

Intermediate IV Practice Problems

Practice Problem 1

The doctor orders Rocephin 1g IVPB q 24 hours. On the shelf in the medication room there is Rocephin 1 g in 250ml of D₅W to be given over 1 hour. What is the flow rate?

What is the volume?

– answer 250 mL

What is the time?

– answer 1 hour

The formula $\frac{\text{volume}}{\text{time}} = \text{flowrate}$

$$\frac{250 \text{ mL}}{1 \text{ hr}} = \frac{\text{mL}}{\text{hr}}$$

– answer $\frac{250 \text{ mL}}{1 \text{ hr}} = 250 \frac{\text{mL}}{\text{hr}}$

Practice Problem 2

The doctor orders 1000mL D₅RL to run at 125 $\frac{\text{mL}}{\text{hr}}$. How long will this IV infusion run?

What is the volume?

– answer 1000 mL

What is the flow rate?

– answer 125mL/hr

rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$

– answer 8 hours

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$."

"The Volume is 1000mL and the flow rate is $125 \frac{\text{mL}}{\text{hr}}$ so $\frac{1000\text{mL}}{1} \times \frac{1\text{hour}}{125\text{mL}} = 8\text{hours}$ or $\frac{1000\text{mL}}{125 \frac{\text{mL}}{\text{hr}}}$
= 8 hours to infuse"

Practice Problem 3

The doctor orders 500mL of 0.45% NS with 20mEq of KCL to infuse over 8 hours. Calculate the flow rate.

What is the volume?

- answer 500 mL

What is the time?

- answer 8 hours

formula $\frac{\text{volume}}{\text{time}} = \text{flowrate}$

$$\frac{500\text{mL}}{8\text{hr}} = = \frac{\text{mL}}{\text{hr}}$$

$\frac{500\text{mL}}{8\text{hr}} = 62.5 \frac{\text{mL}}{\text{hr}}$. Remember to round up! Therefore, the flow rate will be $63 \frac{\text{mL}}{\text{hr}}$.

Let's add in something you learned about dose calculations in a previous module.

Practice Problem 4

The doctor orders IV heparin $1500 \frac{\text{units}}{\text{hr}}$. The pharmacy sends an IV bag labeled heparin 25,000 units in 250mL of D₅W. Calculate the EID flow rate for the dose ordered.

For this problem you have an added step that involves computing the correct dose of an ordered medication. To calculate the IV pump flow rate, you must use the doctor's order and the *given quantity* to determine the volume needed (*wanted quantity*) to deliver the correct dose.

What is the doctor's order?

- answer $1500 \frac{\text{units}}{\text{hr}}$

What is the given quantity or the dose on hand?

- answer $\frac{25,000 \text{units}}{250 \text{mL}}$

After two tries with incorrect answer, "The dose on hand is $\frac{25,000 \text{units}}{250 \text{mL}}$."

Now that you know the doctor's order and the dose on hand, you can figure out the flow rate by multiplying them.

- answer $15 \frac{\text{mL}}{\text{hr}}$

Box 4

If correct, "Correct!"

If incorrect, "Try again. Remember to set up your problem so that the unwanted units cancel

and the wanted units $\frac{\text{mL}}{\text{hr}}$ are left."

$$\text{flow rate is } \frac{1500 \text{units}}{1 \text{hr}} \times \frac{\cancel{250 \text{mL}}}{\cancel{25,000 \text{units}}} = \cancel{15} \frac{\text{mL}}{\text{hr}}."$$

Doctor's order quantity

Given Quantity

Conversion

Wanted

$$\frac{1500 \text{ units}}{\text{hr}}$$

$$\frac{250 \text{ mL}}{25,000 \text{ units}}$$

none

$$= \frac{37,5000}{25,000} = 15 \frac{\text{mL}}{\text{hr}}$$

would be the correct EID setting.

Practice Problem 5

The physician orders aminophylline $44 \frac{\text{mg}}{\text{hr}}$. The pharmacy sent an IV bag labeled: Aminophylline $\frac{1 \text{ g}}{250 \text{ mL NS}}$. Calculate the flow rate.

For this problem you have an added step that involves computing the correct dose of an ordered medication. To calculate the IV pump flow rate, you must use the doctor's order and the *given quantity* to determine the volume needed (*wanted quantity*) to deliver the correct dose.

