**Med-Math Problems**

1. Okay, this is not a med-math problem, but just as a warm up, how many seconds are in a day?

2. You are to give "gr 5 FeSO 4 " but the available bottle gives only the milligrams of iron sulfate per tablet (325 mg/tab). How many milligrams is the order for? (Yes, hard to believe, but this and several of the other problems below are ones I've actually encountered in my nursing practice—there are still some old-school doctors out there who haven't gone metric.)

3. You just opened a 500-mL bottle of guaifenesin and will be giving 1 tablespoon per dose. How many doses are in the bottle? In other words how many tablespoons are in 500 mL?

4. You give your home health patient an unopened 500-mL bottle of guaifenesin and tell them to take 2 teaspoons 4 times a day as ordered. They ask you how long the bottle will last.

5. Your order is for meperidine (Demerol) 35 mg, IM, STAT. Available is a 2-mL vial containing 50 mg/mL meperidine. On hand are 1mL and 3mL syringes. How much should you draw up into which syringe?

6. You are shadowing a nurse during a clinical who receives an order to adjust the infusion rate of a pump so that 1.6 mg of lidocaine are being delivered per minute. Hanging is a 100 mL piggyback containing 0.4 grams lidocaine, a 0.4% solution. Without writing anything down, the nurse tries to solve the problem on a calculator. After the fifth different and incorrect answer you find a piece of scratch paper and offer to show him how to set up the problem. He assures you he can always do problems like this on tests, but admits that at the moment his brain doesn't seem to be working. How would you set up and explain the problem to him?

7. On your first day of clinicals at a long-term care facility you are caring for a resident receiving total enteral feeding through a PEG tube. He is receiving 60 mL Jevity per hour as ordered when the pump fails and no other pumps are available. His over-extended regular nurse hangs drip tubing, adjusts the drip rate to something that "looks about right," and rushes on to her next demand. You decide to adjust the drip rate accurately to give the ordered amount. What do you need to know to do so?

8. Your hospice patient is on a double pump. One side is running NS at 30mL/hr TKO, and the other has a 100mL bag containing 2 mg morphine sulfate (MS) running at 5mL/hr for pain management. She begins to show signs of breakthrough pain and her doctor orders 0.2 mg MS STAT. You would normally use a prefilled syringe containing 1 mg/1 mL MS and give 0.2 mL IV push, but on looking in the narcotic cabinet you find none available and the pharmacy is closed. It occurs to you that you could reset the pump to deliver 0.2 mg MS in 5 minutes, then go back to 5 mL/hr. At what rate should you set the pump?

9. A textbook on clinical calculations includes the following conversion for household to metric: 1 teaspoon = 5 mL = 5 g. As a home health nurse you need to help a client make homemade pediatric electrolyte solution using the following recipe: 1 L boiled water, 30 g sugar, 1.5 g salt, 2.5 g lite salt (KCl), 2.5 g baking soda. Since only kitchen measuring cups and spoons are available you need to convert from metric. The answer, according to the textbook, is 1 qt boiled water, 2 tbsp sugar, 1/4 tsp salt, 1/2 tsp lite salt, and 1/2 tsp baking soda. What questionable assumption does the textbook make?

10. In another textbook you are given the following example: The order is for Chloromycetin 300 mg IV bolus via saline lock. Label: Chloromycetin 1 g. Directions: Reconstitute with 10 mL sterile water for injection to yield 100 mg/mL. How may mL of Chloromycetin should be administered? Equivalents: 1 g = 10 mL, 1000 mg = 1 g

300 mg x   1 g        x 10 mL = 3 mL                  1000 mg      1 g

While the answer "3" happens to be right, the set up is not. What error did the textbook make?

11. How would you prepare 2 L of 3% sodium hypochlorite (bleach) and water solution? You have only a measuring cup.

12. In a home setting, how would you prepare 1 L (or so) of normal saline (0.9% NaCl) using water and table salt if you have only a measuring cup and a teaspoon? On hand is an unopened 1 lb box of salt.

