Med Dosage Reference Guide

Dimensional analysis, conversions, and try-it questions for medication dosage review.

How to use this page: Review the setup patterns here, then practice beyond these try-it questions. The problems on this reference guide are only a small sample of medication dosage calculations. For full preparation, use the Med Dosage Workbook, Med Dosage QBank, Infinite QBank, and the free Med Dosage resources linked at the end of this guide and at www.bcraftmath.com/meddosage.

REFERENCE

Common Conversions, Formulas, and Dimensional Analysis Setup

Quick reference for the conversion factors, formulas, maintenance-fluid tables, and setup habits that show up most often in medication dosage calculations.

Most Common Conversions

Conversion
Weight
1 kg = 2.2 lb
1 kg = 1000 g
1 g = 1000 mg
1 mg = 1000 mcg
1 lb = 16 oz
Volume
1 L = 1000 mL
1 mL = 1 cc
Household
30 mL = 1 fl oz
5 mL = 1 tsp
3 tsp = 1 tbsp
15 mL = 1 tbsp
8 fl oz = 1 cup
1 oz = 2 tbsp

Conversion
1 pt = 2 cups
1 qt = 2 pt
1 gal = 4 qt
Time
1 day = 24 hr
1 hr = 60 min
1 min = 60 sec

Dimensional Analysis Steps

You do not need to memorize a pile of formulas, but you do need to know your conversions. Also, watch for distractors. Extra numbers are common, and not every number in the problem has to be used.

1. Ask, "What is the goal?" Examples: mL/hr, gtt/min, tablets per dose, capsules per day, or mL.
2. Start with the word or unit on top. If the goal has two words, start with the top word first.
3. Get rid of words you do not want by canceling units. If a unit is on bottom, put the matching unit on top of another fraction so it cancels.
4. Keep going until the only unit or units left are part of the goal.
5. When the goal is met, multiply the top numbers, divide by the bottom numbers, and round the final answer correctly.

Frequency Shortcuts

- q12h means every 12 hours
- q8h means every 8 hours
- q6h means every 6 hours
- bid means twice per day
- tid means three times per day
- qid means four times per day

BSA and Parkland Formulas

Use the formula that matches the units given in the problem. If pounds are used in a Parkland problem, convert pounds to kilograms first.

- BSA in m² = $\sqrt{\frac{\text{weight in kg} \times \text{height in cm}}{3600}}$
- BSA in m² = $\sqrt{\frac{\text{weight in lb} \times \text{height in in}}{3131}}$
- For BSA medication doses, calculate BSA first, round BSA to the nearest hundredth, then use the rounded BSA to find the medication amount.
- Medication dose = ordered dose per m^2 x BSA.

- Parkland formula: 4 mL x weight in kg x %TBSA = total fluid for the first 24 hr. For %TBSA, if it is 30%, use 30 in your calculation (not the decimal form).
- For Parkland, give half of the 24-hour total in the first 8 hours and the other half over the next 16 hours.

Holliday-Segar and 4-2-1 Tables

Use the Holliday-Segar table when the question asks for mL/day. Use the 4-2-1 table when the question asks for mL/hr.

Holliday-Segar Daily Table

Weight	Holliday-Segar Daily Maintenance
0-10 kg	100 mL/kg/day
11-20 kg	1000 mL + 50 mL/kg/day for each kg over 10 kg
Over 20 kg	1500 mL + 20 mL/kg/day for each kg over 20 kg

4-2-1 Hourly Table

Weight	4-2-1 Hourly Rate
0-10 kg	4 mL/kg/hr
11-20 kg	40 mL/hr + 2 mL/kg/hr for each kg over 10 kg
Over 20 kg	60 mL/hr + 1 mL/kg/hr for each kg over 20 kg

Common Abbreviations

This list is not every abbreviation you could ever see, but it covers many of the ones that show up often in med dosage courses.

- IM: intramuscular
- IV: intravenous
- PO: by mouth
- gtt: drops
- mL: milliliter
- L: liter
- g: gram
- mg: milligram
- mcg: microgram
- kg: kilogram
- lb or lbs: pounds
- hr: hour
- min: minute
- sec: second
- cc: cubic centimeter
- oz: ounce
- fl oz: fluid ounce
- tbsp: tablespoon
- tsp: teaspoon
- qt: quart
- pt: pint
- c: cup
- gal: gallon
- stat: immediately

Math and Rounding Rules

Rounding rules can vary from school to school. These are the rules used for this reference and the CraftMath Med Dosage practice resources unless a problem says otherwise.

