

## DESSERT ISLE UNIT ANALYSIS

*Stranded Standards for Coconauts*

*Mr. Merrick*

On the fabled *Dessert Isle*, shipwrecked scientist pirates standardized measurement using whatever they had: coconuts, bananas, ropes, hammocks, and drumbeats. These **Dessert Units** are *made up but internally consistent*. Your job is to apply unit analysis to convert between Dessert Units and familiar SI/US units, and to chain conversions through density, energy, power, and time. Keep the **Master Table** and the **Data Box** open while you work.

MASTER TABLE

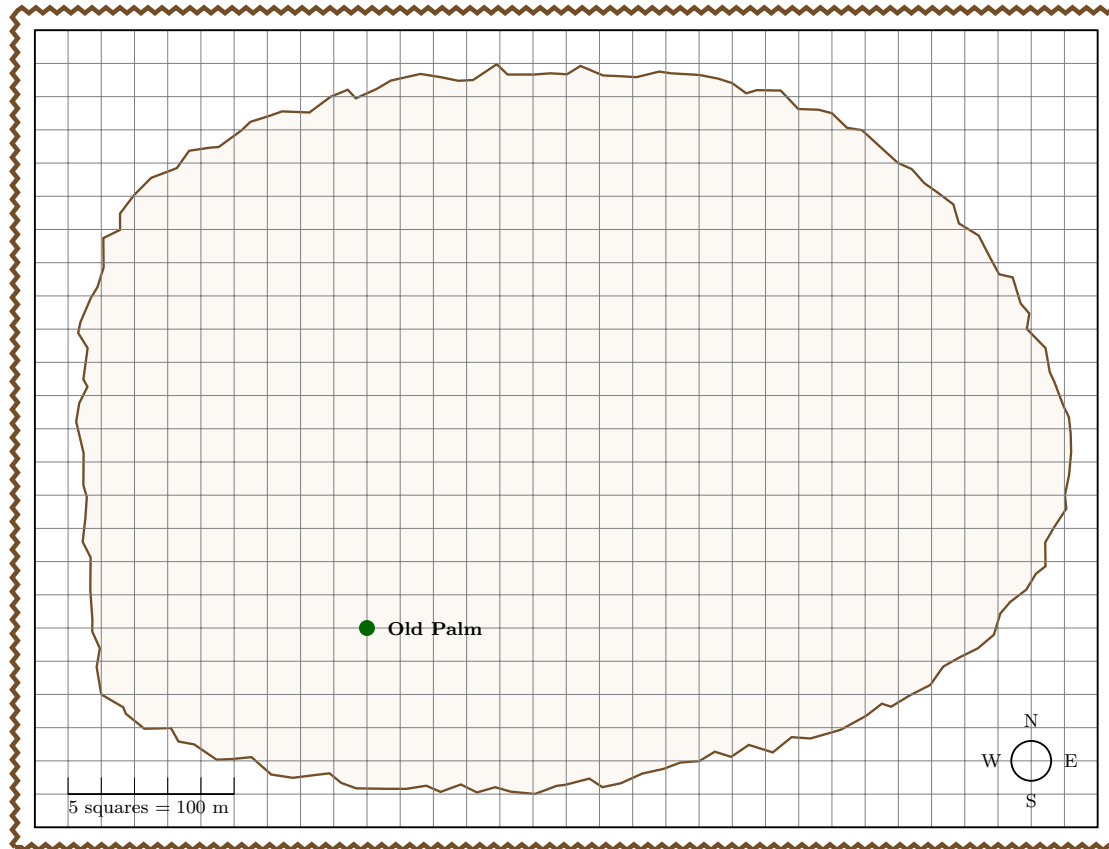
Quantity	Dessert Unit (symbol)	Equivalence (exact unless noted)
<i>Length</i>		
Banana (ba)	1 ba	= 0.20 m
Palm (pl)	1 pl	= 0.50 m
Coconut rope (crp)	1 crp	= 2.00 m
Island mile (imi)	1 imi	= 800 m
<i>Area</i>		
Hammock (hmk)	1 hmk	= 2.0 m <sup>2</sup>
Sandpatch (spd)	1 spd	= 1.5 m <sup>2</sup>
Leaf-mat (lmt)	1 lmt	= 0.50 m <sup>2</sup>
<i>Volume</i>		
Coconut shell (csh)	1 csh	= 0.60 L
Gourd (grd)	1 grd	= 2.4 L = 4 csh
Island barrel (ibr)	1 ibr	= 25 L ≈ 6.58 US gal
<i>Mass</i>		
Coconut (cn)	1 cn	= 1.40 kg
Mango (mgo)	1 mgo	= 0.35 kg = 350 g
Crab (crb)	1 crb	= 0.12 kg
Stone (stn)	1 stn	= 2.50 kg
<i>Time</i>		
Drumbeat (db)	1 db	= 0.75 s
Sunset (sst)	1 sst	= 12 min = 720 s
Nap (np)	1 np	= 20 min
Tide (td)	1 td	= 5 h = 300 min
<i>Derived / Reference</i>		
Scurry (scy)	1 scy	= (1 pl)/(1 db) = $\frac{0.50 \text{ m}}{0.75 \text{ s}}$ = 0.667 m/s
Firechip (fch)	1 fch	= 1.00 MJ = 10 <sup>6</sup> J
Torch (trc)	1 trc	= 50 W = 50 J/s
Coco-milk density	$\rho_{\text{cmilk}}$	= 1050 kg/m <sup>3</sup> (use when cited)
Dry wood energy (ref)	$e_{\text{wood}}$	≈ 16 MJ/kg (use when cited)

