

ANSWERS

NOTE

Calculations may be performed using formula method, ratio and proportion, or dimensional analysis.

$$1. \quad 200 \text{ mg} : 5 \text{ mL} = 300 \text{ mg} : x \text{ mL}$$

or

$$\frac{300 \text{ mg}}{200 \text{ mg}} \times 5 \text{ mL} = x \text{ mL}$$

Answer: 7.5 mL

$$2. \quad 333 \text{ mg} : 1 \text{ tab} = 666 \text{ mg} : x \text{ tab}$$

or

$$\frac{666 \text{ mg}}{333 \text{ mg}} \times 1 \text{ tab} = x \text{ tab}$$

Answer: 2 delayed-release tabs

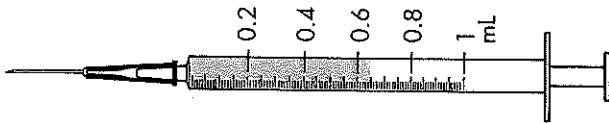
3. a. Tablets B: Septra DS.

b. The prescriber's order indicates DS, which means double strength; therefore the client should be given the tabs that are labeled DS.

$$4. \quad 10,000 \text{ units} : 1 \text{ mL} = 6,500 \text{ units} : x \text{ mL}$$

or

$$\frac{6,500 \text{ units}}{10,000 \text{ units}} \times 1 \text{ mL} = x \text{ mL}$$



Answer: 0.65 mL

5. Conversion is required. Equivalent: 1,000 mg = 1 g

Therefore 0.75 g = 750 mg

$$400 \text{ mg} : 40 \text{ mL} = 750 \text{ mg} : x \text{ mL}$$

or

$$\frac{750 \text{ mg}}{400 \text{ mg}} \times 40 \text{ mL} = x \text{ mL}$$

Answer: 75 mL

$$6. \text{ a. } 50 \text{ mg} : 10 \text{ mL} = 75 \text{ mg} : x \text{ mL}$$

or

$$\frac{75 \text{ mg}}{50 \text{ mg}} \times 10 \text{ mL} = x \text{ mL}$$

Answer: 15 mL

b. 1. Determine mL/hr.

$$x \text{ mL/hr} = \frac{1,000 \text{ mL}}{6 \text{ hr}}; x = 166.6 = 167 \text{ mL/hr}$$

2. Use formula and determine gtt/min.

$$x \text{ gtt/min} = \frac{167 \text{ mL} \times 10 \text{ gtt/mL}}{60 \text{ min}};$$

$$x = 27.8 = 28 \text{ gtt/min}; 28 \text{ macrogtt/min}$$

NOTE

Problem 6 could also be done by using the shortcut method illustrated in Chapter 22.

7. Convert weight in pounds to kilograms. Equivalent:

$$2.2 \text{ lb} = 1 \text{ kg}$$

$$\text{Therefore } 110 \text{ lb} \div 2.2 = 50 \text{ kg}$$

$$50 \text{ kg} \times 1 \text{ mg/kg} = 50 \text{ mg}$$

Answer: 50 mg

8. Conversion is required. Equivalent: 1,000 mg = 1 g

$$\text{Therefore } 0.3 \text{ g} = 300 \text{ mg}$$

$$150 \text{ mg} : 1 \text{ tab} = 300 \text{ mg} : x \text{ tab}$$

or

$$\frac{300 \text{ mg}}{150 \text{ mg}} \times 1 \text{ tab} = x \text{ tab}$$

Answer: 2 tabs

9. a. 95 mg per mL (Vial is 1 g.)

b. Conversion is required. 1,000 mg = 1 g

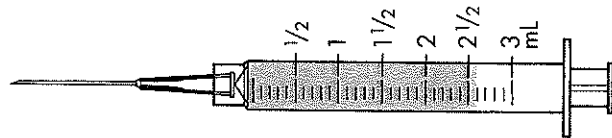
$$\text{Therefore } 0.25 \text{ g} = 250 \text{ mg}$$

$$95 \text{ mg} : 1 \text{ mL} = 250 \text{ mg} : x \text{ mL}$$

or

$$\frac{250 \text{ mg}}{95 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

Answer: 2.63 mL = 2.6 mL



10. Answer: 3 tabs (one 2 mg tab and two 0.5 mg tabs)

$$\text{Total} = 3 \text{ mg} (2 \text{ mg tab} + 1 \text{ mg} = 3 \text{ mg})$$

Administer the least number of tablets to the client.