1. Liquids less than 1 mL: round to the nearest hundredth.
2. Liquids greater than 1 mL: round to the nearest tenth.
3. Tablets are either half or whole. Capsules are whole.
4. Drop rates (gtt/min) and flow rates (mL/hr): round to the nearest whole number.
5. Use a leading zero and no trailing zeros. Write 0.5 mL, not .5 mL, and write 2.5 mL, not 2.50 mL.
6. Round mg to the nearest tenth unless the problem gives different directions.
7. Equivalent rate formats mean the same thing: $125\,\frac{\text{mL}}{\text{hr}}$, 125 mL/hr, and 125 mL per hour.

TOPIC REFERENCE

Med Dosage Topics

Each topic below is formatted like a compact course module: a quick reference, then one or two try-it questions with answers. This is still a reference, not a replacement for repeated practice.

D.1: Conversions

Quick reference and practice for unit conversions used in medication dosage calculations.

QUICK REFERENCE

- Identify the requested unit before setting up the problem.
- Arrange conversion factors so unwanted units cancel.
- Dimensional analysis helps prevent choosing multiplication when division is required.
- Use the conversion factors at the beginning of this reference guide when needed.

1. Convert 0.75 g to milligrams.

Answer: 750 mg

Goal = mg

$$\frac{1000\text{ mg}}{1\,\cancel{g}} \times \frac{0.75\,\cancel{g}}{1} = 750\text{ mg}$$

2. Convert 2.5 tsp to milliliters.

Answer: 12.5 mL

Goal = mL

$$\frac{5\text{ mL}}{1\,\cancel{\text{tsp}}} \times \frac{2.5\,\cancel{\text{tsp}}}{1} = 12.5\text{ mL}$$

3. Convert 1.75 hr to hours and minutes.

Answer: $1 \text{ hr } 45 \text{ min}$

Goal = hr and min

You already have 1 whole hour. For the decimal part, multiply by 60: 0.75 × 60 = 45

So $1.75 \text{ hr} = 1 \text{ hr } 45 \text{ min}$.

RELATED VIDEO LESSON

Conversions with dimensional analysis

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=Vjvbu3qx-p4&t=603s

Starts at 10:03 in Live Session 5. Review pounds-to-kilograms and household liquid conversions.

D.2: Tablets and Capsules

Quick reference and practice for tablets, capsules, labels, and per-dose versus per-day wording.

QUICK REFERENCE

- Goal: tablets or capsules per dose or per day.
- Begin with the available unit, such as 1 tablet over the labeled strength.
- Check whether the question asks per dose or per day, and use the frequency only when needed.
- Capsules are whole. Tablets may be whole or half if they are scored.

1. The order is 500 mg q8h. The medication is available as 250 mg tablets. How many tablets should be given per dose?

Answer: 2 **tablets per dose**

Goal = tabs per dose

q8h is a distractor here because the question asks for tablets per dose, not tablets per day.

$$\frac{1 \text{ tab}}{250 \cancel{\text{mg}}} \times \frac{500 \cancel{\text{mg}}}{1 \text{ dose}} = 2 \frac{\text{tabs}}{\text{dose}}$$

2. The order is 500 mcg tid. The medication is available as 1 mg tablets. How many tablets will the patient receive per day?

Answer: 1.5 **tablets per day**

Goal = tabs per day

Since the question asks for tablets per day, tid is needed. tid means 3 doses per day.

Since the label is in mg and the order is in mcg, use $1 \text{ mg} = 1000 \text{ mcg}$.

$$\frac{1 \text{ tab}}{1 \cancel{\text{mg}}} \times \frac{1 \cancel{\text{mg}}}{1000 \cancel{\text{mcg}}} \times \frac{500 \cancel{\text{mcg}}}{1 \cancel{\text{dose}}} \times \frac{3 \cancel{\text{doses}}}{1 \text{ day}} = 1.5 \frac{\text{tabs}}{\text{day}}$$

RELATED VIDEO LESSON

Tablets: per dose and per day

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=XVq0eJwP6BU&t=154s

Starts at 2:34 in Live Session 1. Work through tablet amounts, mg/mcg conversions, and per-dose versus per-day questions.

D.3: Liquids

Quick reference and practice for oral and injectable liquid medication calculations.

QUICK REFERENCE

- Goal: usually mL, but sometimes tsp or tbsp.
- Treat a label such as 250 mg/5 mL as one conversion factor.
- Check whether the answer is per dose or per day.
- Convert the final volume unit only when the requested unit differs.

