ORIGINAL CLINICAL STUDY WORKBOOK | LAY-FLAT COIL

Clinical Med-Math & IV Dosage Calculation Lay-Flat Spiral Workbook

Dimensional Analysis, Weight-Based Dosing, IV Drip Rates, Pediatric & Critical Care Titration Drills

Imprint: STILL HUMAN NURSING PRESS
Format: 8.5 x 11 in. 360-Degree Lay-Flat Coil Study & Field Workbook
Digital Companion Portal: https://press.stillhumanacademy.com

Educational & Examination Notice: Independent nursing education and exam preparation workbook. Not medical advice and not a substitute for institutional pharmacy protocols, electronic medication administration records (eMAR), or clinical supervision. Verify all medication orders and rounding rules per your clinical facility policy.

Core Clinical Conversion & IV Drip Formulas

Topic / Rule	Specification / Threshold	Reference
Weight Conversion	1 kg = 2.2 lb (divide lb by 2.2 to get kg)	Standard Clinical
Volume & Mass	1 g = 1,000 mg | 1 mg = 1,000 mcg | 1 L = 1,000 mL	Metric System
Household Equivalents	1 tsp = 5 mL | 1 tbsp = 15 mL | 1 oz = 30 mL	Oral Liquid Dosing
Desired / Have	(Desired Dose / Dose on Hand) x Vehicle Volume = Amount to Administer	Basic Oral/IM
IV Pump Rate (mL/hr)	Total Volume (mL) / Total Time (hr) = mL/hr (round per pump policy)	Infusion Pump
Gravity Drip (gtt/min)	(Total Volume mL x Drop Factor gtt/mL) / Time (min) = gtt/min (whole number)	Manual Tubing

How to Use This Lay-Flat Workbook:

1. Fold the plastic coil 360 degrees flat on your desk, kneeboard, or clinical station.
2. Work each Worked Scenario before reading the step-by-step solution.
3. Complete the Module Drill Questions without peeking at the Answer Key & Distractor Rationales.
4. Log missed topics in the Self-Audit Grid at the end of each module and drill them again 48 hours later.

Module 1: Metric Conversions, Household Equivalents & Dimensional Analysis

Module 1 focuses on mastering essential math concepts critical for accurate medication administration and dosage calculation. The module begins with metric conversions and household equivalents commonly used in clinical settings, ensuring learners can confidently convert units like grams to milligrams or teaspoons to milliliters. Dimensional analysis is emphasized as a systematic approach to solving complex dosage problems using unit cancellation chains, reducing medication errors stemming from decimal misplacement or trailing zeros.

Learning Objectives

- Convert units accurately between metric and household systems.
- Apply dimensional analysis techniques to solve medication dosage problems.
- Avoid decimal/trailing-zero medication errors through proper formatting.
- Apply rounding rules appropriately for adult versus pediatric patients.

High-Yield Reference Matrix

Concept / Rule	Threshold / Value	Practical Application
Metric Conversion	1 gram = 1000 milligrams	Convert grams to milligrams before calculating dosage
Household Equivalent	1 teaspoon = 5 milliliters	Useful for oral liquid medication administration
Decimal Rule	Avoid trailing zeros	Write 0.5 mg instead of 0.50 mg
Rounding Rule Adults	Round to nearest tenth	Used for adult medication dosing
Rounding Rule Pediatrics	Round to nearest hundredth	Used for pediatric medication dosing
Dimensional Analysis	Start with desired unit	Use unit cancellation chains

Worked Scenarios & Field Calculations

Scenario 1: Metric Conversion

Prompt: Convert 2 grams of medication into milligrams.

Your Scratchpad / Calculation Work Area:

Worked Solution: Step 1: Recognize the conversion factor: 1 gram = 1000 milligrams. Step 2: Multiply grams by conversion factor. Solution: 2 grams × 1000 milligrams/gram = 2000 milligrams. Takeaway: Always verify metric conversions using known equivalents.

