

Lab 4: Do calculations in this order (shown here /in the lab).

Report T & T_w values \rightarrow

$$\begin{matrix} T \\ T_w \end{matrix}$$

1st calculate e

$$e = e^*_{(T_w)} - \lambda (T - T_w)$$

$\lambda = 66 \text{ Pa } ^\circ\text{C}^{-1}$ (water)
 $\lambda = 582 \text{ Pa } ^\circ\text{C}^{-1}$ (ice)

For each calculation:

Know which temperature

e^* uses $\rightarrow T$ or T_w or T_d

$$r = \frac{(0.622) e}{P - e} \times 1000 \frac{\text{g}}{\text{kg}}$$

Understand how to read the notation:

$e^*_{(T_w)}$ $e^*_{(T)}$ $e^*_{(T_d)}$

$$v_{pd} = (e^*_{(T)} - e)$$

$e^*_{(T_w)}$ is the saturation vapour pressure (e^*) at the wet bulb temperature (T_w) $\rightarrow e^*_{(T_w)}$

$$RH = \frac{e}{e^*_{(T)}} \quad \left[\text{also } \frac{r}{r_s} = RH \right]$$

$e^*_{(T)}$ is the saturation vapour pressure (e^*) at the air temperature (T) $\rightarrow e^*_{(T)}$

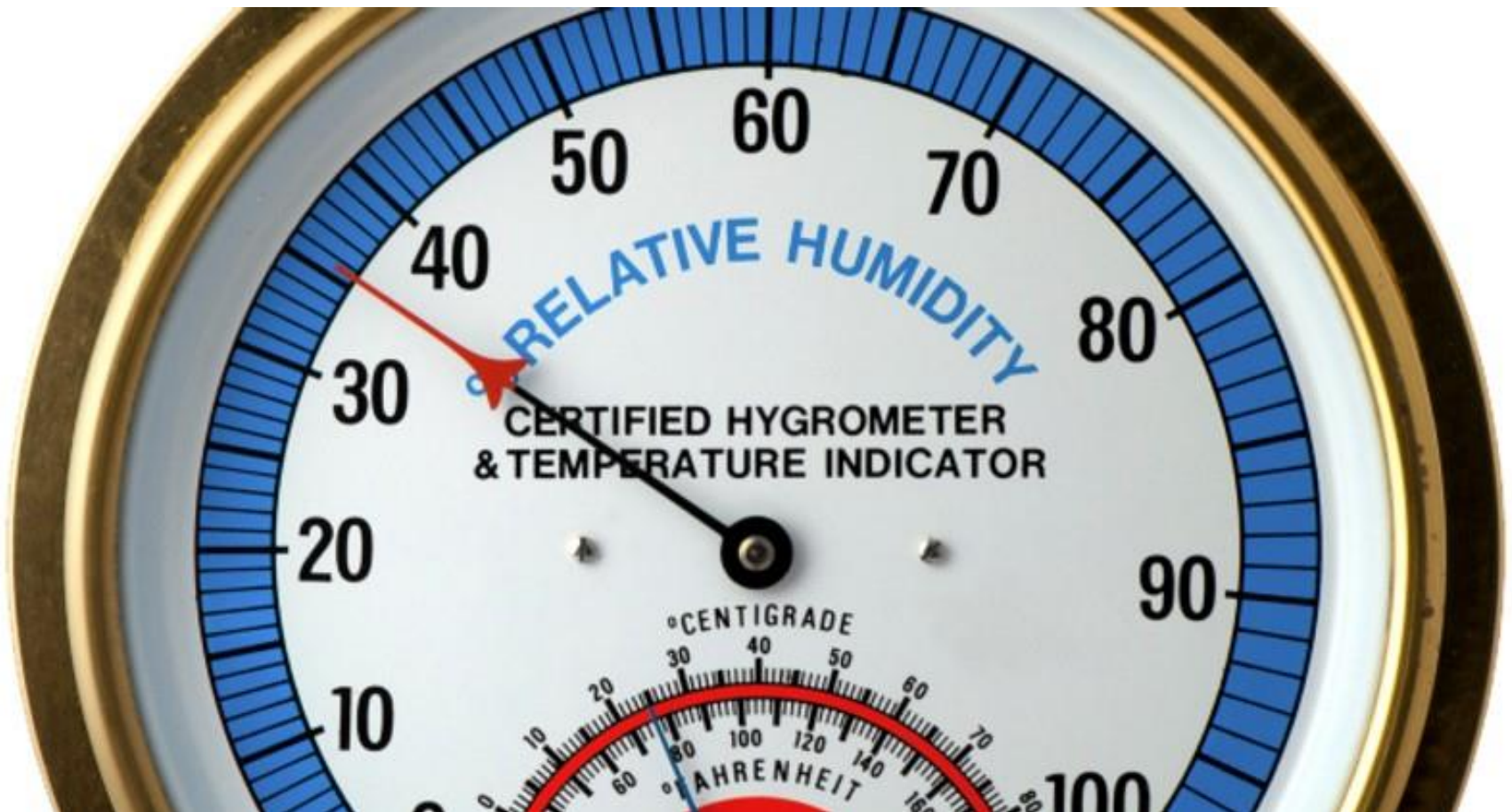
T_d - read from Saturation Vapour pressure curve. $e = e^*_{(T_d)}$