11. Step 1: Determine mL/hr.

$$x \text{ mL/hr} = \frac{250 \text{ mL}}{3 \text{ hr}}; x = 83.3 = 83 \text{ mL/hr}$$

Step 2: Calculate gtt/min.

$$x \text{ gtt/min} = \frac{83 \text{ mL} \times 20 \text{ gtt/mL}}{60 \text{ min}}$$

$$x = 27.6 = 28 \text{ gtt/min}$$

Answer: 28 macrogtt/min; 28 gtt/min

The shortcut method could also have been used to do the problem.

$$12. x \text{ gtt/min} = \frac{100 \text{ mL} \times 10 \text{ gtt/mL}}{45 \text{ min}}$$

$$x = 22.2 = 22 \text{ gtt/min}$$

Answer: 22 macrogtt/min; 22 gtt/min

$$13. \frac{1,000 \text{ } \mu\text{L}}{60 \text{ } \mu\text{L/hr}} = 16.66$$

$$60 \text{ min} = 1 \text{ hr}$$

$$60 \text{ min/hr} \times 0.66 \text{ hr} = 39.6 = 40 \text{ min}$$

Answer: 16 hr + 40 min

14. No weight conversion required. Weight is stated in kg.

$$6 \text{ mg/kg/day} \times 12 \text{ kg} = 72 \text{ mg/day}$$

$$12 \text{ mg/kg/day} \times 12 \text{ kg} = 144 \text{ mg/day}$$

$$\text{Divided dosage: } 72 \text{ mg/day} \div 2 = 36 \text{ mg q12h}$$

$$144 \text{ mg/day} \div 2 = 72 \text{ mg q12h}$$

The safe dosage range is 72-144 mg/day.

The divided dosage is 36-72 mg q12h.

Answer: The prescriber ordered 60 mg q12h. The dosage is safe (60 mg \times 2 = 120 mg); it falls within the safe dosage range.

$$15. \frac{100 \text{ } \mu\text{L}}{50 \text{ } \mu\text{L/hr}} = 2 \text{ hr}$$

a. 2 hr

b. 12 noon or 12 PM (10:00 AM and 2 hours);
military time: 1200

16. Determine the dosage per hour.

$$10 \text{ mcg/min} \times 60 \text{ min} = 600 \text{ mcg/hr}$$

Convert mcg to mg to match solution.

1,000 mcg = 1 mg, therefore

$$600 \text{ mcg} = 0.6 \text{ mg}$$

Calculate mL/hr.

$$50 \text{ mg} : 250 \text{ mL} = 0.6 \text{ mg} : x \text{ mL}$$

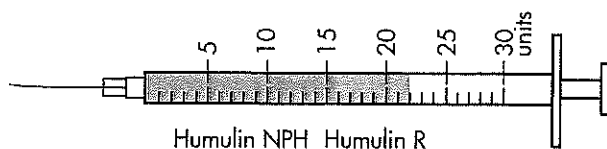
or

$$\frac{50 \text{ mg}}{250 \text{ mL}} = \frac{0.6 \text{ mg}}{x \text{ mL}}$$

$$x = 3 \text{ mL/hr}$$

Answer: To deliver 10 mcg/min, set the flow rate at 3 mL/hr (gtt/min).

17. 22 units (Humulin Regular 6 units + Humulin NPH 16 units)



18. a. 52 mL

$$b. x \text{ gtt/min} = \frac{55 \text{ mL} \times 60 \text{ gtt/mL}}{50 \text{ min}}$$

$$x = 66 \text{ gtt/min}$$

Answer: 66 microgtt/min; 66 gtt/min. The shortcut method could also have been used to do this problem.

c. 66 mL/hr (gtt/min with a microdrop = mL/hr)

$$19. \sqrt{\frac{102 \text{ (lb)} \times 51 \text{ (in)}}{3,131}} = \sqrt{1.66} = 1.288 = 1.29 \text{ m}^2$$

Answer: 1.29 m²

$$20. a. \sqrt{\frac{13.6 \text{ (kg)} \times 60 \text{ (cm)}}{3,600}} = \sqrt{0.226} = 0.475 = 0.48 \text{ m}^2$$

Answer: 0.48 m².

$$b. 0.48 \text{ m}^2 \times 500 \text{ mg/m}^2 = 240 \text{ mg}$$

Answer: 240 mg

$$c. 50 \text{ mg} : 1 \text{ mL} = 240 \text{ mg} : x \text{ mL}$$

or

$$\frac{240 \text{ mg}}{50 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

Answer: 4.8 mL. The dosage ordered is greater than the available strength; therefore you will need more than 1 mL to administer the dosage.

$$21. \frac{2}{5} \times 250 \text{ mL} = x \text{ mL}$$

$$\frac{500}{5} = x$$

$$x = 100 \text{ mL of Ensure Plus}$$

$$250 \text{ mL} - 100 \text{ mL} = 150 \text{ mL (water)}$$

Therefore, you would add 150 mL of water to 100 mL of Ensure Plus to make 250 mL 2/5-strength Ensure Plus.