1. The order is 125 mg q8h. The medication is available as 250 mg/5 mL. How many mL should be given per dose?

Answer: $2.5\ \text{mL}$ **per dose**

Goal = mL per dose

q8h is a distractor here because the question asks for mL per dose, not mL per day.

$$\frac{5\ \text{mL}}{250\ \cancel{\text{mg}}} \times \frac{125\ \cancel{\text{mg}}}{1\ \text{dose}} = 2.5\ \frac{\text{mL}}{\text{dose}}$$

2. The order is 125 mg q8h. The medication is available as 250 mg/5 mL. How many tsp will the patient receive per day?

Answer: $1.5\ \text{tsp/day}$

Goal = tsp per day

Since the question asks for tsp per day, q8h is needed. q8h means 3 doses per day. Use $5\ \text{mL} = 1\ \text{tsp}$ to convert mL to tsp.

$$\frac{1\ \text{tsp}}{5\ \cancel{\text{mL}}} \times \frac{5\ \cancel{\text{mL}}}{250\ \cancel{\text{mg}}} \times \frac{125\ \cancel{\text{mg}}}{1\ \cancel{\text{dose}}} \times \frac{3\ \cancel{\text{doses}}}{1\ \text{day}} = 1.5\ \frac{\text{tsp}}{\text{day}}$$

RELATED VIDEO LESSON

Liquid medication: teaspoons and milliliters

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=XVq0eJwP6BU&t=1006s

Starts at 16:46 in Live Session 1. Practice liquid amounts per dose and per day. Timing clarification: qid and q6h can give the same daily dose count, but four times daily does not necessarily mean every six hours; follow the prescribed schedule.

D.4: mL/hr

Quick reference and practice for infusion pump rates from total volume, time, weight-based orders, and bag labels.

QUICK REFERENCE

- Goal: mL/hr for an infusion pump.
- For total volume and time, divide mL by hours.
- For dose-based or weight-based orders, continue the dimensional-analysis chain until only mL/hr remains.

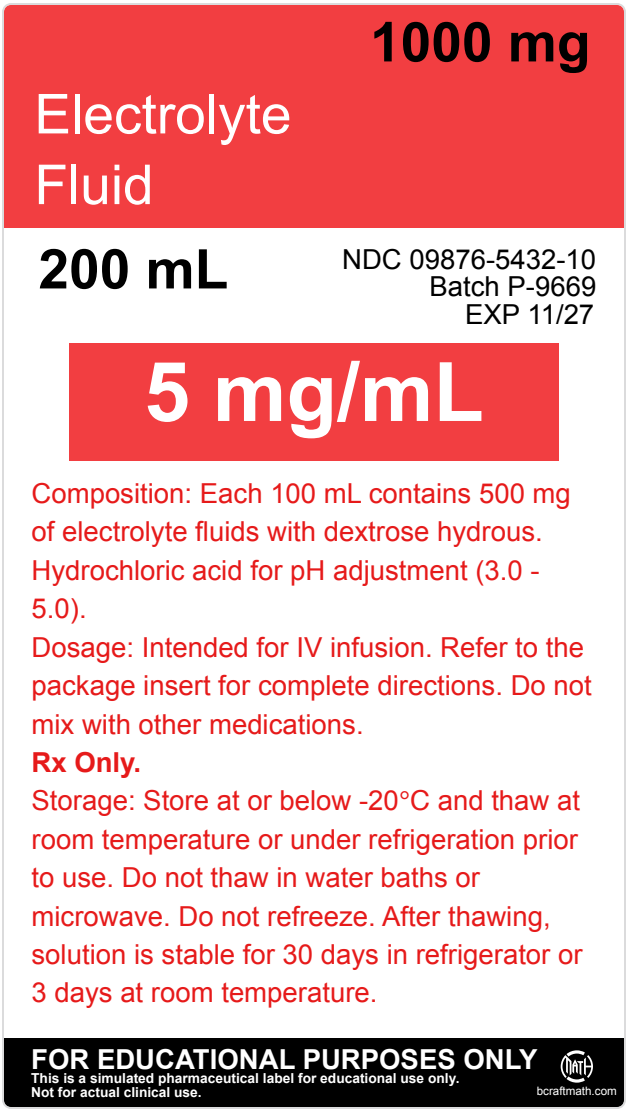
1. Infuse 750 mL over 6 hours. What is the pump rate in mL/hr?

Answer: $125\ \mathrm{mL/hr}$

Goal = mL/hr

$$\frac{750\,\mathrm{mL}}{6\,\mathrm{hr}} = 125\ \frac{\mathrm{mL}}{\mathrm{hr}}$$

2. Electrolyte Fluid is ordered at 0.05 mg/kg/min for a patient who weighs 135 lb. What is the pump rate in mL/hr? Round the final answer to the nearest whole number.



