# Heat Energy Answers – NAT 5

**1)** a) i) Timer and thermometer.

Time interval and temperature change.

Conclusion which is definite.

b) Use a lid or insulate the mugs.

**2)** a) 5250J.

b) The players' ankle.

c) The coolant is changing state i.e it is melting from solid to liquid.

d) To reduce the heat energy transfer **from** the surrounding air.

**NOT** to reduce the heat energy transfer to the surrounding air.

**3)** a)

| Type of heat loss | Correct Insulation |
|---|---|
| Conduction | Double Glazing |
| Convection | Loft Insulation |
| Radiation | Foil-backed plasterboard |

b) i) Greatest 06:00

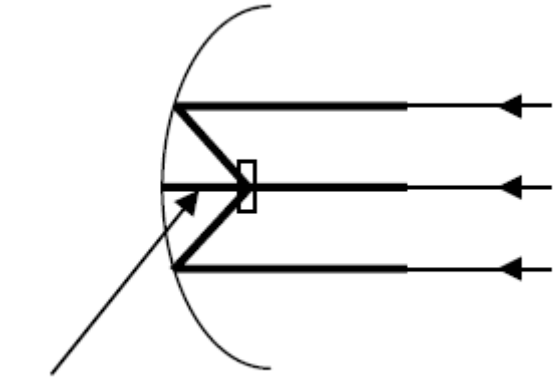
ii) Smallest 18:00

**4)** a) 142,000J

b) i) 600,000J.

ii) 0.2kg.

**5)** a)




b) $3.61 \times 10^{9}$J.

c) i) $3.16 \times 10^{9}$J.

ii) $3.95 \times 10^{3}$s.

iii) Heat energy is lost to the surrounding air **or** lost from the furnace **or** used to heat the container.

**6**) a) 899 $Jkg^{-1}{}^{\circ}C^{-1}$.

b) 18,000s.

c) 200 rocks.

d) It would be easier.

The weight of the rocks on Mercury is smaller than that on Earth.

**7)** a) i) $12^{\circ}C$.

ii) 108,000J

iii) 4,500$Jkg^{-1}{}^{\circ}C^{-1}$.

b) i) Measured value of $E_H$ is too large or $\Delta T$ is too small.

Heat energy is lost to the surrounding air or water is not heated evenly.

ii) Insulate beaker **or** use a lid **or** stir water or fully immerse the heater.

c) 360W.

**8)** a) $4.43 \times 10^{7}$J.

b) 77.7kg.

c) i) Any renewable source.

ii) One advantage and one disadvantage of the renewable source used above.

**9)** a) The pupil assumes that all of the electrical energy stored in the capacitor is converted into heat energy in the oil.

b) A lot of the energy supplied from the capacitor will be lost to the surrounding air and to container holding the oil as heat energy.

**10)** a) i) $E_H = 3.34 \times 10^{6}$J.

ii) t = 1340 seconds.

iii) Not all of the heat energy is used to heat the water.

b) I = 10.9A.

c) $E_H = 2.71 \times 10^{6}$J.