Calculating Infusion Rates in units/h
Given the Infusion Rate (mL/h)

If an IV fluid contains an additive and you need to calculate the rate of infusion of the additive in units/h given a rate of infusion in mL/h of the IV fluid you can do so by following the two steps shown in the yellow box below:

**Step 1:** Calculate the concentration of the additive in the IV fluid:

\[
\text{Concentration of Additive in IV fluid (units/mL)} = \frac{\text{Additive (units)}}{\text{Volume (mL)}}
\]

The concentration of the additive in the IV fluid will specify how many units of additive there are in every 1 mL of IV fluid.

**Step 2:** Calculate the rate of infusion of the additive in units/h by using:

\[
\text{Rate (units/h)} = \text{Rate (mL/h)} \times \text{Concentration of Additive (units/mL)}
\]

- The **Volume** refers to the total volume of fluid that must be infused in mL. This information can be found on the IV fluid order in the box called **Fluid Order***.
- The **Additive** refers to the number of units of the additive that is contained in the Volume of IV fluid to be infused. This information can be found in the box called **Additives***.

* Because there is no standard national Intravenous Fluid Treatment chart the names of the boxes on the charts you use may vary slightly in your training environment or workplace.
Example

Consider the Intravenous Fluid Treatment order for Ms Nada Salib. The infusion pump below the IV fluid order shows the current rate of infusion of the IV fluid in mL/h. Based on this infusion rate of the IV fluid how many units of heparin are being administered every 1 hour?

Overview of the Intravenous Fluid Treatment chart:

- The IV fluid order is valid as all of the required boxes have been filled in and the order is legible.
- Normal saline 500 mL has been ordered with 25,000 units of heparin as an additive.
- The time over which the infusion will run (Rate) will be subject to a protocol (which is not required for this example).
Performing the calculation - Step 1

The formulas in the yellow box above show you the sequence in which the calculation should be carried out. Firstly, you should calculate the concentration of the additive in the IV fluid.

From the IV fluid order identify the number of units of the additive and also the Volume of the IV fluid, ensuring that the Volume is specified in mL.

Additive = 25,000 units
Volume = 500 mL

Now substitute these values into the concentration formula (Step 1 in the yellow box above) to find out how many units of additive there are in every 1 mL of IV fluid:

\[
\text{Concentration (units/mL)} = \frac{\text{Additives (units)}}{\text{Volume (mL)}}
\]

\[
= \frac{25000}{500}
\]

Apply the 10 Rule and remove 2 zeros from the end of 25000 and 500 giving:

\[
= \frac{250}{5}
\]

\[
= 50
\]

Concentration = 50 units/mL

This means that for every 1 mL of IV fluid there are 50 units of heparin. In other words for every 1 mL of IV fluid the patient receives, 50 units of heparin will be administered.
Performing the calculation - Step 2

The current rate at which the IV fluid is being administered is shown on the image of the infusion pump and is 20 mL/h.

The values for the rate of infusion (mL/h) and concentration of the additive are now substituted into the formula in step 2 in the yellow box above to give the rate of infusion in units per hour:

\[
\text{Rate (units/h)} = \text{Rate (mL/h)} \times \text{Concentration of Additive (units/mL)}
\]

\[
= 20 \text{ mL/h} \times 50 \text{ units/mL}
\]

\[
= 1000 \text{ units/h}
\]

The patient is receiving 1000 units of heparin every 1 hour.