SHAPES & SIZES

LUMBER SIZES

Nominal inches	Actual (dry) inches	mm	Actual (green) inches	mm
THICKNESS				
1	¾	19	²⁵/₃₂	20
1¼	1	25	1¹/₃₂	26
1½	1¼	32	1⁹/₃₂	33
2	1½	38	1⁹/₁₆	40
2½	2	51	2¹/₁₆	52
3	2½	64	2⁹/₁₆	65
3½	3	76	3¹/₁₆	78
4	3½	89	3⁹/₁₆	90
4½	4	102	4¹/₁₆	103
6	5½	140	5⁹/₁₆	141
8	7½	191	7⁹/₁₆	194
WIDTH				
2	1½	38	1⁹/₁₆	40
3	2½	64	2⁹/₁₆	65
4	3½	89	3⁹/₁₆	90
5	4½	114	4⅝	117
6	5½	140	5⅝	143
7	6½	165	6⅝	168
8	7¼	184	7½	190
9	8¼	210	8½	216
10	9¼	235	9½	241
11	10¼	260	10½	267
12	11¼	286	11½	292
14	13¼	337	13½	343
16	15¼	387	15½	394

COMMON NAILS

60d
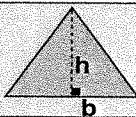50d
40d
30d
20d
16d
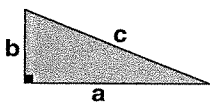12d
10d
9d
8d
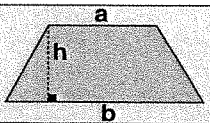7d
6d
5d
4d

1 2 3 4 5 6

NOT TO SCALE

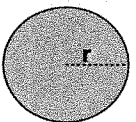## GEOMETRY

Rectangle
Area (A) = Width (w) x Height (h)

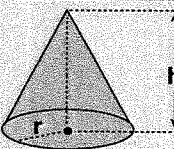**Triangle**
Area (A) = ½ Base (b) x Height (h)

Pythagorean Theorem:
If a right triangle has hypotenuse (c) and sides (a) and (b), then;
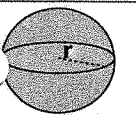$c^2 = a^2 + b^2$

Trapezoid
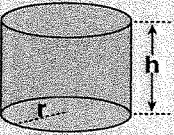Area (A) = $\dfrac{(a+b) \times h}{2}$

Circle
Area (A) = πr^2
Circumference (C) = $2\pi r$
$\pi = 3.1416$

Cone
Volume (V) = $\dfrac{\pi r^2 h}{3}$
Area of <u>curved</u> surface:
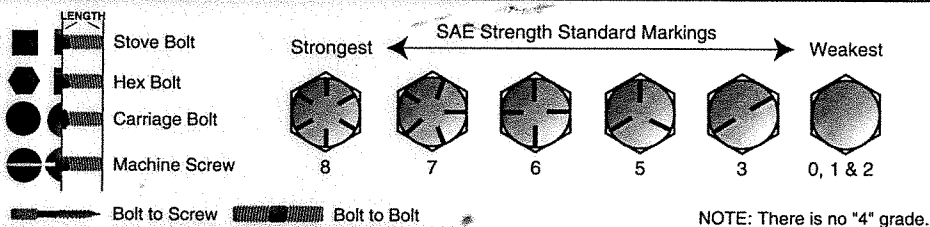$A = \pi r\sqrt{r^2+h^2}$

Sphere
Volume (V) = $\dfrac{4\pi r^3}{3}$
Surface Area: $A = 4\pi r^2$

Right Cylinder
Volume (V) = $\pi r^2 h$
Lateral surface area (A) = $2\pi rh$

BOLT GRADES

LENGTH

Stove Bolt
Hex Bolt
Carriage Bolt
Machine Screw

Strongest ← SAE Strength Standard Markings → Weakest

| 8 | 7 | 6 | 5 | 3 | 0, 1 & 2 |

Bolt to Screw   Bolt to Bolt

NOTE: There is no "4" grade.

