# Dosage Calculation Competency Review 

For Medical Assistants


Competency Statement: Demonstrates ability to use basic mathematic concepts related to the correct administration of medications.

Instructional Strategies: Review of basic math concepts, completion of calculation practice test, self-review of basic pharmacology concepts.

## PERFORMANCE CRITERIA

Demonstrates ability to successfully pass a Dosage Calculation test, identifying accurate calculations involving:
$\checkmark$ Decimals and fractions.
$\checkmark$ Addition, subtraction, multiplication, and division.
$\checkmark$ Percent of a number.
$\checkmark$ Systems of measurement, equivalents, and conversions.
$\checkmark$ Solving for $X$ (determining amount of medication to be administered when the desired dose differs from the medication on hand).

## *Important:

$>$ The Dosage Calculation Test is proctored during the scheduled Competency Assessment Day.
$>$ The test is online in NetLearning.
$>$ The test is 10 questions.
$\Rightarrow$ Associates must obtain a passing score of $90 \%$.
$>$ Associates are permitted 30 minutes to complete the test.
$>$ All necessary supplies to complete the test are provided, including a conversion/formula calculation guide.
$>$ If the associate is unsuccessful in his/her attempt to complete the test online in NetLearning the day of their scheduled competency assessment - he/she will be expected to coordinate with Staff Development to schedule a date within two weeks to complete a second attempt. Please refer to the Dosage Calculation Policy in Compliance 360.


## DECIMALS \& FRACTIONS

(ten thousands) (thousands) (hundreds) (tens) (ones) • (tenths) (hundredths) (thousandths)

$$
\uparrow_{\text {decimal point }}^{\uparrow}
$$

- Whole numbers are to the left of the decimal.
$>$ Fractions are to the right of the decimal.
$>$ Fractions with the highest number, representing tenths has the higher value.
> When the tenths are identical, the higher number representing hundredths indicates the larger fraction.


## FRACTIONS

$1 \rightarrow$ numerator
$2 \rightarrow$ denominator

When the numerators are the same, the fraction with the lowest denominator has the higher value.

Example: $\frac{1}{100}$ is greater than $\frac{1}{150}$

When the denominators are the same, the fraction with the higher numerator has the higher value.

Example: $\frac{3}{5}$ is greater than $\frac{2}{5}$


## ADDITION, SUBTRACTION, MULTIPLICATION, DIVISION

## ADDITION \& SUBTRACTION

> When adding decimals, place all decimal points in a straight line for ease and accuracy.

Example: 5.42

$$
\begin{array}{r}
2.7 \\
+\quad .032 \\
\hline 8.152
\end{array}
$$

> Always add or subtract from right to left.

## MULTIPLICATION \& DIVISION

> When multiplying decimals, the decimal point in the product is placed the same number of places to the left as the total of numbers to the right of the decimal points in the numbers multiplied.

Example: . 53

$$
\frac{\times .48}{.2544}
$$

$>$ If there are insufficient numbers to allow for the placement of the decimal, add enough zeros to the left to correct this.

Example: 0.12

$$
\frac{x 0.2}{24} \rightarrow \text { answer }=.024
$$



To find a percent (\%) of a given number:
First change the percent to a decimal or fraction (whichever is most convenient) and multiply.

For example, find $25 \%$ of 60
First, change percent to decimal or fraction:

$$
25 \%=0.25 \text { or } 25 / 100=\frac{1}{4}
$$

Then, multiply

$$
\begin{aligned}
& 0.25 \times 60=15 \\
& \text { or } \frac{1}{4} \times 60=15 .
\end{aligned}
$$

Solve the following:
Example 1: $75 \%$ of $80=60$

Example 2: $15 \%$ of $60=9$

Example 3: 7\% of $124=8.68$

Apply this mathematical principle to solve the following case scenario:
Decrease the patient's Lantus dose by $20 \%$ as ordered per physician.
The current Lantus dose is 30 units. To calculate the new Lantus dose:
Step 1: $20 \%$ of $30=6$
Step 2: Decrease the dose by 6 units (30-6=24)

## SOLVE FOR WHAT PERCENT ONE NUMBER IS OF ANOTHER

$>$ To find what percent one number is of another, the second number is divided into the first and the decimal result is then changed into a percent.

For example, 14 is what percent of 70 ?
$14 / 70=0.2$
$0.2=20 \%$
Answer: 14 is $20 \%$ of 70

Solve the following:
Example 1: 40 is what \% of $80=50 \%$

Example 2: 60 is what $\%$ of $40=150 \%$

Example 3: 5 is what \% of $200=2.5 \%$

Apply this mathematical principle to solve the following case scenario:
Your patient's blood pressure drops from 130/84 to 96/62.
A systolic drop of 34 points $(130-96=34)$.
What percent did the blood pressure drop?
Step 1: 34 is what percent of 130 ?

$$
34 / 130=0.2615
$$

Step 2: Convert to percentage

$$
0.2615=26 \%
$$

Answer: 34 is $26 \%$ of 130 .
The patient's systolic blood pressure dropped by $26 \%$.

