ALTITUDE DIVING

Quick Notes & Formulas | Stuart Scuba study deck

Pressure basics

P = Force / Area
Absolute Pressure (ATA) = Depth (FSW) / 33 + 1
Example: 132 FSW / 33 + 1 = 5 ATA.

1 ATA = 14.7 psi = 34 ft fresh water (FFW) = 33 ft sea water (FSW).
Fresh water: 14.7 / 34 = 0.432 psi/ft.
Sea water: 14.7 / 33 = 0.445 psi/ft.

Sea Level Equivalent Depth

SLED = actual depth x (P1 / P2)
Use pressure values from the altitude table in ATM or hPa. The deck identifies barometric math with current local pressure as the most accurate method.

Deck example at 4,000 ft:
49 FSW x (1 / 0.864) = 56.7, about **57 ft SLED**.

Worked example at 4,699 ft

0.8353 / 0.9927 = 0.8414
1 - 0.8414 = 0.1586 difference
1 + 0.1586 = 1.1586 depth factor
100 ft x 1.1586 = about **116 ft SLED**.

Math note: Slide 28 prints "0.8414 - 1 = 0.1586." The positive result shown there corresponds to "1 - 0.8414."

Altitude and equilibration

The deck says altitude dives require more decompression than identical sea-level dives and standard sea-level tables cannot be used as written. It gives about 12 hours at altitude for equilibration; full acclimatization takes longer.

Dive-planning sample from the deck

100 ft maximum depth; 24 min total bottom time (including 4 min descent); EAN32; Gradient Factor 50/85; gas density 5.15 g/L.

Deck values: EAN32 = 1.30764 g/L at 1 ATA. 100 FFW (34 ft per ATA freshwater) = 3.9411 ATA.

At 7,000 ft, the sample figure shows 3 min decompression at a 20 ft ceiling.

Ascents and safety stops

Recalculate safety-stop depths to the new SLED.

The deck recommends 3-5 min at or near 15 ft for dives to 20 ft or deeper, unless an emergency or other safety-related reason applies.

Deck guidance: reduce ascent rate by 5 ft/min or more per 4,000 ft elevation; increase safety-stop time by 10% or more per 2,000 ft of elevation gain.

Henry's Law | Kool-Aid Law

At constant temperature, the amount of gas dissolved in a liquid is proportional to that gas partial pressure.

Higher pressure increases gas solubility. Higher temperature decreases it; as a liquid warms, gas escapes.

Class prompt: If we dump the Kool-Aid in the water without stirring, how well does it mix? Will it mix better if we stir it?