Success Center
Directed Learning Activity (DLA)

Pharmacology
Calculations

M601.1
Description: The point of the Pharmacology Examination is to determine if you are capable of computing the proper amount of medication to be given to a patient, given the ordered dosage. In order to do this effectively, you need to understand unit conversions. The problem is that the units ordered by the doctor are not always the units that the medication comes in. For example, the doctor may order 500 mg of a medication that comes in tablets containing 200 mg of the medication. As you can see, it is extremely important for you to develop the skills and confidence to carry out this important calculation.

Prior Knowledge: In order to complete this activity, you need to know the following formula:

\[
\text{Amount to be Given} = \frac{DD}{DH} \times V = \frac{\text{Desired Dose}}{\text{Dose at Hand}} \times \text{Vehicle}.
\]

\[DD = \text{Desired Dose} = \text{What the doctor ordered (for example: mg, gm, cc, units, etc.)}\]

\[DH = \text{Dose at Hand} = \text{What you have available (for example: mg, gm, cc, units, etc.)}\]

\[V = \text{Vehicle} = \text{Medication Form (for example: tablets, cc, ml, etc.).}\]

IMPORTANT!

If the units of DD do not match the units of DH, you must convert the units of DD so they match.

Your answer is always in the units of V.

Here are two useful conversions that you must know:

\[1 \text{ gram (Gm)} = 1000 \text{ milligrams (mg)}\]

\[1 \text{ grain (gr)} = 65 \text{ milligrams (mg)}\]

Materials: You may need a calculator, but check with your instructor to see if you will be allowed to use a calculator during the exam.

Note: If at any time you are not able to understand what is being explained in the examples, please get help from one of the tutors in the Math Success Center.

Step One: Examples

Study the following examples:

1. Ordered: Acetaminophen 90 mg po. Acetaminophen is supplied in 60 mg tablets.

What should you give?
First, identify the units the doctor ordered. In this case DD = 90 milligrams.
Now, identify the units of the medication that is available to you. In this case, the medication is supplied in 60 milligrams per 1 tablet. This means that DH = 60 mg and that V = 1 tablet. The important thing to notice here is that the word “milligrams” appears in the doctor’s orders and in the available form of the medication. This is what we want in order to apply the formula. Let’s do it:

\[
\text{Amount to be Given} = \frac{DD}{DH} \times V = \frac{90 \text{ mg}}{60 \text{ mg}} \times 1 \text{ Tablet}.
\]

Note that you cancel the milligrams. You can also cancel zeros to make the calculations simpler. Since 9 divided by 6 = 1.5, you just multiply 1.5 X 1 Tablet, and your answer is 1.5 Tab

2. Ordered: Ampicillin 1.5 Gm. Ampicillin is supplied in 500 mg/cc. What should you give?

First, identify the units the doctor ordered. In this case DD = 1.5 Gm.
Now, identify the units of the medication that is available to you. In this case, the medication is supplied in 500 mg/cc. This means that DH = 500 mg and that the Vehicle is a cc, that is V = 1 cc.
The first challenge we face is that the doctor ordered grams and the medication comes in milligrams.
You need to convert the doctor’s order into milligrams because that is what you have available.

**Remember, 1 Gm = 1000 mg.**

There are several ways to do this conversion. Your instructor has shown you how to set up a proportion. This proportion looks like this:

\[
\frac{1000 \text{ mg}}{1 \text{ Gm}} = \frac{x \text{ mg}}{1.5 \text{ Gm}}
\]

Your job now is to solve for x. This means you have to find the value of x that makes the proportion true. All proportions of this type can be solved in two steps:
1) Cross multiply the two numbers that are across from each other.
2) Divide your answer by the number across the x.

In this case, we get:

\[x \text{ mg} = \frac{1.5 \text{ Gm}}{1 \text{ Gm}} \times 1000 \text{ mg} = 1500 \text{ mg}\]

So, 1.5 Gm = 1500 mg

Another way to do this conversion is to use the following line of reasoning:
Since 1 Gm = 1000 mg, then 1.5 Gm = 1.5 \times 1000 mg = 1500 mg.

So, 1.5 Gm = 1500 mg.

It is very important that you understand how to do this conversion before you continue. If you need help understanding how to do this conversion, ask one of the tutors for assistance.

Now, you are ready to use the formula:

\[
\text{Amount to be Given} = \frac{DD}{DH} \times V = \frac{1500 \, \text{mg}}{590 \, \text{mg}} \times 1 \, \text{cc}.
\]

Note that you will cancel the milligrams. You can also cancel zeros to make the calculation simpler. Since 15 divided by 5 is 3, you just multiply 3 X 1 cc, and your answer is 3 cc.

3. Ordered: Gantrisin 120 mg IM. Gantrisin is supplied in 300 mg per 5 ml ampules. What should you give?

First, identify the units the doctor ordered. In this case DD = 120 mg.

Now, identify the units of the medication that is available to you. In this case, the medication is supplied in 300 mg per 5 ml ampules. This means that DH = 300 mg and that the Vehicle is a 5 ml ampule, that is V = 5 ml. The important thing for you to realize here is that you need to figure out how many milliliters of the medication you need to give. Notice that the word “milligrams” appears in the doctor’s orders and in the dose at hand. This is what we want in order to apply the formula.