22. Step 1: Calculate the normal daily dosage range.

$$40 \text{ mg/kg/day} \times 21.4 \text{ kg} = 856 \text{ mg}$$

$$50 \text{ mg/kg/day} \times 21.4 \text{ kg} = 1,070 \text{ mg}$$

The safe dosage range is 856-1,070 mg/day.

Step 2: Calculate the dosage infusing in 24 hr.

$$500 \text{ mg q12h} = (2 \text{ dosages})$$

$$500 \text{ mg} \times 2 = 1,000 \text{ mg in 24 hr}$$

Step 3: Assess the accuracy of the dosage ordered.

500 mg q12h (1,000 mg) falls within the 856-1,070 mg/day dosage range. Administer the medication as ordered.

23. 1 L = 1,000 mL; therefore 2 L = 2,000 mL

a. Dextrose: 5 g : 100 mL = x g : 2,000 mL

$$\frac{100x}{100} = \frac{10,000}{100}$$

or

$$\frac{5 \text{ g}}{100 \text{ mL}} = \frac{x \text{ g}}{2,000 \text{ mL}}$$

x = 100 g dextrose

b. NaCl: 0.225 g : 100 mL = x g : 2,000 mL

$$\frac{100x}{100} = \frac{450}{100}$$

or

$$\frac{0.225 \text{ g}}{100 \text{ mL}} = \frac{x \text{ g}}{2,000 \text{ mL}}$$

x = 4.5 g NaCl

NOTE

Remember, $\frac{1}{4}$ NS (sodium chloride) is written as 0.225.

24. Time remaining: 3 hr - 1.5 hr = 1.5 hr ($1\frac{1}{2}$)

Volume remaining: 500 mL - 175 mL = 325 mL

a. Step 1: Calculate mL/hr.

$$325 \text{ mL} \div 1.5 \text{ hr} = 216.6 = 217 \text{ mL/hr}$$

NOTE

In problem 24, in addition to determining mL/hr, another method could be used to determine the drop factor constant and then gtt/min calculated using the drop factor constant

25. Calculate the units/hr infusing.

$$500 \text{ mL} : 20,000 \text{ units} = 25 \text{ mL} : x \text{ units}$$

$$\frac{500x}{500} = \frac{500,000}{500}$$

$$x = 1,000 \text{ units/hr}$$

An IV of 500 mL containing 20,000 units of heparin infusing at 25 mL/hr is administering 1,000 units/hr.

26. a. 50 mg : 1 mL = 25 mg : x mL

or

$$\frac{25 \text{ mg}}{50 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

$$x = 0.5 \text{ mL}$$

b. 25 mg : 1 min = 25 mg : x min

$$\frac{25x}{25} = \frac{25}{25} = 1$$

$$x = 1 \text{ min}$$

27. 80 mg : 250 mL = x mg : 20 mL

$$\frac{250x}{250} = \frac{1,600}{250} = 6.4$$

$$x = 6.4 \text{ mg/hr}$$

Step 2: Calculate the gtt/min.

$$x \text{ gtt/min} = \frac{217 \text{ mL} \times 10 \text{ gtt/mL}}{60 \text{ min}}$$

$$x = \frac{217 \times 1}{6} = \frac{217}{6}$$

$$x = 36 \text{ gtt/min}; 36 \text{ macrogtt/min}$$

The IV rate would have to be changed to 36 gtt/min (36 macrogtt/min).

b. Step 3: Determine the percentage of change.

$$\frac{36 - 28}{28} = \frac{8}{28} = 0.285 = 29\%$$

c. Course of action: Assess the client, and notify the prescriber. This increase is greater than 25%. The order may have to be revised.

Alternate calculation without percents:

Ordered rate \pm (ordered rate \div 4) = acceptable IV readjustment rate

$$28 (28 \text{ macrogtt/min}) + (28 \div 4) = 28 + 7 = 35 \text{ gtt/min}; 35 \text{ macrodrop per min}$$

$$28 (28 \text{ macrogtt/min}) - (28 \div 4) = 28 - 7 = 21 \text{ gtt/min}; 21 \text{ macrodrop per min}$$

The safe range is 21 gtt/min (21 macrogtt/min) to 35 gtt/min (35 macrogtt/min). 36 macrogtt/min (36 gtt/min) is more than the acceptable range.