STANDARD WOOD SCREWS

LENGTH IN INCHES

GAUGE	SHANK	SOFT WOOD	HARD WOOD	¼	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5
0	¹/₁₆	¹/₆₄	¹/₃₂																			
1	⁵/₆₄	¹/₃₂	¹/₃₂																			
2	³/₃₂	¹/₃₂	³/₆₄																			
3	⁷/₆₄	³/₆₄	¹/₁₆																			
4	⁷/₆₄	³/₆₄	¹/₁₆																			
5	⅛	¹/₁₆	⁵/₆₄																			
6	⅛	¹/₁₆	⁵/₆₄																			
7	⁵/₃₂	¹/₁₆	³/₃₂																			
8	¹¹/₆₄	⁵/₆₄	³/₃₂																			
9	³/₁₆	⁵/₆₄	⁷/₆₄																			
10	³/₁₆	³/₃₂	⁷/₆₄																			
11	¹³/₆₄	³/₃₂	⅛																			
12	⁷/₃₂	⁷/₆₄	⅛																			
14	¼	⁷/₆₄	⁹/₆₄																			
16	¹⁷/₆₄	⁹/₆₄	⁵/₃₂																			
18	¹⁹/₆₄	⁹/₆₄	³/₁₆																			
20	²¹/₆₄	¹¹/₆₄	¹³/₆₄																			
24	⅜	⁹/₁₆	⁷/₃₂																			

PILOT HOLE SIZES

Screw Length
Oval Head
Round Head
Flat head

☐ Common sizes
▨ Some Availability

CONVERSION FORMULAS

LENGTH

Centimeters & Inches
cm x .394 = in
in x 2.54 = cm

Centimeters & Millimeters
cm x 10 = mm
mm x .1 = cm

Centimeters & Picas
cm x 2.371 = picas
picas x .4233 = cm

Centimeters & Points
cm x 28.4528 = points
points x .0351 = cm

Millimeters & Inches
mm x .0394 = in
in x 25.4 = mm

Millimeters & Micrometers (Microns)
mm x 1000 = μ
μ x .001 = mm

Meters & Chains (G)
m x .04971 = ch
ch x 20.117 = m

Meters & Fathoms
m x .547 fm
fm x 1.83 = m

Meters & Feet
m x 3.281 = ft
ft x .305 = m

Meters & Yards
m x 1.094 = yd
yd x .914 = m

Meters & Furlongs
m x .005 = fur
fur x 201.17 = m

Chains (G)* & Feet
ch x 66 = ft
ft x .015 = ch

Chains (G)* & Rods
ch x 4 = rd
rd x .25 = ch

Chains (G)* & Yards
ch x 22 = yd
yd x .455 = ch

Fathoms & Feet
fa x 6 = ft
ft x .167 = fa

Kilometers & Feet
km x 3280.84 = ft
ft x (3.048 x 10⁻⁴) km
$ft \times (3.048 \times 10^{-4})\ km$

Kilometers & Yards
km x 1093.6 = yd
yd x .00091 = km

Kilometers & Statute Miles
km x .621 = mi
mi x 1.609 = km

Kilometers & Nautical Miles
km x .540 = n mi
n mi x 1.852 = km

Nautical Miles & Statute Miles
n mi x 1.15 = s mi
s mi x .869 = n mi

*(G) = Gunter's or surveyor's chain

AREA

Sq. Centimeters & cm²
$cm^2 \times .155 = in^2$
$in^2 \times 6.452 = cm^2$

Sq. Meters & Sq. Chains (G)*
$m^2 \times .0025 = ch^2$
$ch^2 \times 404.686 = m^2$

Sq. Rods & Sq. Chains (G)*
$rd^2 \times 625 = ch^2 (G)$
$ch^2 \times 16 = rd^2$

Sq. Chains & Acres
$ch^2(G) \times .1 = A$
$A \times 10 = ch^2(G)$

Sq. Chains (G)* & Sq. feet
$ch^2(G) \times 4356 = ft^2$
$ft^2 \times .00023 = ch^2(G)$

