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ABSTRACT

This module presents a real-world context in which mathematics skills are used as part of a daily routine. The context is the field of veterinary technology, and the module aims to help students understand the significance of being able to convert from one system of measurement to a different system, and of making accurate calculations when working with fractions and decimals. Materials in the module, most of which are designed for the teacher to duplicate and distribute to students, include the following: (1) information on careers in the field of veterinary technology; (2) a task to be performed with information needed for the task; (3) related problems; and (4) answer key for related problems. (KC)

MATHEMATICS FOR THE WORKPLACE

APPLICATIONS FROM VETERINARY TECHNOLOGY

A TEACHER'S GUIDE

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INTRODUCTION

The workplace of tomorrow will require a skills level beyond the twelfth grade. Technological advances have necessitated higher levels of mathematical skills for employees to function efficiently in the workplace. Many employers need workers who can think creatively and use a variety of approaches in problem solving.

Because of the higher levels of mathematical skills needed to succeed in the workplace, now more than ever, there needs to be greater relevance between what is taught in the classroom and what transpires in the real world on a daily basis. Teaching skills in an isolated setting does little to motivate many students to take their studies seriously.

When information is presented in an isolated setting, students who are unable to see a connection between what is taught in the classroom and real-world applications may become disinterested in the subject. Consequently, students perceive no need to apply themselves to their studies and may not take courses which challenge them as learners.

Examples from real-life settings often help students better understand the need to study and learn mathematical skills taught in the classroom. Real-life applications can provide the needed relevance to motivate students, not only to apply themselves to their studies, but also to take the highest level of mathematics they are capable of handling successfully. **Mathematics for the Workplace: Applications from Veterinary Technology** is designed to present a real-world context where mathematics skills are used as part of a daily routine.

One intent of **Mathematics for the Workplace: Applications from Veterinary Technology** is to help students understand the significance of being able to convert from one system of measurement to a different system. An additional purpose is to help students see the need for making accurate calculations when working with fractions and decimals.

HOW TO USE THIS MODULE

The table of contents lists the sections contained in the module. This is a teacher's guide, not a packet of materials designed entirely to be duplicated and presented to students. **There are, however, several sections which need to be duplicated and given to the students so they can complete the assigned task.**

Pages 3-5 give students an introduction to the career field of veterinary technology. Included in this section is such information as a description of the career, job-related duties, working conditions, and high school preparation. **These pages should be duplicated and given to the students as introductory information.**

Pages 6-11 present a job-related task. In this section, students are given an explanation of the task and information to help them understand the need for the task. This section also provides teachers with an understanding of the requirements to complete the task. **This section may be duplicated and given to the students as information.**

Pages 12-13 give related problems to be solved by the students once the concepts have been covered in class. These pages should be duplicated and given to students.

Pages 14-23 are the answer keys to the ***RELATED PROBLEMS.*** Many of the answer keys have two sections because several of the problems can be answered in one of two ways.

DESCRIPTION OF CAREER

Veterinary technicians assist veterinarians and other scientists in capacities much like those of nurses and other medical technicians in the field of human medicine.

Veterinary technicians assume many technical duties and patient care responsibilities, thereby enabling the veterinarian to concentrate on his areas of expertise, increase his patient case load, and expand the services provided for each patient.

Technicians should

- love animals and enjoy caring for them,
- like working with details and using set methods and procedures, and
- be able to combine compassion with objectivity.

Veterinary technicians receive training through two-year college and internship programs and must pass a state examination to become certified. The examination includes oral, written, and practical portions.

In South Carolina, veterinary technicians earned between $17,000 and $23,000 in 1988. Certified technicians may earn salaries beyond this range depending on training, experience, and place of employment.

JOB-RELATED DUTIES

Veterinary technicians may function as professional assistants to biomedical researchers and scientists as well as to veterinarians. Veterinary technicians are trained to assume responsibilities including

- physical therapy,
- biochemical analysis,
- clinical pathology,
- physical examinations,
- animal restraint, and
- appointments scheduling.