28. a. 5 mg : 1 mL = 25 mg : x mL

$$\frac{25 \text{ mg}}{5 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

$$x = 5 \text{ mL}$$

Alternate Solution

$$50 \text{ mg} : 10 \text{ mL} = 25 \text{ mg} : x \text{ mL}$$

or

$$\frac{25 \text{ mg}}{50 \text{ mg}} \times 10 \text{ mL} = x \text{ mL}$$

$$x = 5 \text{ mL}$$

This setup would yield the same answer of 5 mL.

$$b. \frac{5 \text{ mL}}{2 \text{ min}} = 2.5 \text{ mL/min}$$

29. 1,000 mg = 1 g

$$0.5 \text{ g} = 500 \text{ mg}$$

Answer: 40 tabs (2 tabs per dose \times 2 = 4 tabs;

4 tabs \times 10 days = 40 tabs)

$$30. 1,000 \text{ mcg} = 1 \text{ mg} \quad 0.375 \text{ mg} = 375 \text{ mcg}$$

- a. Give the client one 250-mcg tab and one 125-mcg tab.

$$\begin{array}{r} 250\text{-mcg tab} \\ + 125\text{-mcg tab} \\ \hline 375 \text{ mcg} \end{array}$$

- b. 2 tabs (one 250-mcg tab and one 125-mcg tab)
Give the least number of tablets without scoring.

$$31. 15 \text{ mcg} : 0.5 \text{ mL} = 12 \text{ mcg} : x \text{ mL}$$

or

$$\frac{12 \text{ mcg}}{15 \text{ mcg}} \times 0.5 \text{ mL} = x \text{ mL}$$

$$x = 0.4 \text{ mL}$$

32. a. No conversion necessary; use the dosage strength indicated on the label in mg (0.5 mg per 2 mL)

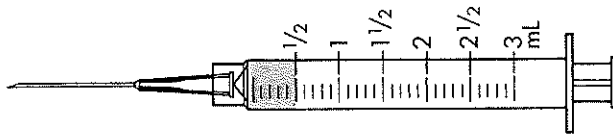
$$0.5 \text{ mg} : 2 \text{ mL} = 0.125 \text{ mg} : x \text{ mL}$$

or

$$\frac{0.125 \text{ mg}}{0.5 \text{ mg}} \times 2 \text{ mL} = x \text{ mL}$$

$$x = 0.5 \text{ mL}$$

b.



$$33. \text{ Convert weight: } 2.2 \text{ lb} = 1 \text{ kg}$$

$$242 \text{ lb} \div 2.2 = 110 \text{ kg}$$

$$a. 80 \text{ units/kg} \times 110 \text{ kg} = 8,800 \text{ units (bolus)}$$

$$b. 14 \text{ units/kg/hr} \times 110 \text{ kg} = 1,540 \text{ units/hr}$$

$$34. 20 \text{ units/kg/hr} \times 88 \text{ kg} = 1,760 \text{ units/hr}$$

$$35. a. 0.25 \text{ mg} : 1 \text{ mL} = 0.375 \text{ mg} : x \text{ mL}$$

or

$$\frac{0.375 \text{ mg}}{0.25 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

$$\text{Answer: } 1.5 \text{ mL}$$

$$b. 1.5 \text{ mL} : 5 \text{ min} = x \text{ mL} : 1 \text{ min}$$

$$5x = 1.5$$

$$x = 0.3 \text{ mL/min}$$

$$36. a. 10 \text{ mg} : 1 \text{ mL} = 8 \text{ mg} : x \text{ mL}$$

or

$$\frac{8 \text{ mg}}{10 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

$$\text{Answer: } 0.8 \text{ mL}$$

$$b. 10 \text{ mg} : 4 \text{ min} = 8 \text{ mg} : x \text{ min}$$

$$\frac{10x}{10} = \frac{32}{10}$$

$$x = 3.2 \text{ min}$$

NOTE

Any of the problems could also be done using the dimensional analysis or formula method.

$$37. \text{ Conversion is required. Equivalent: } 30 \text{ mL} = 1 \text{ oz}$$

$$\text{Total oz} = 18 \text{ oz}$$

$$18 \text{ oz} \times 30 = 540 \text{ mL}$$

$$540 \text{ mL (p.o.)} + 100 \text{ mL (IV)} = 640 \text{ mL}$$

$$\text{Answer: } 640 \text{ mL}$$

$$38. \text{ Step 1: Convert the client's weight to kilograms.}$$

$$\text{Equivalent: } 1 \text{ kg} = 2.2 \text{ lb}$$

$$187 \text{ lb} \div 2.2 = 85 \text{ kg}$$

Step 2: Calculate the heparin bolus dosage.

