**High Plains Technology Center**

**Health Careers**

**Learning Activity Packet (LAP) for Advanced Pharmacy Technician**

**Related unit of instruction:**

Pharmacological Calculations

**Approximate Completion time:**

15 hours

**Rationale for the Lap:**

This LAP is designed to help the students learn the basics of pharmaceutical mathematics including readying, interpreting and solving calculation problems encountered in the preparation and distribution of drugs. Conversions of measurements, ratio and proportion, percentage, dilution and concentration, mill equivalents, units, intravenous flow rates and solving dosage problems are included.

**Criteria for successful completion:**

By the end of this LAP the student will

1. Read and turn in work sheets for Chapter 5 in Ballington & Anderson’s *Pharmacy Practice for Technicians.*
2. Read and turn in work sheets for Chapter 1 in Ballington & Green’s *Pharmacy Calculations for Technicians.*
3. Pass the tests for each chapter

**Learning Objective:**

*Pharmaceutical Measurements and Calculations Chapter 5*

1. Describe four systems of measurement commonly used in pharmacy and convert units from one system to another.
2. Explain the meanings of the prefixes most commonly used in metric measurement.
3. Convert from one metric unit to another (e.g., grams to milligrams).
4. Convert Roman numerals to Arabic numerals.
5. Convert time to 24 hour military time.
6. Convert temperatures to and from the Fahrenheit and Celsius scales.
7. Round decimals up and down.
8. Perform basic operations with proportions, including identifying equivalent ratios and finding an unknown quantity in a proportion.
9. Convert percentages to and from fractions, ratios, and decimals.
10. Perform fundamental dosage calculations and conversions.
11. Solve problems involving powder solutions and dilutions.
12. Use the allegation method to prepare solutions.
13. Calculate the specific gravity of a liquid.

*Understanding Subdivisions of Numbers, Number Systems, Estimating and Accuracy Chapter 1*

1. Understand fractions and be able to compare them, express them as decimals and find common denominators.
2. Manipulate fractions by adding, subtracting, multiplying and dividing them.
3. Interpret Roman and Arabic numbers and convert values between the two systems.
4. Read scientific notation and convert large and small numbers to scientific notation.
5. Determine the value of a decimal and accurately round off decimal values.
6. Estimate drug doses in order to check the accuracy of final calculations.
7. Perform calculations while retaining accuracy and the correct number of significant figures.

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By the end of this LAP the student will

1. Read and turn in work sheets for Chapters 2-4 in Ballington & Green’s *Pharmacy Calculations for Technicians.*
2. Pass the tests for each chapter

**Learning Objective:**

*Using Ratios, Percents, and Proportions Chapter 2*

1. Describe the use of rations and proportions in the pharmacy.
2. Solve pharmacy calculations by using ratios and proportions.
3. Calculate percentage of error in measurements.

*Developing Literacy Skills Chapter 3*

1. Identify the elements of a complete prescription order.
2. Apply calculation operations in handling prescription orders.
3. Recognize the elements of a medication label.
4. Apply calculation operations to information on medication labels.

*Applying Metric Measurements and Calculating Doses Chapter 4*

1. Identify the basic units and prefixes of the metric system.
2. Convert units within the metric system by moving the decimal place, using the ratio-proportion method, and using the dimensional analysis method.
3. Calculate drug doses using the ratio-proportion and dimensional analysis methods.
4. Calculate doses based on weight and body surface area (BSA).
5. Calculate a pediatric dose using the patient’s weight or age and the appropriate adult dose.

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**Criteria for successful completion:**

By the end of this LAP the student will

1. Read and turn in work sheets for Chapters 5-7 in Ballington & Green’s *Pharmacy Calculations for Technicians.*
2. Pass the tests for each chapter

**Learning Objective:**

*Using Household Measure in Pharmacy Calculations Chapter 5*

1. Identify units of household measure and convert between them.
2. Solve medication problems by using household measure and the metric system.
3. Convert body weight between Kilograms and pounds.
4. Determine pediatric doses using dosing tables.
5. Calculate the amount of medication to be dispensed.
6. Calculate temperature conversions between Celsius and Fahrenheit.

*Preparing Injectable Medications Chapter 6*

1. Calculate the volume to be measured when given a specific dose.
2. Calculate the amount of drug in a given volume.
3. Identify drugs that use units as a dose designation.
4. Calculate the volume of a substance that has an electrolyte as its primary ingredient.
5. Calculate the quantity of units in a given concentration and dose.
6. Calculate the volume of insulin to be administered.

*Preparing Intravenous Medications Chapter 7*

1. Describe percentage strength as weight in weight, weight in volume and volume in volume.
2. Calculate the amount of medication in a solution based on a given percentage strength.
3. Calculate the percentage strength of medication in a given solution.
4. Describe the types of IV sets by drops delivered.
5. Calculate IV drop rates and flow rates using various sets.
6. Estimate and calculate time for IV administration.
7. Calculate rates of IV infusion and IV piggyback infusion.

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**Criteria for successful completion:**

By the end of this LAP the student will

1. Read and turn in work sheets for Chapters 8-10 in Ballington & Green’s *Pharmacy Calculations for Technicians.*
2. Pass the tests for each chapter.
3. Use Appendices as needed.

**Learning Objective:**

*Using Special Calculations in Compounding Chapter 8*

1. Calculate the amount of drug in a final product that has been diluted.
2. Calculate the amount of concentrate and diluent needed to make a desired concentration.
3. Calculate the amount of two products needed to prepare a desired concentration.
4. Determine the least weighable quantity on a balance with a known accuracy and a given margin of error.
5. Recognize when a diluent must be added to an ingredient for weighing and measuring purposes.
6. Determine the amount of an aliquot in measuring diluted substances.

*Using Business Math in the Pharmacy Chapter 9*

1. Identify and calculate overhead cost.
2. Identify net and gross profit.
3. Calculate markup and the markup rate.
4. Compute discounts.
5. Apply average wholesale price to profit calculations.
6. Calculate inventory turnover.
7. Calculate depreciation.

*Understanding the Apothecary System Chapter 10*

1. Identify symbols and measures of the apothecary system.
2. Use the apothecary system to solve medication problems.
3. Identify approximately equivalent apothecary and metric units and convert measurements between the two systems.