronics store, or here are two from MSC that will work. The ones with flats might actually be best as you can tighten the screws into them easier. <http://www.mscdirect.com/product/details/67732040> and <http://www.mscdirect.com/product/details/67724724>
- 3 #2 X 1/2 button head sheet metal screws (one source is Micro Fasteners <http://www.microfasteners.com>)
- 1 Sig 11" bubble canopy SIGCS011
- 2 pkg Radio Shack rare earth super magnets, 2 per package Model: 64-1895 Catalog #: 6401895
- 2 11/32 O.D. X 12" long brass tube
- 1 1/8 O.D. X 12" long brass tube
- 2 10-32 nylon thumb screws (McMaster-Carr p/n 94320A345 or similar)
- 27" 1/8 O.D. X 1/6 I.D. carbon tube
- 22" 1/16 dia. music wire
- 4 Du-Bro 2-56 Solder Kwik-Links
- 4 Du-Bro 2-56 Spring Steel Kwik-Link Clevis
- 4 Du-Bro 2-56 threaded couplers
- 6" Sticky-backed Velcro
- 18" One Wrap Velcro

## Radio and Electric Gear

- 1 Thunder Power 3S 2700 mah 25C LiPo battery
- 1 Deans Ultra Plug, male/female set
- 1 Castle Creations Thunderbird 36 ESC
- 1 Spektrum AR 6210 receiver
- 2 Hitec HS-5065MG servos
- 2 JR DS290G servos

# Balsa Wood Density Info

Lb. per cubic foot:  
Oz. per cubic foot:

Ultra Light		Light		Light Medium		Medium		Medium Hard		Hard
4.0	5.4	5.5	6.0	6.1	7.5	7.6	9.5	9.6	12	14
64	86.4	88	96	97.6	120	121.6	152	153.6	192	224

Thickness		Width	Length	Cu. In.
Fraction	Decimal			
1/32	0.03125	3	36	3.375
1/16	0.06250	3	36	6.750
3/32	0.09375	3	36	10.125
1/8	0.12500	3	36	13.500
3/16	0.18750	3	36	20.250
1/4	0.25000	3	36	27.000

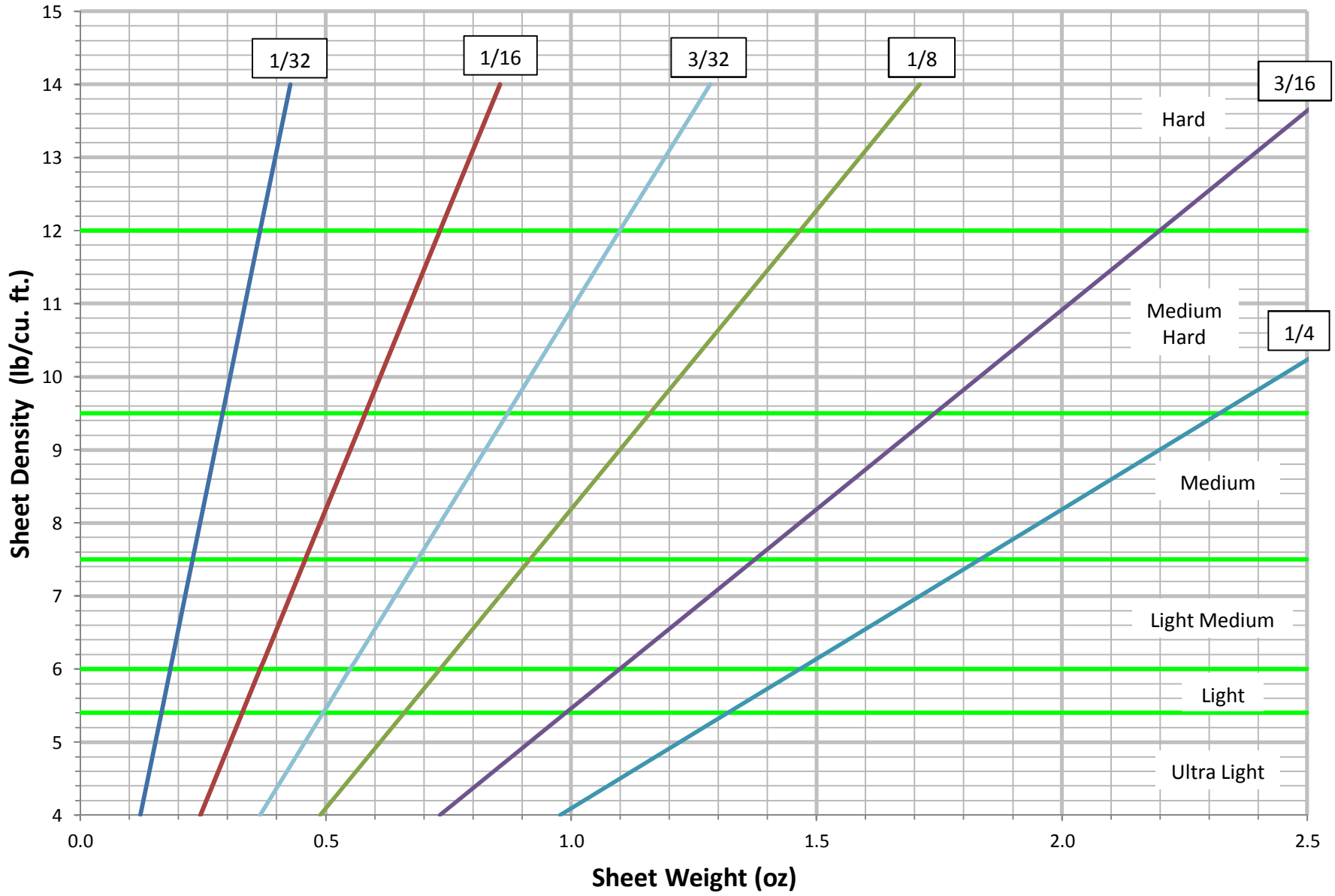
1768 Cu. In. per Cu. Ft.  
28.34952 grams per oz