What is the doctor's order?

– answer $44 \frac{\text{mg}}{\text{hr}}$

The doctor's order is $44 \frac{\text{mg}}{\text{hr}}$.

What is the given quantity or the dose on hand?

– answer $\frac{1 \text{ g}}{250 \text{ mL NS}}$

The dose on hand is $\frac{1 \text{ g}}{250 \text{ mL NS}}$.

Now that you know the doctor's order and the dose on hand, you can figure out the flow rate by multiplying them.

– answer $11 \frac{\text{mL}}{\text{hr}}$

Wanted units $\frac{\text{mL}}{\text{hr}}$ are left." "Hint: you will need an equivalent."

$$\text{flow rate is } \frac{44 \cancel{\text{mg}}}{1 \text{ hr}} \times \frac{250 \text{ mL}}{1 \cancel{\text{g}}} \times \frac{1 \cancel{\text{g}}}{1000 \cancel{\text{mg}}} = 11 \frac{\text{mL}}{\text{hr}}."$$

Physician order	Given Quantity	Equivalent	Wanted quantity
$\frac{44\text{mg}}{\text{hr}}$	$\frac{250\text{mL}}{1\text{g}}$	$\frac{1\text{g}}{1000\text{mg}}$	$= \frac{11,000}{1000} = 11 \frac{\text{mL}}{\text{hr}}$

Practice Problem 6

The nurse checks the IV pump and documents that the pump is set at and delivering $11 \frac{\text{mL}}{\text{hr}}$ and that the IV bag hanging is labeled: Aminophylline $\frac{1\text{g}}{250\text{ mL NS}}$. How many milligrams per hour is the patient receiving?

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{\text{mg}}{\text{hr}}$ are left.

What is the flow rate?

– answer $11 \frac{\text{mL}}{\text{hr}}$

“The flow rate is $11 \frac{\text{mL}}{\text{hr}}$.”

What is the given quantity or the dose on hand?

– answer $\frac{1\text{g}}{250\text{ mL NS}}$

“The dose on hand is $\frac{1\text{g}}{250\text{ mL NS}}$.”

Now that you know the flow rate and the dose on hand, you can figure out $\frac{\text{mg}}{\text{hr}}$.

– answer $44 \frac{\text{mg}}{\text{hr}}$

and the wanted units $\frac{\text{mg}}{\text{hr}}$ are left.” “Hint: you will need an equivalent.”

After two tries with incorrect answer, flow rate is :

$$\frac{mg}{hr} = \frac{11mL}{1hr} \times \frac{1g}{250mL} \times \frac{1000mg}{1g} = 44 \frac{mg}{hr}$$

Flow Rate

Given Quantity

Equivalent

Wanted quantity

$$\frac{11mL}{hr}$$

$$\frac{1g}{250mL}$$

$$\frac{1000mg}{1g}$$

$$= \frac{11 \cdot 1000}{250} = 44 \frac{mg}{hr}$$

Practice Problem 7

An IV of 1000mL of D₅W is infusing at 90 $\frac{mL}{hr}$. How long will it take to complete?

What is the volume?

– answer 1000 mL

What is the flow rate?

– answer 90mL/hr

After two tries with incorrect answer, “The flow rate is how much volume should be administered in a specific amount of time. Therefore, the flow rate is 90mL/hr.”

Now you can figure out how long the IV infusion will run by using the equation Volume x flow

rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$

– answer 11.11 hours or 11 hours and 7 minutes

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$.”

After two tries with incorrect answer, “The Volume is 1000mL and the flow rate is 90 $\frac{mL}{hr}$ so

$$\frac{1000mL}{1} \times \frac{1hour}{90mL} = 11.11hours \text{ or } \frac{1000mL}{90 \frac{mL}{hr}} = 11.11 \text{ hours to infuse.}$$

Remember the fractional hour $\frac{0.11hr}{1} \times \frac{60min}{1hr} = 6.6 \text{ min}$ so 11 hours and 7 minutes is the infusion time.

Practice Problem 8

Calculate the infusion time for an IV of 750mL RL ordered at a rate of $80 \frac{\text{mL}}{\text{hr}}$

What is the volume?

– answer 750 mL

After two tries with incorrect answer, “The volume is the total amount to be infused. Therefore, the volume is 750 mL.”

