1. The surface of a hot plate is made of 12.0 mm (0.012 m) thick aluminum and has an area of 64 cm$^2$ (which equals 0.0064 m$^2$). If the heating coils maintain a temperature of 80°C underneath the surface and the air temperature is 22°C, how much heat can be transferred through the plate in 60 s?

$-464000 \text{ J}$

2. A cast iron frying pan is 5.0 mm thick. If it contains boiling water (100°C), how much heat will be transferred into your hand if you place your hand against the bottom for two seconds? (Assume your hand has an area of 0.0040 m$^2$, and that body temperature is 37°C.)

$-8064 \text{ J}$

3. Suppose the attic in your home is insulated with 27 cm of insulation with an R-value of 22, and the total surface area of the roof is 75 m$^2$. During a 24-hour period, the temperature outside is −5.0°C, and the temperature inside is 21°C. How much heat is lost through the roof during that 24-hour period? (Note: 24 h = 86 400 s.)

$-7658181 \text{ J}$