Answer: $37\ \text{mL/hr}$

Goal = mL/hr

Read the label first. It says the bag contains $1000\ \text{mg}$ in $200\ \text{mL}$.

Convert pounds to kilograms in the setup.

$$\frac{200\ \text{mL}}{1000\ \cancel{\text{mg}}} \times \frac{0.05\ \cancel{\text{mg}}}{\text{kg}\cdot\cancel{\text{min}}} \times \frac{1\ \cancel{\text{kg}}}{2.2\ \cancel{\text{lb}}} \times \frac{135\ \cancel{\text{lb}}}{1} \times \frac{60\ \cancel{\text{min}}}{1\ \text{hr}} \approx 37\ \frac{\text{mL}}{\text{hr}}$$

RELATED VIDEO LESSON

IV pump rates: from basic to weight-based

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=J8osOUNzSJQ&t=121s

Starts at 2:01 in Live Session 6. Build from a simple mL/hr calculation to weight-based problems with multiple conversions.

D.5: gtt/min

Quick reference and practice for manual IV drip-rate calculations.

QUICK REFERENCE

- Goal: gtt/min for a manual IV infusion.
- Use the tubing drop factor in gtt/mL.
- Convert hours to minutes and round to the nearest whole drop.

1. Infuse 1000 mL over 8 hours using tubing with a drop factor of 15 gtt/mL. What is the drip rate?

Answer: $31\ \text{gtt/min}$

Goal = gtt/min

$$\frac{15\ \text{gtt}}{1\ \cancel{\text{mL}}} \times \frac{1000\ \cancel{\text{mL}}}{8\ \cancel{\text{hr}}} \times \frac{1\ \cancel{\text{hr}}}{60\ \text{min}} = 31.25\ \frac{\text{gtt}}{\text{min}}$$

Round to the nearest whole drop: $31\ \text{gtt/min}$.

2. A medication is ordered at 2 mg/min. The solution contains 500 mg in 250 mL. The drop factor is 20 gtt/mL. What is the drip rate?

Answer: $20\ \text{gtt/min}$

Goal = gtt/min

$$\frac{20\ \text{gtt}}{1\ \cancel{\text{mL}}} \times \frac{250\ \cancel{\text{mL}}}{500\ \cancel{\text{mg}}} \times \frac{2\ \cancel{\text{mg}}}{1\ \text{min}} = 20\ \frac{\text{gtt}}{\text{min}}$$

RELATED VIDEO LESSON

How to find gtt/min

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=M49j2wG46UA

Compare a formula with dimensional analysis, including liter and time conversions. The dimensional-analysis setup begins at 1:35.

D.6: Heparin

Quick reference and practice for heparin units, boluses, and infusion rates.

QUICK REFERENCE

- Heparin doses are expressed in units.
- Identify whether the question asks for units/hr, mL/hr, or a bolus volume.
- Treat units as the medication-dose unit and cancel it like mg or mcg.

1. Heparin is ordered at 1200 units/hr. The IV bag contains heparin 25,000 units in 500 mL. What is the pump rate?

Answer: $24\ \text{mL/hr}$

Goal = mL/hr

$$\frac{500\ \text{mL}}{25000\ \cancel{\text{units}}} \times \frac{1200\ \cancel{\text{units}}}{1\ \text{hr}} = 24\ \frac{\text{mL}}{\text{hr}}$$

2. A heparin bolus is ordered at 80 units/kg for a 75 kg client. Heparin is available as 5,000 units per mL. How many mL should be given?

Answer: $1.2\ \text{mL}$

Goal = mL

$$\frac{1\ \text{mL}}{5000\ \cancel{\text{units}}} \times \frac{80\ \cancel{\text{units}}}{\cancel{\text{kg}}} \times \frac{75\ \cancel{\text{kg}}}{1} = 1.2\ \text{mL}$$

RELATED VIDEO LESSON

Heparin: mL/hr and units/hr

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=DW9zwsftZ0I

Review weight-based heparin infusion calculations. This lesson covers infusion rates, not the bolus example above.

D.7: Infusion Time

Quick reference and practice for infusion duration and completion-time calculations.

QUICK REFERENCE

- Goal: infusion duration or completion time.
- Use volume ÷ rate to find hours.
- Convert decimal hours to minutes, then add the duration to the start time.
- Check AM/PM, military time, and whether the finish occurs the next day.

