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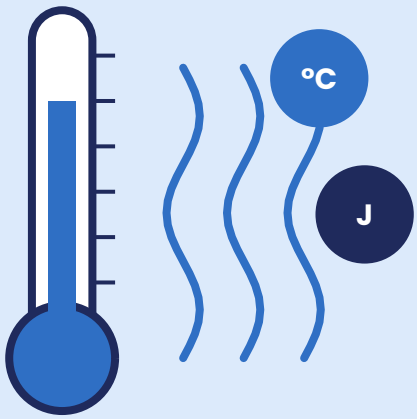
Year 8 • KS3 Physics

Heat Transfer



Mark Scheme – Teacher Copy

Answers, marking points and guidance for the Heat Transfer worksheet.

Temperature | Conduction | Convection | Radiation | Insulation | Cooling

KEY IDEAS IN THIS WORKSHEET

YEAR 8

Name: _____ Class: _____

Date set: _____ Date due: _____

What's inside

Section A	Key ideas	**8 marks**
Section B	Conduction, convection and radiation	**17 marks**
Section C	Applications of heat transfer	**10 marks**
Section D	Data and investigation	**15 marks**

Marking notes

- (1) = one mark for each marking point.
- / separates alternative answers.
- Allow error carried forward in calculations.
- Accept any correct, clearly expressed alternative.

Total marks

50

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Heat Transfer Worksheet – Mark Scheme

Total: 50 marks. (1) = one mark. Accept any scientifically correct alternative wording.

Section A – Key ideas

Q	Answer	Mark	Guidance
1(a)	hot; cold (in that order)	2	1 mark each
1(b)	degrees Celsius; thermometer	2	
1(c)	joules	1	
1(d)	vibrate	1	
2	temperature tells you how hot or cold something is (1); thermal energy is the total energy stored in the particles of a substance (1)	2	
	Section A total	**8**	

Section B – Conduction, convection and radiation

Q	Answer	Mark	Guidance
3	Conduction: solids (especially metals); vibrating particles pass energy to neighbouring particles. Convection: liquids and gases; warm fluid rises and cooler fluid sinks, carrying energy. Radiation: anywhere, including a vacuum; infrared waves carry the energy.	6	1 mark for each correct box (6 boxes)
4	radiation; conduction; convection; radiation	4	1 mark each
5	particles at the hot end gain energy and vibrate more (1); they collide with neighbouring particles and pass on the energy (1); free electrons in metals also carry energy quickly, so metals are good conductors (1)	3	
6	water at the bottom is heated, expands and becomes less dense (1); the warm water rises (1); cooler, denser water sinks to take its place and the cycle repeats (1)	3	
7	the particles are fixed in position and cannot flow	1	
	Section B total	**17**	

Section C – Applications of heat transfer

Q	Answer	Mark	Guidance
8	the vacuum has no particles, so there is no conduction or convection across it (2); silvered surfaces reflect radiation back (1); the stopper is a poor conductor / stops convection and evaporation (1)	4	
9	fibreglass traps pockets of air (1); air is a poor conductor and cannot circulate to form convection currents (1)	2	
10	white / shiny surfaces reflect radiation (1); so less thermal energy is absorbed and the building stays cooler (1)	2	
11	the water at the bottom is heated first and rises (1); this sets up convection currents that heat all the water (1)	2	
	Section C total	**10**	

Section D – Data and investigation

Q	Answer	Mark	Guidance
12(a)	bare: 30 °C; foil: 15 °C; wool: 10 °C	3	1 mark each
12(b)	wool, because its temperature fell the least	1	
12(c)	30 ÷ 10 (1); = 3 °C per minute (1)	2	
12(d)	any two: starting temperature; volume of water; type and size of beaker; room temperature; thickness of wrapping	2	1 mark each
12(e)	to reduce heat loss by evaporation and convection from the surface	1	
13	time on the x-axis and temperature on the y-axis, with units (1); points plotted correctly (1); smooth curve / line of best fit (1)	3	
14	metal is a better conductor than wood (1); thermal energy moves from your hand into the metal faster (1); your hand loses energy faster, so the metal feels colder (1)	3	
	Section D total	**15**	

Worksheet total: 50