What is the flow rate?

– answer 80mL/hr

After two tries with incorrect answer, “The flow rate is how much volume should be administered in a specific amount of time. Therefore, the flow rate is 80mL/hr.”

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$

– answer 9.38 hours or 9 hours and 23 minutes

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time} ."$

After two tries with incorrect answer, “The Volume is 750 mL and the flow rate is $80 \frac{\text{mL}}{\text{hr}}$ so

$$\frac{750\cancel{\text{mL}}}{1} \times \frac{1\cancel{\text{hour}}}{80\cancel{\text{mL}}} = 9.38\text{hours} \text{ or } \frac{750\cancel{\text{mL}}}{80\cancel{\text{mL}}/\text{hr}} = 9.38 \text{ hours to infuse.}''$$

Remember the fractional hour $\frac{0.38\cancel{\text{hr}}}{1} \times \frac{60\cancel{\text{min}}}{1\cancel{\text{hr}}} = 22.8 \text{ min or } 23 \text{ min}$ so 9 hours and 23 minutes is the infusion time.

Practice Problem 9

A rate of $75 \frac{\text{mL}}{\text{hr}}$ is ordered for a total volume of 500mL D5W. Calculate the infusion time.

What is the volume?

– answer 500 mL

After two tries with incorrect answer, “The volume is the total amount to be infused. Therefore, the volume is 500 mL.”

What is the flow rate?

– answer 75mL/hr

After two tries with incorrect answer, “The flow rate is how much volume should be administered in a specific amount of time. Therefore, the flow rate is 75mL/hr.”

Now you can figure out how long the IV infusion will run by using the equation Volume x flow

rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$

– answer 9.38 hours or 9 hours and 23 minutes

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$.”

After two tries with incorrect answer, “The Volume is 500 mL and the flow rate is $75 \frac{\text{mL}}{\text{hr}}$ so

$$\frac{500\cancel{\text{mL}}}{1} \times \frac{1\text{hour}}{75\cancel{\text{mL}}} = 6.67\text{hours} \text{ or } \frac{500\cancel{\text{mL}}}{75\frac{\cancel{\text{mL}}}{\text{hr}}} = 6.67 \text{ hours to infuse.}”$$

Remember the fractional hour $\frac{0.67\cancel{\text{hr}}}{1} \times \frac{60\text{min}}{1\cancel{\text{hr}}} = 40.2 \text{ min or } 40 \text{ min}$ so 6 hours and 40 minutes is the infusion time.

Practice Problem 10

Calculate the infusion time of an IV with a total of 180ml left in the bag running at $25 \frac{\text{mL}}{\text{hr}}$

What is the volume?

– answer 180 mL

The volume is the total amount to be infused. Therefore, the volume is 180 mL.

What is the flow rate?

– answer 25mL/hr

The flow rate is how much volume should be administered in a specific amount of time. Therefore, the flow rate is 25mL/hr.

Now you can figure out how long the IV infusion will run by using the equation Volume x flow

rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$

– answer 7.2 hours or 7 hours and 12 minutes

Volume x flow rate = time or $\frac{\text{volume}}{\text{flowrate}} = \text{time}$."

The Volume is 180 mL and the flow rate is $25 \frac{\text{mL}}{\text{hr}}$ so $\frac{180\text{mL}}{1} \times \frac{1\text{hour}}{25\text{mL}} = 7.2\text{hours}$ or $\frac{180\text{mL}}{25 \frac{\text{mL}}{\text{hr}}} = 7.2$ hours to infuse."

Remember the fractional hour $\frac{0.2\text{hr}}{1} \times \frac{60\text{min}}{1\text{hr}} = 12\text{min}$ so 7 hours and 12 minutes is the infusion time.

Practice Problem 11

An IV of D₅LR is infusing at 150mL/hr. Calculate the manual infusion rate for macrodrip tubing calibrated at 10gtt/mL.

flow rate x drop factor x 1hr/60min = gtt/min

– answer 150mL/hr

What is the flow rate?

Remember the flow rate is how much volume should be administered in a specific amount of time. Therefore, the flow rate is 150mL/hr.

– answer 10gtt/mL

What is the drop factor?

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 10gtt/mL.

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 10gtt/mL.”