1. An IV of 875 mL is running at 100 mL/hr. How long will it take to infuse?

Answer: $8.75\ \text{hr}$, or 8 hr 45 min

Goal = hr

$$\frac{1\ \text{hr}}{100\ \cancel{\text{mL}}} \times \frac{875\ \cancel{\text{mL}}}{1} = 8.75\ \text{hr}$$

If you want hours and minutes, multiply the decimal part by 60: $0.75 \times 60 = 45\ \text{min}$. So $8.75\ \text{hr}$ is 8 hr 45 min.

2. An IV of 650 mL is running at 100 mL/hr. If it starts at 2100, what time will it finish?

Answer: 0330 the next day

Goal = hr, then finish time

$\frac{1\,\text{hr}}{100\,\cancel{\text{mL}}} \times \frac{650\,\cancel{\text{mL}}}{1} = 6.5\,\text{hr}$

Convert 0.5 hr to minutes: $0.5 \times 60 = 30$ min, so the infusion time is 6 hr 30 min.

Add 6 hr 30 min to 2100: $2100 + 0630 = 2730$. Since this passes 2400, subtract 2400: $2730 - 2400 = 0330$. The IV finishes at 0330 the next day.

RELATED VIDEO LESSON

Infusion time and decimal hours

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=UE7fm7QXfTM

Use a weight-based heparin example to find infusion time and convert decimal hours to hours and minutes. This lesson does not cover an overnight finish time.

D.8: Safe Dose Range

Quick reference and practice for checking whether a dose is within the recommended range.

QUICK REFERENCE

- Calculate the minimum and maximum safe amounts.
- Compare per-dose orders with the per-dose range and daily orders with the daily range.
- State safe or unsafe and support the conclusion with the calculated range.

1. The safe dose is 10 to 15 mg/kg/dose. A child weighs 22 kg. The ordered dose is 300 mg. Is the dose safe?

Answer: Yes, the dose is safe.

Goal = mg per dose safe range

Low end: $\frac{10\,\text{mg}}{\cancel{\text{kg}}\cdot\text{dose}} \times \frac{22\,\cancel{\text{kg}}}{1} = 220\,\frac{\text{mg}}{\text{dose}}$

High end: $\frac{15\,\text{mg}}{\cancel{\text{kg}}\cdot\text{dose}} \times \frac{22\,\cancel{\text{kg}}}{1} = 330\,\frac{\text{mg}}{\text{dose}}$

The ordered dose is 300 mg, which is between 220 mg and 330 mg, so it is safe.

2. The safe dose is 8 to 12 mg/kg/day. A child weighs 18 kg. The order is 60 mg q8h. The medication is available as 100 mg per 5 mL. Find the safe range per dose, safe range per day, decide if the dose is safe, and find the mL per dose if safe.

Answer: **Safe range:** $48\text{-}72\ \text{mg/dose}$ **and** $144\text{-}216\ \text{mg/day}$. **Yes, safe. Give** $3\ \text{mL per dose}$.

Goal = safe range per dose, safe range per day, and mL per dose
q8h means 3 doses per day.

Safe range per day:
$\frac{8\ \text{mg}}{\cancel{\text{kg}}\cdot\text{day}} \times \frac{18\ \cancel{\text{kg}}}{1} = 144\ \frac{\text{mg}}{\text{day}}$
$\frac{12\ \text{mg}}{\cancel{\text{kg}}\cdot\text{day}} \times \frac{18\ \cancel{\text{kg}}}{1} = 216\ \frac{\text{mg}}{\text{day}}$

Safe range per dose:
$\frac{144\ \text{mg}}{\cancel{\text{day}}} \times \frac{1\ \cancel{\text{day}}}{3\ \text{doses}} = 48\ \frac{\text{mg}}{\text{dose}}$
$\frac{216\ \text{mg}}{\cancel{\text{day}}} \times \frac{1\ \cancel{\text{day}}}{3\ \text{doses}} = 72\ \frac{\text{mg}}{\text{dose}}$

The ordered dose is $60\ \text{mg per dose}$, which is between $48\ \text{mg}$ and $72\ \text{mg}$.
Ordered daily dose: $60\ \text{mg/dose} \times 3\ \text{doses/day} = 180\ \text{mg/day}$, which is between $144\ \text{mg}$ and $216\ \text{mg}$. The order is safe.

mL per dose:
$\frac{5\ \text{mL}}{100\ \cancel{\text{mg}}} \times \frac{60\ \cancel{\text{mg}}}{1\ \text{dose}} = 3\ \frac{\text{mL}}{\text{dose}}$

RELATED VIDEO LESSON

Finding and checking a safe dose range

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=2pcrtJ_63qM

Find the minimum and maximum dose, compare the order with that range, and calculate the liquid amount.

