Pharmacy Math Practice Problems with Solutions

30 PTCB-style calculation problems, each with a step-by-step worked solution.

Source: ptcbquizprep.com. Solutions show every step. Last reviewed July 15, 2026.

1. A pharmacist asks you to repackage 2.5 L of an antacid suspension into unit-of-use bottles. How many milliliters are in 2.5 L?

A. 250 mL
B. 2,500 mL
C. 25,000 mL
D. 0.25 mL

Answer: B. Step 1: Recall the metric conversion 1 L = 1,000 mL. Step 2: Multiply: 2.5 L x 1,000 mL/L = 2,500 mL. Watch for decimal-shift errors: 250 mL comes from multiplying by 100 instead of 1,000, and 25,000 mL comes from multiplying by 10,000.

2. A prescription is written for 10 mL of cephalexin suspension by mouth three times daily. Using household measures, how many teaspoonfuls should the patient take per dose?

A. 1/2 teaspoonful
B. 1 teaspoonful
C. 2 teaspoonfuls
D. 3 teaspoonfuls

Answer: C. Step 1: Recall the household conversion 1 teaspoonful (tsp) = 5 mL. Step 2: Divide the dose volume by 5 mL/tsp: 10 mL / 5 mL per tsp = 2 teaspoonfuls per dose. The 1/2 tsp answer comes from inverting the ratio (5/10), a common setup error.

3. A patient weighs 176 lb. What is the patient's weight in kilograms? (1 kg = 2.2 lb)

A. 80 kg
B. 88 kg
C. 387.2 kg
D. 76 kg

Answer: A. Step 1: To convert pounds to kilograms, divide by 2.2 (because 1 kg = 2.2 lb). Step 2: 176 lb / 2.2 lb per kg = 80 kg. Multiplying instead of dividing gives the impossible 387.2 kg; 88 kg comes from dividing by 2 instead of 2.2.

4. An older prescription calls for aspirin gr v (5 grains). Using the exact apothecary conversion 1 gr = 64.8 mg, how many milligrams is this dose?

A. 300 mg
B. 64.8 mg
C. 12.96 mg
D. 324 mg

Answer: D. Step 1: The apothecary grain has been defined as exactly 64.8 mg since 1958. Step 2: Multiply the number of grains by 64.8 mg/gr: 5 gr x 64.8 mg = 324 mg. Note: 300 mg results from using the rougher 60 mg/gr approximation, and 12.96 mg comes from dividing 64.8 by 5 instead of multiplying.

5. Amoxicillin oral suspension is available as 250 mg/5 mL. How many milliliters must be measured to deliver a 400 mg dose?

A. 8 mL
B. 5 mL
C. 10 mL
D. 12.5 mL

Answer: A. Step 1: Set up a proportion: 250 mg / 5 mL = 400 mg / x mL. Step 2: Cross-multiply: 250x = 400 x 5 = 2,000. Step 3: Solve: x = 2,000 / 250 = 8 mL. A quick check: the concentration is 50 mg/mL, and 400 / 50 = 8 mL.

6. An IV bag contains heparin 25,000 units in 250 mL of D5W. How many units of heparin are contained in 40 mL of this solution?

A. 2,500 units
B. 400 units
C. 4,000 units
D. 6,250 units

Answer: C. Step 1: Find the concentration: 25,000 units / 250 mL = 100 units/mL. Step 2: Multiply by the volume: 100 units/mL x 40 mL = 4,000 units. The 6,250-unit answer comes from inverting the ratio (25,000 / 4), and 400 units is a decimal-shift error.

7. A benzalkonium chloride solution is labeled 1:200 (w/v). How many milligrams of benzalkonium chloride are in 15 mL of this solution?

A. 7.5 mg
B. 75 mg
C. 750 mg
D. 30 mg

Answer: B. Step 1: A 1:200 (w/v) ratio strength means 1 g of drug per 200 mL of solution. Step 2: Convert to mg: 1 g = 1,000 mg, so the concentration is 1,000 mg / 200 mL = 5 mg/mL. Step 3: Multiply by the volume: 5 mg/mL x 15 mL = 75 mg. The 7.5 mg and 750 mg answers are decimal-shift errors.

8. A stock solution contains 1.2 g of active ingredient in 480 mL. How many milliliters of this stock solution will provide a 75 mg dose?