Additional duties include

- performing pre-anesthetic evaluations,
- calculating radiation dosage and exposure time,
- caring for hospitalized patients,
- conducting outpatient/field service, and
- managing the office and/or hospital.

Veterinary technicians work under the supervision of a veterinarian. However, if a technician proves reliable and responsible, he or she may receive little supervision while performing certain job duties.

WORKING CONDITIONS

Veterinary technicians usually work indoors in lighted and comfortable areas. Outdoor work may be required of technicians who are responsible for exercising animals or working with large animals.

Caring for animals can be dirty, repetitious, routine, and demanding work. The work may involve bites or scratches and exposure to infection.

Technicians generally work a 40-hour week. Evening, weekend, and holiday work may be required due to the fact that animals need food and care seven days a week. Overtime work may be required in the case of an emergency.

Employment opportunities for veterinary technicians may include

- private veterinary hospitals,
- animal health representatives,
- veterinary and medical research facilities,
- zoo/wildlife medicine, and
- colleges of veterinary medicine.

HIGH SCHOOL PREPARATION

In order to be best prepared for a program of studies in veterinary technology, a student should take algebra, biology, and chemistry courses.

ADDITIONAL INFORMATION

Students can obtain additional information on veterinary technology careers from school guidance offices, libraries, local veterinarians, or area technical colleges.

Colleges in South Carolina, Georgia, and North Carolina which offer Veterinary Technology programs are

Tri-County Technical College
Contact: Dr. Roseann Marshall
Department Head
Veterinary Technology
P. 0. Box 587
Pendleton, S.C. 29670

Fort Valley State College
Contact: Dr. K. L. Arora
Department Head
Veterinary Technology
State College Drive
Fort Valley, GA 31030

Central Carolina Community College
Contact: Dr. Alvin Mackay
Department Head
Veterinary Technology
1105 Kelley Drive
Sanford, NC 27330

INTRODUCTION OF THE TASK

One specific task veterinary technicians perform is determining the amount of antibiotic needed to counteract an infection within an animal's body. Animals, like humans, are given medication to fight infections.

When a veterinarian prescribes medication for a patient, it is the technician's responsibility to determine the dosage to be administered. The medication to be administered is usually in liquid form (milliliters), but the recommended dosage is based on a solid measure (milligrams per kilogram). Therefore, the technician must convert from a solid unit to a liquid unit of measure in order to obtain the correct amount of medication.

The amount of medication given to the patient is based on the patient's weight. The patient's weight is usually measured in pounds, but the recommended dosage is based on a weight measured by kilograms. It is the technician's responsibility to convert the number of pounds to an equivalent number of kilograms.

Once the number of kilograms is known, the technician can then determine the required amount of medication in milligrams. However, even though the technician knows the dosage amount in milligrams, he or she must convert this dosage to an equivalent amount measured in milliliters. When the recommended dosage in milliliters is known, the medication can then be given to the patient.

CALCULATING THE CORRECT DOSAGE

A client brought two pets (Fang, a cat, and George, a mouse) to the office. Fang is afraid of George, but George managed to bite Fang's ear. Fang then slapped George, resulting in a cut on George's head. Both the cat and the mouse need antibiotics.

The veterinarian prescribes Amoxicillin injectable for both animals. It is the veterinary technician's responsibility to determine the number of milliliters of Amoxicillin to be administered to each animal.

As with any type of injectable medication, Amoxicillin is measured in milliliters, which is a liquid measure. However, the recommended dosage is based on a certain number of milligrams per kilogram of weight for the animal.

In order to determine the amount of Amoxicillin to be administered to each animal, the weight in pounds must be converted to the equivalent weight in kilograms. The recommended dosage in milligrams must then be computed. This amount must then be converted to an equivalent amount in milliliters.

CONVERTING THE WEIGHTS

After weighing the animals, the technician finds the weights of the cat and mouse to be ten pounds and one-tenth pound, respectively. In order to determine the amount of dosage, the number of pounds must be converted to an equivalent number of kilograms.