D.9: Distractors

Quick reference and practice for identifying what information actually matters in a dosage problem.

QUICK REFERENCE

- Identify the requested unit before calculating.
- Ignore values that cannot affect that requested unit.
- If a unit will not cancel, check whether the value is a distractor or whether a conversion is missing.

1. A patient weighs 72 kg. The order is 500 mg q8h. The medication is available as 250 mg/5 mL. How many mL should be given for one dose?

Answer: $10\ \text{mL}$

Goal = mL per dose
The patient weight and q8h schedule are distractors because the question asks for one dose.

$\frac{5\ \text{mL}}{250\ \cancel{\text{mg}}} \times \frac{500\ \cancel{\text{mg}}}{1\ \text{dose}} = 10\ \frac{\text{mL}}{\text{dose}}$

2. A provider orders 1000 mL of IV fluid with 40 mEq of potassium to infuse over 8 hours. The tubing drop factor is 15 gtt/mL. What is the flow rate in mL/hr?

Answer: $125\ \text{mL/hr}$

Goal = mL/hr
The potassium amount and drop factor are distractors because the question asks for mL/hr, not mEq/hr or gtt/min.

$$\frac{1000\ \text{mL}}{8\ \text{hr}} = 125\ \frac{\text{mL}}{\text{hr}}$$

RELATED VIDEO LESSON

Finding the flow rate and ignoring distractors

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=YZxugUbatZ4

See why a loading dose is a distractor when the question asks for the ongoing heparin infusion rate.

D.10: Building the Double Slash

Quick reference and practice for weight-based double-slash dimensional-analysis chains.

QUICK REFERENCE

- Use the double slash setup when the goal has a dose unit, body weight, and time unit, such as mg/kg/hr or mcg/kg/min.
- Start with the top unit in the goal, then use the order or bag concentration, flow rate, weight, and time conversions to build the chain.
- Keep cancelling until only the requested double-slash unit remains.

1. A client weighs 60 kg and is receiving 240 mg in 500 mL at 25 mL/hr. How many mg/kg/hr is the client receiving?

Answer: $0.2\ \text{mg/kg/hr}$

Goal = mg/kg/hr

$$\frac{240\ \text{mg}}{500\ \cancel{\text{mL}}} \times \frac{25\ \cancel{\text{mL}}}{1\ \text{hr}} \times \frac{1}{60\ \text{kg}} = 0.2\ \frac{\text{mg}}{\text{kg}\cdot\text{hr}}$$

2. A client weighs 110 lb and is receiving 300 mg in 250 mL at 10 mL/hr. How many mcg/kg/min is the client receiving?

Answer: $4\ \text{mcg/kg/min}$

Goal = mcg/kg/min

$$\frac{1000\ \text{mcg}}{1\ \cancel{\text{mg}}} \times \frac{300\ \cancel{\text{mg}}}{250\ \cancel{\text{mL}}} \times \frac{10\ \cancel{\text{mL}}}{1\ \cancel{\text{hr}}} \times \frac{1\ \cancel{\text{hr}}}{60\ \text{min}} \times \frac{1}{110\ \cancel{\text{lb}}} \times \frac{2.2\ \cancel{\text{lb}}}{1\ \text{kg}} = 4\ \frac{\text{mcg}}{\text{kg}\cdot\text{min}}$$

RELATED VIDEO LESSON

Building the double slash: mcg/kg/min

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LmKjbXvcwa0

Combine the medication concentration, pump rate, and weight in pounds to find mcg/kg/min.

D.11: BSA

Quick reference and practice for body-surface-area medication calculations.

QUICK REFERENCE

- BSA doses are commonly ordered in mg/m².
- Calculate and round BSA as directed before calculating the medication dose.
- Multiply the ordered amount per m² by the patient's BSA, then use the available concentration if a volume is requested.
- Use the BSA and Parkland formulas provided at the top of this reference guide.

1. A medication is ordered at 50 mg/m². The patient has a BSA of 1.6 m². The medication is available as 100 mg/2 mL. How many mL should be given?

Answer: $1.6\ \text{mL}$

Goal = mL

$$\frac{2\ \text{mL}}{100\ \cancel{\text{mg}}} \times \frac{50\ \cancel{\text{mg}}}{\cancel{\text{m}^2}} \times \frac{1.6\ \cancel{\text{m}^2}}{1} = 1.6\ \text{mL}$$

2. A client weighs 60 kg and is 150 cm tall. The medication is ordered at 25 mg/m². Find the client's BSA and medication amount in mg.