### Dessert Isle Data Box: Quick Equivalences

1 L = 1000 mL = 1000 cm<sup>3</sup>; 1 m<sup>3</sup> = 1000 L  
 1 in = 2.54 cm; 1 ft = 0.3048 m; 1 mi = 1609 m  
 1 US gal = 3.785 L; 1 lb = 0.4536 kg  
 1 kWh = 3.6 × 10<sup>6</sup> J; 1 BTU ≈ 1055.06 J

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Captain Pi-rate Gaussbeard has left movement instructions. Convert each instruction to *squares*. Mark the treasure with an ✕.



1. From the **Old Palm**, walk **260 pl** straight **north**.
2. Then go **300 ba** east.
3. Next, head **40 crp** toward the **northeast** at  $45^\circ$ .
4. Travel **0.08 imi** south.
5. Go **100 ba** west.
6. Move **east** at **25 crp/min** for **60 s**.
7. Go **north** for **0.08 sst** at **1.4 scy**.
8. Head **30 crp** toward the **southwest** at  $45^\circ$ .
9. For **180 db** at **1.3 scy**, move **east**.
10. Finally, advance **22 crp** toward the **northeast** at  $45^\circ$ .

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## Practice — Dessert Isle Conversions

Use only the Master Table and the Data Box. Show unit cancellation at every step.

1. **Banana highway.** The beach loop is 1.75 imi. Express its length in palms (pl) and in bananas (ba).
2. **Hammock zoning with conversion.** A rectangular lot is 18 pl by 35 ba. Compute its area in  $\text{m}^2$ , hmk, and  $\text{ft}^2$ .
3. **Coco-milk mass from volume.** A keg holds 12 grd of coco-milk. Using  $\rho_{\text{cmlk}}$ , find the mass in kg and in mangos (mgo).
4. **Flow over a tide.** A still produces 4.2 ibr every tide. Report the average flow in L/s and in US gal/min.

5. **Pace to mph.** A runner holds 2.0 scy for one sunset (sst). Give the distance in meters and the average speed in mph.
6. **Fire to light (energy chain).** The beacon runs at 3.5 trc for 1.5 td. How many firechips (fch), kWh, and BTU is that?
7. **Wood-to-heat estimate.** If dry wood has  $e_{\text{wood}} \approx 16 \text{ MJ/kg}$ , how many kilograms of wood are equivalent to 18 fch? Also report in pounds.
8. **Raft volume.** A rectangular raft is 40 pl long, 60 ba wide, and 12 ba thick. Find its total volume in cubic meters and in liters.
9. **Market basket (mixed units).** A trader brings 18 crb, 12 mgo, and 6 cn. Find the total mass in kg and in stones (stn).

10. **Lagoon in bananas (two ways).** A lagoon is labelled 0.62 imi. Compute its length in bananas (ba) using (i) direct conversion, and (ii) via meters then bananas.

11. **From barrels to pace.** A drip system delivers 0.85 ibr per nap. How many csh per minute is that? Then, if each person drinks 3 csh per sunset, how many people can you serve continuously?

12. **Cart cruise.** A cart moves at 2.5 scy for one tide. How far does it travel in meters and in island miles (imi)?