**Energy (answers)**

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| Instructions to students  • You have 50 minutes to complete the test.  • Please answer all questions in the spaces provided.  • There is to be no talking during the test. | Marks  Section I: Multiple-choice questions: 5 marks  Section II: Short-answer questions: 12 marks  Section III: Extended-response questions: 8 marks  Total: 25 marks |

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| Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | Score: /25  Grade: % |
| Comments: | |

Section I: Multiple-choice questions

For each question, circle the correct answer.

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| 1 A toaster converts: | |  |
| A | electrical energy into heat energy. |
| B | gravitational energy into chemical energy. |
| C | kinetic energy into heat energy. |
| D | chemical energy into sound energy. |
| 2 Which of the following examples has the most kinetic energy? | | |
| A | A car travelling at 100 km/h. | |
| B | A cricket ball travelling at 100 km/h. | |
| C | A bus travelling at 100 km/h. | |
| D | A motorcycle travelling at 100 km/h. | |
| 3 Which one of the following inventions converts sunlight energy into electricity? | | |
| A | Compact fluorescent lights | |
| B | Photovoltaic cells | |
| C | Incandescent lights | |
| D | Light-emitting diodes | |

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| 4 What sort of energy is stored in petrol? | |
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| A | Gravitational potential energy |
| B | Biomass energy |
| C | Chemical potential energy |
| D | Light energy |
| 5 If the input energy into a system is 80 units, and the output energy is 20 units, the energy efficiency is: | |
| A | 20%. |
| B | 80%. |
| C | 10%. |
| D | 25%. |

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|  | Section I  Total marks:  /5 marks |

Section II: Short-answer questions

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| 6 Describe how a bow and arrow transforms potential energy to kinetic energy. | |
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| The elastic potential energy of the bowstring when it is pulled back (1 mark) is transformed into kinetic energy of the arrow when the string is released and the arrow moves through the air (1 mark). | |
|  | /2 marks |
| 7 Give two different examples of how thermal energy can be generated. | |
| Any two of the following for 1 mark each. Burning of any fuel source should be considered to be a single example.  • Burning of any fuel source (e.g. wood, gas, oil, etc.)  • Friction (e.g. rubbing hands together)  • Electrical devices (e.g. electrical resistance in a transformer) | |
|  | /2 marks |
| 8 The energy efficiency of a light globe was calculated to be 80%. What is the law of conservation of energy and how does it explain why the light globe efficiency isn’t 100%? | |
| The law of conservation of energy states that energy cannot be created or destroyed, only transferred and transformed (1 mark). A light globe with an efficiency of 80% is converting 80% of the electrical energy in to light energy (1 mark). The other 20% of energy is likely converted into heat energy and lost from the system (1 mark). | |
|  | /3 marks |
| 9 Calculate the energy efficiency of a fan that produces 12 units of energy output for every 20 units of input. | |
| 60% (1 mark for working, 1 mark for correct answer) | |
|  | /2 marks |

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| 10 Some hydroelectric plants work by placing turbines under waterfalls. The water falls onto a turbine and spins it around, thereby generating electricity. Describe how this process works in terms of energy transformation. | |
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| Gravitational potential energy (water being above the turbine) 🡪 kinetic energy (falling water rotating the turbine) 🡪 electrical energy (rotating turbine produces electricity) (1 mark for each step). | |
|  | /3 marks |
|  | Section II  Total marks:  /12 marks |

Section III: Extended-response questions

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| 11 Provide two examples of improving the energy efficiency of a house and explain how they reduce the amount of electricity required. | |
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| Any two of the following. Award 1 mark for identifying the feature and 1 mark for a correct explanation.  • Switching from incandescent to fluorescent globes – fluorescent globes do not heat up as easily as incandescent globes and so are more efficient.  • Using wall / ceiling / floor insulation – slows the transfer of heat energy between the inside and outside of the house.  • Curtains / window awnings / veranda – prevents solar energy from striking the windows / walls of the house, reducing the thermal energy transfer into the house. | |
|  | /4 marks |

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| 12 Draw an energy flow diagram to show all the energy transformations occurring in a mobile phone being used with headphones to listen to music. | |
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| Drawing shows arrows drawn correctly from input to output (1 mark).  Each correct energy transformation (1 mark).  Chemical energy in the battery 🡪 Electrical energy in the wires 🡪 Kinetic energy in the speakers of the headphones 🡪 Sound energy being heard in ears. | |
|  | /4 marks |
|  | Section III  Total marks:  /8 marks |