Module 1 Practice Drill Questions

1. Which household equivalent is correct?

A. 1 teaspoon = 1 milliliter
B. 1 tablespoon = 1 milliliter
C. 1 teaspoon = 5 milliliters
D. 1 tablespoon = 1 liter

2. What is the correct way to write 0.5 milligrams?

A. 0.5 mg
B. 0.5 mg
C. 0.5 mg
D. 0.5 mg

3. Which rounding rule applies to adult medication dosing?

A. Round to nearest tenth
B. Round to nearest hundredth
C. Round to nearest thousandth
D. Round to nearest whole number

4. Which rounding rule applies to pediatric medication dosing?

A. Round to nearest tenth
B. Round to nearest hundredth
C. Round to nearest thousandth
D. Round to nearest whole number

5. How many milligrams are in 0.2 grams?

A. 2 milligrams
B. 2 milligrams
C. 2 milligrams
D. 2 milligrams

6. What is the correct way to write 0 milligrams?

A. 0 mg
B. 0 mg
C. 0 mg
D. 0 mg

Module 3: Gravity IV Drip Rates (gtt/min) & Electronic Infusion Pumps (mL/hr)

Gravity IV drip rates are calculated using macrodrip tubing (typically delivering 10, 15, or 20 drops/mL) and microdrip tubing (delivering exactly 60 drops/mL). The formula used is Total Volume ÷ Time (in minutes) × Drop Factor = Drip Rate (gtt/min). For electronic infusion pumps, the calculation focuses on mL/hr rather than drops/min, simplifying administration accuracy.

Learning Objectives

- Calculate gravity IV drip rates accurately using macrodrip and microdrip tubing.
- Determine electronic infusion pump rates based on prescribed mL/hr.
- Calculate piggyback infusion timing including start and stop times.
- Perform remaining fluid audits during shift changes.

High-Yield Reference Matrix

Concept / Rule	Threshold / Value	Practical Application
Macrodrip Tubing	Drop factor = 10, 15, or 20 gtt/mL	Used for general IV infusions
Microdrip Tubing	Drop factor = 60 gtt/mL	Used for critical care patients
Gravity IV Formula	Total Volume ÷ Time × Drop Factor	Calculate drops/min
Electronic Pump Formula	Total Volume ÷ Time	Calculate mL/hr
Piggyback Timing	Start time + Duration ≤ End time	Ensure timely administration
Fluid Audit	Remaining Volume = Total Volume − Delivered Volume	Track progress during shift changes

Worked Scenarios & Field Calculations

Scenario 1: Macrodrip IV Drip Rate Calculation

Prompt: Order: Administer 1,000 mL NS over 8 hours using tubing calibrated at 15 gtt/mL.

Your Scratchpad / Calculation Work Area:

Worked Solution: Step 1: Convert hours to minutes → 8 × 60 = 480 minutes. Step 2: Apply formula → Total Volume ÷ Time × Drop Factor → 1,000 ÷ 480 × 15 ≈ 31.25 gtt/min. Step 3: Round appropriately → ≈ 31 gtt/min. Takeaway: Macrodrip tubing delivers slower rates suitable for general IV therapy.

Full-Length Timed Mock Examination (20 Questions)

Set a 30-minute timer. Complete all 20 questions before checking the scoring key.

1. A patient weighing 15 kg needs a medication dose of 10 mg/kg/day divided into two doses. How many milligrams should each dose contain?

A. 7 mg
B. 75 mg
C. 15 mg
D. 150 mg

2. Convert 2 liters/hour to milliliters/minute.

A. 33 mL/min
B. 3 mL/min
C. 3 mL/min
D. 3 mL/min

3. An IV solution is running at 12 mL/hr via tubing calibrated at 15 drops/mL. What is the drip rate?

A. 3 drops/min
B. 3 drops/min
C. 3 drops/min
D. 3 drops/min

4. A patient weighing 7 kg requires a medication dose of 2 mg/kg/hr IV infusion. How many mg/hr should be administered?

A. 1 mg/hr
B. 1 mg/hr
C. 1 mg/hr
D. 1 mg/hr

5. Order: Dobutamine infusion at 5 mcg/kg/min. Patient weight = 6 kg. What is the infusion rate?

A. mcg/min
B. mcg/min
C. mcg/min
D. mcg/min

ADDITIONAL WORKSPACE & CLASSROOM NOTES