Name: _____   Block: _____

Thermal Conductivity

1. The surface of a hot plate is made of 12.0 mm (0.012 m) thick aluminum and has an area of 64 cm² (which equals 0.0064 m²). 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?

$\boxed{-464\,000 \text{ J}}$

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 m², and that body temperature is 37°C.)

$\boxed{-8\,064 \text{ J}}$

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 m². 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.)

$\boxed{-7\,658\,181 \text{ J}}$