(35). Objective: $V = xyz$

Constraint: $x + 2y + 2z = 108$

$$F = xyz - \lambda(x + 2y + 2z - 108)$$

$$F_x = yz - \lambda = 0$$
$$F_y = xz - 2\lambda = 0$$
$$F_z = xy - 2\lambda = 0$$
$$F_\lambda = -(x + 2y + 2z - 108) = 0$$

Multiply F_x by x, F_y by y and F_z by z to conclude that

$$\frac{xyz}{\lambda} = x, \quad \frac{xyz}{\lambda} = 2y, \quad \frac{xyz}{\lambda} = 2z$$

and so $x = 2y = 2z$. As $x + 2y + 2z = 108$,

$$x = 2y = 2z = \frac{108}{3} = 36$$

It follows that $\underline{x = 36,\ y = 18,\ z = 18}$.

(36) $F = xyz - \lambda(5xy + 2xz + 2yz - C)$

$$F_x = yz - \lambda(5y + 2z) = 0$$
$$F_y = xz - \lambda(5x + 2z) = 0$$
$$F_z = xy - \lambda(2x + 2y) = 0$$
$$F_\lambda = -(5xy + 2xz + 2yz - C) = 0$$

Multiply the 1st eq. by x, 2nd by y and subtract: $\lambda(2yz - 2xz) = 0$,

$$2xz = 2yz, \quad \underline{x = y}$$

Multiply the 1st eq by x, 3rd by z and subtract:

$$5xy = 2yz, \quad \underline{5x = 2z}$$

Multiply the 2nd eq. by y, 3rd by z and subtract:

$$5xy = 2xz, \quad 5y = 2z$$

We get $x = y = \frac{2}{5}z$. So: $5\cdot\left(\frac{2}{5}z\right)^2 + 2\cdot\frac{2}{5}z\cdot z + 2\cdot\frac{2}{5}zz = C$,

$z^2 = \frac{5C}{12}$, $\boxed{z = \sqrt{\frac{5C}{12}},\quad x = \frac{2}{5}\sqrt{\frac{5C}{12}},\quad y = \frac{2}{5}\sqrt{\frac{5C}{12}}}$.