

Core questions – Physic unit 1 – Energy

	Questions	Answers
1	What is a 'system'?	An object or group of objects
2	What can happen to energy?	It can be stored or transferred
3	What happens when a 'system' changes?	Energy is transferred either: <ul style="list-style-type: none"> • into or away from the system • between different objects in the system • between different types of energy stores
4	What is a 'closed system'?	A system where neither matter nor energy can enter or leave
5	What is the net change in the total energy of a closed system?	Zero
6	What is the unit and unit symbol for all types of energy?	Joules, J
7	What is an example of energy stored as elastic potential energy?	A stretched or compressed spring
8	What is an example of energy stored as thermal energy?	A property an object has because of the kinetic energy of its particles (so everything has a thermal energy store)
9	What is another name for a thermal energy store?	Internal energy store
10	What is an example of energy stored as kinetic energy?	Anything that is moving
11	What is an example of energy stored as gravitational potential energy?	Any object above the ground
12	What is an example of energy stored as chemical energy?	An object that has energy stored due to its chemical composition – e.g batteries, fuels, food
13	What is an example of energy stored as electrostatic energy?	Between two charged objects (i.e. two object that have a potential difference)
14	What is an example of energy stored as nuclear energy?	Radioactive nuclei
15	What are the four main ways energy can be transferred between energy stores?	Heating, radiation, electrical working, mechanical working
16	Give an example of how energy is transferred mechanically?	By a force doing some work
	How is energy transferred by radiating?	Waves are given out in all directions
17	Give an example of how energy is transferred through radiation?	Light & sound, or anything that is part of the EM spectrum
18	Give an example of how energy is transferred electrically?	A complete circuit allowing charge to flow
19	What are the energy store changes when a ball is thrown upwards?	Kinetic energy store decreases and gravitational potential store increases
20	What is another way of saying 'energy transferred'?	Work done
21	What are the energy store changes when a moving object hits an obstacle?	The moving object has a store of kinetic energy, which is transferred to other stores when it hits the obstacle and suddenly stops. Some of these stores include elastic potential energy in squashing objects and thermal energy into the surroundings
22	What are the energy store changes when an object is accelerated by a constant force?	When a constant force is applied across a distance, work is done on the object. This work is transferred to a store of kinetic energy in the object, causing it to move

23	What are the energy store changes when a vehicle applies its brakes to slow down?	A moving vehicle has a store of kinetic energy, work is done when the brakes are applied and there is a large amount of friction. Energy is transferred to thermal energy stores.
24	What are the energy store changes when water is boiled in an electric kettle?	The kettle transfers a store of electrical energy to thermal energy, which is transferred to the water to heat it up as water has more internal energy.
25	What two measurements do you need to be able to calculate the kinetic energy store of a moving object?	Mass (in metres, m) Velocity (in metres per second, m/s)
26	What is the word equation for calculating kinetic energy?	Kinetic Energy = $\frac{1}{2}$ x mass x velocity ²
27	What is the symbol equation for kinetic energy?	$E_k = \frac{1}{2} mv^2$
28	What is the word equation for calculating gravitational potential energy?	Gravitational potential energy = mass x gravitational field strength x height
29	What is the symbol equation for calculating gravitational potential energy?	$E_p = mgh$
30	What energy transfer happens when an object is falling?	Stored gravitational potential energy is transferred to its kinetic energy store
31	What two ways can elastic potential energy can be transferred to an object?	Stretching or squashing
32	What two measurements do you need to be able to calculate the elastic potential energy store of a squashed or stretched object?	Spring constant (in Newtons per metre, N/m) Extension or compression (in metres, m)
33	What does the increase in temperature of a system depend on?	The mass of the substance, the type of material and the energy input.
34	What is the word equation that relates the change in energy of a system, mass, specific heat capacity & temperature change?	Change in thermal energy = mass x specific heat capacity x temperature change
35	What is the symbol equation that relates the change in thermal energy of a system to the factors that it depends upon?	$\Delta E = m c \Delta\theta$
36	What are the units and unit symbols of specific heat capacity?	Joules per kilogram per degree Celsius, J/kg °C
37	What is the specific heat capacity of a substance?	The amount of energy required to raise the temperature of 1 kg of the substance by 1 °C
38	What is power?	Rate of energy transfer or rate of doing work
39	What is the unit and unit symbol of power?	Watts, W
40	How much energy is transferred by 1 watt?	1 Joule per second
41	What is the word equation for power?	Power = $\frac{\text{energy transferred}}{\text{time}}$, Power = $\frac{\text{work done}}{\text{time}}$
42	What is the symbol equation for power?	$P = \frac{E}{t}$, $P = \frac{W}{t}$
43	What does dissipated mean?	Energy that is not usefully transferred
44	What is the principle of conservation of energy?	Energy cannot be created or destroyed, it can only be transferred usefully, stored or dissipated
45	What does it mean when we say that energy is "wasted"?	When energy is dissipated, so that it is stored in less useful ways
46	What is the most common form of 'wasted' energy?	Into the thermal energy stores of the surroundings