Procedure A *(DIVISION)*

One way to convert from pounds to kilograms is to divide the number of pounds by 2.2 lbs/kg. (One kilogram is approximately the same weight as 2.2 pounds.)

Fang's weight is 10 pounds. Therefore, divide 10 pounds by 2.2 pounds per kilogram or

$$10 \text{ pounds} \div 2.2 \text{ lbs/kg} = 4.5 \text{ kg.}$$

George's weight is 0.1 pounds. Dividing 0.1 pounds by 2.2 lbs/kg gives

$$0.1 \text{ pounds} \div 2.2 \text{ lbs/kg} = .045 \text{ kg.}$$

Procedure B *(PROPORTION)*

A second method of calculating an equivalent metric weight, given a standard weight, is to set up a proportion.

Setting up the proportion gives:

$$\frac{1 \text{ kg}}{2.2 \text{ lbs}} = \frac{x \text{ kg}}{10 \text{ lbs}}.$$

Cross multiplication results in:

$$x \text{ kg} \times 2.2 \text{ lbs} = 10 \text{ lbs} \times 1 \text{ kg}.$$

Solving for x gives:

$$x \text{ kg} = \frac{1 \text{ kg} \times 10 \text{ lbs}}{2.2 \text{ lbs}}$$

$$x \text{ kg} = 4.5 \text{ kg}.$$

A proportion can also be set up to determine George's weight.

$$\frac{1 \text{ kg}}{2.2 \text{ lbs}} = \frac{x \text{ kg}}{0.1 \text{ lbs}}.$$

Cross multiplication results in:

$$x \text{ kg} \times 2.2 \text{ lbs} = 0.1 \text{ lbs} \times 1 \text{ kg}.$$

Solving for x gives:

$$x \text{ kg} = \frac{1 \text{ kg} \times 0.1 \text{ lbs}}{2.2 \text{ lbs}}$$

$$x \text{ kg} = 0.045 \text{ kg}.$$

CALCULATING THE NECESSARY DOSAGE

Once the weight in kilograms is known, the technician can proceed with the process of determining the amount of medication needed.

The recommended dosage of Amoxicillin injectable is 22 mg/kg. This means for every kilogram of weight, the patient must receive 22 milligrams of medication.

Since Fang's weight is 4.5 kg, and since he must be given 22 mg for each kilogram of weight, the technician multiplies Fang's weight by the required dosage or

$$4.5 \text{ kg} \times 22 \text{ mg/kg} = 99 \text{ mg.}$$

The resulting product of 99 mg is the amount of medication required for Fang.

In the same way, the technician determines the amount of medication required by George. Multiplying George's metric weight by the recommended dosage, the technician gets:

$$0.045 \text{ kg} \times 22 \text{ mg/kg} = 0.99 \text{ mg.}$$

The resulting product of 0.99 mg is the amount of medication required for George.

Since the animals are receiving injectable Amoxicillin, the technician must now determine the corresponding number of milliliters for each recommended dosage before administering the medication.

CALCULATING THE NUMBER OF MILLILITERS

Injectable Amoxicillin contains 30 milligrams of medication per milliliter of solution. The number of required milliliters can be calculated in one of two ways.

Procedure A *(DIVISION)*

The first way to compute the number of milliliters is to divide the required dosage, given in milligrams, by the number of milligrams per milliliter.

Since the recommended dosage for Fang is 99 mg, divide this amount by the number of milligrams per milliliter or

$$99 \text{ mg} \div 30 \text{ mg/ml} = 3.3 \text{ ml.}$$

The resulting quotient of 3.3 ml is the amount of injectable Amoxicillin to be administered to Fang.

The same process will give the amount of medication required for George. Dividing the recommended dosage, 0.99 mg, by the number of milligrams per milliliter gives

$$0.99 \text{ mg} \div 30 \text{ mg/ml} = 0.03 \text{ ml.}$$

The resulting quotient of 0.03 ml is the amount of injectable Amoxicillin to be administered to George.

Procedure B *(PROPORTION)*

Another method of calculating the required dosage in milliliters is to set up a proportion.