Hectares & Sq. Miles
$ha \times .0039 = mi^2$
$mi^2 \times 258.999 = ha$

Hectares & Acres
ha x .405 = A
A x 2.471 = ha

Acres & Sq. Miles
$A \times .00156 = mi^2$
$mi^2 \times 640 = A$

Sq. Kilometers & Sq. Miles
$km^2 \times .386 = mi^2$
$mi^2 \times 2.590 = km^2$

Sq. Meters & Acres
$m^2 \times .000247 = A$
$A \times 4046.856 = m^2$

Sq. Meters & Hectares
$m^2 \times .0001 = ha$
$ha \times 10,000 = m^2$

Sq. Meters & Sq. Feet
$m^2 \times 10.764 = ft^2$
$ft^2 \times .093 = m^2$

Sq. Meters & Sq. Yards
$m^2 \times 1.196 = yd^2$
$yd^2 \times .836 = m^2$

Sq. Meters & Sq. Rods
$m^2 \times .03954 = rd^2$
$rd^2 \times 25.293 = m^2$

Sq. Yards & Sq. Feet
$yd^2 \times 9 = ft^2$
$ft^2 \times .1111 = yd^2$

*(G) = Gunter's or surveyor's Chain

LIQUID CAPACITY

UK & US Gallons
UK gal x 1.201 = US gal
US gal x .833 = UK gal

UK & US Quarts
UK qt x 1.201 = US qt
US qt x .833 = UK qt

UK & US Pints
UK pt x 1.201 = US pt
US pt x .833 = UK pt

UK & US Ounces
UK oz x .961 = US oz
US oz x 1.041 = UK oz

UK Gallons & Liters
UK gal x 4.546 = L
L x .220 = UK gal

UK Quarts & Liters
UK qt x 1.137 = L
L x .880 = UK qt

UK Pints & Liters
UK pt x .568 = L
L x 1.760 = UK pt

UK Ounces & Milliliters
UK oz x 28.413 = ml
ml x .035 = UK oz

US Gallons & Liters
US gal x 3.785 = L
L x .264 = US gal

US Quarts & Liters
US qt x .947 = L
L x 1.056 = US qt

US Pints & Liters
US pt x .473 = L
L x 2.113 = US pt

US Ounces & Liters
US oz x .03 = L
Liter x 33.8 = US oz

US Ounces & Milliliters
US oz x 29.572 = ml
ml x .034 = US oz

Gills (US) & Ounces (US)
gi x 4 = oz
oz x .25 = gi

Gills (US) & Cubic Centimeters
gi x 118.29 = cc
cc x .00845 = gi

Gills (UK) & Cubic Centimeters
gi x 142.065 = cc
cc x .00704 = gi

DRY CAPACITY

Cubic centimeters & Cubic inches
$cm^3 \times .061 = in^3$
$in^3 \times 16.387 = cm^3$

Cubic inches & Cubic feet
$in^3 \times .000579 = ft^3$
$ft^3 \times 1728 = in^3$

Cubic feet & Cubic yards
$ft^3 \times .037 = yd^3$
$yd^3 \times 27 = ft^3$

Cubic meters & Cubic yards
$m^3 \times 1.308 = yd^3$
$yd^3 \times .765 = m^3$

Cubic meters & Cubic feet
$m^3 \times 35.315 = ft^3$
$ft^3 \times .028 = m^3$

Pints & Quarts
pt x .5 = qt
qt x 2 = pt

Quarts & Pecks
qt x .125 = pk
pk x 8 = qt

Pecks(US) & Bushels(US)
pk x .25 = bu
bu x 4 = pk

Bushels (US) & Barrels (US)*
bu x .0305 = bbl
bbl x 3.281 = bu

Bushels (UK) & Bushels (US)
bu (US) x .969 = bu (UK)
bu (UK) x 1.032 = bu (US)

* A barrel is not the same container as a steel **drum**, which typically holds 55 gallons (US). Barrels come in different sizes based on their contents as defined by various statutes.
Oil = 42 gal
Beer = 31 gal (US)
Beer = 50 liters (Europe)
Dry Goods = 7056 in³
Cranberries = 5826 in³
Flour = 196 lbs.
Cornmeal = 200 lbs.
Cement = 376 lbs.
Lime = 280 lbs.

