

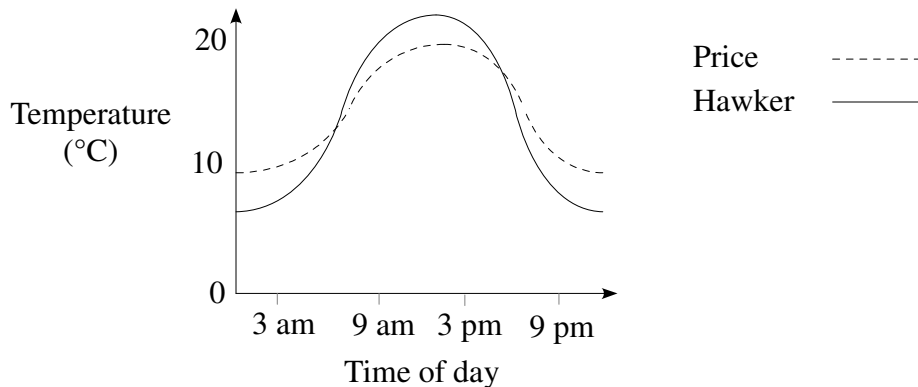
1.
 - (a) State one similarity and one difference between heat and temperature. /2
 - (b) Suggest and explain one way temperature can be measured without a thermometer. /3

2.
 - (a) Consider a metal object and a plastic object at the same temperature. Explain which one feels colder to touch. /2
 - (b) "During the winter, the insulation in our homes helps keep the cold out." Explain whether you agree or disagree with this statement. /2
 - (c) Use an example to explain how convection transfers heat energy. /2
 - (d) Write two questions for which the answer could include "Radiant heat". /2

3. Explain one example of how thermal expansion is used or worked around. /3

4.
 - (a) Use an analogy to explain thermal equilibrium. Thermal equilibrium is like... /2
 - (b) Calculate the rate at which energy will be transferred from a hot drink at 70°C, given that the room temperature is 25°C, the surface area exposed to the air is $5.0 \times 10^{-3} \text{ m}^2$, and the heat transfer coefficient from water to air is $13 \text{ W m}^{-2} \text{ K}^{-1}$. /2
 - (c) "A hot drink at 90°C will reach room temperature faster than a hot drink at 70°C." Explain whether you agree or disagree with this statement. /2

5. The graph below compares the average daily temperatures for the month of September in two South Australian towns. Price is a coastal town, Hawker is inland.



Explain why the difference between maximum and minimum temperatures is larger for Hawker than for Price. /2

6. The specific heat capacity of water is $4.18 \text{ J/g}^\circ\text{K}$.
 - (a) Calculate the energy needed to heat 500 g of water by 50°K . /2
 - (b) When 50g of aluminium at 100°C is placed in water and cools to 30°C , it loses 3075 J of heat energy. Calculate the specific heat capacity of aluminium. /3
 - (c) Consider 10.0g of water at 100°C . If 1.0g of water evaporates, calculate the temperature of the remaining 9.0 grams, given the latent heat of vaporisation for water is 2272 J/g . /3

7.
 - (a) A car engine operates at an efficiency of about 25%. Explain what this means. /2
 - (b) An 11 W compact fluorescent lamp bulb produces about 0.99 W of light. Calculate the efficiency of the lamp. /2

TOTAL /36