Dear Student:

As a faculty member of the Johns Hopkins University School of Nursing, we are pleased to welcome you to the School. In preparation for a key nursing course, Foundations of Nursing Practice, all students must enter with core knowledge of medication dosage calculation. In order to achieve a consistent level of knowledge within the student population, each student must purchase the medication dosage book noted below, study the chapters outlined, and complete the mathematics and medication problems at the end of each chapter. By doing so, you will become knowledgeable in the basics of dosage calculation.

During the course, the basic information you have learned will be expanded upon and presented in greater detail. Thus, it is important that you achieve a preliminary level of knowledge before additional information is presented. As you will see when reviewing the content of the book, this is an extensive subject area. However, much of the information is based on basic math and will only require drill and practice and, at times, some memorization to master.

**Book Purchase Information**

The following book is required for purchase prior to the beginning of the semester:

- **Title:** Henke’s Med Math: Dosage Calculation Preparation and Administration, 8th edition
- **Author:** Susan Buchholz
- **Publisher:** Lippincott Williams and Wilkins
- **ISBN:** ISBN- 9781496302847
- **Publication date:** 2016
- **List price:** $79.95


**Outline of Study**

You are responsible for knowing the material presented in chapters 1 (review as needed), 2, 3, 4 5, 6, 7 and 8. You should be able to complete the practice problems in an accurate and timely fashion after studying these chapters. These chapters offer different mathematical approaches to solving dosage problems. While reading these chapters, evaluate the various methods presented. You may use any of these methods to solve the practice problems. Please know, however, that classroom presentation will focus on the
use of ratio and proportion as the primary method used to problem solve. I have enclosed standard conversion tables between the apothecary, metric, and household methods of measurement. **Those conversions preceded by an *asterisk must be memorized, as they are commonly used in clinical practice.** You should be familiar with and comfortable using the remaining conversions; but, they do not require memorization. These conversions that do not have an asterisk will be made available to you during testing. Additional assistance is available with the online component of the package you are to purchase. This online material includes additional explanations, practice problems, and interactive exercises. I will put additional practice problems on our blackboard web site once you are at the SON.

There will be one dosage calculation assessment after the material is presented in class. The assessment will cover the content described in this letter as well as additional content that will be presented during class time. You must complete dosage calculation assessment with a 90% or greater. **The first grade on the dosage assessment counts as 15% of course grade. Students who receive less than 90% will need to retake the assessment. However, if you need to retake the dosage assessment to achieve a 90%, subsequent grades will not be factored in the course grade.**

Additional practice problems and answers are included in this packet. These problems are very similar to some of those you will encounter on the assessment; consequently, I encourage you to complete them, prior to starting the program and receiving new drug calculation content. A list of abbreviations is included for your convenience and you will need to memorize those also.

Please feel free to contact me at (410) 614-5299 if you have any questions or problems. I am looking forward to meeting you. Welcome to Foundations of Nursing Practice!

Sincerely,

Kathryn Kushto-Reese
Course Coordinator

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**Approximate Equivalents in Household/Apothecary/Metric**

**Household**
### Apothecary

#### Volume

<table>
<thead>
<tr>
<th>60 gtts.</th>
<th>1 tsp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 tsp.</td>
<td>1 tbs.</td>
</tr>
<tr>
<td>2 tbs.</td>
<td>1 oz.</td>
</tr>
<tr>
<td>8 oz.</td>
<td>1 cup</td>
</tr>
<tr>
<td>2 cups</td>
<td>1 pint</td>
</tr>
<tr>
<td>2 pts.</td>
<td>1 qt.</td>
</tr>
<tr>
<td>4 qts.</td>
<td>1 gal.</td>
</tr>
</tbody>
</table>

Often included in apothecary system

#### Weight

<table>
<thead>
<tr>
<th>16 fluid</th>
<th>1 pint (pt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 pts.</td>
<td>1 quart (qt.)</td>
</tr>
<tr>
<td>4 qts.</td>
<td>1 gallon (gal.)</td>
</tr>
</tbody>
</table>

1 gr. = 60 mg

### Metric

#### Volume

<table>
<thead>
<tr>
<th>1 cc. = 1 mL. = 1 g.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 mL. = 1 L. = 1 kg.</td>
</tr>
</tbody>
</table>

