Energy

Energy from Food

What do we need energy for?

- Growing
- Moving
- Fighting disease

How does the body store energy?

The body stores energy in fat.

What happens if the body has too much energy to store?

The body will store too much fat, causing the person to become obese.

How could the amount of energy different types of food contains be investigated?

Burn a sample of each type of food and use it to heat a boiling tube of water. Record the temperature change of the water. The greater the temperature change, the more energy there is stored in that type of food.

Energy Transfers and Stores

State nine forms of energy stores, giving an example for each one. The first one has been done for you.

1. Thermal energy – energy stored in hot objects, e.g. a hot saucepan.
2. Light energy – lightbulb
3. Sound energy - talking
4. Electrical energy – kitchen appliances
5. Kinetic energy – a moving car
6. Strain energy – elastic band
7. Chemical energy – food, batteries
8. Gravitational potential energy – a book on the bookshelf
9. Nuclear potential energy – Nuclear bomb

Fuels and Energy Resources

Define 'renewable'.

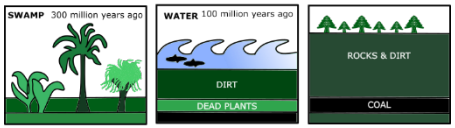
An energy source that will never run out, e.g. tidal.

Define 'non-renewable'.

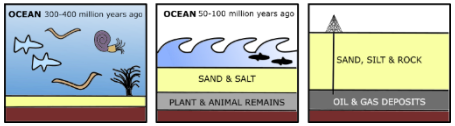
An energy source that will run out because we cannot renew our supplies of it, e.g. fossil fuels.

Draw annotated diagrams to show how coal, oil and natural gas are formed.

FORMATION OF COAL



FORMATION OF OIL AND NATURAL GAS



State the advantages and disadvantages of the different types of energy resources given.

	Advantage	Disadvantage
Fossil Fuel	Cheap, convenient to use in cars	Releases polluting gases, non-renewable
Nuclear	No polluting gases	Safe disposal of radioactive waste is difficult
Renewable Resource	Renewable, no pollution	Not available all of the time

Using Resources

How can our use of fossil fuels be reduced?

- Using roof insulation and double glazing in homes.
- Cycling or walking instead of going by car.
- Using energy saving lightbulbs.

What does 'efficiency' mean? Give the efficiency equation in your answer.

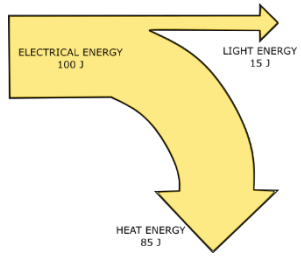
How much of the energy transferred by a machine is useful.

$$\text{Efficiency} = \frac{\text{useful energy}}{\text{input energy}} \times 100$$

Use the efficiency equation to calculate the % efficiency of the following appliances.

Useful (J)	Starting (J)	Efficiency (%)
50	100	50
25	200	25
10	40	25

100 J is supplied to a lightbulb each second by electricity. 15 J of the energy input is transferred each second by light and 85 J is transferred each second by heating. Draw a Sankey diagram to illustrate the efficiency of this lightbulb.



What is the energy input and the energy outputs of a lightbulb?

Energy input – Electrical energy

Energy output – Light and heat energy

What is Albert Einstein's famous quote about energy?

"Energy cannot be created or destroyed, it can only be changed from one form to another."

Ecosystems

Variation

What is variation? Give two examples in your answer.
Differences in the characteristics of different individuals of the same species, e.g. height, dimples.
What is the difference between continuous and discontinuous (discrete) data? Give an example of each in your answer.
Continuous data – data can be any value in a range, e.g. weight.
Discontinuous data – data can only take a limited set of values, e.g. eye colour.
What is inherited variation? Characteristics as a result of genetic information from the parents of the offspring.

Adaptations

How is an artic fox adapted to live in the artic?
White fur for camouflage, thick fur to keep warm, small pointy ears to help hear prey moving underground.
How is a cactus adapted to live in the desert?
No leaves and small surface area to reduce water loss, spines to stop animals eating it. Shallow but extensive roots to absorb water quickly when it rains.

Transfers in Food Chains

What is the difference between a food chain and a food web? A food web consists of many food chains. A food chain only follows one path as animals find food.
What is the trophic level in a food chain or food web?
The trophic level describes the position of the organism in relation to the other nutrient and energy transfers in an ecosystem.

Effects of the Environment

What two factors cause variation?

1. Genetic inheritance
2. Environment

All organisms interact as a community. What is the name for an organism that can make its own food?
A producer.

Effects on the Environment

Give two examples of competition in nature.

1. Competition for food
2. Competition for territory

What causes competition? Limited resources
What does a food web show? A food web represents multiple pathways through which energy and matter flow through an ecosystem.
How can the population of a prey affect the population of a predator? If the population of prey increases, it is likely the population of the predator would increase. If the population of prey decrease - population of the predator would decrease.

Order the following organisms into a food chain: cod, plankton, seal, krill.
plankton → krill → cod → seal
What is a decomposer? An organism that breaks down organic material, e.g. bacteria, fungi.

