

The left side of the slide features a decorative design consisting of several vertical stripes in various shades of green and light green. Below these stripes, there are several solid green circles of different sizes, some overlapping, creating a bubbly effect.

# **INTRAVENOUS CALCULATIONS, SOLUTIONS, AND EQUIPMENT**

**Calhoun Community College**

# WHAT DOES THE PHYSICIAN'S ORDER LOOK LIKE FOR IV THERAPY?


- Name of IV solution
- Name of any medications added if any
- Amount (volume) to be administered
- Time period during which the IV is to infuse  
– *not always written*

Example:

- IV of NS @ 125 mL/hr
- IV of NS 125 mL/hr for 8 hours
- IV of 1000 mL NS in 8 hours



# CALCULATING PERCENTAGE OF SOLUTE IN IV FLUIDS

- Amount of each ingredient in an IV fluid is already calculated and on the label (so you don't have to worry about memorizing or learning this)
  - Solution strength expressed as a percentage means “gram of drug per 100 mL of fluid”
    - Ex: 5% dextrose solution will have 5 g of dextrose in each 100 mL
- 

## IV FLOW RATE IN mL/H

- To regulate an IV volume by electronic infusion pump or controller calibrated in mL/h, calculate:

$$\frac{\text{Total amount of solution ordered (mL)}}{\text{Time in hours ordered to be administered}} = \text{___ mL/hr}$$

(Remember: *always rounded to a whole number*)

Order reads: D<sub>5</sub>W 250 mL IV over the next 2 h by infusion pump. Flow rate: \_\_\_\_\_ mL/h

Use formula: 
$$\frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \textit{Flowrate}$$

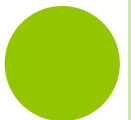
$$\frac{250 \text{ mL}}{2 \text{ h}} = 125 \text{ mL/h}$$



## IV FLOW RATE IN mL/H

- To regulate an IV volume by electronic infusion pump or controller calibrated in mL/h, calculate:
- *Order reads:* D<sub>5</sub>LR 1000 mL IV over the next 8 h.
- How many mL/hr will you infuse? \_\_\_\_\_
- Use the formula: 
$$\frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \textit{Flowrate}$$

$$\frac{1000 \text{ mL}}{8 \text{ hrs}} = 125 \text{ mL/hr}$$



## IV FLOW RATE IN mL/H

- *Order reads:* NS 0.9% 250 mL IV over the next 4 h .
- How many mL/hr will you infuse? \_\_\_\_\_
- Use the formula: 
$$\frac{\text{Total mL ordered}}{\text{Total h to infuse}} = \textit{Flowrate}$$

$$\frac{250 \text{ mL}}{4 \text{ hrs}} = 62.5 \text{ mL/hr}$$

Don't forget to round... 63 mL/hr



# IV FLOW RATE IN mL/H PRACTICE QUESTIONS

- **Order reads:** SW 2000 mL IV over the next 24 h  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** LR 600 mL IV over the next 6 h by  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** NS 0.9% 250 mL IV over the next 2 h  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** D<sub>5</sub>LR 1250 mL IV over the next 8 h  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** NaCl 0.45% 200 mL IV over the next 4 h  
How many mL/hr will your IV infuse? \_\_\_\_\_

# IV FLOW RATE IN mL/H PRACTICE QUESTIONS

## ANSWERS

- **Order reads:** SW 2000 mL IV over the next 24 h  
How many mL/hr will your IV infuse? 83.3 = 83 mL/h
- **Order reads:** LR 600 mL IV over the next 6 h by  
How many mL/hr will your IV infuse? 100 mL/h
- **Order reads:** NS 0.9% 250 mL IV over the next 2 h  
How many mL/hr will your IV infuse? 125 mL/h
- **Order reads:** D<sub>5</sub>LR 1250 mL IV over the next 8 h  
How many mL/hr will your IV infuse? 165 mL/h
- **Order reads:** NaCl 0.45% 200 mL IV over the next 4 h  
How many mL/hr will your IV infuse? 50 mL/h



# IV FLOW RATE IN mL/H FOR INFUSION RATE OF 1 HOUR OR LESS

- When you need to calculate IV fluid *to be infused in less than one hour*, use the following formula:.

$$\frac{\text{Total mL ordered}}{\text{Total minutes ordered}} \times 60 \text{ min/h} = \text{mL/h}$$