#### Weight

<table>
<thead>
<tr>
<th>1000 mcg.</th>
<th>1 mg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 mg.</td>
<td>1 g.</td>
</tr>
<tr>
<td>1000 g.</td>
<td>1 kg.</td>
</tr>
</tbody>
</table>

#### Basic Unit of Length

<table>
<thead>
<tr>
<th>1000 microns</th>
<th>1 mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mm.</td>
<td>1 cm.</td>
</tr>
<tr>
<td>1000 mm.</td>
<td>1 m.</td>
</tr>
<tr>
<td>100 cm.</td>
<td>1 m.</td>
</tr>
<tr>
<td>1000 m.</td>
<td>1 km.</td>
</tr>
</tbody>
</table>

**Common Approximate Weight Equivalents for Metric and Apothecary Systems**
<table>
<thead>
<tr>
<th>Metric</th>
<th>Apothecary and Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mg.</td>
<td>1/60 gr.</td>
</tr>
<tr>
<td>60 mg.</td>
<td>1 gr.</td>
</tr>
<tr>
<td>1 g.</td>
<td>15 gr.</td>
</tr>
<tr>
<td>4 g.</td>
<td>60 gr.</td>
</tr>
<tr>
<td>*30 g.</td>
<td>1 oz.</td>
</tr>
<tr>
<td>* 1 kg.</td>
<td>2.2 lbs.</td>
</tr>
</tbody>
</table>

**Common Approximate Volume Equivalents for Metric and Apothecary and Household Systems**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Apothecary</th>
<th>Household</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 5 mL.</td>
<td>*60 gtt. (1 tsp.)</td>
<td></td>
</tr>
<tr>
<td>* 30 mL.</td>
<td>*1 oz.</td>
<td>* 2 lbs. (6 tsp.)</td>
</tr>
<tr>
<td>240 mL.</td>
<td>8 oz.</td>
<td>1 cup</td>
</tr>
<tr>
<td>500 mL.</td>
<td>1 pt.</td>
<td>1 pt.</td>
</tr>
<tr>
<td>* 1000 mL.</td>
<td>*1 qt.</td>
<td>* 1 qt.</td>
</tr>
</tbody>
</table>

****** BE SURE TO MEMORIZE THE EQUIVALENTS WITH THE *

**ROMAN NUMERALS**

<table>
<thead>
<tr>
<th>ARABIC NUMBER</th>
<th>ROMAN NUMERAL</th>
</tr>
</thead>
</table>
In an effort to prevent errors in interpretation, a line is sometimes drawn over the symbol in medicine.

If a smaller value symbol proceeds a larger value symbol, you subtract the value of the smaller symbol from the larger symbol.

Ex: IX = 9 OR ix = 9

If a smaller value symbol follows a larger value symbol, you add the value of the smaller symbol to the larger symbol.

Ex: XV = 15 OR xv = 15

Tablets can be scored (cut in precise halves) and if so can be given as 1.5tabs, 2.5 tablets, 3.5 tabs., etc.

Dosage and Solution Practice Problems

Apothecary System

1. 10cm = __________ mm.
2. 1 gr. = __________ mg.

**Metric System**

3. 800 mcg. = __________ mg.
4. 4 mg. = __________ g.
5. 0.065 g. = __________ mg.
6. 1500 g. = __________ kg.
7. 0.1L = __________ mL.
8. 675 mL = __________ L.

**Metric to Apothecary**

9. 3 mL. = cc. __________
10. 120 mL = fl. oz. __________
11. 300 mL = fl. oz. __________
12. 750 mL = pt. __________
13. 2.5 L = qt. __________
14. 45 mg = gr. __________
15. 2 kg. = 1b. __________
16. 0.6 g. = gr. __________
17. 30 mg. = gr. __________

**Apothecary to Metric**

18. 2 oz. = __________ mL.
19. gr. X = __________ mg.
20.  gr. 1/100 = _____________ mg.
21.  fl. oz. ¼ = _____________ mL.
22.  fl. oz. VIII = _____________ mL.
23.  qt. 1 = _____________ mL.
24.  fl. oz. XII = _____________ g.