Answer: $1.58\ \text{m}^2$ and $39.5\ \text{mg}$

Goal = BSA, then mg dose

Use the kg/cm formula because weight is in kg and height is in cm.

$$\text{BSA} = \sqrt{\frac{60 \times 150}{3600}} = 1.58\ \text{m}^2$$

Use the rounded BSA to calculate the medication amount.

$$\frac{25\ \text{mg}}{\cancel{\text{m}^2}} \times \frac{1.58\ \cancel{\text{m}^2}}{1} = 39.5\ \text{mg}$$

RELATED VIDEO LESSON

Medication calculations using a given BSA

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=llGlOhrmMjE

Use a supplied BSA to calculate a medication amount. Brandon has changed his method of teachign dimensional analysis since this older lesson was created. This older lesson starts the dimensional-analysis chain with BSA rather than the goal unit; it does not calculate BSA from height and weight.

D.12: Reconstitution

Quick reference and practice for using the final concentration after a medication is mixed.

QUICK REFERENCE

- Read the label for the amount of diluent and the concentration after mixing.
- Calculate the dose using the final concentration, not the dry-powder amount alone.
- After reconstitution, solve it like any other liquid-medication problem.

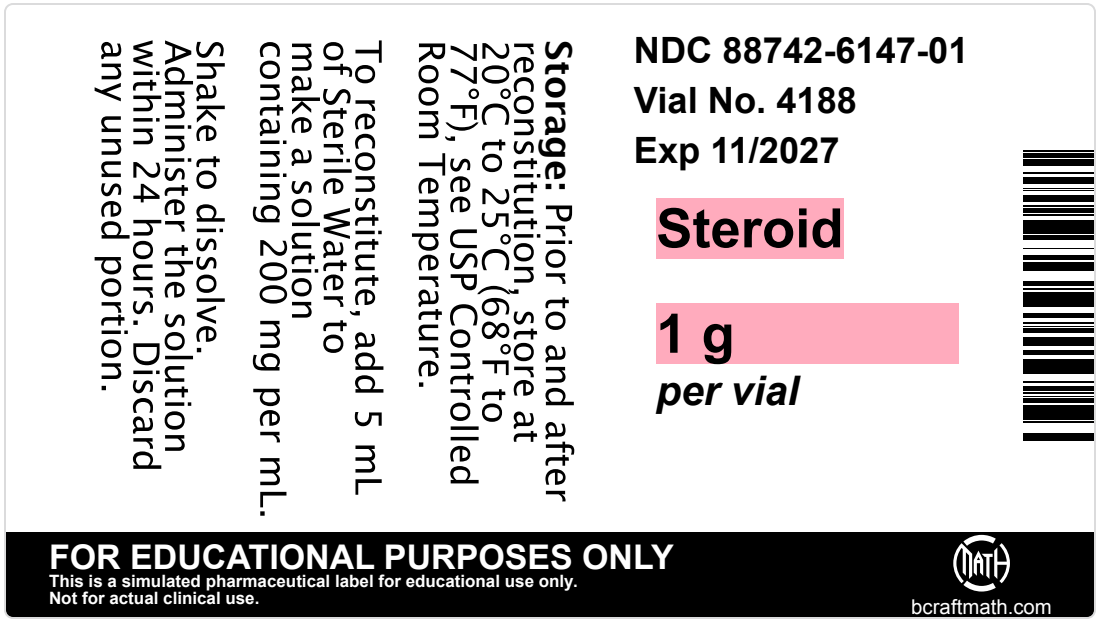
1. After reconstitution, a medication has a concentration of 400 mg/5 mL. The order is 240 mg. How many mL should be given?

Answer: $3\ \text{mL}$

Goal = mL

$$\frac{5\ \text{mL}}{400\ \cancel{\text{mg}}} \times \frac{240\ \cancel{\text{mg}}}{1} = 3\ \text{mL}$$

2. Use the medication label. How much diluent should be added, and how many mL should be given for an order of 600 mg?



Answer: Add $5\ \text{mL}$ sterile water; give $3\ \text{mL}$.

Goal = diluent amount and mL dose

Read the label first. It says to add $5\ \text{mL}$ sterile water. After mixing, the concentration is $200\ \text{mg/mL}$.

$$\frac{1\ \text{mL}}{200\ \text{mg}} \times \frac{600\ \text{mg}}{1} = 3\ \text{mL}$$

RELATED VIDEO LESSON

Reconstitution: concentration and volume

SCAN FOR VIDEO WALKTHROUGH

www.youtube.com/watch?v=aJVaa-d0EuE&t=147s

Starts at 2:27 in Live Session 2. Review two reconstitution setups involving concentration and volume. Use the label instructions to distinguish diluent added from final volume.