MEASUREMENTS, EQUIVALENTS, CONVERSIONS


$$
\begin{aligned}
& 1 \mathrm{oz}=30 \mathrm{ml} \\
& 1 \mathrm{tsp}=5 \mathrm{ml} \\
& 1 \mathrm{tbs}=15 \mathrm{ml} \\
& 1000 \mathrm{ml}=1 \text { liter } \\
& 1000 \mathrm{mg}=1 \mathrm{gram} \\
& 1000 \mathrm{mcg}=1 \mathrm{mg} \\
& 1 \mathrm{~kg}=2.2 \mathrm{lbs}
\end{aligned}
$$

## SOLVING FOR X (DOSAGE CALCULATION)

> There are three basic rules for all dosage calculations:

1. Routinely double check all math
2. Assess each answer to determine if it is logical

3. Seek out help if you have any question about accuracy
> Using ratio and proportion
4. Always write known quantities on the left.
5. Always use same sequence ( $\mathrm{mg}: \mathrm{ml}:: \mathrm{mg}: \mathrm{ml}$ )
6. Write incomplete or unknown quantities on the right. This is also dosage ordered.

For example: Give 700 mg of a drug with a dosage strength of 500 mg per 2 ml .
$500 \mathrm{mg}: 2 \mathrm{ml}:: 700 \mathrm{mg}: \times \mathrm{ml}$
Multiply the means (inside) and the extremes (outside)

$$
\begin{aligned}
& 500 x=2 \times 700 \\
& X=\frac{2 \times 700}{500} \\
& X=\frac{1400}{500} x=2.8 \mathrm{ml}
\end{aligned}
$$

$>$ If the drug weights are of different units of measurement, you must convert first.

For example: Give 750 mg of medication. Drug is available as $1 \mathrm{gm} / 10 \mathrm{ml}$. Convert gm to mg
1000:10::750:X
1000X = 7500
$X=7500$
$1000 \rightarrow X=7.5 \mathrm{ml}$

## USING THE FORMULA METHOD



$$
\frac{D}{H} \times Q=X
$$

$D=$ desired, dose ordered (mg, g, etc)
$H$ = have on hand, dosage strength available ( $\mathrm{mg}, \mathrm{g}$, etc)
$Q=$ quantity, volume dosage strength is available in ( $\mathrm{ml}, \mathrm{l}, \mathrm{etc}$ )
$X=$ unknown, volume of desired dose ( $\mathrm{ml}, \mathrm{I}$, etc)

For example: 80 mg dosage is ordered, dosage strength available is $100 \mathrm{mg} / 2 \mathrm{ml}$ 80

$$
\begin{aligned}
& \frac{100}{0.8} \times 2=x \\
& \times 2=1.6 \mathrm{ml}
\end{aligned}
$$

As before, if the drug weights are of different units of measurement, you must convert first.

For example: 500 mg dosage is ordered, dosage strength available is $1 \mathrm{gram} / 5 \mathrm{ml}$ Convert 1 gram $=1000 \mathrm{mg}$

$$
\begin{aligned}
& \frac{500}{1000} \times 5=x \\
& 0.5 \times 5=2.5 \mathrm{ml}
\end{aligned}
$$



## DOSAGE CALCULATION PRACTICE QUESTIONS

1. Ordered: $15 \mathrm{mg} / \mathrm{Kg} / 24 \mathrm{hrs}$ of a medication in divided doses every 8 hrs . The patient weighs 130 lb . How many mg of the medication would be administered per dose?
a. 325 mg
b. 295 mg
c. 275 mg
d. 130 mg
2. Ordered: 500 mg I.M. of a medication $q 12 \mathrm{hr}$. Available: $0.5 \mathrm{grams} / 2 \mathrm{ml}$. How many ml would be administered per dose?
a. 500 ml
b. 2 ml
c. 1 ml
d. 0.5 ml
3. Ordered: 0.5 grams of a medication. Available: 500 mg tablets. How many tablets should be administered?
a. 1 tablet
b. 2 tablets
c. 0.5 tablets
d. 2.5 tablets
4. Convert 3 oz to mls . $\qquad$
5. Calculate the following percentage: 180 is $\qquad$ $\%$ of $210 ?$
a. $14 \%$
b. $42 \%$
c. $64 \%$
d. $86 \%$

Answers

1. $b$
2. $b$
3. $a$
4. 90
5. d
