

Mark Scheme

Combined Science GCSE

Conservation of Energy Test

(Levels 4-9)

	Answer	Marks
1. (a)	An energy store is the capture of energy produced at one time for use at a later time.	(1)
1. (b)		(4)

(Total for Question 1 = 5 marks)

	Answer	Marks
2. (a)	Chemical store (1) converts to kinetic store. (1)	(2)
2. (b)	kinetic energy = $0.5 \times \text{mass} \times \text{speed}^2$ or $\text{KE} = \frac{1}{2} \times m \times v^2$	(1)
2. (c)	$\text{KE} = \frac{1}{2} \times m \times v^2$ $\text{KE} = \frac{1}{2} \times 650 \times 12^2$ 46,800 J (1 mark correct answer, 1 mark J) Correct answer and unit with no workings gains 3 marks.	(3)

(Total for Question 2 = 6 marks)

	Answer	Marks
3. (a)	In any order: Mechanically (1) Electrically (1) Heating (1) Radition (1)	(2)
3. (b) (i)	Energy is transferred mechanically (1) from gravitational potential (1) to kinetic. (1)	(4)
3. (b) (ii)	Energy is transferred electrically (1) from the heating element of the kettle (1) to the thermal energy store of the water. (1)	(4)

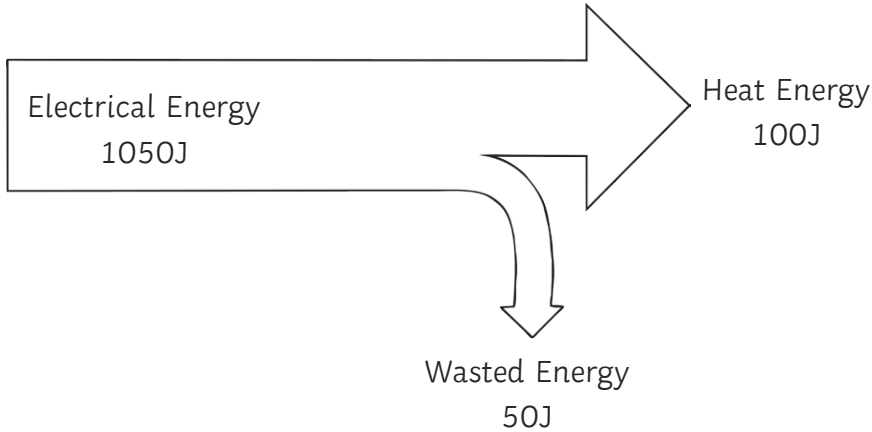
(Total for Question 3 = 10 marks)

	Answer				Marks								
4.	<table><tr><th>0 marks</th><th>1-2 marks</th><th>3-4 marks</th><th>5-6 marks</th></tr><tr><td>No relevant content.</td><td>Mentions two different types of renewable energy resources and has mentioned either one benefit or one disadvantage.</td><td>Mentions several different types of renewable energy resources and has, for at least one example, discussed both advantages and disadvantages in detail.</td><td>Mentions several different types of renewable energy resources and has, for each one, discussed both benefits and disadvantages in detail.</td></tr></table>				0 marks	1-2 marks	3-4 marks	5-6 marks	No relevant content.	Mentions two different types of renewable energy resources and has mentioned either one benefit or one disadvantage.	Mentions several different types of renewable energy resources and has, for at least one example, discussed both advantages and disadvantages in detail.	Mentions several different types of renewable energy resources and has, for each one, discussed both benefits and disadvantages in detail.	(6)
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Wind Power Benefits • Free power once set up • No pollution Disadvantages • Noisy • Spoil the view • Only work when it's windy Hydro Electric Power Benefits • No pollution • Minimal running costs Disadvantages • Loss of habitat Solar Cells Benefits • Can be used in remote places • No pollution • No running costs Disadvantages • Mainly small scale • Doesn't work at night Tidal Barges Benefits • Mainly small scale • Doesn't work at night Disadvantages • Mainly small scale • Doesn't work at night													

(Total for Question 4 = 6 marks)

	Answer	Marks
5. (a)	Efficiency = $\frac{\text{(useful energy transferred by the device)}}{\text{(total energy supplied to the device)}}$	(1)
5. (b)	Thermal (1) Kinetic (1)	(2)
5. (c)	Useful energy = $1200 - 550 = 650$ (1) Efficiency = $\frac{650}{1200} \times 100 = 54.16\%$ (2)	(3)

(Total for Question 5 = 6 marks)

	Answer	Marks
6. (a)	Energy can be stored, transferred and dissipated between stores, but it cannot be created or destroyed.	(1)
6. (b) (i)	 The diagram shows a large arrow on the left labeled 'Electrical Energy 1050J'. This arrow splits into two arrows on the right. The top arrow is labeled 'Heat Energy 100J' and the bottom arrow is labeled 'Wasted Energy 50J'.	(3)
6. (b) (ii)	Lubrication reduces the friction between surfaces (1) and therefore less energy is dissipated as heat. (1)	(2)
6. (b) (iii)	Cavity walls have an inner and outer wall with an air gap between them. (1) The air gap reduces the amount of energy transferred by conduction. (1)	(2)

(Total for Question 5 = 6 marks)

	Answer	Marks
7. (a)	Gravitational Potential Energy is the amount of energy an object has according to its height above ground.	(1)
7. (b)	$\Delta GPE = m \times g \times \Delta h$	(1)
7. (c)	Joule	(1)
7. (d)	$3 \times 10 \times 100 = 3000J$ (unit must be included to gain mark)	(1)
7. (e)	Convert km to m $15 \times 1000 = 15\,000$ (1) $67 \times 10 \times 15\,000 = 10\,050\,000J$ (1) Convert J to Kj $10\,050\,000 \div 1000 = 10\,050kJ$ (1) Zero marks are awarded for correct answer with no workings.	(3)

(Total for Question 7 = 7 marks)

Question	Answer	Marks
8. (a)	Biofuels are created from animal or plant waste (1), for example chicken waste or any other reasonable answer. (1)	(2)
8. (b)	Advantage One from: reliable, carbon neutral, can be stored, can be grown for demand. (1) Disadvantage One from: destroying habitats to make room for biofuels, can be very smelly, isn't enough space for food crops. (1)	(2)
8. (c)	Hybrid cars can run on two types of energy: petrol and electricity.	(1)

(Total for Question 7 = 5 marks)