$80 \text{ units/kg} \times 85 \text{ kg} = 6,800 \text{ units}$. The client should receive 6,800 units IV heparin as a bolus.

Determine the volume (mL) the client would receive. The concentration of heparin is 1,000 units per mL.

$$1,000 \text{ units} : 1 \text{ mL} = 6,800 \text{ units} : x \text{ mL}$$

$$\frac{1,000x}{1,000} = \frac{6,800}{1,000}$$

$$x = \frac{6,800}{1,000}$$

$$x = 6.8 \text{ mL (bolus is 6.8 mL)}$$

Step 3: Calculate the infusion rate (18 units/kg/hr).

$18 \text{ units/kg/hr} \times 85 \text{ kg} = 1,530 \text{ units/hr}$. Determine the rate in mL/hr at which to set the infusion device using the concentration of 1,000 units per mL.

$$1,000 \text{ units} : 1 \text{ mL} = 1,530 \text{ units} : x \text{ mL}$$

$$\frac{1,000x}{1,000} = \frac{1,530}{1,000}$$

$$x = \frac{1,530}{1,000}$$

$x = 1.53 = 1.5 \text{ mL/hr}$ (not rounded to a whole number because the pump is capable of delivering in tenths of a mL)

The client's APTT is 43 sec. According to the protocol, rebolus with 40 units/kg, and increase the rate by 2 units/kg/hr.

Step 4: Calculate the dosage of heparin rebolus and the continuous infusion increase based on the APTT according to the protocol.

Calculate the dosage (units) of heparin rebolus.

$$40 \text{ units/kg} \times 85 \text{ kg} = 3,400 \text{ units}$$

Determine the volume (mL) to administer 3,400 units.

$$1,000 \text{ units} : 1 \text{ mL} = 3,400 \text{ units} : x \text{ mL}$$

$$\frac{1,000x}{1,000} = \frac{3,400}{1,000}$$

$$x = \frac{3,400}{1,000}$$

$$x = 3.4 \text{ mL (bolus)}$$

Now determine the infusion rate increase (2 units/kg/hr \times kg.)

$$2 \text{ units/kg/hr} \times 85 \text{ kg} = 170 \text{ units/hr}$$

The infusion rate should be increased by 170 units/hr.

Calculate the adjustment in hourly infusion rate (mL/hr).

$$1,000 \text{ units} : 1 \text{ mL} = 170 \text{ units} : x \text{ mL}$$

$$\frac{1,000x}{1,000} = \frac{170}{1,000}$$

$$x = \frac{170}{1,000}$$

$$x = 0.17 = 0.2 \text{ mL/hr}$$

The rate should be increased by 0.2 mL/hr.

Increase rate:

$$1.5 \text{ mL/hr (current rate)}$$

$$+ 0.2 \text{ mL/hr (increase)}$$

1.7 mL/hr (new infusion rate; not rounded to a whole number because pump is capable of delivering in tenths of a mL)

39. Calculate the dosage per hour using the upper and lower dosages.

$$4 \text{ mcg/min} \times 60 \text{ min/hr} = 240 \text{ mcg/hr}$$

$$12 \text{ mcg/min} \times 60 \text{ min/hr} = 720 \text{ mcg/hr}$$

Convert mcg/hr to match the available strength.

$$\text{Equivalent: } 1,000 \text{ mcg} = 1 \text{ mg}$$

$$240 \text{ mcg} = 0.24 \text{ mg}$$

$$720 \text{ mcg} = 0.72 \text{ mg}$$

Calculate rate in mL/hr for upper and lower dosage.

$$8 \text{ mg} : 1,000 \text{ mL} = 0.24 \text{ mg} : x \text{ mL}$$

$$\frac{8x}{8} = \frac{1,000 \times 0.24}{8}$$

$$\frac{8x}{8} = \frac{240}{8}$$

$$x = \frac{240}{8}$$

$$x = 30 \text{ mL/hr}$$

To infuse 4 mcg/min, set the infusion pump at 30 mL/hr.

$$8 \text{ mg} : 1,000 \text{ mL} = 0.72 \text{ mg} : x \text{ mL}$$

$$\frac{8x}{8} = \frac{1,000 \times 0.72}{8}$$

$$\frac{8x}{8} = \frac{720}{8}$$

$$x = \frac{720}{8}$$

$$x = 90 \text{ mL/hr}$$

To infuse 12 mcg/min, set the infusion pump at 90 mL/hr.