$e^*_{(T_d)}$ is the dew point temperature for e

$$e = \rho R_v T \quad \text{rearrange + solve for } \rho$$

Don't misunderstand & misuse RH.....

Don't Misunderstand or Misuse Relative Humidity (RH)



Don't misunderstand & misuse RH.....

How RH Changes → Reason 1:

Temperature changes when water vapour is the same.

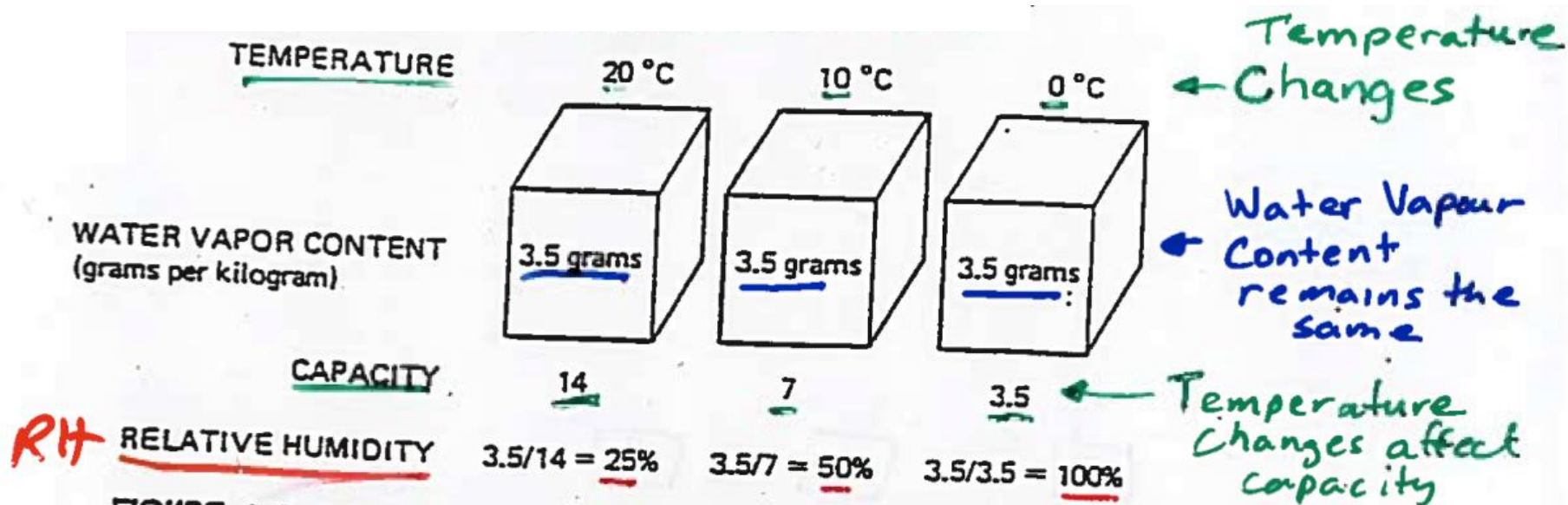


FIGURE 4-5 When the water vapor content (specific humidity) remains constant, the relative humidity may be changed by increasing or decreasing the air temperature. In this example the specific humidity remains at 3.5 grams per kilogram. The reduction in temperature from 20°C to 0°C causes a decrease in capacity and thus an increase in the relative humidity.

