Year 8 Heat Transfer Worksheet

Year 8 · KS3 Physics · Conduction, convection, radiation and insulation

Name: ..... **Class:** ..... **Date:** ..... **Score: / 50**

Section A: Key ideas [8 marks]

hot | cold | joules | vibrate | degrees Celsius | thermometer

1 Use words from the box to complete the sentences.

(a) Thermal energy always moves from a ..... object to a ..... object. **[2]**

(b) Temperature is measured in ..... using a ..... . **[2]**

(c) Energy is measured in ..... . **[1]**

(d) When a solid is heated, its particles ..... faster. **[1]**

2 Explain the difference between heat (thermal energy) and temperature. **[2]**

.....

.....

Section B: Conduction, convection and radiation [17 marks]

3 Complete the table. **[6]**

Method	Where it mainly happens	How the energy is transferred
Conduction		
Convection		
Radiation		

4 Name the main method of heat transfer in each example. **[4]**

Example	Conduction, convection or radiation?
Feeling warm in front of a fire without touching it	
A metal spoon in hot soup gets hot	
A radiator heats the air in a room	
The Sun warms the Earth	

5 Explain how thermal energy travels through a metal rod when one end is heated. **[3]**

6 Water in a beaker is heated from below. Explain how a convection current forms. **[3]**

7 Explain why convection cannot happen in a solid. **[1]**

Section C: Applications of heat transfer [10 marks]

8 Explain how a vacuum flask keeps hot drinks hot. Use the ideas of conduction, convection and radiation. **[4]**

9 Houses are insulated with fibreglass in the loft. Explain how this reduces heat loss. **[2]**

10 People in hot countries often paint roofs white. Explain why. **[2]**

11 The heating element in an electric kettle is at the bottom. Explain why this is a good place for it. **[2]**

Section D: Data and investigation [15 marks]

12 A student fills three identical beakers with 200 cm^3 of water at 90 °C. One is wrapped in foil, one in wool and one is left bare. The temperature is recorded every 2 minutes.

Results (temperature in °C):

Time (min)	0	2	4	6	8	10
Bare beaker	90	82	75	69	64	60
Foil-wrapped	90	86	83	80	77	75
Wool-wrapped	90	88	86	84	82	80

(a) Calculate the temperature drop after 10 minutes for each beaker. **[3]**

(b) Which material is the best insulator? Give a reason. **[1]**

(c) Calculate the average rate of cooling of the bare beaker in °C per minute. **[2]**

(d) Give two variables the student must keep the same. **[2]**

(e) Suggest why a lid could be added to each beaker. **[1]**

13 Plot a line graph of the results for the bare beaker only on the grid below. Label both axes with units. **[3]**

Graph grid

14 Challenge: on a cold day a metal bench feels colder than a wooden bench, although both are at the same temperature. Explain why. **[3]**