1/32
1/16
3/32
1/8
3/16
1/4

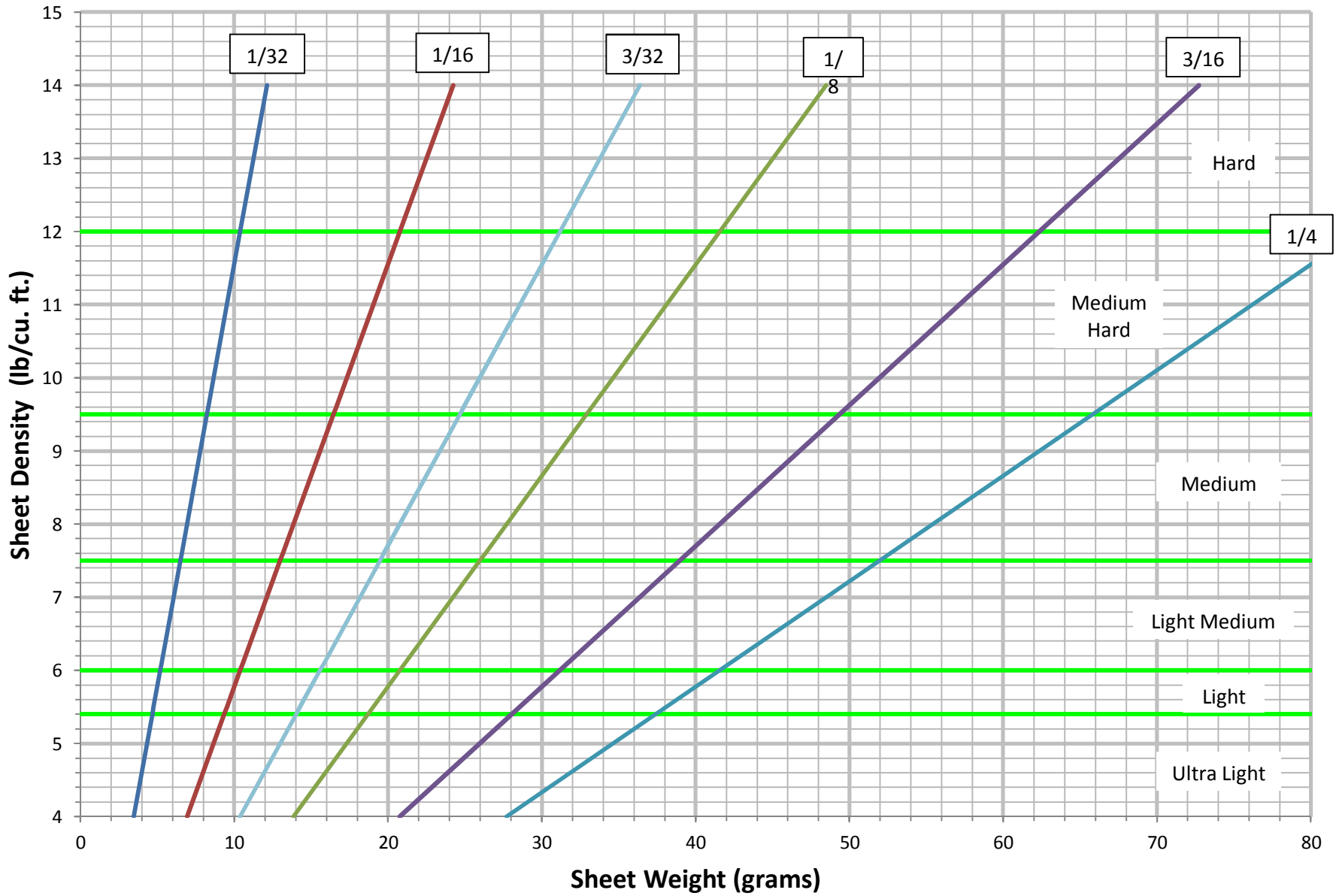
Weight (oz.)										
0.122	0.165	0.168	0.183	0.186	0.229	0.232	0.290	0.293	0.367	0.428
0.244	0.330	0.336	0.367	0.373	0.458	0.464	0.580	0.586	0.733	0.855
0.367	0.495	0.504	0.550	0.559	0.687	0.696	0.870	0.880	1.100	1.283
0.489	0.660	0.672	0.733	0.745	0.916	0.929	1.161	1.173	1.466	1.710
0.733	0.990	1.008	1.100	1.118	1.374	1.393	1.741	1.759	2.199	2.566
0.977	1.319	1.344	1.466	1.490	1.833	1.857	2.321	2.346	2.932	3.421