The proportion is:

$$\frac{30\ \text{mg}}{1\ \text{ml}} = \frac{99\ \text{mg}}{x\ \text{ml}}.$$

Cross multiplication results in:

$$x\ \text{ml} \times 30\ \text{mg} = 99\ \text{mg} \times 1\ \text{ml}.$$

Solving for x gives:

$$x\ \text{ml} = \frac{99\ \text{mg} \times 1\ \text{ml}}{30\ \text{mg}}$$

$$x\ \text{ml} = 3.3\ \text{ml}.$$

The amount of medication required for Fang is 3.3 ml.

The proportion to determine the dosage for George is:

$$\frac{30\ \text{mg}}{1\ \text{ml}} = \frac{0.99\ \text{mg}}{x\ \text{ml}}.$$

Cross multiplication results in

$$x\ \text{ml} \times 30\ \text{mg} = 0.99\ \text{mg} \times 1\ \text{ml}.$$

Solving for x gives:

$$x\ \text{ml} = \frac{0.99\ \text{mg} \times 1\ \text{ml}}{30\ \text{mg}}$$

$$x\ \text{ml} = 0.03\ \text{ml}.$$

The amount of medication required for George is 0.03 ml.

RELATED PROBLEMS

1. Mrs. Jones has called the veterinarian's office and said that her horse, Buckshot, has cut his leg on barbed wire. You and the veterinarian drive out to the farm. After examining Buckshot, the veterinarian asks you to get an injection of penicillin ready. Buckshot weighs 1200 pounds. The penicillin bottle has 300,000 units per ml. If the required dosage is 5,000 units per pound, how many cc's do you pull up in the syringe? (1 cc = 1 ml.)

2. Bojangles, a cocker spaniel, was admitted to the office this morning for surgery. The vet asks you to give him his pre-op dose of atropine and acepromazine. Bojangles weighs 35 pounds. The dosage of atropine is 1 milliliter per twenty pounds of weight. The acepromazine dosage is .01 milligram per kilogram of weight. There are 10 mg of acepromazine per ml of solution. How much atropine and acepromazine are given to Bojangles?

3. Sadie, a German shepherd, has come to the office for her yearly check-up and vaccinations. When performing the microscopic parasite exam, you find hookworms. The veterinarian prescribes Nemex. If Sadie weighs 95 pounds, and the Nemex dose is 5 mg per kilogram of weight, how many ml of Nemex do you get ready to give Sadie? (Nemex liquid comes 50 mg/ml.)

4. Simon, a 13-year old-cairn terrier, has been vomiting for 2 days. The veterinarian asks you to draw blood for a CBC (complete blood count) and chemistry evaluation. You are then to start an IV administration of lactated ringers. You are to give the fluids at 20 drops per minute. The IV set you are using gives 15 drops per milliliter. How long will it take to give the 1000 ml bottle to Simon?

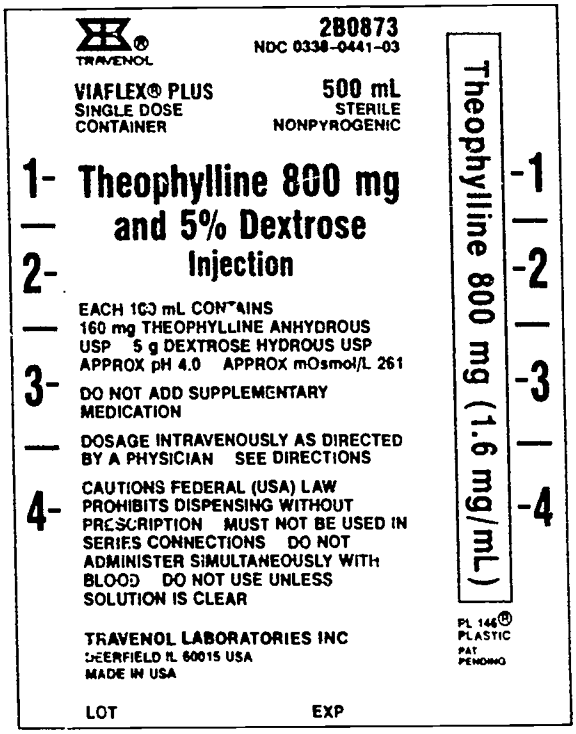
5. Rex, a 5-year-old cat, has a bladder infection, and the vet prescribes Cefadroxil for 10 days. Rex weighs 10 pounds. Cefadroxil dose is 22 mg/kg once daily by mouth. Cefadroxil comes in 100 mg tablets. How many tablets per day does Rex get, and how many tablets should you dispense for Rex?

