1.41

1.41 If 1 cup of cream having a density of 1005 kg/m^3 is turned into 3 cups of whipped cream, determine the specific gravity and specific weight of the whipped cream.

Mass of cream, $m = \left(1005 \frac{kg}{m^3}\right) \times (\forall_{cup})$

where $\forall$ ~ volume.

Since $m_{cream} = m_{\substack{whipped \\ cream}}$

$$\rho_{\substack{whipped \\ cream}} = \frac{m_{\substack{whipped \\ cream}}}{\forall_{3\ cups}} = \frac{\left(1005 \frac{kg}{m^3}\right) \forall_{cup}}{\forall_{3\ cups}}$$

$$= \frac{1005 \frac{kg}{m^3}}{3} = 335 \frac{kg}{m^3}$$

$$SG = \frac{\rho_{\substack{whipped \\ cream}}}{\rho_{H_2O\ @\ 4°C}} = \frac{335 \frac{kg}{m^3}}{1000 \frac{kg}{m^3}} = \underline{\underline{0.335}}$$

$$\gamma_{\substack{whipped \\ cream}} = \rho_{\substack{whipped \\ cream}} \times g = \left(335 \frac{kg}{m^3}\right)\left(9.81 \frac{m}{s^2}\right)$$

$$= \underline{\underline{3290 \frac{N}{m^3}}}$$