Weight (grams)										
3.4635	4.6757	4.7623	5.1953	5.2819	6.4941	6.5807	8.2259	8.3124	10.391	12.122
6.927	9.3515	9.5247	10.391	10.564	12.988	13.161	16.452	16.625	20.781	24.245
10.391	14.027	14.287	15.586	15.846	19.482	19.742	24.678	24.937	31.172	36.367
13.854	18.703	19.049	20.781	21.127	25.976	26.323	32.903	33.25	41.562	48.489
20.781	28.054	28.574	31.172	31.691	38.965	39.484	49.355	49.875	62.343	72.734
27.708	37.406	38.099	41.562	42.255	51.953	52.645	65.807	66.5	83.124	96.978

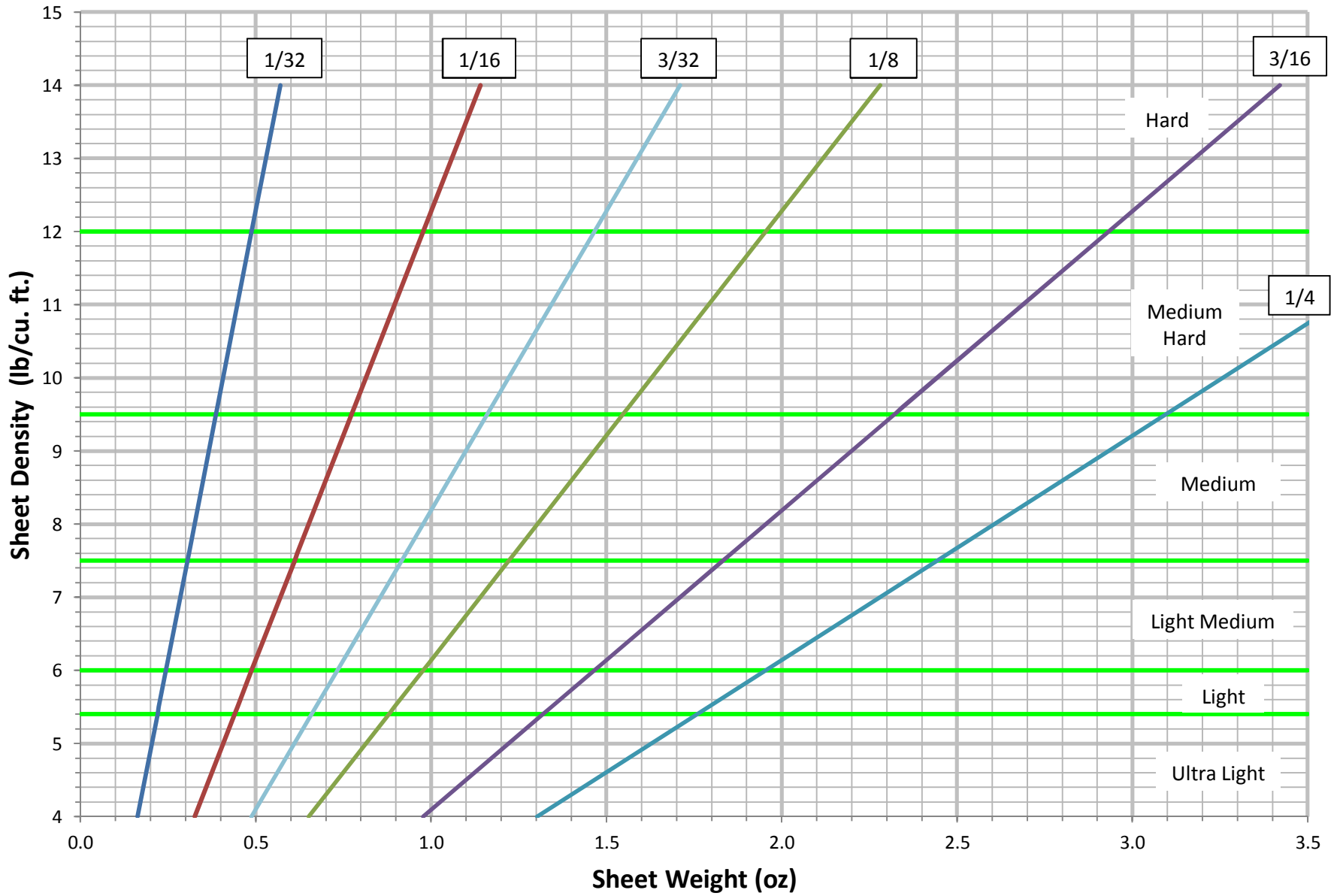
# Density for 3" x 36" Balsa Sheets



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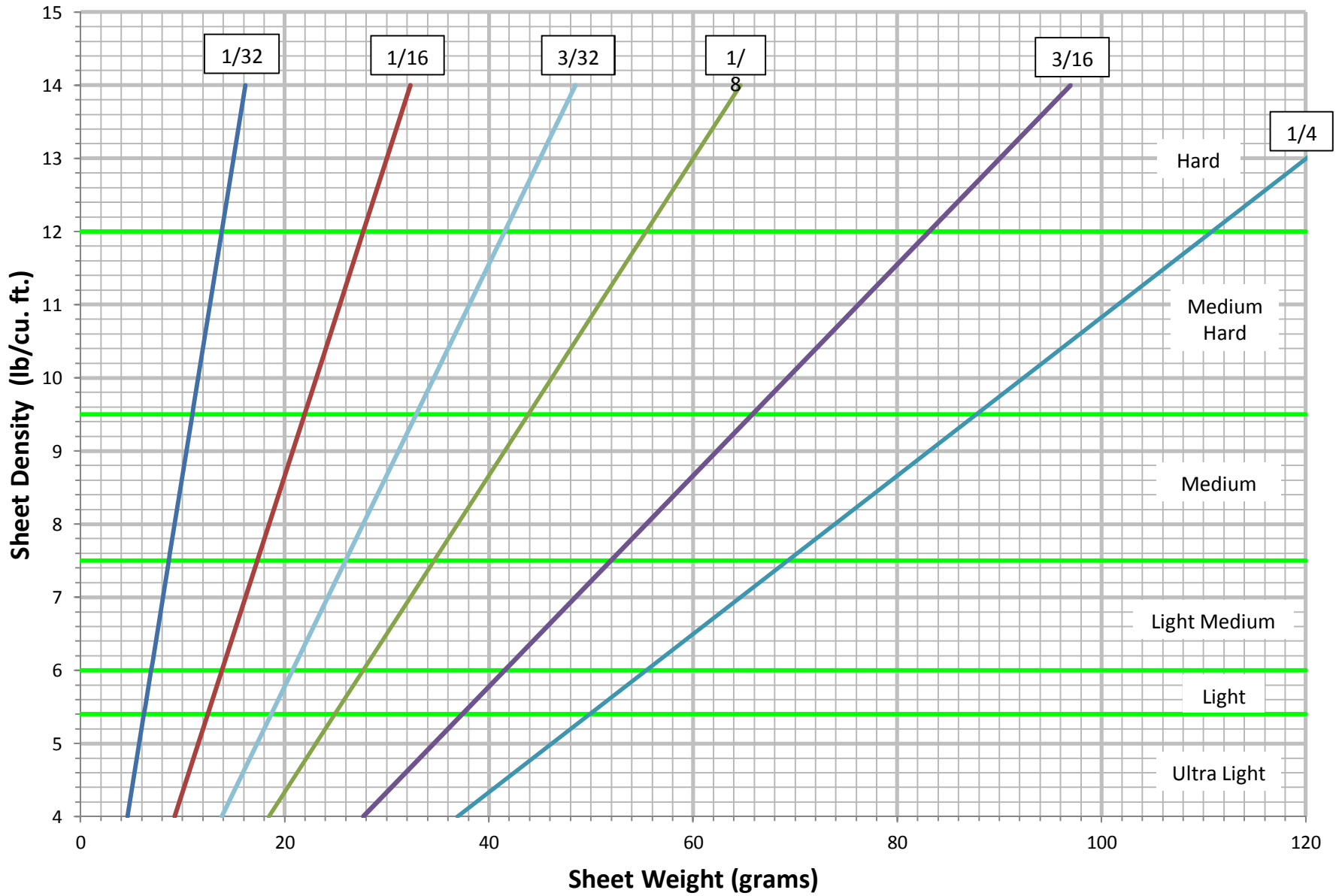


