

Draw an energy transfer diagram for a car that takes for every 100 joules of chemical energy it uses it produces 40j of kinetic energy. The rest of the energy is wasted.

(Use a ruler to ensure the diagram is to scale)

The kinetic arrow should 4/10s the size of the chemical energy arrow.

The wasted energy arrow should be 6/10s the size of the chemical energy arrow.

State the definition for efficiency.

A measure of how much energy is wasted

State the equation for efficiency.

=useful output / total input (x100), expressed a decimal in this spec

Calculate the efficiency of a light bulb that produces 3 Joules light energy for every 15 Joules it receives.

3/15 =0.2

Explain how a different bulb can produce the same amount of light energy, but be less efficient.

It has a higher input efficiency

Explain how to make a home more energy efficient.

Double glazing. Reduces heat transfer by convection. Roof insulation, heat rises by convection and is trapped.

Complete the table with information about methods of electricity generation. The first row has been done for you.

|  |  |  |  |
| --- | --- | --- | --- |
| Name of source | Renewable? (Y/N) | Advantages | Disadvantages |
| Solar (Photovoltaics)  | Y | Clean, no pollution, source will last for billions of years | Less output when not Sunny. Expensive. |
| Wind | Y  | Clean, no pollution,  | No wind no output, works best in some locations. Can harm wildlife |
| Geo-thermal | Y | Reliable power output.  | Releases pollution, can only be done in some parts of the world |
| Hydroelectric | Y | Reliable power output, can be used to with pump storage  | Destroys habitats, lot of concrete used in production releases CO2 |
| Biomass | Y | Can be used with very local sources, farms etc | Releases CO2 which is not immediately recaptured.  |
| Tidal | Y | Reliable and predicable source of energy | Only produces power at certain times of day |
| Nuclear | N | Safer than fossil fuels over time. No pollution released  | Produces toxic waste. When something goes wrong it goes REALLY wrong |
| Oil | N | Versatile fuel, can be used for many different things | Pollution, causes oil spills  |
| Gas | N | Less pollution than coal and oil. Relatively cheap | Releases pollution. Storage can be difficult |
| Coal | N | In some areas is still cheap, but becoming more expensive | Large amounts of pollution, land damage in mining |

Explain why many countries are pushing to use more and more renewable energy. Less pollution and CO2 released contributes to climate change less. Energy security, does not have to rely on other countries for electricity.

State the equation for gravitational potential energy.

GPE= mass x gravity x height

Calculate the gravitational potential energy is a bicycle of mass 20kg and its rider of mass 50kg cycle to the top of a hill 120 metres high.

20+50 = 70

70x10x120 = 84000J

State the equation for kinetic energy.

KE= ½ x mass x velocity 2

Calculate the kinetic energy of a runner of mass 60kg running at a speed of 4m/s

½ x 60 x 42= 480 Joules

State the types of energy stores

Thermal, chemical, kinetic, nuclear, gravitational potential, magnetic, nuclear

State the types of energy transfer

Mechanical, electrical, radiation, heating

State the law of conservation of energy. Energy can not be created or destroyed, only transferred from one form to another

Write a couple of sentences describing the energy transfers in each situation. The first has been done for you

A ball rolled up a slope: Kinetic energy is transferred to gravitational potential energy as the ball gains height. It is also transferred to thermal energy through mechanical energy transfer (friction with slope)

An object hitting an obstacle and stopping:

Kinetic Energy transfers of sound and heating.

A kettle boiling:

Electrical energy transfer to thermal energy store in the kettle.

A vehicle applying its brakes to come to a stop.

Mechanical energy transfer of friction of the brakes moves kinetic energy to thermal