Dosage range of 4-12 mcg/min is equal to a IV flow rate of 30-90 mL/hr.

Set up a proportion to determine the incremental flow rate for a dosage rate change of 2 mcg/min

$$\frac{4 \text{ mcg/min}}{30 \text{ mL/hr}} = \frac{2 \text{ mcg/min}}{x \text{ mL/hr}}$$

$$\frac{4x}{4} = \frac{60}{4}$$

$$x = \frac{60}{4}$$

$$x = 15 \text{ mL/hr}$$

For each dosage change of 2 mcg/min, the incremental flow rate is 15 mL/hr.

Set up titration table.

Titration Table

Dosage Rate (mcg/min)	Flow Rate (mL/hr)
4 mcg/min (minimum)	30 mL/hr
6 mcg/min	45 mL/hr
8 mcg/min	60 mL/hr
10 mcg/min	75 mL/hr
12 mcg/min (maximum)	90 mL/hr

40. 1. Convert weight: Equivalent: 2.2 lb = 1 kg

$$127.2 \text{ lb} \div 2.2 = 57.8 \text{ kg}$$

2. $10 \text{ mcg/kg} \times 57.8 \text{ kg} = 578 \text{ mcg}$

Answer: 578 mcg

41. a. $75 \text{ mg} : 2 \text{ mL} = 32 \text{ mg} : x \text{ mL}$

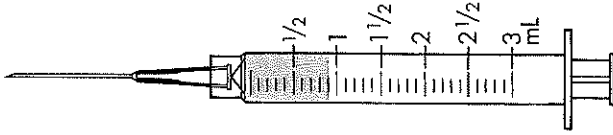
or

$$\frac{32 \text{ mg}}{75 \text{ mg}} \times 2 \text{ mL} = x \text{ mL}$$

$$x = 0.85 = 0.9 \text{ mL}$$

Answer: 0.9 mL

b.



42. $38 \text{ mg} : 1 \text{ mL} = 900 \text{ mg} : x \text{ mL}$

or

$$\frac{900 \text{ mg}}{38 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

$$x = 23.68 = 23.7 \text{ mL}$$

Answer: 23.7 mL

43. No conversion required.

$$\frac{1}{3} \times 180 \text{ mL} = x \text{ mL}$$

$$x = \frac{180}{3}$$

$$x = 60 \text{ mL}$$

Answer: You need 60 mL of solute (hydrogen peroxide) to prepare the desired solution (180 mL of 1/3 strength). The total to make is 180 mL. The amount of solvent needed, therefore, is:

$$180 \text{ mL} - 60 \text{ mL} = 120 \text{ mL (solvent/ normal saline).}$$

To make 180 mL of 1/3 strength hydrogen peroxide, mix 60 mL of full strength hydrogen peroxide and 120 mL of normal saline.

44. a. Morphine Sulfate 4 mg subcut q4h prn pain

b. Digoxin 0.375 mg p.o. daily (every day)

45. A conversion is required. Equivalent: 1,000 mg = 1 g

$$0.1 \text{ g} = 100 \text{ mg}$$

$$50 \text{ mg} : 1 \text{ tab} = 100 \text{ mg} : x \text{ tab}$$

or

$$\frac{100 \text{ mg}}{50 \text{ mg}} \times 1 \text{ tab} = x \text{ tab}$$

Answer: 2 tabs

46. $10 \text{ mg} : 1 \text{ mL} = 2.5 \text{ mg} : x \text{ mL}$

or

$$\frac{2.5 \text{ mg}}{10 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

a. Answer: 0.25 mL. The available dosage strength is more than the ordered dosage. Therefore the nurse would need less than 1 mL to administer the ordered dosage.

b.



47. Conversion is required. Equivalent: 1 g = 1,000 mg

$$1,550 \text{ mg} = 1.55 \text{ g}$$

$$3 \text{ g} : 8 \text{ mL} = 1.55 \text{ g} : x \text{ mL}$$

or

$$\frac{1.55 \text{ g}}{3 \text{ g}} \times 8 \text{ mL} = x \text{ mL}$$

$$x = \frac{12.4}{3} = 4.13 = 4.1 \text{ mL}$$

Answer: 4.1 mL; 4.13 rounded to the nearest tenth. The available dosage strength is more than the ordered dosage. Therefore the nurse will need less than 8 mL to administer the ordered dosage.

