The temperatures of equal masses of three different liquids A, B and C are 12°C, 19°C and 28°C respectively. The temperature when A and B are mixed is 16°C, and when B and C are mixed, it is 23°C. What will be the temperature when A and C are mixed?

Let S_A, S_B and S_C be the specific heat capacities of the liquids A, B and C respectively.

Given, $m_A = m_B = m_C = m$ (let)

Case 1: $m_A S_A (16-12) = m_B S_B (19-16)$ {By principle of calorimetry} — (1)

Case 2: $m_B S_B (23-19) = m_C S_C (28-23)$ {By principle of calorimetry}

or

$m_C S_C (5) = m_B S_B (4)$ — (2)

Dividing (1) by (2)

$$\Rightarrow \frac{(4) S_A}{(5) S_C} = \frac{(3)}{(5)}$$

$$\Rightarrow \boxed{\frac{S_A}{S_C} = \frac{3}{4}}$$

Case 3: $m_A S_A (T-12) = m_C S_C (28-T)$ {By principle of calorimetry}

$$\Rightarrow \frac{S_A}{S_C} = \frac{28-T}{T-12}$$

$$\Rightarrow \frac{3}{4} = \frac{28-T}{T-12}$$

$$\Rightarrow \boxed{T = 20.3^\circ C}$$