Don't misunderstand & misuse RH.....

How RH Changes → Reason 2:

Water vapour changes when temperature is the same.

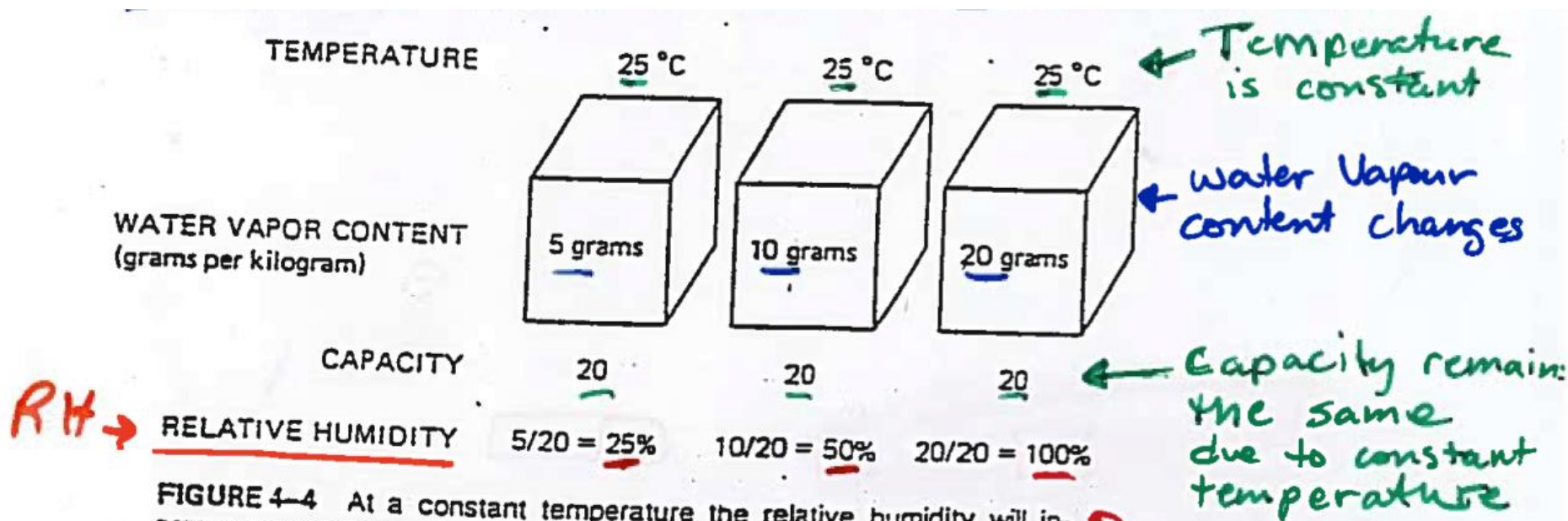


FIGURE 4-4 At a constant temperature the relative humidity will increase as water vapor is added to the air. Here, the capacity remains constant at 20 grams per kilogram and the relative humidity rises from 25 percent to 100 percent as the water vapor content increases.

RH →

RH changes due to water vapour content changes

So, only knowing RH has changed
doesn't indicate that atmospheric water
vapour (i.e. moisture) has changed.

This is because....

Relative humidity changes when:

Temperature changes and water vapour is the same.

Water vapour changes and temperature is the same.