6. ORDER: Infuse 500 ml D_5W with 800 mg theophylline at 0.7 mg/kg/hr. The patient weighs 60 kg. As you can see in the package below, the theophylline is already in D_5W.

a. How many mg/cc are in the package?

b. How many mg is the patient to receive per hour?

c. How many ml will be needed to deliver this hourly rate?



ANSWER KEY FOR RELATED PROBLEMS

1. To find the number of units required in the dose, multiply Buckshot's weight, 1200 pounds, by the number of required units per pounds, 5000, or

   1200 lbs. X 5000 units/lbs. = 6,000,000 units.

   The required dosage is 6,000,000 units of penicillin.

   There are 300,000 units of penicillin per milliliter of solution. Dividing the required number of units, 6,000,000, by the number of units per ml, 300,000, gives

   6,000,000 ÷ 300,000 = 20 ml.

   The required number of ml is 20. If 1 ml is equal to 1 cc, then the number of cc's pulled up in the syringe is 20.

2. ***DETERMINING THE REQUIRED DOSE OF ATROPINE***

The dose rate of atropine is 1 milliliter for every 20 pounds of weight. To compute the required dosage, set up a proportion to answer the question "If 1 ml is required for 20 lbs. of weight, how many ml are required for 35 lbs. of weight?" The proportion to answer the question is

$$\frac{1 \text{ ml}}{20 \text{ lbs}} = \frac{x \text{ ml.}}{35 \text{ lbs}}$$

Cross multiplication gives

$$x \text{ ml} \times 20 \text{ lbs.} = 1 \text{ ml} \times 35 \text{ lbs.}$$

Solving for x gives

$$x \text{ ml} = \frac{1 \text{ ml} \times 35 \text{ lbs}}{20 \text{ lbs}}$$

$$x \text{ ml} = 1.75 \text{ ml or } 1.75 \text{ cc's.}$$

The required dosage is 1.75 cc's.

DETERMINING THE REQUIRED DOSE OF ACEPROMAZINE

To determine the required dose of acepromazine, Bojangles' weight, in standard units (pounds), must be converted to metric weight (kilograms). The weight conversion can be done in one of two ways: by division or by proportion.

Procedure A *(DIVISION)*

One kilogram is approximately 2.2 pounds. Bojangles' weight is 35 pounds. Therefore, divide 35 pounds by 2.2 pounds per kilogram or

$$35 \text{ pounds} \div 2.2 \text{ lbs/kg} = 16 \text{ kg.}$$

Bojangles' weight in metric units is 16 kg.

Procedure B *(PROPORTION)*

A second method of calculating an equivalent metric weight, given a standard weight, is to set up a proportion.

Setting up the proportion gives

$$\frac{1\text{ kg}}{2.2\text{ lbs}} = \frac{x\text{ kg}}{35\text{ lbs}}.$$

Cross multiplication results in

$$x\text{ kg} \times 2.2\text{ lbs} = 35\text{ lbs} \times 1\text{ kg}.$$

Solving for x gives

$$x\text{ kg} = \frac{1\text{ kg} \times 35\text{ lbs}}{2.2\text{ lbs}}$$

$$x\text{ kg} = 16\text{ kg}.$$

The recommended dosage of acepromazine is .01 mg/kg. Since Bojangles' weight is 16 kg, multiply the weight by the required dosage or

$$16\text{ kg} \times .01\text{ mg/kg} = .16\text{ mg}.$$

Therefore, .16 mg of medication are required. However, mg is a solid measure, and the medication is based upon a liquid measure, ml. The number of required milliliters can be calculated in one of two ways: by division or by proportion.