48. **Step 1:** Calculate each medication:

$$\text{Morphine: } 10 \text{ mg} : 1 \text{ mL} = 6 \text{ mg} : x \text{ mL}$$

or

$$\frac{6 \text{ mg}}{10 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

Answer: 0.6 mL (Morphine)

$$\text{Phenergan: } 50 \text{ mg} : 1 \text{ mL} = 20 \text{ mg} : x \text{ mL}$$

or

$$\frac{20 \text{ mg}}{50 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

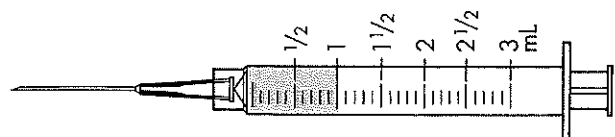
Answer: 0.4 mL (Phenergan)

a. Answer: 0.6 mL of Morphine is needed and 0.4 mL of Phenergan. The available strengths for both medications is more than the dosage ordered.

Therefore the nurse would need less than 1 mL to administer each medication.

Step 2: Add the two medications together to obtain the total volume.

$$\text{Morphine } 0.6 \text{ mL} + \text{Phenergan } 0.4 \text{ mL} = 1 \text{ mL.}$$



49. a. First convert the weight. Equivalent: $2.2 \text{ lb} = 1 \text{ kg}$
 $33 \text{ lb} \div 2.2 = 15 \text{ kg}$
 $2 \text{ mg/kg}/24 \text{ hr} \times 15 \text{ kg} = 30 \text{ mg}/24 \text{ hr}$
 $4 \text{ mg/kg}/24 \text{ hr} \times 15 \text{ kg} = 60 \text{ mg}/24 \text{ hr}$
 Answer: The dose ordered is safe:
 $15 \text{ mg} \times 3 = 45 \text{ mg}/24 \text{ hr}$
 $45 \text{ mg}/24 \text{ hr}$ falls within the safe dosage range of
 30 to 60 mg/24 hr.
- b. $25 \text{ mg} : 1 \text{ mL} = 15 \text{ mg} : x \text{ mL}$

or

$$\frac{15 \text{ mg}}{25 \text{ mg}} \times 1 \text{ mL} = x \text{ mL}$$

Answer: 0.6 mL. The available dosage strength is more than the ordered dosage. Therefore the nurse will need less than 1 mL to administer the ordered dosage.

Alternate Solution

$$50 \text{ mg} : 2 \text{ mL} = 15 \text{ mg} : x \text{ mL}$$

or

$$\frac{15 \text{ mg}}{50 \text{ mg}} \times 2 \text{ mL} = x \text{ mL}$$

This setup would net the same answer (0.6 mL).

- 50.
- Step 1:**
- Determine the BSA

$$m^2 = \sqrt{\frac{45 \text{ (kg)} \times 155 \text{ (cm)}}{3,600}} = \sqrt{\frac{6,975}{3,600}} = \sqrt{1.937}$$

$$\sqrt{1.937} = 1.391 = 1.39 \text{ m}^2$$

$$1.38 \text{ m}^2 \times \frac{1.5 \text{ mg}}{\text{m}^2} = 2.08 = 2.1 \text{ mg}$$

$$1.39 \text{ m}^2 \times \frac{2 \text{ mg}}{\text{m}^2} = 2.78 = 2.8 \text{ mg}$$

- a. Dosage not safe. 4 mg falls outside the range of 2.1 to 2.8 mg per (weekly) dose.
- b. Because the dosage is not safe, the milliliters to administer is not calculated, and the prescriber would be notified.
51. **Step 1:** Determine IV intake

$$75 \text{ mL/hr (7a-10a)} = 75 \text{ mL/hr} \times 3 \text{ hr} = 225 \text{ mL}$$

$$100 \text{ mL/hr (10a-12p and 1p-3p)} =$$

$$100 \text{ mL/hr} \times 4 \text{ hr} = 400 \text{ mL}$$

$$\text{Ampicillin } 100 \text{ mL (12p-1p)} =$$

$$100 \text{ mL} \times 1 \text{ hr} = 100 \text{ mL}$$

$$\text{Total IV intake} = 725 \text{ mL}$$

- Step 2:**
- Determine p.o. intake

$$\text{Cranberry juice } 6 \text{ oz} \times 1\frac{1}{2} = 9 \text{ oz}$$

$$\text{Tea } 8 \text{ oz} \times 2\frac{1}{2} = 20 \text{ oz}$$

$$\text{Gingerale } 12 \text{ oz} \times \frac{3}{4} = 9 \text{ oz}$$

$$\text{Broth } 6 \text{ oz} \times \frac{1}{2} = 3 \text{ oz}$$

$$\text{Ice cream } 4 \text{ oz}$$

$$\text{Total oz} = 45 \text{ oz}$$

$$\text{Convert oz to mL: Equivalent } 1 \text{ oz} = 30 \text{ mL}$$

$$45 \text{ oz} \times 30 = 1,350 \text{ mL}$$

$$\text{Step 3: IV intake } 725 \text{ mL} + \text{p.o. intake } 1,350 \text{ mL} = 2,075 \text{ mL}$$