D.13: Fluid Intake and Output

Quick reference and practice for intake, output, and fluid balance.

QUICK REFERENCE

- Convert all measurable fluids to mL.
- Total intake and output separately.
- Fluid balance = intake – output.
- Do not count nonfluid distractors.

1. A patient drinks 8 oz of water and 120 mL of juice, then receives 500 mL IV fluid. Output is 650 mL. What is the fluid balance?

Answer: $+210\ \text{mL}$

Goal = mL balance
Convert ounces to mL first:
$\frac{30\ \text{mL}}{1\ \cancel{\text{fl oz}}} \times \frac{8\ \cancel{\text{fl oz}}}{1} = 240\ \text{mL}$
Add all intake:
$240 + 120 + 500 = 860\ \text{mL}$

Subtract output:
$860 - 650 = 210\ \text{mL}$

2. Use the shift record to calculate intake, output, and total (net) I&O. Use intake minus output for total (net) I&O.

8-HOUR SHIFT RECORD

- Water: 6 oz
- Juice: 120 mL
- IV fluid: 75 mL/hr for 8 hr
- Urine: 700 mL
- Emesis: 100 mL
- Oral medication: 2 tablets

Answer: **Intake:** $900\ \text{mL}$. **Output:** $800\ \text{mL}$. **Total (Net) I&O:** $+100\ \text{mL}$.

Goal = intake, output, and total, or net I&O
Do not count the oral medication tablets. They are a distractor.

Water: $\frac{30\ \text{mL}}{1\ \cancel{\text{fl oz}}} \times \frac{6\ \cancel{\text{fl oz}}}{1} = 180\ \text{mL}$
IV fluid: $\frac{75\ \text{mL}}{1\ \cancel{\text{hr}}} \times \frac{8\ \cancel{\text{hr}}}{1} = 600\ \text{mL}$
Intake total: $180 + 120 + 600 = 900\ \text{mL}$
Output total: $700 + 100 = 800\ \text{mL}$
Total (Net) I&O: $900 - 800 = 100\ \text{mL}$

RELATED VIDEO LESSON

Adding oral and IV fluid intake

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=zIoTCQ5FO6c&t=91s

Starts at 1:31. Add oral liquids and IV fluids to find total intake. This lesson covers intake only, not output or net fluid balance.

D.14: Maintenance Fluids

Quick reference and practice for hourly and daily maintenance fluid calculations.

QUICK REFERENCE

- Use the 4-2-1 hourly table when the requested rate is mL/hr.
- Use the Holliday-Segar daily table when the requested amount is mL/day.
- Pick the row that matches the patient's weight. The previous weight ranges are already included in the row formula.

1. Use the 4-2-1 rule to find the hourly maintenance fluid rate for a 26 kg child.

Answer: $66\ \text{mL/hr}$

Goal = mL/hr
A 26 kg child falls in the over 20 kg row of the 4-2-1 hourly table.
That row already includes the first 20 kg, so use: 60 mL/hr plus 1 mL/kg/hr for each kg over 20.
$26 - 20 = 6\ \text{kg over } 20$
$60 + 6 = 66\ \text{mL/hr}$

2. Use the Holliday-Segar daily table to find the daily maintenance fluid need for an 18 kg child.

Answer: $1400\ \text{mL/day}$

Goal = mL/day
An 18 kg child falls in the 11-20 kg row of the Holliday-Segar daily table.
That row already includes the first 10 kg, so use: 1000 mL/day plus 50 mL/kg/day for each kg over 10.
$18 - 10 = 8\ \text{kg over } 10$
$8\ \text{kg} \times 50\ \text{mL/kg/day} = 400\ \text{mL/day}$
$1000 + 400 = 1400\ \text{mL/day}$

PUT IT ALL TO PRACTICE

This reference is only the quick version.

These examples are a small sample of medication dosage calculations. To be fully prepared, practice the same topics repeatedly with different numbers, labels, wording, and distractors.

Med Dosage Workbook

Practice dosage calculations with written solutions and video support using dimensional analysis.

Med Dosage QBank

Practice fixed dosage calculation question sets with instant feedback and detailed solutions.

Infinite QBank

Generate unlimited Med Dosage practice questions by topic, including mL/hr,

Additional Free Med Dosage Resources

Use the main Med Dosage page for free videos,

gtt/min, safe dose, heparin, and more.

playlists, study links, and extra resources.