8. The centers of mass (with centimeters understood) for each of the five sides are as follows:

$$\begin{aligned}
(x_1, y_1, z_1) &= (0, 20, 20) && \text{for the side in the } yz \text{ plane} \\
(x_2, y_2, z_2) &= (20, 0, 20) && \text{for the side in the } xz \text{ plane} \\
(x_3, y_3, z_3) &= (20, 20, 0) && \text{for the side in the } xy \text{ plane} \\
(x_4, y_4, z_4) &= (40, 20, 20) && \text{for the remaining side parallel to side 1} \\
(x_5, y_5, z_5) &= (20, 40, 20) && \text{for the remaining side parallel to side 2}
\end{aligned}$$

Recognizing that all sides have the same mass m, we plug these into Eq. 9-5 to obtain the results (the first two being expected based on the symmetry of the problem).

(a)

$$x_{\text{com}} = \frac{mx_1 + mx_2 + mx_3 + mx_4 + mx_5}{5m} = \frac{0 + 20 + 20 + 40 + 20}{5} = 20\,\text{cm}$$

(b)

$$y_{\text{com}} = \frac{my_1 + my_2 + my_3 + my_4 + my_5}{5m} = \frac{20 + 0 + 20 + 20 + 40}{5} = 20\,\text{cm}$$

(c)

$$z_{\text{com}} = \frac{mz_1 + mz_2 + mz_3 + mz_4 + mz_5}{5m} = \frac{20 + 20 + 0 + 20 + 20}{5} = 16\,\text{cm}$$