Key Definitions

Habitat – the natural home or environment of an animal, plant or other organism.
Species – A group of similar organisms that can breed with one another to produce fertile offspring.
Hybrid – An offspring resulting from combining the qualities of two organisms of different breeds, varieties or species, e.g. mule.
Predator – An animal that hunts and eats other animals.
Prey – An animal that gets eaten by other animals.
Carnivore – An animal that only eats meat, e.g. polar bears.
Herbivore – An animal that only eats plants, e.g. cows, horses.
Omnivore – An animal that eats both plants and animals, e.g. humans, grizzly bears.
Top Predator – A predator at the top of its food chain.
Producer – An organism that makes food, e.g. plants, algae.
Consumer – An organism that gets its energy by consuming other organisms.
Food Chain – Shows the dependency of organisms on other organisms for food.

Acids and Alkalis

Hazards

Name the following hazard symbols.

Harmful | Corrosive | Explosive

Flammable | Toxic | Harmful to the environment

How is the hazard of concentrated hydrochloric acid different from the hazard of dilute hydrochloric acid?

Concentrated hydrochloric acid is more corrosive than dilute hydrochloric acid.

Neutralisation

What is neutralisation?

A reaction in which an acid reacts with an alkali to produce a salt and water only.

Give the general equation for a neutralisation reaction.

acid + alkali → salt + water

Complete the following equations:

hydrochloric acid + sodium hydroxide → sodium chloride + water

sulfuric acid + copper oxide → copper sulfate + water

lithium hydroxide + sulfuric acid → lithium sulfate + water

Indicators

Define an indicator.

A substance used to identify whether an unknown solution is acidic or alkaline.

Give two examples of chemical indicator:

- Litmus paper
- Universal indicator

What does the pH scale run to and from?

0 - 14

Label the pH scale below with numbers, strong acid, weak acid, neutral, weak alkali and strong alkali.

What is a base? Any substance that neutralises an acid (an alkali is a soluble base).

What is the pH of saltly water? pH 7

How could you determine neutralisation has been reached when reacting an acid with an alkali? By using an indicator, e.g. by adding universal indicator to the solution, neutralisation will have been reached when the solution turns green.

Acidity and Alkalinity

Give two examples of acid:

- Hydrochloric acid
- Sulfuric acid

Give two examples of alkali:

- Sodium hydroxide
- Potassium hydroxide

Are the following substances acid, alkali or neutral?

Substance	Acid	Alkali	Neutral
Cola	✓		
Drain cleaner		✓	
Lemon juice	✓		
Toothpaste		✓	
Sugar Solution			✓
Oven Cleaner		✓	
Pure Water			✓
Vinegar	✓		

What is the pH of:

1. Stomach acid – pH 2
2. Bleach – pH 13
3. Pure water – pH 7

7L Sound – Revision Spread

Making Sounds

How do animals make sounds?

Sounds are produced by vibrations of the vocal folds in the larynx as air passes from the lungs through the larynx.

Match the keywords with the correct definition.

Keyword	Definition
Volume	The size of vibrations
Pitch	The loudness of a sound
Frequency	The number of vibrations per second
Amplitude	How high or low a note sounds

Using Sounds

Match the keywords with the correct definition.

Keyword	Definition
Absorb	To bounce off a surface
Transmit	Take in
Reflect	To pass through a substance

State two uses of sound waves.

1. Communication
2. Ultrasound waves used to monitor the development of an unborn baby.

Moving Sounds

Why would you not hear anything in space?

Space is a vacuum and therefore does not contain any particles.

Sound can only travel through a medium (solid, liquid, gas). Which medium does sound travel fastest in and why?

Solid – the particles are closer together so vibrations pass through the particles more quickly.

How does sound travel?

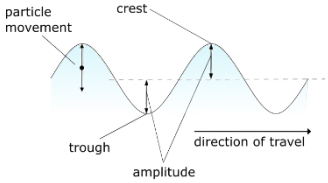
Moving particles make neighbouring particles move, and so the vibrations spread through the air, forming a sound wave.

Sound waves spread out from a source. Do waves transfer energy or particles?

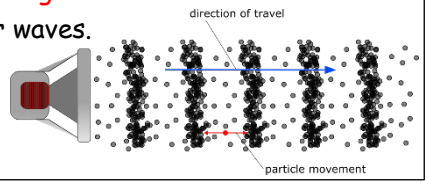
Waves transfer energy.

Comparing Waves

Transverse waves – direction of vibration of the particles is across the direction of wave travel, e.g. water waves.

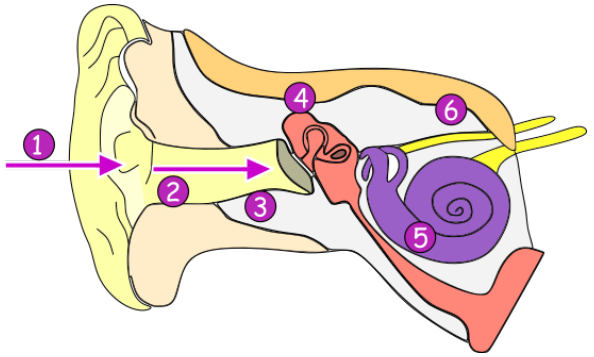


Longitudinal waves - direction of vibration of the particles is along the same direction of wave travel, e.g. water waves.



Detecting Sounds

Number each statement to match the diagram of the ear to explain how the ear works.



3	The waves make the ear drum vibrate.
5	The cochlea turns these into electrical signals.
1	Sound waves are collected by the ear lobe or *pinna*.
6	The auditory nerve takes the signals to the brain.
4	The small bones (ossicles) amplify the vibrations.
2	The waves travel along the ear canal.

Summarise how a microphone works.

Sound waves make a diaphragm in the microphone vibrate. Electrical circuits in the microphone detect the vibrations and convert them into changes in electrical current.