Dosage Calculations
Cheat Sheet

Hey friend,

Are you struggling with dose calc as much as I did?

I remember coming home from school and crying my eyes out because I just didn't get it.

Math was always a struggle for me.

And can I tell you a secret?

I still don't know how to do division by hand. I missed that class in 5th grade, and I've never learned it since.

Honestly, it's been a fear of mine for a long, long time. And I've always thought I was bad at math.

So when they told us we needed to pass that dose calc exam with a 90% or better?

Well...I just about threw up.

Cue the crying.

So after months of learning and practicing how to do dosage calculation problems, I can finally say that no, I'm not bad at math. I'm actually really good at math. (insert Mean Girls reference here...;))

And I'm going to show you how to be good at math too.

Here's what we'll walk through in this cheat sheet:

1. The simple 6-step process for getting dose calc problems right
2. Practice problems
3. Must know dosage calculation conversions

And if you want more practice with dosage calculations, be sure to check out this playlist on YouTube.

All my best,
Christina

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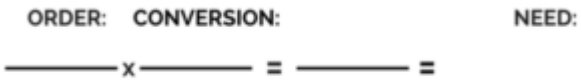
THE SIMPLE 6-STEP PROCESS FOR GETTING DOSE CALC PROBLEMS RIGHT:

Let's walk through the simple 6-step process first to get you familiar with it. Don't worry, I'll go through some practice problems on the next few pages to get you more comfortable with it!



Step 1: What do I need?

- What unit of measurement do you need?

Write this on the right of your paper.

Step 2: What is the order?

- What does the order or prescription say?

Write this on the left of the paper.

Step 3: What conversion do I need to use?

- Does the question give any conversion?
- What conversion does the medication give?
- Are there any other conversions needed?

Write these in the middle of the paper.

Step 4: Solve the problem

Multiply across the top. Multiply across the bottom. And divide those two numbers.

Be sure to follow the proper rounding rules!

Step 5: Write the answer appropriately

Include leading zeros, but never training zeros.

Step 6: Check your answer

Repeat steps 1-5 to double check your math.

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PRACTICE PROBLEM #1:

Your patient, Mary, has been hospitalized for 4 days for bacterial pneumonia. She is prescribed 250mg of levofloxacin to be taken orally once per day for the next 14 days until her next appointment. You are getting her medications ready so she can go home but you only have 500mg tablets in your med cart. Mary is going to be discharged this afternoon. How many milligrams total will Mary need to go home with?

Step 1: What do I need?

- What is the question asking you for?

Do you need mL, mg, g, number of tablets or gtts/min? Often times you'll see a question that looks easy on the surface, but is actually asking you something different than you originally thought.

At first glance, this question looks like you need to figure out how many tablets Mary will be receiving. But it is actually asking you how many milligrams Mary will need to go home with. You need to read the entire questions before you decide what the question is really asking.

Write what you need at the very right hand side of your paper.

NEED:

mg (total)

Step 2: What is the order?

- What does the order or prescription say?

In the example, the only information we need is her prescribed dose (250mg), how often she takes it (once per day), and how long she will be taking it (14 days).

We do not need to pay attention to the other details, such as how long she's been in the hospital and how many milligrams the tablets are in the med cart.

Write what your order is at the very left hand side of your paper.

ORDER:

$\frac{250mg}{1\ day}$

NEED:

mg (total)

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Step 3: What conversions do I need to use?

- Figure out what conversions you need.

What medication, unit, or product does the question make available to you? Are you needing to convert grams to milligrams? Minutes to hours? Or milliliters to drops?

Pick out the information that pertains to the answer you need, and cross out unnecessary details. If the test is on paper, I like to physically cross out information I do not need to keep me from getting distracted.

In this case, we are keeping the dosage unit in milligrams, but we need to figure out how many milligrams she needs for 14 days.

Write all of the conversions you need to do in the middle of the paper.

Step 4: Solve the problem.

- Multiply across the top line. Multiply across the bottom line. And divide both of those numbers.

This is a super awesome fraction trick that does the conversions for you, and one of the top reasons why I love the dimensional analysis method so much.

Step 5: Write the answer appropriately.

A handy dandy mnemonic to remember this is: Nurses are LEADERS, not FOLLOWERS.

This means that you include leading zeros, but never trailing zeros.

Let's say your calculator said something like .5. We wouldn't write this answer as just .5 because imagine how easy it would be for that decimal point to get lost and the dose to turn into 5.

And we definitely wouldn't write it as .50 for the same reason. 50! Oh my!

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So, friend, no trailing zeros! You need to watch them at all times, so keep them in front! 🙂

The only correct way to write it is 0.5. Even if the decimal gets lost, it will look like 05, causing others to double check where the decimal is.