WEIGHT

Grains(gr) & Grams(g)
gr x .065 = g
g x 15.432 = gr

Drams(avdp)* & Ounces(avdp)
dr(avdp) x .062 = oz(avdp)
oz(avdp) x 16 = dr(avdp)

Pennyweight & Grams
dwt x 1.5552 = g
g x .643 = dwt

Grams & Ounces (US)
g x .035 = oz
oz x 28.349 = g

Ounces (troy) & Grains
oz tr x 480 = gr
gr x .00208 = oz tr

Ounces (troy) & Grams
oz tr x 31.103 = g
g x .032 = oz tr

Ounces (troy) & Ounces (avdp)
oz tr x 1.097 = oz (avdp)
oz (avdp) x .911 = oz tr

Ounces (avdp)& Pounds (avdp)
oz (avdp) x .0625 = lb (avdp)
lb (avdp) x 16 = oz (avdp)

Milligrams & Grains
mg x .015 = gr
gr x 64.799 = mg

Grains & Carats
gr x .32399 = c
c x 3.0865 = gr

Grams & Carats (metric)
g x 5 = c (metric)
c (metric) x .2 = g

Milligrams & Carats (metric)
mg x .005 = c (metric)
c (metric) x 200 = mg

Pounds & Kilograms
lb x .454 = kg
kg x 2.205 = lb

Tons (long) & pounds (avdp)
lt x 2240 = lbs (avdp)
lbs (avdp) x .0004464 = lt

Tons (short) & pounds (avdp)
sht x 2000 = lbs (avdp)
lbs (avdp) x .0005 = sht

Tonnes (metric) & pounds (avdp)
t x 2204.62 = lbs (avdp)
lbs (avdp) x .0004536 = t

*avdp = avoirdupois (from French) meaning "good of weight"

KITCHEN LIQUID MEASURES

1 gal	4 qt	8 pt	16 cups	128 fl oz	3.79L		
½ gal	2 qt	4 pt	8 cups	64 fl oz	1.89L		
¼ gal	1 qt	2 pt	4 cups	32 fl oz	.95L		
	½ qt	1 pt	2 cups	16 fl oz	.47L		
	¼ qt	½ pt	1 cup	8 fl oz	.24L		
			½ cup	4 fl oz	.12L	8 Tbs	24 tsp
			¼ cup	2 fl oz	.06L	4 Tbs	12 tsp
			⅛ cup	1 fl oz	.03L	2 Tbs	6 tsp
				½ fl oz	.015L	1 Tbs	3 tsp

KITCHEN DRY MEASURES

1 cup	8 fl oz	16 Tbs	48 tsp	237 ml
¾ cup	6 fl oz	12 Tbs	36 tsp	177 ml
⅔ cup	5⅓ fl oz	10⅔ Tbs	32 tsp	158 ml
½ cup	4 fl oz	8 Tbs	24 tsp	118 ml
⅓ cup	2⅔ fl oz	5⅓ Tbs	16 tsp	79 ml
¼ cup	2 fl oz	4 Tbs	12 tsp	59 ml
⅛ cup	1 fl oz	2 Tbs	6 tsp	30 ml
1⁄16 cup	½ fl oz	1 Tbs	3 tsp	15 ml
1⁄48 cup	⅙ fl oz	⅓ Tbs	1 tsp	5 ml

