

## RULE OF THREE

December 2023

The rule of three, also known as the rule of proportionality, is an indispensable mathematical tool in pharmacy. It is essential for the dosing of prescribed medications as well as for compounding preparations, and proves useful in various other types of pharmaceutical calculations. This method, simple and efficient, is a key element of daily calculations in pharmacy.



Let's consider an example of an oral suspension that contains 125 mg of active ingredient per 5 mL of liquid. If a doctor prescribes 200 mg of this medication to a patient, how do you **determine the necessary amount** of the suspension?

### Identify the known ratio:

You know that in 5 mL of susp., there are 125 mg of the medication.

### Determine what you need to find:

Your goal is to calculate the amount of suspension needed to provide 200 mg of the medication.

### Apply the rule of three:

Known ratio: 125 mg is equal to 5 mL

What you need to find: How many mL correspond to 200 mg?

### Proceed with the calculation:

1

**Write down the two ratios:**

125 mg = 5 mL

200 mg = x mL (where x is the value you are looking for).

The two ratios should always use identical units.

2

**Multiply** crosswise:

Multiply the desired dose (200 mg) by the known volume (5 mL).

3

**Divide** by the remaining value:

Divide the result obtained by the initial quantity of medication (125 mg).

Thus, to obtain 200 mg, you will need **8 mL** of the suspension.

1

125 mg = 5 mL

200 mg = x mL



2

200 mg x 5 mL

125 mg



3

x = 8 mL

The mg cancel out in the calculation, leaving only mL, as we are dividing and multiplying by the same unit.



Imagine you need to make 180 mL of an oral amlodipine solution at 1 mg/mL using 5 mg amlodipine tablets and Oral Mix\* solution. The preparation method suggests using 20 tablets to make 100 mL of solution.

**How many tablets do you need for this?**

**Identify the known ratio:**

You already know that you need 20 tablets, each containing 5 mg, to make 100 mL of the solution.

**Determine what you need to find:**


Your goal is to figure out how many tablets are required to prepare 180 mL of the solution, with a concentration of 1 mg/mL.

**Apply the rule of three:**

Known ratio: 20 tablets for 100 mL

What you need to find: How many tablets are needed for 180 mL?

- 1 Write down the two ratios:**  
20 tablets = 100 mL  
 $x$  tablets = 180 mL ( $x$  = the number of tablets you're looking for).
- 2 Multiply crosswise:**  
Multiply the desired volume (180 mL) by the known tablet count (20 tablets).
- 3 Divide by the remaining value:**  
Divide the result obtained by the initial volume of the solution (100 mL).


$$\begin{array}{l} \text{1} \quad 20 \text{ tab.} = 100 \text{ mL} \\ \quad \quad x \text{ tab.} = 180 \text{ mL} \\ \quad \quad \quad \downarrow \\ \text{2} \quad \frac{180 \text{ mL} \times 20 \text{ tab.}}{100 \text{ mL}} \\ \quad \quad \quad \downarrow \\ \text{3} \quad x = 36 \text{ tab.} \end{array}$$

The mL cancel out in the calculation, leaving only the tablets., as we are dividing and multiplying by the same unit.

So, to prepare 180 mL of the solution at 1 mg/mL, you will need **36 amlodipine tablets**.

Understanding the rule of three is a practical skill in pharmacy, essential for performing accurate calculations necessary for the preparation of medications. This method, both simple and versatile, is crucial for ensuring precise dosages and correct preparations in pharmacy.

Medication: VALGANCICLOVIR 50 mg/mL      Prescribed Dose: 200 mg  
**How many mL of VALGANCICLOVIR are needed to administer a 200 mg dose?**

**A**

Medication: DALACIN C\* 75 mg/5 mL  
**How many milligrams is an administration of 12 mL of DALACIN C\* 75 mg/5 mL equivalent to?**

**B**

Medication: AMOXICILLIN 250 mg/5 mL  
Prescribed Dose: 200 mg  
**How much AMOXICILLIN in mL is needed to obtain a dose of 200 mg?**

**C**

**Practical Application!**



Compounded Preparation: PREDNISONONE 5 mg/mL from 5 mg tablets

Amount to Prepare: 200 mL

Knowing that 25 tablets of PREDNISONONE 5 mg are needed to prepare 25 mL of a 5 mg/mL suspension, **how many 5 mg PREDNISONONE tablets do you need to use to prepare 200 mL?**

D

Compounded Preparation: METRONIDAZOLE 50 mg/mL from powder

Amount to Prepare: 175 mL

Knowing that 5 g of metronidazole powder are needed to prepare 100 mL of a 50 mg/mL suspension, **how many grams of powder are needed to prepare 175 mL?**

E

METRONIDAZOLE 10mg/mL from 250 mg tablets

Compounded Preparation, Amount to Prepare: 150 mL

Knowing that 8 tablets are needed to prepare 200 mL of a 10 mg/mL suspension, **how many 250 mg METRONIDAZOLE tablets do you need to use to prepare 150 mL?**

F

If we know that one kilogram is approximately equal to 2.2 pounds, **how much does a child weigh in kg if their weight is 52.8 pounds?**

G



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## Solutions

Known ratio: "50 mg is equivalent to 1 mL."

To find: "How many mL correspond to 200 mg?"

Note the two ratios:

50 mg = 1 mL

200 mg = x mL

Multiply crosswise and divide by the remaining value.

Answer: 4 mL

A

Known ratio: "75 mg is equivalent to 5 mL."

To find: "How many mg are equivalent to 12 mL?"

Note the two ratios:

75 mg = 5 mL

x mg = 12 mL

Multiply crosswise and divide by the remaining value.

Answer: 180 mg

B

Known ratio: "250 mg is equivalent to 5 mL."

To find: "How many mL correspond to 200 mg?"

Note the two ratios:

250 mg = 5 mL

200 mg = x mL

Multiply crosswise and divide by the remaining value.

Answer: 4 mL

C

Known ratio: "25 tablets are equivalent to 25 mL."

To find: "How many tablets are needed for 200 mL?"

Note the two ratios:

25 tablets = 25 mL

x tablets = 200 mL

Multiply crosswise and divide by the remaining value.

Answer: 200 tablets

D

Known ratio: "5 g of powder is equivalent to 100 mL."

To find: "How many grams of powder are needed for 175 mL?"

Note the two ratios:

5 g = 100 mL

x g = 175 mL

Multiply crosswise and divide by the remaining value.

Answer: 8.75 g

E

Known ratio: "8 tablets are equivalent to 200 mL."

To find: "How many tablets are needed for 150 mL?"

Note the two ratios:

8 tablets = 200 mL

x tablets = 150 mL

Multiply crosswise and divide by the remaining value.

Answer: 6 tablets

F

Known ratio: "2.2 pounds is equivalent to 1 kg."

To find: "How many kilograms are equivalent to 52.8 pounds?"

Note the two ratios:

2.2 pounds = 1 kg

52.8 pounds = x kg

Multiply crosswise and divide by the remaining value.

Answer: Approximately 24 kg

G

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