X and Y

Temp (°C)	(mmHg) VP
21	18.65
22	19.83
23	21.07
24	22.38
25	23.76
26	25.21
27	26.74
28	28.35
29	30.04
30	31.82

(Y.) On a 86 °F, VP of H_2O is 20. mmHg.

a) $°F = (°C)(\frac{9}{5}) + 32$
$86 = (°C)(9/5) + 32$ } → **30. °C**

b) Relative Humidity:
at 30°C, VP of H_2O = 31.82 mmHg, if at saturation/equilibrium value.

$$\frac{20.\ mmHg}{31.82\ mmHg} = 0.62(85) \rightarrow \boxed{63\ \%}$$ humidity.

(c) Dew point: what temp must the air cool to, to be saturated w/ H_2O vapor, so that any colder temp can cause precipitation?

the Dew pt. is between 22 and 23°C... 22.14 °C if you interpolate and give too many SF

(X) Density of H_2O 1.00 g/mL } at 25°C
of Hg 13.6 g/mL

Atmospheric pressure = 735 mmHg..
if you used a water-barometer instead of a mercury barometer, column will be 13.6 times taller since H_2O is $\frac{1}{13.6}$ th as dense as Hg

$$(735\ mmHg)\left(\frac{13.6\ mmH_2O}{1\ mmHg}\right) = 9996\ mmH_2O$$

$$\rightarrow \underline{1.00 \times 10^3\ mmH_2O}$$

(b) But really the H_2O has vapor pressure so you dont have a perfect vacuum at the top of the column.. you have the vapor pressure from evaporated H_2O molecules at the top of column pushing on that surface.. causing the height to be slightly lower..

VP of H_2O at 25°C = 23.76 mmHg

$735 - 23.76 = 711$ mmHg difference between air and inside of column.

$$(711\ mmHg)\left(\frac{13.6\ mmH_2O}{1\ mmHg}\right) = 9673\ mmH_2O$$

$$\rightarrow \underline{9670\ mmH_2O}$$