



Dosage Calculations I – Introduction to Drug Calculations

DOSAGE CALCULATIONS

Doctors can prescribe medications in amounts that are not convenient to administer. A tablet or liquid may contain a certain amount of active ingredient, and the prescription might be a multiple or a fraction of that amount.

In these cases, the formula for the conversion is the same:

$$\frac{D}{H} \times Q = \text{Dosage}$$

D is the dosage prescribed, H is the dosage on hand, and Q is the quantity in one dose. D and H should be figures from the question that are expressed in the same unit, and Q should be in the same unit as the answer that you want.

Example 1: A doctor prescribes 50 mg of a medication available in liquid form. The bottle says 20 mg/10 mL. How much liquid makes up one dose?

Solution: The dosage prescribed is 50 mg, so that's D. Of the two numbers on the bottle, the one with the same unit is 20 mg, so that's H. That leaves 10 mL for Q, which makes sense because we want to know how much liquid there is in one dose, and liquid is measured in mL.

$$\frac{D}{H} \times Q = 1 \text{ dose}$$

$$\frac{50 \text{ mg}}{20 \text{ mg}} \times 10 \text{ mL} = 1 \text{ dose}$$

$$2.5 \times 10 \text{ mL} = 25 \text{ mL}$$

Sometimes the result of the fraction D/H is a nice whole number, and sometimes it's a decimal fraction. Usually the answers to these problems work out to whole numbers or fractions like $2\frac{1}{2}$. There are a couple of strategies you can use to make this calculation easier and avoid decimals.

You can multiply D × Q first instead of dividing $D \div H$. In order of operations, multiplication and division have equal priority, so it doesn't matter which one you do first. In Example 1, we could multiply $50 \times 10 = 500$, and then $500 \div 20 = 25 \text{ mL}$, and no decimal fractions are involved.

You can cancel some of H first by finding common factors with either D or Q or both. Making the divisor H smaller will make the problem easier. In Example 1, we could cancel the 10 in Q with 10 from H, leaving us with $\frac{50}{2}$, which gives 25 mL.



Example 2: A doctor prescribes 40 mg of a medication available in liquid form. The bottle says 0.1 g/10 mL. How much liquid makes up one dose?

Solution: In this case, the two units of weight do not match. We must convert the weight units to the same unit before calculating the volume needed for one dose. The bottle says 0.1 g/10 mL. To convert to mg per mL, use the conversion factor of 1000 mg/g.

$$\frac{0.1 \text{ g}}{10 \text{ mL}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = \frac{100 \text{ mg}}{10 \text{ mL}}$$

We could have also chosen to convert the prescribed amount in mg to g. Choose whichever conversion is easier for you. Now we can continue to calculate the volume needed for one dose:

$$\frac{D}{H} \times Q = \frac{40 \text{ mg}}{100 \text{ mg}} \times 10 \text{ mL} = 4 \text{ mL}$$

NOTES

While the doctor's prescription might include information like "b.i.d." to tell you how often to administer doses, this information is *not* used in calculating the amount of the dose. (Knowing that you'll have to give the patient so much medicine twice in a day doesn't tell you how much to give each time.)

When the question refers to "tablets", the value for Q is generally "1 tablet".

EXERCISES

A. Calculate the correct dosages (fluids).

- 1) 35 mg of codeine. 70 mg/1 ml for SC Injection is available. How many ml do you administer?
- 2) 60 mg of amoxicillin trihydrate orally. 150 mg/10 ml is available. How many ml do you administer?
- 3) 25 mg of furosemide intravenously. 10 mg/1 ml of liquid for IV Injection is available. How many ml will you administer?
- 4) A doctor orders 50 milligrams of theophylline IV for a patient. 250 milligrams in 10 millilitres of liquid for IV is available. How many millilitres will you administer?
- 5) 125 mcg of digoxin is ordered IVP nightly. The vial contains 0.5 mg in 4 ml. How many ml should you give?
- 6) 3 mg hydromorphone IM is ordered for your patient. The only available dosage strength is 4 mg/cc. How many cc's should you administer?
- 7) A cortisol solution of 100mg/2ml IM is available. Your patient needs 50 mg IM. What amount will you give?
- 8) Four milligrams of haloperidol IM are ordered for your patient. Haloperidol is available in 2 ml ampoules that contain 5 mg/ml. What amount will you give?



B. Calculate the correct dosages (tablets).

- 1) A patient is ordered 30 mg of sertraline. The available dosage is 60mg tablets. What amount will you give?
- 2) 90 mg of propranolol is ordered. The available dosage strength is a scored 40 mg tablet. What amount will you give?
- 3) 2.5 g of sulfasalazine has been ordered b.i.d. The tablets on hand are 500 mg each. What amount will you give?
- 4) 1.5 mg progesterone is ordered daily for a client. The available tablet strength is 600 mcg. What amount will you give?
- 5) 400 mg atorvastatin is ordered; available tablets are 1.6 g. How many tablets will you give?

Help us to make this worksheet better!

If there are other types of questions you'd like more practice with, let us know! Tell us in the Learning Centre, or email us at lifesciencetutor@vcc.ca. Include an example of the kinds of problems you'd like to see.

SOLUTIONS

- A: (1) 0.5 ml (2) 4 ml (3) 2.5 ml (4) 2 ml (5) 1 ml (6) 0.75cc (7) 1 ml
(8) 0.8 ml
- B: (1) $\frac{1}{2}$ tablet (2) $2\frac{1}{4}$ tablets (3) 5 tablets (4) $2\frac{1}{2}$ tablets (5) $\frac{1}{4}$ tablet