For our above example, the answer is 3500mg. We would not write it as 3500.00mg, 3,500mg, or 03500mg. Simply write it as 3500mg.

Step 6: Check your answer.

- Always check your work.

Checking my work has saved by booty more than once on exams and in the real world.

Seriously, friend, save yourself the stress and anxiety that comes with questioning yourself or hurting your patient just because you didn't take the extra few seconds to check your calculations.

Take a step back, breathe, and do the problem again. The patient's apple juice can wait. Safe nursing practice is always your number one priority.

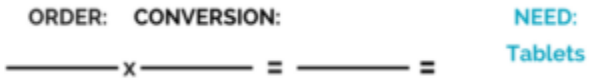
Dosage calculations can be intense, and you should always be very careful when doing the math. Thankfully, these steps will help take some of the pressure off.

PRACTICE PROBLEM #2:

The doctor ordered 50mg of Metoprolol twice a day for hypertension. You only have 25mg tablets in the med cart. How many tablets will you give your patient?

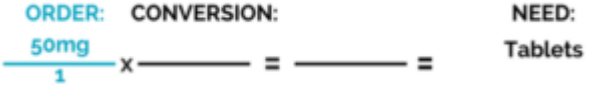
Step 1: What do I need?

The question is asking for the number of tablets you will give the patient. This goes in the right hand side of your paper.



Step 2: What is the order?

For this question, the order is 50mg twice a day. This goes in the very left hand side of your paper.



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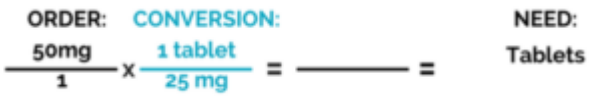
Step 3: What conversions do I need to use?

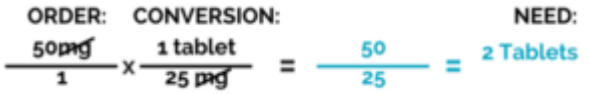
The question says that you have 25mg in each tablet available. This conversion goes in the middle of the paper.



Step 4: Solve the problem.

This is where dimensional analysis starts to really come in handy!

All you need to do is make sure your units are on opposite sides of the "railroad" or fraction, multiply the entire top row, multiply the entire bottom row, and divide those two numbers. Instant magic!



Step 5: Write the answer appropriately.

Since our example problem doesn't have a decimal, we don't need to add or subtract any zeros or use rounding rules. Easy peasy!

If you have a dosage calculation problem that does require rules regarding zeros, remember: Nurse are LEADERS, not FOLLOWERS. This means that you include a leading zero, but never a trailing zero.

Step 6: Check your answer.

Always, always, always double check your work. Many-a-time has my booty been epically saved by this step right here. Please do not skip it!

And there you have it! The simplest way to ace your dose calc problems every time, whether in real life or on an exam.

PRACTICE PROBLEM #3:

Margret, your patient in room 110, has not been drinking enough water to satisfy Dr. Feelbetter. He orders 1000mL of normal saline fluid to run over 8 hours. Your tubing is 15gtts/mL. How many drops per minute will the patient receive?

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Step 1: What do I need?

You need to figure out what the question is asking you for first in order to make sure you use the right order and conversion factors.

This question says you need to calculate the drops per minute. This should go on the very right hand side of your paper.

$$\text{NEED: } \frac{\text{gtts (drops)}}{\text{1 min}}$$

Step 2: What is the order?

The doctor ordered 1000mL to run over 8 hours. We know this is the order we are calculating because it is the only one listed.

Sometimes, exam questions may contain multiple orders and expect you to pick out the right one.

This is why you should always start with what the question is asking from you first (step 1).

Write your order on the left hand side of your paper.

$$\text{ORDER: } \frac{\text{1000 mL}}{\text{8 hrs}} \qquad \text{NEED: } \frac{\text{gtts (drops)}}{\text{1 min}}$$

Step 3: What conversions do I need to use?

There are usually at least 2 conversions you need for basic drip rates: the IV tubing size and time.

This scenario gives you an IV tubing size of 15gtts/mL.

The second conversion you need to use is 1 hr/60 min.

Write your conversion factors in the middle of your paper.

$$\text{ORDER: } \frac{\text{1000 mL}}{\text{8 hrs}} \times \text{CONVERSIONS: } \frac{\text{1 hr}}{\text{60 min}} \times \frac{\text{15 gtts}}{\text{1mL}} \qquad \text{NEED: } \frac{\text{gtts}}{\text{min}}$$

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Step 4: Solve the problem.

To double check to make sure your conversions are correct, you can put a line through the units that cancel each other out (one on the top row, and one on the bottom row). Which leaves you with gtts/min.