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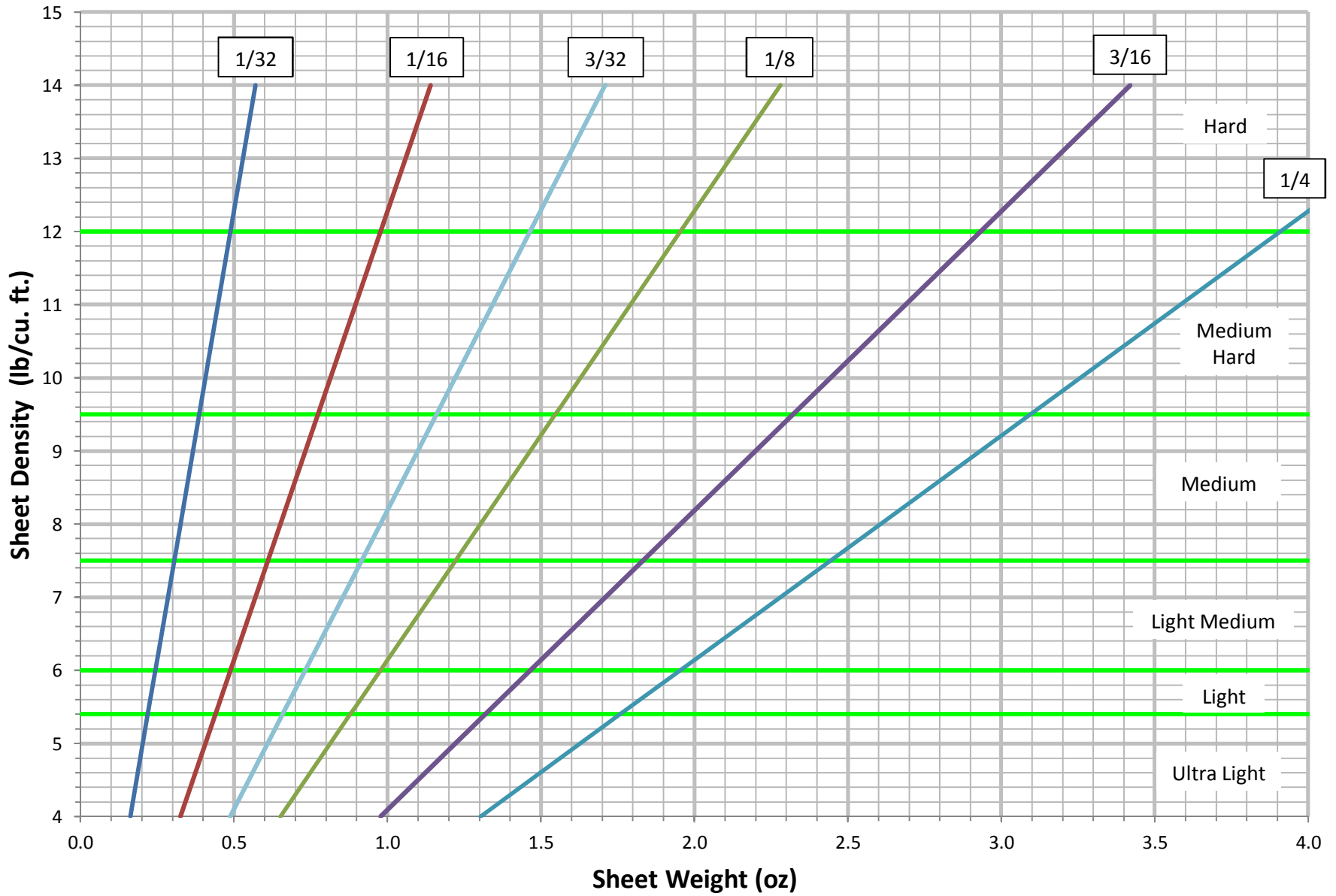