– answer 25gtt/min

Flow rate	drop factor		Conversion	
$\frac{150\text{mL}}{\text{hr}}$	x $\frac{10\text{gtt}}{\text{mL}}$	x	$\frac{1\text{hr}}{60\text{min}}$	= $\frac{10 \times 150}{60} = 25 \frac{\text{gtt}}{\text{min}}$

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{\text{gtt}}{\text{min}}$ are left.

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{\text{gtt}}{\text{min}}$ are left. The infusion rate is 25gtt/min.

Practice Problem 12

An antibiotic with a volume of 50mL is to infuse over 30 minutes. The minidrip tubing is calibrated at 60gtt/mL.

flow rate x drop factor x 1hr/60min = gtt/min

You are not given the flow rate so you must calculate it first.

What is the volume?

– answer 50 mL

After two tries with incorrect answer, “The volume is the total amount to be infused. Therefore, the volume is 50 mL.”

What is the time?

– answer 30 min

Remember, the time is how long the IV should take to infuse.

The time is how long the IV should take to infuse. Therefore, the time is 30 minutes or 0.5 hour.

Let’s now plug it into the formula $\frac{\text{volume}}{\text{time}} = \text{flow rate}$

– answer 100mL/hr

$$\frac{50\text{mL}}{0.5\text{hr}} = \frac{\text{mL}}{\text{hr}}$$

Remember, volume/time = flow rate (mL/hr).

After two tries with incorrect answer, “100 $\frac{\text{mL}}{\text{hr}}$ ”

What is the drop factor?

– answer 60 gtt/mL

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 60gtt/mL.

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 60gtt/mL.

Now that you know all the parts of the formula, you can solve for gtt/min.

– answer 100gtt/min

Flow rate	drop factor		Conversion	
$\frac{100mL}{hr}$	$\times \frac{60gtt}{mL}$	\times	$\frac{1hr}{60min}$	$= 100 \frac{gtt}{min}$

Try again. Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{gtt}{min}$ are left.”

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{gtt}{min}$ are left. The infusion rate is 100gtt/min.

Practice Problem 13

The doctor orders 500mL of ½ NS to infuse over 3 hours. Calculate the infusion rate in gtt/min using equipment calibrated at 20gtt/mL. Determine the number of drops that would infuse in 15 seconds.

$$\text{flow rate} \times \text{drop factor} \times 1hr/60min = \text{gtt/min}$$

You are not given the flow rate so you must calculate it first.

What is the volume?

– answer 500 mL

What is the time?

– answer 3 hours

Try again. Remember, the time is how long the IV should take to infuse.

The time is how long the IV should take to infuse. Therefore, the time is 3 hours.

Let’s now plug it into the formula $\frac{\text{volume}}{\text{time}} = \text{flowrate}$

– answer 167mL/hr

$$\frac{500mL}{3hr} = \frac{mL}{hr}$$

Remember, volume/time = flow rate (mL/hr).

167 $\frac{mL}{hr}$. Remember to round appropriately.

What is the drop factor?

– answer 20 gtt/mL

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 20gtt/mL.

Remember the drop factor indicates how many drops of fluid falling in the drip chamber are equal to one milliliter of fluid. Therefore, the drop factor is 20gtt/mL.

Now that you know all the parts of the formula, you can solve for gtt/min.

– answer 57gtt/min

Flow rate	drop factor	x	Conversion	=	
$\frac{167mL}{hr}$	$x \frac{20gtt}{mL}$		$x \frac{1hr}{60min}$		$= 56 \frac{gtt}{min}$

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{gtt}{min}$ are left.

Remember to set up your problem so that the unwanted units cancel and the wanted units $\frac{gtt}{min}$ are left. Also remember to round appropriately. The infusion rate is 56gtt/min.

Now you can solve for how many drops will infuse in 15 seconds. Remember the formula:

$$\text{infusion rate (gtt/min)} \times 1 \text{ min}/60\text{sec (conversion)} \times 15\text{sec}/1$$

– answer 14

Infusion rate	Conversion	x	time needed	=	Wanted Quantity
$56 \frac{gtt}{min}$	$x \frac{1min}{60sec}$		$x \frac{15sec}{1}$		14 gtt every 15 seconds

Remember to set up your problem so that the proper units cancel.

Approximately 14 drops should infuse every 15 seconds.