Entry/Foyer

Up

Up
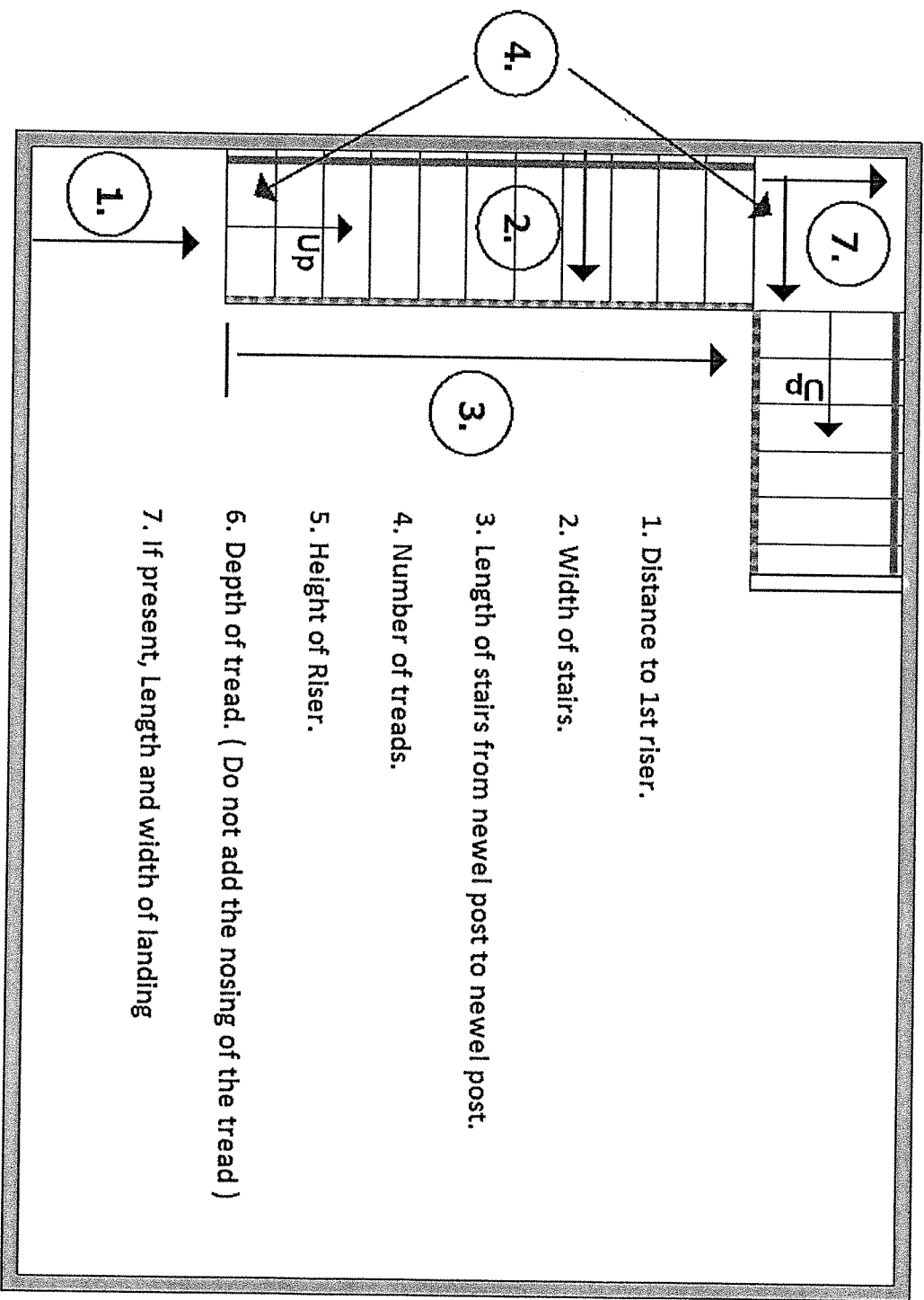
1. Distance to 1st riser.

2. Width of stairs.

3. Length of stairs from newel post to newel post.

4. Number of treads.

5. Height of Riser.

6. Depth of tread. (Do not add the nosing of the tread)

7. If present, Length and width of landing

1.

2.

3.

4.

5.

7.

Karl's Roofing Cheatsheet

ROOF SYMBOLS

☐⊗ Turtle/Box or Turbine Attic vent

≠ X Gutter or Downspout

e Exhaust vent – up to 4"

E Exhaust vent - more than 4"

FC Furnace / Water Heater Rain cap

⊙ Soil/Plumbing Stack

Sat Tv Satellite Dish / TV Antenna

CH Chimney

[—] Ridge vent (specify shingle over or aluminum)

