1. a) Whether or not it is advisable to touch a hot stovetop is a matter of **temperature**.

   b) The unit of **temperature** is Kelvin.

   c) Keeping a large house warm during winter requires a lot of **heat**.

   d) If you place a pot of cold water onto a hot stovetop, **heat** flows from the stovetop to the pot of water.

   e) When mixing water of 20 °C with water of 40 °C, after a while, the **temperature** of the water equalizes.

   f) An object can warm up by absorbing **heat**.

   g) If two objects of different temperatures touch, **heat** flows from one to the other.

2. a) Two hot bricks joined together have more **internal energy** than just one of them.

   b) Two hot bricks joined together have the same **temperature** as just one of them.

   c) An extremely hot brick contains a lot of **internal energy**.

   d) If **heat** is transferred into a brick it warms up.

3. a) it increases

   b) it decreases

   c) higher

   d) $\Delta U = W + Q = 230\text{ J} + (-\,170\text{ J}) = \underline{\underline{60\text{ J}}}$

4. a) their movement becomes more intense

   b) it rises

   c) the brick's potential energy is transformed into internal energy:
   $\Delta U = E_{\text{pot}} = m \cdot g \cdot h = 0.500\text{ kg} \cdot 9.81\,\frac{\text{m}}{\text{s}^2} \cdot 130\text{ m} = \underline{\underline{638\text{ J}}}$

   d) it decreases

   e) heat, flowing to the surrounding

5. a) $c_{\text{water}} = 4'182\ \frac{\text{J}}{\text{kg}\cdot\text{K}}$, $c_{\text{olive oil}} = 1'970\ \frac{\text{J}}{\text{kg}\cdot\text{K}}$

   b) In both – olive and water – the amount of *gained heat* is equal. Therefore the *increase in internal energy* is equal too for both. But the *specific heat capacity* of water is greater than the specific heat capacity of olive oil, therefore more energy is required for rising the water's temperature by 1K. Thus, the *increase in temperature* is less for water.

6. $\Delta U = c_{\text{water}} \cdot m \cdot \Delta T = 4'182\ \frac{\text{J}}{\text{kg}\cdot\text{K}} \cdot 200.0\ \text{kg} \cdot 15\ \text{K} = 12'546\ \text{kJ} = \underline{\underline{12.5\ \text{MJ}}}$

7. $m = \frac{\Delta U}{c \cdot \Delta T} = \frac{1'000'000\ \text{J}}{4'182\ \frac{\text{J}}{\text{kg}\cdot\text{K}} \cdot 87\ \text{K}} = 2.75\ \text{kg}$ $\quad \underline{\underline{2.75\ \ell}}$

8. $\Delta T = \frac{\Delta U}{c \cdot m} = \frac{88'000\ \text{J}}{4'182\ \frac{\text{J}}{\text{kg}\cdot\text{K}} \cdot 5.3\ \text{kg}} = 3.97\ \text{K}$ $\quad 22\ °\text{C} + 4.0\ \text{K} = \underline{\underline{26.0\ °\text{C}}}$

9. $m = \rho_{\text{aluminium}} \cdot V = 2.70 \cdot 10^3\ \frac{\text{kg}}{\text{m}^3} \cdot 37.4 \cdot (10^{-2}\ \text{m})^3 = 2.70 \cdot 10^3\ \frac{\text{kg}}{\text{m}^3} \cdot 37.4 \cdot 10^{-6}\ \text{m}^3 = 0.101\ \text{kg}$

   $\Delta U = c_{\text{aluminium}} \cdot m \cdot \Delta T = 896\ \frac{\text{J}}{\text{kg}\cdot\text{K}} \cdot 0.101\ \text{kg} \cdot 14\ \text{K} = 1'267\ \text{J} = \underline{\underline{1.3\ \text{kJ}}}$

10. $m = \rho_{\text{silver}} \cdot V = \rho \cdot \frac{4\pi}{3} \cdot r^3 = 10.51 \cdot 10^3\ \frac{\text{kg}}{\text{m}^3} \cdot \frac{4\pi}{3} \cdot (0.0174\ \text{m})^3 = 0.232\ \text{kg}$

   $\Delta T = \frac{\Delta U}{c \cdot m} = \frac{651\ \text{J}}{235\ \frac{\text{J}}{\text{kg}\cdot\text{K}} \cdot 0.232\ \text{kg}} = 11.94\ \text{K}$ $\quad 22.0\ °\text{C} + 11.94\ \text{K} = \underline{\underline{33.9\ °\text{C}}}$