13. You have an order to infuse 1000 mL of D5W (5% Dextrose in water) IV over a period of 5 hr. No pump is available, but the tubing set package notes that the drop factor is 10 gtt/mL. How would you adjust the drip rate?

14. The order is for meperidine 60 mg and atropine gr 1/150, IM. The meperidine on hand is 100 mg/mL and the atropine is 0.4 mg/mL. The two are compatible so you plan to draw up both in the same syringe. How much of each will you draw up?

15. Tagamet is ordered 200 mg, IV, q6hr. Available is Tagamet 300 mg in a 2 mL vial of aqueous solution. You are to dilute a portion of this in 100 mL NS and infuse over 20 minutes using a Buretrol with a drop factor of 60 gtt/mL. How much Tagamet will you inject into the Buretrol, and what will the drip rate be?

16. The order is for amoxicillin 60 mg, po, tid for a child weighing 13 lb. The pediatric dosage range is 20-40 mg/kg/day in three equal doses. Is the dose safe?

17. A child with severe poison ivy weighs 25 kg and Benadryl PO 5 mg/kg/day is ordered q6h. Benadryl is available as a 12.5 mg/5 mL solution. What dose should be given?

18. You are to infuse heparin 25000 U in 250 mL NS at 10.6 mL/hr. What is the concentration of heparin solution? When you clear the pump you note that 67 mL have been infused. How much heparin has been given?

19. Your patient weighs 143 lb, and you are ordered to infuse 250 mg dobutamine in 500 mL NS at 10 mcg/kg/min. How many milligrams of dobutamine will infuse per hour?

20. Phenobarbital 180 mg/m 2 /24 hours given every eight hours is ordered for a child whose BSA (body surface area) is 0.29 m 2 . How much will each dose be?

21. You are to give Lidocaine 30 mcg/kg/min to a child weighing 55 lb. The piggyback contains 120 mg Lidocaine in 100 mL NS. At what rate will you set the pump?

22. Nipride is ordered and you are to titrate to maintain the systolic blood pressure at 150 mm Hg. Available is Nipride 50 mg/250 mL. The range is 3-6 mcg/kg/min. A microdrip chamber (60 gtt/mL) is used with a pump. Your patient weighs 135 lb.

     • What is the concentration of the solution in mcg/mL?

     • How many mcg/min, lower and upper range, could be administered?

     • Within what range will the pump rate be set?

     • What is the titration factor in mcg/gtt?

     • The patient's systolic BP is currently 170 mm Hg while receiving the low range dose. If you increase the gtt/min by 5 gtt, how many mcg/min will the patient be receiving?

     • After 1 hr, the systolic blood pressure is 120 mm Hg, so you decrease the gtt/min by 6 gtt. How many mcg/min is the patient now receiving?

23. How would you prepare 500 mL of a 1:35 bleach solution from a 1:10 bleach solution using water?

24. Dr. Kissoff, wishing to test your perspicacity, orders 1.9 milliscruples of Morphine IV for each stone of body weight to be administered over a 300-minute period. Available is 1 gill of Morphine (MS) solution having a concentration of 0.4 pennyweights of Morphine dissolved in 1000 drachms of solution. The patient weighs 79 kilograms. At what rate should you set the pump? Your drug guide says that 0.8 to 10 mg of morphine can be given per hour. Is the ordered dose safe? (Yes, all the units of measure are real, if seldom used, but the point is you don't even have to know what the units are, just how to get from what you are given to what you want to know. See the long list of [Conversion factors](http://www.alysion.org/dimensional/conversions.htm) for clues, then use the Back button on your browser to return.)

25. You have come down with a bad case of the geebies, but fortunately your grandmother has a sure cure. She gives you an eyedropper bottle labeled:

*Take 1 drop per 15 lb of body weight per dose four times a day until the geebies are gone. Contains gr 8 heebie bark per dr 100 solvent. 60 drops=1 tsp.*

You weigh 128 lb, and the 4-oz bottle is half-full. You test the eyedropper and find there are actually 64 drops in a teaspoon. You are going on a three-week trip and are deeply concerned that you might run out of granny's geebie tonic. Do you need to see her before leaving to get a refill?