Procedure A *(DIVISION)*

Divide the required dosage, given in milligrams, by the number of milligrams per milliliter.

Since the recommended dosage for Bojangles is .16 mg, divide this amount by the number of milligrams per milliliter or

$$.16 \text{ mg} \div 10 \text{ mg/ml} = .016 \text{ ml.}$$

The resulting quotient of .016 ml is the amount of acepromazine to be administered to Bojangles.

Procedure B *(PROPORTION)*

Setting up the proportion gives

$$\frac{10 \text{ mg}}{1 \text{ ml}} = \frac{.16 \text{ mg.}}{x \text{ ml}}$$

Cross multiplication results in

$$x \text{ ml} \times 10 \text{ mg} = .16 \text{ mg} \times 1 \text{ ml.}$$

Solving for x gives

$$x \text{ ml} = \frac{.16 \text{ mg} \times 1 \text{ ml}}{10 \text{ mg}}$$

$$x \text{ ml} = .016 \text{ ml.}$$

The amount of acepromazine required for Bojangles is .016 ml.

3. To determine the required amount of Nemex, Sadie's weight must be converted from standard measure (pounds) to metric measure (kilograms) using either division or proportion.

Procedure A *(DIVISION)*

One kilogram is approximately 2.2 pounds. Sadie's weight is 95 pounds. Therefore, divide 95 pounds by 2.2 pounds per kilogram or

$$95 \text{ pounds} \div 2.2 \text{ lbs/kg} = 43.2 \text{ kg.}$$

Procedure B *(PROPORTION)*

Setting up the proportion gives

$$\frac{1 \text{ kg}}{2.2 \text{ lbs}} = \frac{x \text{ kg}}{95 \text{ lbs}}.$$

Cross multiplication results in

$$x \text{ kg} \times 2.2 \text{ lbs} = 95 \text{ lbs} \times 1 \text{ kg.}$$

Solving for x gives

$$x \text{ kg} = \frac{1 \text{ kg} \times 95 \text{ lbs}}{2.2 \text{ lbs}}$$

$$x \text{ kg} = 43.2 \text{ kg.}$$

Sadie's equivalent metric weight is 43.2 kg.

The recommended dosage of Nemex is 5 mg/kg. Since Sadie's weight is 43.2 kg, multiply the weight by the required dosage or

$$43.2 \text{ kg} \times 5 \text{ mg/kg} = 216 \text{ mg.}$$

Therefore, 216 mg of medication is required. However, mg is a solid measure and the medication is based upon a liquid measure, ml. The number of required milliliters can be calculated in one of two ways: by division or proportion.

Procedure A *(DIVISION)*

Divide the recommended dosage, 216 mg, by the number of milligrams per milliliter, or

216 mg ÷ 50 mg/ml = 4.3 ml.

The resulting quotient of 4.3 ml is the amount of Nemex to be administered to Sadie.

Procedure B *(PROPORTION)*

Setting up the proportion gives

$$\frac{50 \text{ mg}}{1 \text{ ml}} = \frac{216 \text{ mg.}}{x \text{ ml}}$$

Cross multiplication results in

x ml X 50 mg = 216 mg X 1 ml.

Solving for x gives

$$x \text{ ml} = \frac{216 \text{ mg} \times 1 \text{ ml}}{50 \text{ mg}}$$

$$x \text{ ml} = 4.3 \text{ ml.}$$

The amount of Nemex required for Sadie is 4.3 ml.

4. To determine how long it will take to give 1000 ml of medication to Simon, you must first determine how many drops are in the bottle. If there are 1000 ml in the bottle, and each ml results in 15 drops, multiply the number of milliliters, 1000, by the number of drops per ml, 15, or

$$1000 \text{ ml} \times 15 \text{ drops/ml} = 15{,}000 \text{ drops.}$$

To determine the number of drops dispersed per hour, multiply the number of drops per minute, 20, by the number of minutes per hours, 60, or

$$20 \text{ drops/minute} \times 60 \text{ minutes/hour} = 1200 \text{ drops/hour.}$$

To determine the amount of time required to give the bottle of medication, divide the number of required drops, 15,000, by the rate per hour, 1200, or

$$15{,}000 \text{ drops} \div 1200 \text{ drops/hour} = 12.5 \text{ hours.}$$

It will take 12.5 hours to give the bottle of medication to Simon.

