Water has a density of 1gcm^{-3} and condensed milk has a density of 1.5gcm^{-3}. A milk man mixed 100cm3 of water in 400cm-3. What is the density of milk mixed with water?

Solution.

$$\rho_w = 1\frac{g}{cm^3}, \rho_m = 1.5\frac{g}{cm^3}, V_m = 100cm^3 V_w = 400cm^3;$$

$$\rho - ?$$

The density of milk mixed with water is:

$$\rho = \frac{m}{V}.$$

The mass of the milk mixed with water is:

$$m = m_m + m_w.$$

The mass of the milk is:

$$m_m = \rho_m V_m.$$

The mass of the water is:

$$m_w = \rho_w V_w.$$

The volume of the milk mixed with water is:

$$V = V_m + V_w;$$

V_m - the volume of the milk;
V_w - the volume of the water.

The density of milk mixed with water is:

$$\rho = \frac{m_m + m_w}{V_m + V_w};$$

$$\rho = \frac{\rho_m V_m + \rho_w V_w}{V_m + V_w}.$$

$$\rho = \frac{1.5\frac{g}{cm^3}100cm^3 + 1\frac{g}{cm^3}400cm^3}{100cm^3 + 400cm^3} = 1.1\frac{g}{cm^3}.$$

Answer: The density of milk mixed with water is $\rho = 1.1\frac{g}{cm^3}$.