47	What does thermal conductivity mean?	The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material.
48	What factors affect the rate of cooling of a building?	The thickness and thermal conductivity of its walls.
49	State four ways to insulate a house	Cavity wall insulation, double glazing, Loft Insulation, draft excluders.
50	How can you reduce the amount of energy dissipated by a device?	Lubricate to reduce friction or insulate to reduce thermal energy transfer
51	What is the mathematical link between useful and wasted energy?	Total Energy In = Useful energy + Wasted Energy
52	What is efficiency?	A measure of how much energy is transferred by a device into a useful energy store.
53	How do we calculate efficiency	Efficiency = $\frac{\text{Useful output energy/power}}{\text{Total input energy/power}}$
54	What is the unit of efficiency?	Efficiency is measured as a decimal or a percentage
55T	Name two ways that thermal energy is transferred (Triple only)	Conduction and Convection
56T	How is thermal energy transferred between touching objects? (Triple only)	Conduction
57T	How is thermal energy transferred through fluids? (Triple only)	Convection
58T	What happens to particles when they are heated up? (Triple only)	They gain kinetic energy and vibrate more
59T	How is energy transferred by conduction? (Triple only)	Vibrating particles collide passing on energy.
60T	What happens to the particles in a fluid when they are heated? (Triple only)	Increase in kinetic energy means particles spread out
61T	What happens to the density of a heated fluid? (Triple only)	It decreases
62T	What is convection? (Triple only)	Hotter, less dense fluids rise
63	What is the source of most of our naturally occurring energy resources?	The sun
64	Name the three fossil fuels	Coal, oil and natural gas
65	What type of energy store do fuels have?	Chemical energy store
66	How is the energy stored in fossil fuels released into useful energy?	Combustion (transferred into thermal store)
67	How does a fossil fuelled power station work?	<ol style="list-style-type: none"> 1. Fuel combusts releasing thermal energy 2. Thermal energy used to heat water 3. Water turns into steam and turns a turbine 4. The turbine is connected to a generator which generates electricity
68	Name the three main uses of fossil fuels	Generating electricity, heating and transport
69	Fossil fuels are non-renewable, what does it mean?	They will run out
70	Why is burning fossil fuels bad for the environment?	They release CO ₂ and sulfur dioxide into the atmosphere
71	Why is carbon dioxide bad for the environment?	It is a greenhouse gas and contributes to global warming
72	Why is sulfur dioxide bad for the environment?	It causes acid rain
73	What are the other disadvantages of using fossil fuels, other than the gases released?	Coal mining causes disruption to the landscape. Oil spillages cause serious environmental problems

74	What are the two main nuclear fuels?	Uranium and plutonium
75	What is a benefit of nuclear fuel?	Does not release greenhouse gases
76	What is the main disadvantage with nuclear power?	Produces nuclear waste which is hard to dispose of
77	State four renewable energy resources directly linked to the sun's energy	Solar, wind, wave and biofuels
78	What other renewable energy resources are there that don't rely on the sun?	Geothermal, tidal
79	Where does geothermal energy come from?	Volcanic regions or where hot rocks that are near the surface
80	Give two advantages of geothermal energy	Very reliable and causes very little environmental damage
81	Give two disadvantages of geothermal energy	Very limited availability, very expensive to build power plants
82	How does hydro-electric power generate electricity?	Water falling from height spins a turbine, connected to generator
83	Give two benefits of hydro-electric power	Immediate response to a sudden demand (no start up time) Very reliable
84	Give two disadvantages of hydro-electric power	Loss of habitat when dams are built, very expensive to build
85	What is the difference between a solar cell and solar panel/heater?	Solar cells use light energy to generate electricity and solar panels use heat from the sun heat water
86	Why are wind turbines and solar cells unreliable ?	They depend on the weather
87	What are the advantages of both wind turbines and solar cells?	Produce no pollution (i.e. carbon dioxide), no fuel costs
88	What are the disadvantages of wind turbines?	Power output is unreliable, can be noisy, cause visual pollution
89	What is a bio-fuel?	A fuel made from plant material or animal waste
90	What is meant by the term "carbon neutral"?	Activities that do not add extra CO ₂ into the atmosphere
91	Bio-fuels made from plants are said to be carbon neutral why?	CO ₂ released when the fuel burns is removed from the atmosphere when the plants grow
92	What is a disadvantage of bio-fuels?	Loss of habitat used to grow plants for bio-fuels, land could be used for growing crops for food instead
93	Give three reasons for using more renewable energy in the future	Non-renewables are running out Combat global warming Higher demand for energy due to population growth
94	What are the main reasons we are not using more renewable fuels?	They are expensive to build and companies/governments don't want to pay. Infrastructure for fossil fuels is already there Many renewable energy resources are unreliable