11 PHYSICS ATAR
ASSIGNMENT 4: HEATING AND COOLING

NAME: _____ **DUE DATE:** _____ **TOTAL:** ___/34

1. If, during summer, today's maximum temperature is 40.0 °C, and tomorrow's maximum temperature is 20.0 °C, is today twice as hot as tomorrow? Explain your answer.

(2)

2. Why are burns caused by steam more serious than those caused by boiling water?

(3)

3. Explain why a bench top in the Science laboratory feels cold when you first place your hand on it.

(2)

4. Why do you feel cold when, during a hot summer's day, you emerge from a pool or the ocean and a reasonably strong wind is blowing? Explain your answer.

(3)

5. Explain, using a clear diagram, how a strong land breeze forms over Perth during the summer.

(3)

6. During the winter, when Perth has clear and cold nights around 2-4 °C, Rottnest generally has a minimum around 14-16 °C. Explain why there is such a difference.

(3)

7. A 65.0 kg athlete transforms chemical energy at the rate of about 4.00×10^3 W during a 1500 m run. Assume all of this energy is converted into the internal energy of the body tissues.

   (a) What maximum rise in body temperature could be expected after completing the run in 4.00 minutes? (Take $c_{body} = 3.50 \times 10^3$ $Jkg^{-1}K^{-1}$)

(4)

(b) Would the athlete's body temperature rise by this amount? Explain your answer.

(2)

(c) What effect would a **high humidity** in the atmosphere have on the ability of the athlete to maintain a constant body temperature? Explain your answer.

(3)

8. A 125 g glass had 275 g of Coke placed into it. The temperature settled at 11.2 °C. A 30.0 g block of ice at -4.20 °C was taken from a freezer and placed into the Coke. Estimate the final temperature of the mixture.

(5)

9. A 2.30 kW electric kettle of steel (mass = 1.10 kg) holds 1.95 kg of water at 21.0 °C. How long does it take to bring the water to the boil if 35.0 % of the heat generated by the heating element is lost to the environment?

(4)