Let’s do it:

\[
\text{Amount to be Given} = \frac{DD}{DH} \times V = \frac{120 \, \text{mg}}{300 \, \text{mg}} \times 5 \, \text{ml}.
\]

\[
= 0.4 \times 5 \, \text{ml}.
\]

Note that you cancel the milligrams. Since 120 divided by 300 = 0.4, you just multiply 0.4 X 5 ml, and your answer is 2 ml.

Now let’s work out two problems together.

4. Ordered: Heparin 4 mg sub q. Heparin is supplied in 10 mg/ml vials. What should you give?

First, write down what the doctor ordered: DD = ____________

Now, since the medication is supplied in 10 mg/ml vials, DH = __________ and V = 1 ml.

This means you need to figure out how many milliliters of the medication you need to give. If you did the previous step correctly, the units of DD and DH should be the same. Now you are ready to plug in the values in the formula.
Amount to be Given = \( \frac{DD}{DH} \times V = \)

Write your final answer here: Give ________________

5. Ordered: Ampicillin 1.2 Gm IM. Ampicillin is supplied in 300 mg/cc.
What should you give?

First, write down what the doctor ordered: DD = _______
Now, since the medication is supplied in 300 mg/ml vials, DH = ______ and V = ____.
If you did the previous step correctly, the units of DD and DH should NOT match. So you have to convert the units the doctor ordered into the units you have available.

[Hint: 1 Gm = 1000 mg].

Use the method that makes more sense to you to convert 1.2 Gm into mg. Show your work and write your answers on the line below.

So, DD = 1.2 Gm = ___________mg
Now you are ready to plug in the values in the formula.

Amount to be Given = \( \frac{DD}{DH} \times V = \)

Write your final answer here: Give ________________

**CHECK YOUR ANSWERS ON THE FOLLOWING PAGE**

**ANSWERS TO EXAMPLES 4 AND 5**
[Answers have been highlighted]

4. Ordered: Heparin 4 mg sub q. Heparin is supplied in 10 mg/ml vials.
What should you give?

First, write down what the doctor ordered: DD = 4 mg
Now, since the medication is supplied in 10 mg/ml vials, DH = 10 mg and V = ml.
So, you need to figure out how many milliliters of the medication you need to give.
If you did the previous step correctly, the units of DD and DH should be the same.
Now you are ready to plug in the values in the formula.

Amount to be Given = \( \frac{DD}{DH} \times V = \)

\[ \frac{4 \text{ mg}}{10 \text{ mg}} \times ml = 0.4 \text{ ml} \]
Notice that we cancelled the milligrams and that 4 divided by 10 = 0.4

Write your final answer here: Give 0.4 ml

5. Ordered: Ampicillin 1.2 Gm IM. Ampicillin is supplied in 300 mg/cc. What should you give?

First, write down what the doctor ordered: DD = \text{1.2 Gm}

Now, since the medication is supplied in 300 mg/ml vials, DH = 300 mg and V = cc.

If you did the previous step correctly, the units of DD and DH should NOT match. So you have to convert the units the doctor ordered into the units you have available.

[Hint: 1 Gm = 1000 mg].

Use the method that makes more sense to you to convert 1.2 Gm into mg. Show your work and write your answers on the line below.

Since 1 Gm = 1000 mg, then 1.2 Gm = 1.2 \times 1000 mg = 1200 mg.

[Remember, you can also set up a proportion to do this conversion.]

So, DD = 1.2 \text{ gm} = 1200 \text{ mg}. Now you are ready to plug in the values in the formula.

\[
\text{Amount to be Given} = \frac{DD \times V}{DH} = \frac{1200 \text{ mg}}{300 \text{ mg}} \times \text{ cc} = \frac{12}{3} \times \text{ cc} = 4 \text{ cc}
\]

Write your final answer here: Give 4 cc

Step Two: Independent Practice

Your turn. Follow the examples above to complete the following problems. Show all your work clearly. Write and circle your final answer on the space provided.

Before you start your calculations, please fill in the blanks below:

1 Gm = \underline{\hspace{2cm}} mg

1 \text{ gr} = \underline{\hspace{2cm}} mg

1. Ordered: 500 mg of Utracef. On hand, you have 1 gram tablets.

Give \underline{\hspace{2cm}}
2. Ordered: 0.250 mg of Lanoxin. On hand, you have 0.125 mg tablets.

Give ________________

3. Ordered: 62.5 mg of Diamox. On hand, you have 125 mg tablets.

Give ________________

4. Ordered: 500 mg of Dilor. On hand, you have a 2 ml ampule that contains Dilor, 500 mg/ml.

Give ________________

5. Ordered: Acetaminophen 10 gr. On hand, you have 325 mg tablets.

Give ________________

6. Ordered: Bicillin 600,000 u. On hand, you have Bicillin, 1,200,000 units/2 ml.

Give ________________
7. Ordered: Duricef tabs 1500 mg. On hand, you have Duricef tabs 0.25 Gm.

Give ______________

8. Ordered: Lasix oral solution 30 mg. On hand, you have Lasix oral solution, 60 ml bottle that contains 10 mg/ml.

Give ______________

Step Three: Reflections

a) Why did you (or your instructor) decide that completing this activity was a valuable learning experience?

b) What was the most challenging part of this activity? How did you deal with this challenge?

c) Name something new you learned as a result of completing this activity that you think will help you do better on the Pharmacology Examination. Be specific.

STOP. Please go over your work with a tutor at this time.
You may not get credit for completing this DLA if you fail to leave this sheet with the front desk receptionist.