*(Don't forget to round to a whole number 😊)*

- Order: Ampicillin 500 mg IV in 50 mL D<sub>5</sub><sup>1</sup>/<sub>2</sub>NS in 30 min by IV pump

$$\frac{50 \text{ mL}}{30 \text{ min}} \times 60 \text{ min/h} = \frac{50 \text{ mL} \times 60 \text{ min/h}}{\cancel{30 \text{ min}}^1} = 100 \text{ mL/h}$$



# IV FLOW RATE IN mL/H FOR INFUSION RATE OF 1 HOUR OR LESS

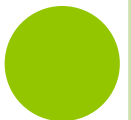
- Order: *Ancef 2 gm IVPB in 100 mL D<sub>5</sub>W in 1 hr*
- How many mL/hr will your IV infuse? \_\_\_\_\_
- Use the formula:  $\frac{\text{Total mL ordered}}{\text{Total min ordered}} \times 60 \text{ min/h} = \text{mL/hr}$

$$\frac{100 \text{ mL}}{60 \text{ min}} \times \cancel{60 \text{ min/hr}} = 100 \text{ mL/hr}$$



IV FLOW RATE IN mL/H  
FOR INFUSION RATE IS 1 HOUR OR LESS  
PRACTICE QUESTIONS

- **Order reads:** Ancef 1 gm IVPB in 50 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** Ceclor 250 mg IVPB in 100 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** Ancef 2 gm IVPB in 100 mL D<sub>5</sub>W in 45 min  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** Rocephin 1 gm IVPB in 200 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? \_\_\_\_\_
- **Order reads:** PCN 500 mg IVPB in 100 mL D<sub>5</sub>W in 20 min  
How many mL/hr will your IV infuse? \_\_\_\_\_



IV FLOW RATE IN mL/H  
FOR INFUSION RATE IS 1 HOUR OR LESS

**ANSWERS**

- **Order reads:** Ancef 1 gm IVPB in 50 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? 100
- **Order reads:** Ceclor 250 mg IVPB in 100 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? 200
- **Order reads:** Ancef 2 gm IVPB in 100 mL D<sub>5</sub>W in 45 min  
How many mL/hr will your IV infuse? 133
- **Order reads:** Rocephin 1 gm IVPB in 200 mL D<sub>5</sub>W in 30 min  
How many mL/hr will your IV infuse? 400
- **Order reads:** PCN 500 mg IVPB in 100 mL D<sub>5</sub>W in 20 min  
How many mL/hr will your IV infuse? 300



# CALCULATING IV FLOW RATE IN GTT/MIN

- The formula method to calculate IV flow rate for manually regulated IVs ordered in mL/h or for a prescribed number of minutes is:

