2. $P_s = M_{col} \cdot g$

<u>Earth</u>: $M_{col} = \frac{P_s}{g} = \frac{1.013 \times 10^5 \text{ Pa}}{9.81 \text{ m/s}^2} = 1.033 \times 10^4 \text{ kg/m}^2$

CO_2 mass mixing ratio: $380 \times 10^{-6} \left(\frac{44}{28.96}\right) = 5.77 \times 10^{-4}$
(28.96 = mean molecular wt = 0.78(28) + 0.21(32) + 0.01(40))

So, the column mass of CO_2 is:

$M_{col}(CO_2) = 5.77 \times 10^{-4} (1.033 \times 10^4 \text{ kg/m}^2)$
$= 5.96 \text{ kg/m}^2$

<u>Mars</u>: $M_{col} = \frac{P_s}{g} = \frac{600 \text{ Pa}}{3.73 \text{ m/s}^2} = \underline{161} \text{ kg/m}^2$

CO_2 mass mixing ratio: ~ 0.95

So, the column mass is:

$M_{col}(CO_2) = 0.95 (161 \text{ kg/m}^2)$
$= 153 \text{ kg/m}^2$

$\therefore \frac{\text{Mars column } CO_2}{\text{Earth column } CO_2} = \frac{153 \text{ kg/m}^2}{5.96 \text{ kg/m}^2}$
$= \boxed{25.6}$

i.e., Mars has much more CO_2 in a vertical column than does Earth.