

Lab math: how many units to draw

You don't need chemistry for this. You need two numbers from your vial, one from your syringe, and one small sum. Six steps, and the last one catches mistakes.

● The four words you'll see

mg milligrams

How much peptide is in the vial. It's printed on the label, e.g. "5 mg".

mL milliliters

How much water you add to the vial. 1 mL of water fills a 1 mL insulin syringe to the 100 mark.

mcg micrograms, also written μg

The amount you draw each time. 1 mg = 1,000 mcg, so 250 mcg is a quarter of a milligram.

units the marks on an insulin syringe

On a U-100 syringe, 100 units = 1 mL, so 1 unit = 0.01 mL, on the 0.3, 0.5 and 1 mL sizes alike.

● Six steps, with a worked example

Step	Example	Your vial
1. The vial says	5 mg	_____ mg
2. Water you added	2 mL	_____ mL
3. What one unit holds vial mg $\times$ 10 $\div$ water mL	$5 \times 10 \div 2 = \mathbf{25\ mcg}$	____ $\times$ 10 $\div$ ____ = _____ mcg
4. The amount you want	250 mcg	_____ mcg
5. Units to draw amount you want $\div$ what one unit holds	$250 \div 25 = \mathbf{10\ units}$	____ $\div$ ____ = _____ units
6. Check it backwards units $\times$ what one unit holds = the amount you want	$10 \times 25 = 250\ mcg\ \checkmark$	____ $\times$ ____ = _____ mcg

Why " $\times 10$ "? Vial mg $\div$ water mL is the concentration in mg per mL. A milligram is 1,000 mcg and a milliliter is 100 units, and $1,000 \div 100 = 10$. So mg/mL $\times 10$ = mcg per unit.

Too few or too many units?

Under 2 units is hard to measure: next time add more water, so the same amount is more units.
Over 100 units won't fit a 1 mL syringe: add less water, or draw twice.

Prefer to type it?

The same six steps, done for you, on your phone:
peptidesmadesimplebooks.com/calculator

One more word: IU (international units), printed on a few products, is a different measure and not the same as syringe units.

Quick reference

Two lookups and you're done. Find your vial and your water in the first table: that is what one unit holds. Find that number in the second table and read across to the amount you want.

1. What one unit holds

Your vial says	1 mL of water	2 mL of water	3 mL of water	5 mL of water
2 mg	20 mcg per unit 2 mg/mL	10 mcg per unit 1 mg/mL	6.67 mcg per unit 0.67 mg/mL	4 mcg per unit 0.4 mg/mL
5 mg	50 mcg per unit 5 mg/mL	25 mcg per unit 2.5 mg/mL	16.67 mcg per unit 1.67 mg/mL	10 mcg per unit 1 mg/mL
10 mg	100 mcg per unit 10 mg/mL	50 mcg per unit 5 mg/mL	33.33 mcg per unit 3.33 mg/mL	20 mcg per unit 2 mg/mL
15 mg	150 mcg per unit 15 mg/mL	75 mcg per unit 7.5 mg/mL	50 mcg per unit 5 mg/mL	30 mcg per unit 3 mg/mL
20 mg	200 mcg per unit 20 mg/mL	100 mcg per unit 10 mg/mL	66.67 mcg per unit 6.67 mg/mL	40 mcg per unit 4 mg/mL
30 mg	300 mcg per unit 30 mg/mL	150 mcg per unit 15 mg/mL	100 mcg per unit 10 mg/mL	60 mcg per unit 6 mg/mL
50 mg	500 mcg per unit 50 mg/mL	250 mcg per unit 25 mg/mL	166.67 mcg per unit 16.67 mg/mL	100 mcg per unit 10 mg/mL

2. Units to draw

One unit holds	You want 50 mcg	You want 100 mcg	You want 250 mcg	You want 500 mcg	You want 1,000 mcg
5 mcg e.g. 1 mg in 2 mL	10 units 0.1 mL	20 units 0.2 mL	50 units 0.5 mL	100 units 1 mL	over 100 units more than one 1 mL syringe
10 mcg 2 mg in 2 mL, 5 mg in 5 mL	5 units 0.05 mL	10 units 0.1 mL	25 units 0.25 mL	50 units 0.5 mL	100 units 1 mL
20 mcg 2 mg in 1 mL, 10 mg in 5 mL	2.5 units 0.03 mL	5 units 0.05 mL	12.5 units 0.12 mL	25 units 0.25 mL	50 units 0.5 mL
25 mcg 5 mg in 2 mL	2 units 0.02 mL	4 units 0.04 mL	10 units 0.1 mL	20 units 0.2 mL	40 units 0.4 mL
50 mcg 5 mg in 1 mL, 10 mg in 2 mL	1 unit 0.01 mL	2 units 0.02 mL	5 units 0.05 mL	10 units 0.1 mL	20 units 0.2 mL
100 mcg 10 mg in 1 mL, 20 mg in 2 mL	0.5 units 0.01 mL	1 unit 0.01 mL	2.5 units 0.03 mL	5 units 0.05 mL	10 units 0.1 mL

Not in the table? Units = amount you want (mcg) ÷ what one unit holds (mcg). The amounts across the top are examples for the arithmetic, not recommendations. Over 100 units means more than a full 1 mL syringe: add less water when you mix, or draw twice.

One line per vial. Fill in the first four columns, then work across the same way as the six steps.