

Quick Quiz

Topic	Answers				Marks
	Q1	Q2	Q3	Q4	
8Ka	C	C	B	A	4
8Kb	D	B	C	A	4
8Kc	B	D	C	A	4
8Kd	B	D	A	C	4
8Ke	A	C	C	D	4

End of Unit Test Mark Scheme Standard (S)

Question	Part	Step	Answer	Mark scheme
1	a	1st	thermometer	1 mark
	b	1st	D temperature	1 mark
2	a	6th	From the air in the room to the can, because the air is warmer than the can.	1 mark – direction and explanation both needed
	b	6th	The same as the air temperature (or any temperature between 18 °C and 22 °C).	1 mark
3	a	4th	100;	1 mark
		4th	degrees Celsius (or °C)	1 mark
	b i	4th	A Metal is a good conductor of heat;	1 mark
		4th	B Wood is a good insulator of heat. (Do not allow 'so we don't burn our hands')	1 mark
c	3rd	Any solid insulating material – plastic is the most likely answer.	1 mark	
4	a	4th	B	1 mark
	b	6th	Air is a poor conductor;	1 mark
6th		Trapping air stops energy being transferred by convection.	1 mark	
5	a	5th	i conduction;	1 mark
		5th	ii convection	1 mark
b	7th	Heating makes particles vibrate more;	1 mark	
	7th	the increased vibrations are passed on.	1 mark	
6	a	7th	Any <i>two</i> from: the thicker pan has more mass;	2 marks – one for each point
		7th	so it stores more energy; so it takes longer to cool down/can still transfer energy to the water inside the pan	
b	6th	Warm air cannot rise so it stops energy transfer by convection;	1 mark	
	6th	Evaporated water cannot escape, so it prevents energy transfer by evaporation.	1 mark	

Question	Part	Step	Answer	Mark scheme
7	a	7th	Radiation;	1 mark
		6th	Any <i>one</i> from: it is not conduction because air is a poor conductor, or it is not convection because this would transfer energy upwards in this situation; radiation is absorbed at different rates by the black bulb and the silver bulb	1 mark
	b	6th	The top line/line at the highest temperature is for the one painted black, because black/dark colours are better absorbers.	1 mark – answer and explanation needed
	c	6th	It allows her to spot any mistakes.	1 mark
8		7th	A A is more powerful, because it transfers the same amount of energy in a shorter time.	1 mark – answer and explanation both needed
9	a	6th	C by heating and by sound	1 mark – both needed
	b	6th	D Y, because more energy is transferred as useful energy	1 mark – answer and explanation both needed
10		7th	People – cheaper energy bills;	1 mark
		7th	Environment – any <i>one</i> from: less pollution; fewer greenhouse gases released; doesn't contribute to climate change as much.	1 mark
		7th	Correct grammar and spelling.	1 mark

Final Step Calculation

Marks	Step
1	Below 1st
2-3	1st
4	2nd
5-7	3rd
8-11	4th
12-16	5th
17-21	6th
22-30	7th

End of Unit Test Mark Scheme Higher (H)

Question	Part	Step	Answer	Mark scheme
1	a	7th	Heating makes particles vibrate more;	1 mark
		7th	the increased vibrations are passed on.	1 mark
	b	7th	Any <i>two</i> from: the thicker pan has more mass; so it stores more energy; so it takes longer to cool down/can still transfer energy to the water inside the pan.	2 marks – one for each point
2		6th	Air is a poor conductor.	1 mark – both points needed for mark
		6th	Trapping air stops energy being transferred by convection.	

Question	Part	Step	Answer	Mark scheme
3	a	7th	Radiation;	1 mark
		6th	Any <i>one</i> from: it is not conduction because air is a poor conductor, or it is not convection because this would transfer energy upwards in this situation; radiation is absorbed at different rates by the black bulb and the silver bulb.	1 mark
	b	6th	The top line/line at the highest temperature is for the one painted black, because black/dark colours are better absorbers.	1 mark – answer and explanation both needed
	c	6th	It allows her to spot any mistakes.	1 mark
4	a	6th	D by evaporation	1 mark
	b	8th 8th 8th	Any <i>three</i> from: the fastest moving particles escape when part of a liquid evaporates; so the ones that are left have lower speeds/are storing less energy in movement; so the remaining liquid is cooler; so energy will be transferred from the milk to the liquid water remaining in the cloth.	3 marks – one for each point
5		6th	Cold air inside the freezer will be more dense than the air in the kitchen;	1 mark
		6th	so without the solid front, most of the cold air would fall out when the door was opened;	1 mark
		7th	Diagram showing cold air falling out of freezer and warmer air from room taking its place.	1 mark
6		7th	A A is more powerful, because it transfers the same amount of energy in a shorter time.	1 mark – answer and explanation both needed
7	a	6th	C by heating and by sound	1 mark – both needed
	b	7th	Similar diagram but with the useful energy output arrow wider than in the one given.	1 mark
8	a	5th	The time it takes to save (in energy bills) the amount of money spent on buying a more efficient machine (or adding insulation).	1 mark
	b	7th	B (payback time = £50/£5 =) 10 years	1 mark
9		7th	People – cheaper energy bills;	1 mark
		7th	Environment – any <i>two</i> from: burning fossil fuels/generating electricity adds carbon dioxide/greenhouse gases to the atmosphere;	2 marks – 1 for each point to a maximum of 2
		7th	additional greenhouse gases are causing global warming/climate change; more efficient machines burn less fuel/use less electricity and so can help to reduce our contribution to climate change.	
		7th	Correct grammar and spelling.	1 mark