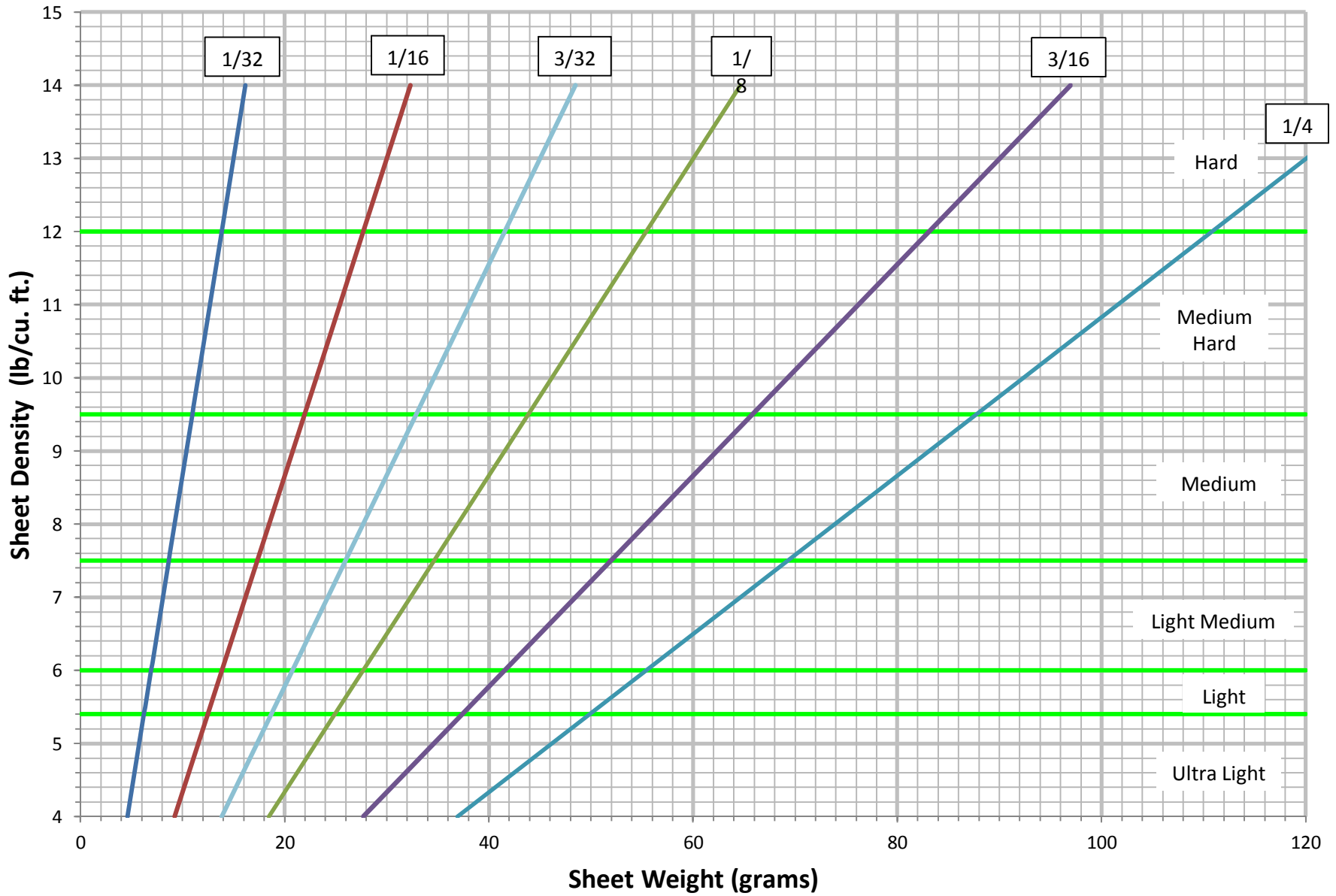
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