



Med Math & Clinical Cheat Sheet

The medication-math calculations and critical-care fundamentals CRNA programs expect you to know cold.

Study aid, not a clinical reference. Use this to review for interviews and coursework. Always follow your institution's protocols and verify every dose against an authoritative source before clinical use.

Conversions to know cold

- 1 kg = 1000 g · 1 g = 1000 mg · 1 mg = 1000 mcg
- 1 kg = 2.2 lb (lb / 2.2 = kg)
- 1 L = 1000 mL · 1 tsp ~ 5 mL
- 1% solution = 10 mg/mL
- 60 min = 1 hr (for mcg/min <-> mcg/hr)

The calculations you must know

Desired over have

$$\text{Volume} = (\text{desired dose} / \text{available concentration}) \times \text{volume per unit}$$

Example: Order 40 mg; vial is 80 mg / 2 mL -> $(40 / 80) \times 2 = 1$ mL.

Weight-based dose

$$\text{Dose} = \text{ordered (mg/kg)} \times \text{weight (kg)}$$

Example: Propofol 2 mg/kg for a 70 kg patient -> $2 \times 70 = 140$ mg.

IV drip rate (gtt/min)

$$\text{gtt/min} = (\text{volume mL} \times \text{drop factor gtt/mL}) / \text{time in minutes}$$

Example: 1000 mL over 8 h with a 15 gtt/mL set -> $(1000 \times 15) / 480 \sim 31$ gtt/min.

Infusion rate from a weight-based dose

$$\text{mL/hr} = (\text{mcg/kg/min} \times \text{weight kg} \times 60) / \text{concentration (mcg/mL)}$$

Example: Norepinephrine 0.1 mcg/kg/min, 80 kg, bag 4 mg/250 mL (= 16 mcg/mL) -> $(0.1 \times 80 \times 60) / 16 = 30$ mL/hr.

Percent concentration

$$\text{A 1\% solution} = 10 \text{ mg/mL (1 g per 100 mL)}$$

Example: Lidocaine 2% = 20 mg/mL; so 5 mL holds 100 mg.

Practice problems

Work each on paper first, then check yourself.

1. Order 25 mg; the vial is 50 mg/mL. How many mL do you draw up?
Answer: $25 / 50 = 0.5$ mL.
2. Succinylcholine 1.5 mg/kg for a 60 kg patient. What dose?
Answer: $1.5 \times 60 = 90$ mg.
3. Infuse 1000 mL over 6 h with a 10 gtt/mL set. Rate in gtt/min?
Answer: $(1000 \times 10) / 360 \sim 28$ gtt/min.
4. Dopamine 5 mcg/kg/min, 90 kg, bag 400 mg/250 mL (1600 mcg/mL). Rate in mL/hr?
Answer: $(5 \times 90 \times 60) / 1600 = 27,000 / 1600 \sim 16.9$ mL/hr.
5. How many mg of lidocaine are in 3 mL of a 2% solution?
Answer: $2\% = 20$ mg/mL $\rightarrow 20 \times 3 = 60$ mg.
6. Convert 0.5 g to mcg.
Answer: $0.5 \text{ g} \times 1000 = 500 \text{ mg} \times 1000 = 500,000$ mcg.

Critical-care quick reference

Hemodynamics

- $CO = HR \times SV$ (normal $\sim 4\text{-}8$ L/min)
- $MAP = DBP + 1/3 (SBP - DBP)$ — target ≥ 65 mmHg
- SV depends on preload, afterload, and contractility

Vasoactive drugs

- Pressors (raise SVR): norepinephrine, phenylephrine, vasopressin
- Inotropes (raise contractility): dobutamine, milrinone, epinephrine
- Dopamine is dose-dependent across receptors

ABG, four steps

- 1) pH — acidemia < 7.35 , alkalemia > 7.45
- 2) $PaCO_2$ (respiratory) — normal 35-45 mmHg
- 3) HCO_3^- (metabolic) — normal 22-26 mEq/L
- 4) Compensation — which system is correcting?

Electrolytes to respect

- K^+ 3.5-5.0 — hyper $\rightarrow$ peaked T waves; hypo $\rightarrow$ arrhythmias
- Na^+ 135-145 — correct slowly to avoid shifts
- Mg^{2+} and Ca^{2+} matter for rhythm and contractility

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For study and interview prep only. Reference ranges and doses are summarized and may differ by source and institution — always confirm against an authoritative clinical reference. Prepared by Boost CRNA · boostcrna.com · Updated June 2026.