A. 18.75 mL
B. 12 mL
C. 300 mL
D. 30 mL

Answer: D. Step 1: Convert grams to milligrams: 1.2 g = 1,200 mg. Step 2: Find the concentration: 1,200 mg / 480 mL = 2.5 mg/mL. Step 3: Divide the dose by the concentration: 75 mg / 2.5 mg per mL = 30 mL. Forgetting the g-to-mg conversion or inverting the concentration produces the wrong answers.

9. How many grams of dextrose are contained in a 500 mL bag of D5W (5% dextrose in water)?

A. 5 g
B. 25 g
C. 50 g
D. 2.5 g

Answer: B. Step 1: A 5% w/v solution contains 5 g of dextrose per 100 mL. Step 2: Set up a proportion: 5 g / 100 mL = x g / 500 mL. Step 3: Solve: x = 5 x (500 / 100) = 25 g. The 50 g answer doubles the correct value (a common slip when scaling 100 mL to 500 mL), and 5 g forgets to scale at all.

10. How many grams of sodium chloride are required to compound 1 L of normal saline, 0.9% (w/v) sodium chloride solution?

A. 0.9 g
B. 4.5 g
C. 9 g
D. 90 g

Answer: C. Step 1: 0.9% w/v means 0.9 g of NaCl per 100 mL. Step 2: Convert 1 L to 1,000 mL. Step 3: Scale up: 0.9 g x (1,000 / 100) = 9 g. Answers of 0.9 g and 90 g are decimal-shift errors; 4.5 g would be correct only for 500 mL.

11. A 45 g tube contains hydrocortisone 2.5% (w/w) cream. How many grams of hydrocortisone are in the tube?

A. 1.125 g
B. 11.25 g
C. 0.1125 g
D. 2.5 g

Answer: A. Step 1: A 2.5% w/w preparation contains 2.5 g of drug per 100 g of product. Step 2: Multiply by the total weight: (2.5 / 100) x 45 g = 0.025 x 45 = 1.125 g. The 11.25 g and 0.1125 g answers are decimal-shift errors, and 2.5 g mistakes the percent value itself for the drug content.

12. How many milliliters of isopropyl alcohol are needed to compound 480 mL of a 70% (v/v) isopropyl alcohol solution?

A. 144 mL
B. 33.6 mL
C. 686 mL
D. 336 mL

Answer: D. Step 1: A 70% v/v solution contains 70 mL of alcohol per 100 mL of final solution. Step 2: Multiply: 0.70 x 480 mL = 336 mL of isopropyl alcohol. Note: 144 mL is the volume of the diluent (the other 30%), not the alcohol; 686 mL comes from dividing 480 by 0.70 instead of multiplying.

13. How many milliliters of a 10% stock solution are required to prepare 250 mL of a 2% solution?

A. 25 mL
B. 50 mL
C. 125 mL
D. 5 mL

Answer: B. Step 1: Use the dilution equation C1V1 = C2V2. Step 2: Plug in: 10% x V1 = 2% x 250 mL. Step 3: Solve: V1 = (2 x 250) / 10 = 500 / 10 = 50 mL of stock, then q.s. with diluent to 250 mL. Inverting the concentrations (10 x 250 / 2) would give 1,250 mL, and 25 mL comes from halving instead of solving the equation.

14. A compounding order calls for 120 g of a 5% ointment. The pharmacy stocks a 10% ointment and a 2% ointment. Using alligation, how many grams of the 10% ointment are required?

A. 75 g
B. 60 g
C. 45 g
D. 36 g

Answer: C. Step 1: Set up the alligation grid with 10% (high), 2% (low), and 5% (desired). Step 2: Parts of 10% = 5 - 2 = 3 parts; parts of 2% = 10 - 5 = 5 parts; total = 8 parts. Step 3: Grams of 10% ointment = 120 g x (3/8) = 45 g. Choosing 75 g mixes up the parts (that is the amount of the 2% ointment).

15. A technician dilutes 50 mL of 50% dextrose injection to a final volume of 250 mL with sterile water for injection. What is the percentage strength of the final solution?

A. 10%
B. 25%
C. 5%
D. 20%

Answer: A. Step 1: Use C1V1 = C2V2. Step 2: Plug in: 50% x 50 mL = C2 x 250 mL. Step 3: Solve: C2 = 2,500 / 250 = 10%. A quick check: the volume increased 5-fold (50 mL to 250 mL), so the strength drops 5-fold (50% to 10%). The 25% answer comes from halving instead of using the 5-fold dilution factor.