Conversion to Household

25.  4 tbs. = _____________ fl. oz.
26.  5 mL. = _____________ tsp.
27.  fl. oz. II = _____________ tsp.
28.  20 gtts. = _____________ tsp.

Dosage Problems

29. Order reads: Give prednisone 0.04 g. q.a.m. (every morning)
30. Order reads: Hydrodiuril gr. Iss (every day)
On hand: 50 mg. tablets
How many tablets would you give?

31. Order reads: Give gr. 1/300 of Levothyroxin now.
On hand: 100 mcg. tablets
How many tablets would you give?

32. Order reads: Thoraxine elixir 325 mg. Po (by mouth) q.i.d. (4 x a day).
On hand: 100 mg./mL.
How many mls. (or cc’s) would you give?

33. On hand: Ferrous Sulfate (FeSO₄) gr II / fl. oz.
Order reads: FeSO₄ gr V.
How many mls. (or cc’s) would you give?

34. On hand: Phenergan 25 mg/mL.
Order reads: Give Phenergan gr. ¾ I.M. (intramuscularly) now.
How many mls would you give?

35. On hand: Benadryl 50 mg/mL
Order reads: Benadryl 30 mg I.M. now.
How many mls would you give?

36. On hand: Demerol 75 mg/cc
Order reads: Demerol 50 mg. I.M. now.
How many mls would you give?

Answers Sheet to Dosage and Solution Problems

1. 100 mm.  
2. 60 mg  
20. 0.6 mg.  
21. 7.5 mL
3. 0.8 mg.  
4. 0.004 g.  
5. 65 mg  
6. 1.5 kg.  
7. 100 mL.  
8. 0.675 L.  
9. 3 cc  
10. 4 oz.  
11. fl. oz.  
12. pt.  
13. qt.  
14. 3/4 gr  
15. lb. 4.4  
16. gr. IX  
17. gr. ss  
18. 60 mL.  
19. 600 mg.  
20. 240 mL.  
21. 1000 or 960 mL.  
22. 360 g.  
23. fl. oz.  
24. tsp.  
25. 12 tsp.  
26. tsp. 1/3  
27. 8 tablets  
28. 2 tablets  
29. 2 tablets  
30. 3.25 mL.  
31. 75 cc  
32. 1.8 cc  
33. 0.6 cc  
34. 0.67 cc or 0.7 cc  

**ABBREVIATIONS FOR MEDICATIONS**

<table>
<thead>
<tr>
<th>Routes of Administration</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>p.o. by mouth</td>
<td>c. = cup</td>
</tr>
<tr>
<td>p.r. by rectum</td>
<td>cc = a cubic centimeter</td>
</tr>
<tr>
<td>I.V. intravenous</td>
<td>cm. = centimeter</td>
</tr>
<tr>
<td>I.M. intramuscular</td>
<td>dr. = dram</td>
</tr>
<tr>
<td>ID intradermal</td>
<td>fl. = fluid</td>
</tr>
</tbody>
</table>


top. = Topical
sl. SL = sublingual
SC, s.c. = subcutaneously
OD = right eye
OS = left eye
OU = both eyes
g,Gm = gram
gr. = grain
gtt. = drop
kg. = kilogram
L. = Liter
m. = meter
mEq. = milliequivalent
mg. = milligram
mL = milliliter
m/M = minim
mcg. = microgram
oz. = ounce
pt. = pint
qt. = quart
ss. = one-half
t./tsp. = teaspoon
sol. = solution
T./tbs. = tablespoon
elix. = elixir
ext. = extract
sup. or supp. = suppository
tr./tinct. = tincture
amp. = ampule
comp. = compound

Types of Medication

Times for Medication Administration
a.c. – before meals
asap – as soon as possible
b.i.d. – twice a day
h. – hour
h.s. – hour of sleep
p.c. – after meals
p.r.n. – as necessary
q. – every
q. a.m. – every morning
q.h. – every hour
q2h – every 2 hours
q4h – every 4 hours
every day
every other day

q.h.s. – every night at bedtime
q.i.d. – four times a day
q.sh. – every shift
stat – at once
t.i.d – three times a day

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