NMSU, DEPARTMENT OF NURSING, BSN PROGRAM
PRECLINICAL DOSAGE CALCULATION REQUIREMENTS

I. Overall Goal: Prior to participating in clinical experiences each semester, the student is expected to perform common dosage calculations necessary for safe medication administration with a minimum of 92% accuracy (23/25 correct) by the second attempt.

II. Specific Requirements:

A. Students are expected to do their own individual work.
B. Students need to bring their own writing utensil (no Scantron is needed).
C. Students may use only the Department's simple calculator (no programmable electronics nor other references materials may be used).
D. Students will show their work and write down their own answer.
E. There will be 25 questions involving calculations following the blueprint below.
F. A maximum of 60 minutes are allowed to complete the test.
G. The following dosage calculation rules will be followed for this requirement:
    1. Amounts less than 1 will be written with a zero to the left of the decimal.
    2. Extra zeros will NOT be placed at the right of the decimal point at the end.
    3. All tablets are scored in half, so round tablets to the nearest half of a tablet.
    4. Volumes less than 1 mL will be rounded to the nearest hundredth (two places).
    5. Volumes 1 mL or over will be rounded to the nearest tenth (one place).
    6. Weights in kilograms will be rounded to nearest tenth (one place).
H. Students may review the test only at the appointed time and place.
I. Students are responsible for their own remediation (see faculty for resources).
J. Arrangements will be made to take the second dosage test, if necessary.
K. The second version will follow the same requirements, outcomes, and blueprint.

III. Expected Outcomes: Prior to clinical each semester, the student is expected to:

A. Interpret medication orders and standard abbreviations needed for dosage calculations;

B. Convert within and between these selected measurement systems:
    1. Metric
        a. Convert weight between micrograms, milligrams, grams and kilograms
        b. Convert volume between milliliters and liters
    2. Household
        a. Convert weight between pounds and kilograms
        b. Convert volume between ounces and milliliters
        c. Convert volume between teaspoons and milliliters
    3. Apothecary
        a. Convert weight between grains and milligrams;

C. Calculate dosages for administration of medications by common routes:

1. Calculate dosages of solid oral medications from 0.5 to 3 tablets
2. Calculate oral liquid volumes from 0.001 to 30 mL
2. Calculate injectable medication volumes from 0.001 to 3 mL;

D. Calculate infusion rates and times for intravenous administration:

1. Calculate volumes between milliliters per hour and drops per minute
2. Calculate total/end infusion times for intravenous fluids
3. Calculate amounts/times to administer IV push medications
4. Calculate infusion rates/times for IV intermittent infusions (piggybacks); and

E. Calculate dosages for administration of medications in tightly controlled situations:

1. Determine dosages based on patient's clinical data (weight, VS or lab results)
2. Determine if an ordered amount is within a safe/recommended range.
3. Contrast different concentrations of solutions/ratios.
4. Calculate rates/amounts for intravenous medication drips

* The calculations may require conversions as part of the problem, too
** The amounts may range from fractions/decimals to thousands of units.
*** There will NOT be information needed nor questions about: specific pharmacology of medications, administration techniques, nor nursing implications in the preclinical dosage calculation requirement. These topics will be covered in theory and/or clinical applications.

V. Blueprint: (The breakdown of the cognitive level students are expected to perform.)

BLOOM'S LEVEL	# OF QUESTIONS	PERCENTAGE
Comprehension	5	20
Application	15	60
Analysis	5	20
TOTAL	25	100

A. Examples at the Comprehension level (understanding the meaning of information):

1. How many milliliters are in 2 Liters? (2,000 milliliters)

2. How many kilograms are in163 pounds? (rounded to 74.1 kilograms)

3. How many milligrams are in grain X? (600 to 650 milligrams)

B. Examples at the Application level (use learned information in relevant situations):

1. The patient needs: Lasix 15 milligrams PO now. The medication is available as: Lasix 10 milligram (scored) tablets. How many tablet(s) will the nurse administer now? (1.5 tablets)

2. A client has an order for: Ceclor 100 mg PO every 6 hours. The local pharmacy has: Ceclor 125 mg per 5 milliliters. How many milliliter(s) should the client take for one dose? (4 mL)

3. Order: Morphine Sulfate 10 mg IM every 4 hours prn pain. Available: Morphine sulfate grain 1/6 per milliliter. How many milliliter(s) will the nurse inject for one dose? (1 mL)

4. A client has a prescription for: Insulin Humulin NPH 30 units every am and 20 Units every hs. How many total unit(s) will the client receive in 24 hours? (50 units)

5. The order is for: Heparin 5,000 Units SC every 8 hours. The available vial contains: Heparin 10,000 Units per mL. How many milliliter(s) will the nurse administer for one dose? (0.5 mL)

6. There is an order for: Normal Saline IV at 125 mL per hour. The available IV infusion set has 20 gtt per milliliter. How many drops per minute will the nurse administer? (rounded to 42 gtt/min)

7. A patient has a physician's order for: Kefzol 0.5 g IVPB every 6 hours. The manufacturer supplies: Kefzol 0.5 g mixed in 50 mL of D5W. The medication book recommends that each dose be administered intermittently over 30 minutes. How many milliliter(s) per hour will the nurse set the IV pump to infuse one dose? (100 mL/hour)

C. Examples at the <u>Analysis</u> level (break down information for further understanding):

1. The order is for: Zithromax 400 mg IVPB every day for 2 days. The supplied vial has 500 mg of powdered Zithromax with directions on the label as follows: Reconstitute to 100 mg/mL with 4.8 mL of Sterile Water for injection. How many milliliter(s) would the nurse draw out of the vial to obtain one dose? (4 mL)

2. The practitioner orders: Vistaril 20 mg IM every 4-6 hours prn nausea for a child, who weighs 44 lbs. The medication resource indicates that the usual IM dosage is 0.5 mg to 1 mg/kg/dose every 4 to 6 hours as needed. Is this a safe dosage for this child's weight? (Yes, this child's safe range is 10 to 20 mg/dose.)

3. A patient, who weighs 110 lbs, has an order to begin IV Heparin by hospital protocol. The protocol is an IV bolus, then: Infuse the IV drip at 18 Units/kg/hour. Draw an APTT in 6 hours and call MD with results. The standard heparin available from the pharmacy is: Heparin 25,000 Units in 250 mL of ½ NS. How many milliliter(s) per hour should the nurse set the IV pump for this infusion? (9 mL/hr)