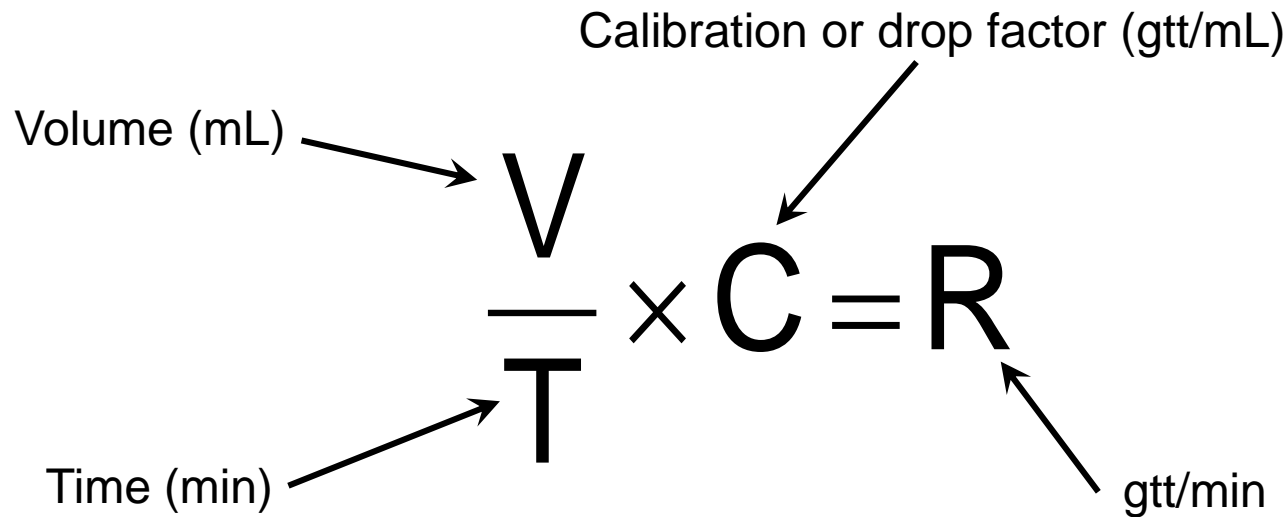
$$\frac{V}{T} \times C = R$$

Volume (mL) →  $V$

Time (min) →  $T$

Calibration or drop factor (gtt/mL) →  $C$

$R$  → gtt/min



# CALCULATING IV FLOW RATE IN GTT/MIN

## RULES TO REMEMBER

- Carry calculations to one decimal. Round gtt/min to the nearest whole number, because you can watch/count only whole drops.
- Step one: id the type of tubing and its calibration (found on the tubing package)
  - **Macrodrop tubing** – standard tubing used for general IV administration. Delivers **LARGE** drops, thus administers large amounts of fluid (10, 15, or 20 gtts equal 1 mL)
  - **Microdrop tubing** – delivers **tiny** drops used in critical care, pediatrics and in the elderly. Each 60 gtts equals 1 mL, therefore the number of gtts/min is equal to the number of mL/h (ex: 100 mL/hr = 100 micro gtts/min)
- Don't forget to label your answer... \_\_\_gtt/min



## CALCULATION OF GTT/MIN

- The physician orders: D<sub>5</sub>W IV @ 125 mL/h.
- The infusion set is calibrated for a drop factor of 10 gtt/mL.
- Calculate the IV flow rate in gtt/min. Notice that the mL cancel out, leaving *gtt/min*.

$$\frac{125 \text{ mL}}{60 \text{ min}} \times 10 \text{ gtt/mL} = \frac{125 \cancel{\text{ mL}}}{60 \text{ min}} \times \frac{10 \text{ gtt}^1}{1 \cancel{\text{ mL}}} = 20.8 \text{ gtt/min}$$

***Use your watch to count the drops and adjust the roller clamp to deliver 21 gtt/min.***



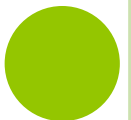
# CALCULATION OF GTT/MIN

- The physician orders: D<sub>5</sub>W IV @ 50 mL/h
- The infusion set is calibrated for a drop factor of 60 gtt/mL.
- Calculate the IV flow rate in gtt/min.

Use the formula:

$$\frac{V}{T} \times C = R$$

- $\frac{50 \text{ mL}}{60 \text{ min}} \times 60 \text{ gtt/mL} = 50 \text{ gtts/min}$





# CALCULATE IV FLOW RATE IN GTT/MIN

## PRACTICE QUESTIONS

- **Order reads: D 5 LR @ 100 mL/h**  
Drop factor is 15 gtt/mL  
Calculate the IV flow rate in gtt/min \_\_\_\_\_
- **Order reads: LR @ 100 mL/h**  
Drop factor is 20 gtt/mL  
Calculate the IV flow rate in gtt/min \_\_\_\_\_
- **Order reads: D 5 LR @ 30 mL/h**  
Drop factor is 15 gtt/mL  
Calculate the IV flow rate in gtt/min \_\_\_\_\_
- **Order reads: D 5 W NS @ 150 mL/h**  
Drop factor is 10 gtt/mL  
Calculate the IV flow rate in gtt/min \_\_\_\_\_



# CALCULATE IV FLOW RATE IN GTT/MIN

## ANSWERS

- **Order reads:** D 5 LR @ 100 mL/h  
Drop factor is 15 gtt/mL  
Calculate the IV flow rate in gtt/min 25
- **Order reads:** LR @ 100 mL/h  
Drop factor is 20 gtt/mL  
Calculate the IV flow rate in gtt/min 33
- **Order reads:** D 5 LR @ 30 mL/h  
Drop factor is 15 gtt/mL  
Calculate the IV flow rate in gtt/min 7.5
- **Order reads:** D 5 W NS @ 150 mL/h  
Drop factor is 10 gtt/mL  
Calculate the IV flow rate in gtt/min 25