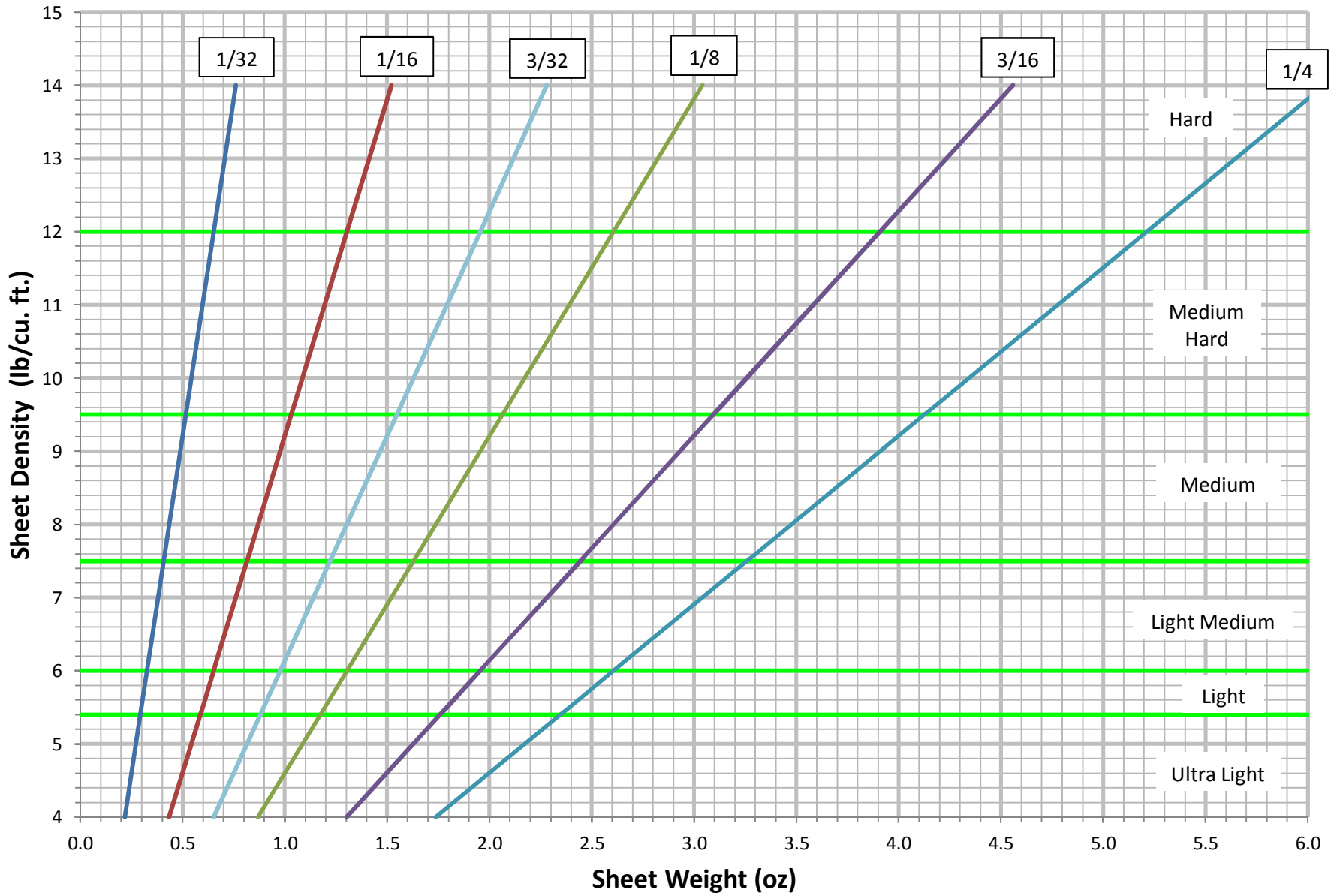
# Density for 3" x 48" Balsa Sheets



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