16. How many milliliters of sterile water must be ADDED to 120 mL of a 25% solution to reduce it to a 10% solution?

A. 300 mL
B. 120 mL
C. 48 mL
D. 180 mL

Answer: D. Step 1: Find the final volume with C1V1 = C2V2: 25% x 120 mL = 10% x V2, so V2 = 3,000 / 10 = 300 mL. Step 2: The question asks for the water ADDED, so subtract the starting volume: 300 mL - 120 mL = 180 mL. Answering 300 mL is the classic trap of reporting the final volume instead of the added diluent.

17. A prescription reads: metoprolol 50 mg, take 1 tablet by mouth twice daily, quantity dispensed #60. What is the days' supply?

A. 15 days
B. 30 days
C. 60 days
D. 45 days

Answer: B. Step 1: Calculate the daily usage: 1 tablet x 2 doses per day = 2 tablets/day. Step 2: Divide the quantity dispensed by the daily usage: 60 tablets / 2 tablets per day = 30 days. Answering 60 days ignores the twice-daily dosing; 15 days doubles the daily use by mistake.

18. A pharmacy dispenses 150 mL of an antibiotic suspension with the directions: give 5 mL by mouth three times daily. What is the days' supply?

A. 5 days
B. 15 days
C. 10 days
D. 30 days

Answer: C. Step 1: Calculate the daily volume: 5 mL x 3 doses per day = 15 mL/day. Step 2: Divide the total volume by the daily volume: 150 mL / 15 mL per day = 10 days. Answering 30 days uses only one 5 mL dose per day; 5 days doubles the daily volume by mistake.

19. A patient injects insulin glargine U-100, 35 units subcutaneously twice daily, using a 10 mL vial. How many full days will one vial last?

A. 14 days
B. 28 days
C. 15 days
D. 10 days

Answer: A. Step 1: U-100 insulin contains 100 units/mL, so a 10 mL vial holds 100 x 10 = 1,000 units. Step 2: Calculate daily use: 35 units x 2 = 70 units/day. Step 3: Divide: 1,000 / 70 = 14.28..., which is 14 full days (round DOWN for days' supply; the partial 15th day cannot be completed from the vial). Answering 28 days forgets that the dose is given twice daily.

20. A child weighing 44 lb is prescribed a medication at 15 mg/kg/day divided into two equal doses. How many milligrams are in each dose?

A. 300 mg
B. 330 mg
C. 75 mg
D. 150 mg

Answer: D. Step 1: Convert weight to kg: 44 lb / 2.2 = 20 kg. Step 2: Calculate the total daily dose: 15 mg/kg x 20 kg = 300 mg/day. Step 3: Divide into two doses: 300 / 2 = 150 mg per dose. Answering 300 mg gives the whole day's dose, and 330 mg comes from skipping the lb-to-kg conversion (44 x 15 / 2).

21. Cefdinir is prescribed at 7 mg/kg per dose every 12 hours. What is the amount of each dose for a child weighing 66 lb?

A. 105 mg
B. 210 mg
C. 462 mg
D. 420 mg

Answer: B. Step 1: Convert weight to kg: 66 lb / 2.2 = 30 kg. Step 2: Multiply by the per-dose rate: 7 mg/kg x 30 kg = 210 mg per dose. Answering 462 mg comes from using pounds instead of kilograms (66 x 7), and 420 mg is the total daily amount (both doses), not a single dose.

22. An order calls for a single vancomycin dose of 20 mg/kg IV for a patient weighing 187 lb. The reconstituted vancomycin solution contains 50 mg/mL. How many milliliters of the solution are needed for this dose?

A. 17 mL
B. 3.4 mL
C. 34 mL
D. 37.4 mL

Answer: C. Step 1: Convert weight to kg: 187 lb / 2.2 = 85 kg. Step 2: Calculate the dose: 20 mg/kg x 85 kg = 1,700 mg. Step 3: Divide by the concentration: 1,700 mg / 50 mg per mL = 34 mL. Answering 37.4 mL comes from using pounds instead of kilograms; 3.4 mL and 17 mL are decimal and halving errors.

23. An IV infusion of 1,000 mL of normal saline is ordered to run over 8 hours. What is the flow rate in mL/hr?

A. 125 mL/hr
B. 100 mL/hr
C. 133 mL/hr
D. 80 mL/hr

Answer: A. Step 1: Flow rate (mL/hr) = total volume / total time in hours. Step 2: 1,000 mL / 8 hr = 125 mL/hr. Answering 80 mL/hr comes from inverting the setup (8 into 1,000 misread as 1,000 into 8 with a decimal shift), and 100 mL/hr comes from dividing by 10 instead of 8.