5. To determine the required amount of Cefadroxil, Rex's weight must be converted from standard measure (pounds) to metric measure (kilograms) using either division or proportion.

Procedure A *(DIVISION)*

One kilogram is approximately 2.2 pounds. Rex's weight is 10 pounds. Therefore, divide 10 pounds by 2.2 pounds per kilogram or

$$10 \text{ pounds} \div 2.2 \text{ lbs/kg} = 4.5 \text{ kg.}$$

Procedure B *(PROPORTION)*

Setting up the proportion gives

$$\frac{1 \text{ kg}}{2.2 \text{ lbs}} = \frac{x \text{ kg}}{10 \text{ lbs}}.$$

Cross multiplication results in

$$x \text{ kg} \times 2.2 \text{ lbs} = 10 \text{ lbs} \times 1 \text{ kg.}$$

Solving for x gives

$$x \text{ kg} = \frac{1 \text{ kg} \times 10 \text{ lbs}}{2.2 \text{ lbs}}$$

$$x \text{ kg} = 4.5 \text{ kg.}$$

The recommended dosage of Cefadroxil is 22 mg/kg. Since Rex's weight is 4.5 kg, multiply the weight by the required dosage or

$$4.5 \text{ kg} \times 22 \text{ mg/kg} = 99 \text{ mg.}$$

Therefore, 99 mg of medication are required, so, Rex will be getting one tablet per day.

Since the medication has been prescribed for 10 days, ten tablets are to be dispensed for Rex.

6. *PART A*

By examining the label, we see that each 100 ml of solution contains 160 mg of medication. Setting up a proportion to determine the number of mg per ml of solution gives

$$\frac{100 \text{ ml}}{160 \text{ mg}} = \frac{1 \text{ ml}}{x \text{ mg}}$$

Cross multiplication gives

$$x \text{ mg} \times 100 \text{ ml} = 160 \text{ mg} \times 1 \text{ ml}.$$

Solving for x gives

$$x \text{ mg} = \frac{160 \text{ mg} \times 1 \text{ ml}}{100 \text{ mg}}$$

$$x \text{ mg} = 1.6 \text{ mg}.$$

However, the question asks how may mg/cc are in this package. Recall from an earlier problem that 1 ml = 1 cc. Since there are 1.6 mg per ml of solution, there are also 1.6 mg/cc of solution.

The packet label also gives the number of mg/ml, which is 1.6. Substituting cc's for ml' s, we see that there are 1.6 mg/cc.

PART B

The instructions tell us that the medication is to be infused at a rate of 0.7 mg/kg/hr. Since the patient weighs 60 kg, multiply the hourly dose rate, 0.7mg/kg/hr, by the weight of the patient, 60 kg, or

$$0.7 \text{ mg/kg/hr} \times 60 \text{ kg} = 42 \text{ mg/hr}.$$

The number of mg the patient receives per hour is 42.

PART C

To determine the number of ml required to deliver the hourly rate of 42 mg, a proportion, based on the number of mg/ml , should be set up. Since 42 mg of medication are to be infused each hour, the proportion needed to solve the problem is

$$\frac{1\ \text{ml}}{1.6\ \text{mg}} = \frac{x\ \text{ml}}{42\ \text{mg}}.$$

Cross multiplication gives

$$x\ \text{ml} \times 1.6\ \text{mg} = 1\ \text{ml} \times 42\ \text{mg}.$$

Solving for x gives

$$x\ \text{ml} = \frac{1\ \text{ml} \times 42\ \text{mg}}{1.6\ \text{mg}}$$

$$x\ \text{ml} = 26\ \text{ml}.$$

The number of ml needed to deliver the 42 mg per hour is 26.