$$\text{Answer: Total intake} = 2,075 \text{ mL}$$

$$\text{Step 4: Total output: } 375 \text{ mL} + 250 \text{ mL} + 400 \text{ mL} + 300 \text{ mL} = 1,325 \text{ mL}$$

$$\text{Answer: Total output: } 1,325 \text{ mL}$$

- 52.
- Step 1:**

No weight conversion required; weight is in kilograms.

Determine the number of units/hr based on client's weight in kilograms.

$15 \text{ units/kg/hr} \times 82 \text{ kg}$ requires 1,230 units/hr of heparin.

- Step 2:**

Calculate the IV rate in mL/hr that delivers the client's hourly dose of heparin.

$$25,000 \text{ units} : 250 \text{ mL} = 1,230 \text{ units} : x \text{ mL}$$

$$\frac{25,000x}{25,000} = \frac{307,500}{25,000}$$

$$x = \frac{307,500}{25,000}$$

$$x = 12.3 \text{ mL/hr}$$

Answer: 12.3 mL/hr will deliver the client's hourly dose of 1,230 units. The rate is stated in tenths; the pump is capable of delivering in tenths of a milliliter.

53. No weight conversion required; child's weight is in kilograms.

$$\text{Child's weight} = 32 \text{ kg}$$

Step 1: Determine the mL/day using the formula.

$$100 \text{ mL/kg/day} \times 10 \text{ kg} = 1,000 \text{ mL/day for first 10 kg}$$

$$50 \text{ mL/kg/day} \times 10 \text{ kg} = 500 \text{ mL/day for next 10 kg}$$

$$20 \text{ mL/kg/day} \times 12 \text{ kg} = 240 \text{ mL/day for remaining 12 kg}$$

$$\text{Total} = 1,740 \text{ mL/day or per 24 hr}$$

Answer: 1,740 mL/day or per 24 hr

Step 2: Determine mL/hr.

$$x \text{ mL/hr} = \frac{1,740 \text{ mL}}{24 \text{ hr}} = 72.5 \text{ mL/hr}$$

Answer: 72.5 mL/hr will deliver 1,740 mL/24 hr or per day. Pump capable of delivering in tenths of a milliliter.

54. **Step 1:** Weight conversion required. Convert weight to kilograms. Equivalent: 1 kg = 1,000 g

$$2,500 \text{ g} \div 1,000 = 2.5 \text{ kg}$$

Step 2: Select and apply appropriate formula.

$$100 \text{ mL/kg/day} \times 2.5 \text{ kg} = 250 \text{ mL/day or per 24 hr}$$

Answer: 250 mL/day or per 24 hr

Step 3: Determine mL/hr.

$$x \text{ mL/hr} = \frac{250 \text{ mL}}{24 \text{ hr}} = 10.41 = 10.4 \text{ mL/hr}$$

Answer: 10.4 mL/hr; 10.41 rounded to the nearest tenth of a milliliter. The pump is capable of delivering in tenths of a milliliter.

55. Weight conversion is required. Convert weight to kilograms. Equivalent: 2.2 lb = 1 kg

$$78 \text{ lb} \div 2.2 = 35.45 = 35.5 \text{ kg}$$

Step 1: Determine the mL/day using the formula.

$$100 \text{ mL/kg/day} \times 10 \text{ kg} = 1,000 \text{ mL/day for the first 10 kg}$$

$$50 \text{ mL/kg/day} \times 10 \text{ kg} = 500 \text{ mL/day for the next 10 kg}$$

$$20 \text{ mL/kg/day} \times 15.5 \text{ kg} = 310 \text{ mL/day for the remaining 15.5 kg}$$

$$\text{Total} = 1,810 \text{ mL/day or per 24 hr}$$

Step 2: Determine mL/hr

$$x \text{ mL/hr} = \frac{1,810 \text{ mL}}{24 \text{ hr}} = 75.4 \text{ mL/hr} = 75 \text{ mL/hr}$$

The pump is capable of delivering in whole mL; therefore mL/hr is rounded to a whole number.