Once you have your conversions set up in your equation, all you need to do is multiply all of the numbers across the top row, multiply all of the numbers across the bottom row, and divide those two numbers.

Step 5: Round appropriately.

I'm about to throw a rounding rule at you…are you ready??

Drip rates are ALWAYS rounded to whole numbers!

This makes sense if you think about it: you would look a little silly trying to count a quarter of a drop coming out of the drip chamber.

That would take you forever to set correctly! So no, none of that nonsense, thankfully!

You simply use basic rounding rules: If it's less than 5, round DOWN; If it's 5 or greater, round UP.

In this case, your decimal is .25, which is less than .5, so you would round down to the nearest whole number: 31.

Therefore, your drip rate should be 31 drops per minute.

Step 6: Check your answer.

Use these same 5 steps to solve the problem again.

You are a nursing ROCK STAR and I know the last thing you want to do is make a medication error.

So re-checking your work will help to prevent that.

And there you have it, my friend! The easiest way to get your drip rates right every time!

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PRACTICE PROBLEM #4:

Your elderly patient, Andrew, in room 404 has been prescribed 100mL of Lactated Ringers to help increase his electrolytes. The doctor prescribed the solution to run over 30 minutes. You have IV tubing that says it's a drop factor of 10gtts/mL. How many milliliters per hour will Andrew receive?

Step 1: What do I need?

At first glance, you might think you need to calculate the drops per minute for your patient. But the question is actually asking for milliliters (mL) per hour.

It's good to read the entire question before jumping to conclusions on what the question is actually asking. Some of your exam questions may be misleading, so read carefully!

You'll want to write mL per hour on the very right hand side of your paper, so you know that's what you need to end up with in the end.

$$\text{NEED: } \frac{\text{mL}}{\text{hr}}$$

Step 2: What is the order?

This question tells you that the doctor ordered 100mL of Lactated Ringers to run over 30 minutes. You'll want to write this on the left hand side of your paper.

$$\text{ORDER: } \frac{100\ \text{mL}}{30\ \text{min}} \qquad \text{NEED: } \frac{\text{mL}}{\text{hr}}$$

Step 3: What conversions do I need to use?

The question gives you a conversion factor related to the IV tubing (10gtts/mL). Your second conversion factor is time: 60 min/1 hr.

Feel free to write both of these in the middle of your paper if you're unsure if they're necessary or not. The dimensional analysis method makes it really easy to see which conversions to use or not.

$$\text{ORDER: } \frac{100\ \cancel{\text{mL}}}{30\ \cancel{\text{min}}} \times \text{CONVERSIONS: } \frac{60\ \cancel{\text{min}}}{1\ \text{hr}} \times \frac{10\ \text{gtts}}{\cancel{\text{mL}}} \qquad \text{NEED: } \frac{\text{mL}}{\text{hr}}$$

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Now that your equation is set up, you can see that you can't use the 10gtts/mL drip factor because you need mL to be on the top of the equation. This conversion would cancel it out, leaving you with drops (gtts) per hour, which is not what the question is asking for.

But when you use just the time conversion, you end up crossing minutes out and are left with mL on the top and hours on the bottom, which is exactly what Step 1 says you need! See, piece of cake! (I'll take chocolate, please!)

Step 4: Solve the problem.

To solve the problem, you simply multiply across the top row, multiply across the bottom row, and divide these two numbers.

Step 5: Round appropriately.

Remembering your rounding rules from this post, you know that you (almost) always round IV rates to whole numbers. And since your answer is already a whole number, no rounding is needed.

One major BUT: If your IV pump allows for you to input the mL/hr to the tenth decimal place, and you have a calculation that contains a tenth decimal (our example does not), then you should input it for a more accurate measurement.

This is especially important when calculating pediatric or high risk medication dosages. And of course, always follow your clinical sites policy.

Step 6: Check your answer.

Even though you're obviously a dose calc pro, mistakes can still happen. So make sure to check your work by following steps 1-5 a second time, just to be safe.

If you follow these steps exactly how they are laid out, you are going to be flying through your dosage calculation test.

Get ready to leave that exam with a little extra pep in your step, my friend!

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MUST KNOW DOSAGE CALCULATION CONVERSIONS:

- 1 mg = 1000 mcg
- 1gm (g) = 1000 mg
- 1 L = 1000 mL
- 1 mL = 1 cc
- 5 mL = 1 Tsp
- 3 Tsp = 1 Tbsp
- 1 Tsp = 5 mL
- 15 mL = 1 Tbsp
- 30 mL = 1 oz
- 1 oz = 2 Tbsp
- 8 oz = 1 cup
- 1 kg = 1000 gm (g)
- 1 kg = 2.2 lbs