

Recently in the news, there have been many stories of hospital patients being given an overdose of a drug. This occurs when an arithmetic error in calculating the number of tablets or the amount of a solution to give the patient occurs. This is usually a result of incorrectly converting measurements.

Below is a table of measurements that are commonly used in medicine:

| MEASUREMENT | ABBREVIATION | CONVERSION |
|-------------|--------------|----------------|
| Microgram | mcg | 1mcg = 0.001mg |
| Milligram | mg | 1mg = 1,000mcg |
| Gram | g | 1g = 1,000mg |
| Kilogram | kg | 1kg = 1,000g |
| Millilitre | ml | 1ml = 0.001L |
| Litre | L | 1L = 1,000ml |

TASK A

Convert the following measurements into milligrams

- | | | | |
|---------|----------|-----------|-----------|
| 1) 1g | 2) 0.25g | 3) 50mcg | 4) 0.001g |
| 5) 3mcg | 6) 18g | 7) 750mcg | 8) 2kg |

In a hospital a doctor prescribes an amount of a drug to a patient and the nurse gives the patient the drug in the form of tablets. The problem is that there is not one tablet for every possible dosage, so the nurse must calculate how many he/she needs to give the patient.

EXAMPLE: A doctor prescribes a dose of 0.1g of a drug. The tablets in stock have a strength of 50mg per tablet. How many tablets should the patient be given?

$$\text{Dose to be given} \div \text{tablet stock strength} = \text{no. of tablets required}$$

$$0.1 \times 1,000 = 100\text{mg (converting from grams to mg)}$$

$$100\text{mg} \div 50\text{mg} = 2 \text{ tablets}$$

NOTE: you may find it easier to convert to the smallest unit each time. In this case we converted grams to milligrams, as milligrams are the smaller unit.

TASK B

Calculate how many tablets the patient should be given in each scenario

| | DOSE TO BE GIVEN | TABLET STOCK STRENGTH | NUMBER OF TABLETS NEEDED |
|----|------------------|-----------------------|--------------------------|
| 1) | 4,000mg | 4g | |
| 2) | 200mcg | 0.1mg | |
| 3) | 0.2g | 50mg | |
| 4) | 75mcg | 0.025mg | |
| 5) | 0.01g | 5mg | |
| 6) | 4,500mg | 1.5g | |

The drug a doctor prescribes can also be given to the patient in the form of a solution. This means that the nurse needs to calculate the volume of the solution he/she needs to give to a patient.

EXAMPLE: A doctor prescribes a dose of 2,000mg of a drug. The drug solution contains 1g per 15ml. How much of the solution should the patient be given in ml?

$$\begin{aligned} & \text{Dose to be given} \times \frac{\text{Solution strength}}{\text{Solution volume}} \\ = & \frac{\text{Dose to be given}}{\text{Solution strength}} \times \text{Solution Volume} = \text{Volume of solution patient needs} \end{aligned}$$

$$1 \text{ } 1000 = 1,000\text{mg (conversion from grams to mg)}$$

$$\frac{2,000\text{mg}}{1,000\text{mg}} \times 15\text{ml} = 2 \times 15\text{ml} = 30\text{ml}$$

MEDICAL ARITHMETIC



TASK C

For each scenario, calculate the volume of solution that the patient needs to be given in millilitres.

| | DOSE TO BE GIVEN | SOLUTION STRENGTH | SOLUTION VOLUME | VOLUME OF SOLUTION THE PATIENT NEEDS |
|----|------------------|-------------------|-----------------|--------------------------------------|
| 1) | 100mg | 50mg | 1ml | |
| 2) | 300mg | 0.2g | 6ml | |
| 3) | 1,000mg | 1.25g | 10ml | |
| 4) | 4g | 160mg | 3ml | |
| 5) | 750mcg | 0.5mg | 6ml | |
| 6) | 150g | 1,000mg | 2ml | |