Final Step Calculation

Marks	Step
1–4	Below 5th
5–8	5th
9–13	6th
14–18	7th
19–25	8th

Quick Check answers

Topic	Step	Answers
8Ka	4th–6th	<p>Possible questions to fit the answers are:</p> <ol style="list-style-type: none"> 1 What are the units for measuring temperature? 2 What is another name for internal energy? / What do you have to transfer to something to make its temperature rise? 3 Why does a tank of hot water store more energy than a cup full of hot water? 4 How can you use the least energy to make a cup of tea? / How can you make a kettle boil quicker? 5 If two objects are at different temperatures, which way will energy be transferred? 6 What three things do you need to know to work out how much thermal energy is stored in something? 7 When does a liquid evaporate fastest? 8 Why does a liquid cool down when some of it evaporates?
8Ka Lit		<ol style="list-style-type: none"> 1 A is short and uses simple language. It provides direct instructions. B is much longer, and provides an explanation for how the thermometer works given in simple language. C is very short and uses a couple of harder words (immerse and equilibrate) 2 A is for the Year 7 worksheet; B is for the primary teacher; C is instructions on the packet. 3 A gives instructions in simple language. B includes explanations, so pupils understand <i>why</i> the thermometer must be used in a certain way. C is very short, so it does not take up much space on the package, but scientists would be expected to understand the vocabulary used.
8Kb	5th–7th	<ol style="list-style-type: none"> A Conduction through the pan; convection spreads energy throughout the liquid in the pan; radiation from the hot pan and hot liquid; evaporation from the liquid. B Mostly radiation from the hot coals; convection from hot air/combustion products rising; conduction in the solids in the fireplace/horseshoe/tongs. C Convection from rising hot air/combustion products; radiation from flames (which explains why their feet will be warmed as well as the upper parts of their bodies). D Radiation from Sun to Earth; radiation from hot ground; conduction through hot ground; convection in the form of sea breezes (if students have done <i>Explaining 4</i>). Note that convection will not take place in the sea, as the top part of the sea is warmed so a convection current will not form.

Topic	Step	Answers
8Kc	5th–8th	<p>Hay box: foil lining – reduces energy transferred by radiation, as shiny, silver surfaces are good at reflecting radiation; straw-filled bags and straw surrounding pot – reduce energy transferred by conduction as the straw contains lots of trapped air; cardboard box – mainly to hold straw, but also provides some insulation.</p> <p>Solar cooker: foil inside top flap and box – increases amount of radiation reaching the pot as it is a good reflector; glass cover – reduces energy transfer by convection as it prevents warmed air rising out of the cooker, but still lets radiation go through it; insulation material in walls – keeps inside of cooker hot by reducing energy transfers by conduction; black pot – increases energy absorbed by radiation, as black is a good absorber.</p>
		<p>Water purifier: Transparent cover – allows radiation through but reduces energy transfer by convection as it stops warm air rising, and also prevents escape of evaporated water; Black pan – absorbs radiation that has passed through the water, black is a good absorber, and the hot black pan will then heat the water; Reflective surface – increases temperature inside the box by reflecting radiation into the box; Wooden frame – reduces energy transfers by conduction, so helps to keep the temperature inside the box high; Catch trough and tap – allow condensed pure water to be removed.</p>
8Kc WS	5th–6th	<p>Explanations in all cases should refer to accurate results being close to the target or true value, and precise results being clustered together (whether or not they are close to the true value).</p> <p>1 a low accuracy, high precision b high accuracy, low precision c low accuracy, low precision d high accuracy, high precision</p> <p>2 a high accuracy, high precision b low accuracy, high precision c high accuracy, low precision d low accuracy, low precision</p>
8Kd	5th–7th	<p>1 ... and 1 watt is 1 joule per second/or kilowatts/which measures how fast energy is transferred by the machine.</p> <p>2 ... and these are more powerful machines/and we can work out which these are from their power ratings.</p> <p>3 ... and some is wasted/but the total energy transferred is the same as the energy supplied.</p> <p>4 ... and the widths of the arrows show the relative amounts of energy / ... and we can use them to work out the efficiency of a machine.</p> <p>5 ... to find out the percentage of energy that is transferred as useful energy/which compares the useful energy to the total energy supplied.</p>

<p>8Ke</p>	<p>6th– 8th</p>	<p>The energy stored in a substance depends <u>only on its temperature and its mass</u> [it also depends on the type of material]. When something is heated its temperature <u>always goes up</u> [unless it is melting/boiling], because the particles start vibrating more or moving around more. Conduction happens when the vibrations are passed on in a solid. <u>All solids [metals]</u> are good conductors of energy [but many other solid materials are not, particularly those containing trapped air].</p> <p>Energy is spread out through fluids by convection. Part of the fluid is warmer and becomes <u>denser</u> [less dense], so a convection current starts. Radiation is how energy is transferred through empty space. Radiation cannot pass through <u>solids and liquids</u> [it can pass through transparent solids and liquids]. Insulating materials usually contain trapped air. Shiny, light coloured surfaces are <u>good</u> [poor] absorbers and emitters of radiation.</p> <p>Energy can also be transferred by evaporation. When some of a liquid evaporates, it is only the fastest-moving particles that form a gas. The particles that are left are not moving as fast so the temperature goes down.</p> <p>Power is a way of saying how fast energy is being transferred. It is measured in <u>kilowatt-hours</u> [watts or kilowatts]. Some energy transferred is wasted. Most wasted energy is transferred by heating. The efficiency of a machine compares the useful energy transferred to the <u>wasted energy transferred</u> [total energy supplied].</p> <p>We pay for gas and electricity by the amount of energy used. We can reduce the amount we have to pay by using <u>less</u> [more] efficient machines. We need to work out the payback time as sometimes it costs more to buy a new machine than the amount of money it will save.</p>
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