

### Answer on Question #39678, Physics, Mechanics

#### Question:

Calculate the amount of heat conducted in 45 min through an iron plate 5-cm thick and with an area of 2 sq m. The two sides are kept at 0°C and 60°C. (K<sub>fc</sub>=0.12)

#### Answer:

Amount of heat equals:

$$Q = \frac{K_{fc} A \Delta T}{d} t$$

where  $A$  is area,  $d$  is thickness,  $K_{fc}$  is thermal conductivity of iron,  $\Delta T$  is temperature difference,  $t$  is time.

Therefore:

$$Q = \frac{0.12 \frac{W}{K \cdot m} \cdot 2m^2 \cdot 60^\circ C}{0.05m} 45 \cdot 60s = 777600 W \cong 7.8 \cdot 10^5 W$$

(But it looks like mistake in thermal conductivity, because its value for iron is about 70 – 80  $\frac{W}{K \cdot m}$ . Then:

$$Q = \frac{75 \frac{W}{K \cdot m} \cdot 2m^2 \cdot 60^\circ C}{0.05m} 45 \cdot 60s \cong 5 \cdot 10^8 )$$