24. One liter of D5W is to infuse over 12 hours using an IV administration set calibrated at 15 gtt/mL. What is the flow rate, rounded to the nearest whole drop per minute?

A. 1,250 gtt/min
B. 6 gtt/min
C. 42 gtt/min
D. 21 gtt/min

Answer: D. Step 1: Use the formula gtt/min = (volume in mL x drop factor) / time in MINUTES. Step 2: Convert: 1 L = 1,000 mL and 12 hr x 60 = 720 minutes. Step 3: Calculate: (1,000 x 15) / 720 = 15,000 / 720 = 20.83, which rounds to 21 gtt/min. Answering 1,250 gtt/min comes from dividing by 12 hours instead of 720 minutes; 42 gtt/min comes from using 360 minutes (6 hours) by mistake.

25. An IV is infusing at 30 gtt/min through an administration set calibrated at 10 gtt/mL. What is the infusion rate in mL/hr?

A. 18 mL/hr
B. 180 mL/hr
C. 300 mL/hr
D. 20 mL/hr

Answer: B. Step 1: Convert drops per minute to mL per minute by dividing by the drop factor: 30 gtt/min / 10 gtt/mL = 3 mL/min. Step 2: Convert to hours: 3 mL/min x 60 min/hr = 180 mL/hr. Answering 300 mL/hr comes from multiplying by the drop factor instead of dividing; 18 mL/hr is a decimal-shift error; 20 mL/hr comes from inverting the drop-factor division.

26. Potassium chloride oral solution contains 20 mEq per 15 mL. How many milliliters are needed to provide a 40 mEq dose?

A. 15 mL
B. 7.5 mL
C. 30 mL
D. 60 mL

Answer: C. Step 1: Set up a proportion: 20 mEq / 15 mL = 40 mEq / x mL. Step 2: Cross-multiply: 20x = 40 x 15 = 600. Step 3: Solve: x = 600 / 20 = 30 mL. A quick check: the dose is exactly double the labeled 20 mEq, so double the volume (15 mL x 2 = 30 mL). Answering 7.5 mL comes from inverting the proportion.

27. Approximately how many milliequivalents of sodium chloride (molecular weight = 58.5; valence = 1) are contained in 1 L of 0.9% sodium chloride injection?

A. 154 mEq
B. 15.4 mEq
C. 9 mEq
D. 585 mEq

Answer: A. Step 1: Find the mass of NaCl: 0.9% w/v = 0.9 g/100 mL, so 1 L (1,000 mL) contains 9 g = 9,000 mg. Step 2: Use mEq = (mg x valence) / molecular weight = (9,000 x 1) / 58.5. Step 3: Calculate: 9,000 / 58.5 = 153.8, or approximately 154 mEq. Answering 15.4 mEq is a decimal-shift error; 9 mEq confuses grams with milliequivalents.

28. A pharmacy purchases an OTC blood glucose meter for $48.00 and applies a 25% markup on cost. What is the selling price?

A. $52.00
B. $64.00
C. $12.00
D. $60.00

Answer: D. Step 1: Calculate the markup amount: $48.00 x 0.25 = $12.00. Step 2: Add the markup to the cost: $48.00 + $12.00 = $60.00. Answering $12.00 gives only the markup, not the selling price; $52.00 comes from misreading 25% as a flat $4 or using a decimal-shift markup.

29. A wholesaler invoice totals $250.00 and carries a 2% prompt-payment discount if paid within 15 days. How much does the pharmacy pay if it settles the invoice within the discount window?

A. $240.00
B. $245.00
C. $247.50
D. $255.00

Answer: B. Step 1: Calculate the discount: $250.00 x 0.02 = $5.00. Step 2: Subtract the discount from the invoice total: $250.00 - $5.00 = $245.00. Answering $247.50 uses a 1% discount, $240.00 uses 4%, and $255.00 adds the discount instead of subtracting it.

30. A prescription retails for $65.00 and the drug's acquisition cost to the pharmacy is $39.00. What is the gross profit margin expressed as a percentage of the selling price?

A. 26%
B. 66.7%
C. 40%
D. 60%

Answer: C. Step 1: Calculate the gross profit: selling price - cost = $65.00 - $39.00 = $26.00. Step 2: Divide the gross profit by the SELLING PRICE: $26.00 / $65.00 = 0.40. Step 3: Convert to a percentage: 0.40 x 100 = 40%. Answering 66.7% computes markup on cost ($26 / $39) instead of margin on selling price; 60% is the cost-to-price ratio; 26% mistakes the dollar profit for a percentage.