Written to the specification from Speca's own topic maps, then independently rechecked for accuracy. These are original practice questions, not past-paper questions. Spotted a mistake? Tell us at hello@speca.co.uk.

SPECA

GCSE Combined Science (AQA Trilogy) · Physics

Energy · Mark Scheme

For use with the Tiered Worksheet. Marking points are indicative, not exhaustive: award equivalent correct answers.

Section A: Foundation (Q1 to 16)

1) An object or a group of objects (1) [1]

2) Kinetic energy store decreases (1); gravitational potential energy store increases (1) [2]

3) $E_k = ½ \times m \times v^2 = ½ \times 2 \times 6^2$ (1) = 36 J (1) [2]

4) $E_e = ½ \times k \times e^2 = ½ \times 250 \times 0.04^2$ (1); $0.04^2 = 0.0016$ correctly squared (1); = 0.2 J (1) [3]

5) Ep = m × g × h = 5 × 9.8 × 3 (1) = 147 J (1) [2]

6) $\Delta E = m \times c \times \Delta\theta = 0.5 \times 4200 \times 20$ (1); correct substitution shown (1); = 42 000 J (1) [3]

7) The energy needed to raise the temperature of one kilogram of a substance by one degree Celsius (1) [1]

8) P = E ÷ t = 180 000 ÷ 90 (1) = 2000 W (1) [2]

9) It transfers 1000 joules of energy every second (1) [1]

10) Efficiency = 320 ÷ 800 = 0.4 (1) = 40% (1) [2]

11) The total energy in a closed system stays the same overall (1); some energy is dissipated into less useful stores (e.g. thermal energy to the surroundings) rather than being destroyed (1) [2]

12) Any two of: lubrication, to reduce friction between moving surfaces; thermal insulation, to reduce unwanted energy transfer by heating to the surroundings (1 mark each, max 2) [2]

13) Non-renewable (1); it is being used up much faster than it can be replenished / it is a finite resource (1) [2]

14) Advantage: e.g. does not release carbon dioxide when generating electricity (1); disadvantage: e.g. unreliable, only generates electricity when the wind blows (1) (accept other valid points) [2]

15) Renewable only describes how quickly a resource is replenished, not how much environmental impact it has (1); manufacturing and installing solar panels (e.g. materials used, land use) can still have a genuine environmental impact (1) [2]

16) Any two of: mass of the metal block; temperature before and after heating (or temperature change); power of the heater; time for which the heater is switched on (1 mark each, max 2) [2]

Section B: Higher (Q17 to 19)

17) Lubricating the moving parts (1) reduces friction, so less energy is transferred to the surroundings by heating instead of to the drum's kinetic energy store (1); using wiring with lower electrical resistance (1) reduces the energy transferred to the wires' thermal energy store instead of to the motor (1) [4]

18) The total amount of energy transferred is unchanged: energy is still conserved (1); a more efficient transfer simply means a greater proportion of that same total energy ends up in the useful/intended store rather than being dissipated (1) [2]

19) Indicative content, mark holistically to a maximum of 3: e.g. adding insulation around the kettle body, which reduces energy transferred by heating to the surroundings, so a greater

Free from speca.co.uk/gcse-science-questions-by-topic. Original questions written by Speca, not past papers.
Speca is not affiliated with, endorsed by, or sponsored by AQA.

proportion of the input energy is transferred usefully to the water. Accept other valid design features with equivalent reasoning. [3]

Total: 31 marks (Section A) + 9 marks (Section B) = 40 marks

Speca is an independent product and is not affiliated with, endorsed by, or sponsored by AQA. This mark scheme is originally authored by Speca and is not an AQA document.