SL DL Standard or Round/Dome Skylight

⊠ Soffit vent

R Round Attic vent cover

P S Power or Solar Attic vent cover

CIRCLE

Area

Pi x radius^2

.7854 x diameter^2

.0796 x perimeter^2

Perimeter

Pi x diameter
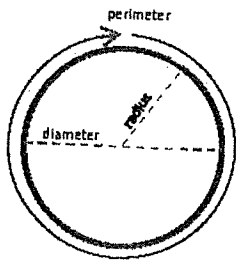
PARALLELOGRAM

Area

Base x height
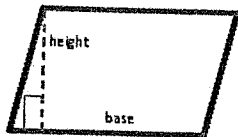
PRISM

Area

Sum of sides ÷ 2 x radius
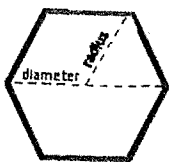
RECTANGLE

Area

length x height
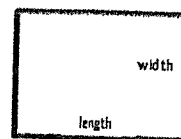
TRAPEZOID

Area

(base + top) ÷ 2 x height
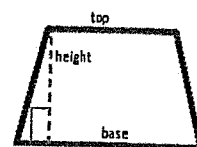
TRIANGLE

Area

(base x height) ÷ 2
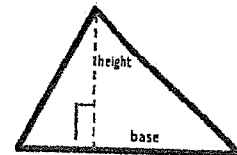
PYTHAGOREAN THEOREM

Rafter Length

rise^2 + run^2
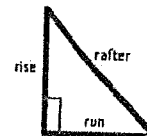
CONVERSION FACTORS

| DIVIDE	BY	TO CONVERT TO
square inches	144	square feet
square inches	144	board feet
cubic inches	1,728	cubic feet
cubic inches	46,656	cubic yards
square feet	9	square yards
square feet	100	squares
cubic feet	27	cubic yards
feet	5,280	miles
meters	1,609	miles
yards	1,770	miles
attic sq ft	150	total net free area (NFA) in sf
NFA in sq ft	2	balanced NFA in sq ft (I or E)
balanced NFA	0.0069	NFA in sq inches (I or E)
attic sq ft	1.43	power vent CFM required
Power CFM	300	balanced NFA in sq ft (Intake)

Gable Roof
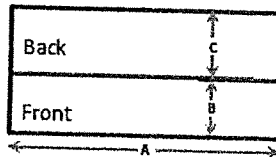
Front Slope = A x B
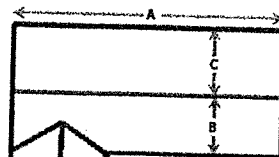
RFG Area = A(B + C)

Hip Roof
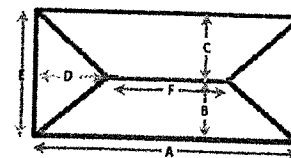
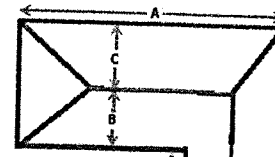Front Slope = ½(A + F) x B

Left Slope = ½(D x E)

RFG Area = A(B + C)

Gable or Hip Extensions

Total RFG Area = A(B + C) + F(D + E)

Fractions: 1" = 0.084 • 2" = 0.167 • 3" = 0.25 • 4" = 0.334 • 5" = 0.417 • 6" = 0.5 • 7" = 0.584 • 8" = 0.667 • 9" = 0.75 • 10" = 0.834 • 11" = 0.917

Square estimates when slope & base area are known: 1/12=1.003 • 2/12=1.014 • 3/12=1.031 • 4/12=1.054 • 5/12=1.083 • 6/12=1.118 • 7/12=1.158 • 8/12=1.202 • 9/12=1.250 • 10/12=1.302 • 11/12=1.357 • 12/12=1.412 • 13/12=1.474 • 14/12=1.537 • 15/12=1.601 • 16/12=1.667 • 17/12=1.734 • 18/12=1.803 • 19/12=1.873 • 20/12=1.944 • 21/12=2.016 • 22/12=2.088 • 23/12=2.162 • 24/12=2.236

1/12

2/12

3/12

4/12

5/12

6/12

7/12

8/12

9/12

10/12

11/12

12/12

13/12

14/12

16/12

15/12

17/12

18/12

20/12

19/12

21/12