

## 1. What is energy?

**Energy** is a quantity that is stored in objects and systems. It makes things happen.

For example, the energy stored in a car makes it move.



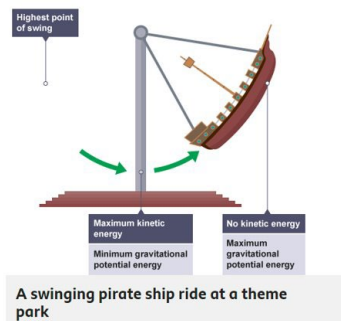
Energy is measured in **joules (j)**.

## 2. Energy Stores

Energy store	Example
Chemical	
Kinetic	
Gravitational potential	
Elastic	
Thermal	

## 3. Energy Transfers

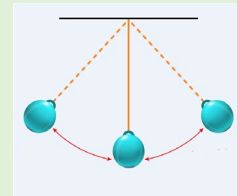
Energy can be transferred between different stores.



## 4. Conservation of Energy

When energy is transferred from one store to another the **total amount of energy does not change**.

Energy cannot be created or destroyed. All that can be changed is how it is stored. This idea is called the **law of conservation of energy**.

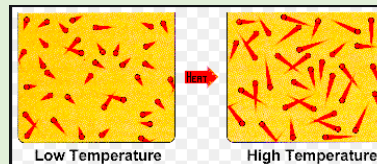


## KS3 Science Energy Transfers

## 5. Temperature

The **temperature** of an object is to do with how hot or cold it is, measured in degrees Celsius (°C).

The temperature is due to the movement of the particles in the object. When an object is heated, its particles move more vigorously and its temperature increases.

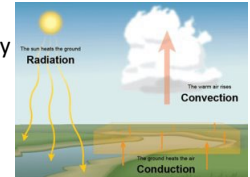


## 6. Heating



energy is **always transferred** from the **hotter** object to the **cooler** one

Energy can be transferred thermally in three ways:  
conduction (between solids),  
Convection (between liquids and gases), radiation (where there are no particles).



## 7. Conductor and Insulators

A substance that transfers energy easily from the hot end to the cold end it is called a **conductor**.

Examples – Metals, water, diamonds.



A substance that does not transfer energy easily from the hot part to the cold part is called an **insulator**.

Examples – Plastics, air, wool.



## 8. Power

The amount of energy transferred is called '**work done**' and is measured in joules (j)

**Power** is the amount of work done divided by the time it took to transfer all the energy. It is measured in **watts (w)**.

To calculate the **power** we use the equation:

$$\text{power} = \frac{\text{work done}}{\text{time taken}}$$

$$P = \frac{E}{t}$$

Where:

- power (P) in watts (W)
- work done (E) in joules (J)
- time (t) in seconds (s)

### 1. What are pathogens?

A pathogen is a micro-organism that causes diseases.

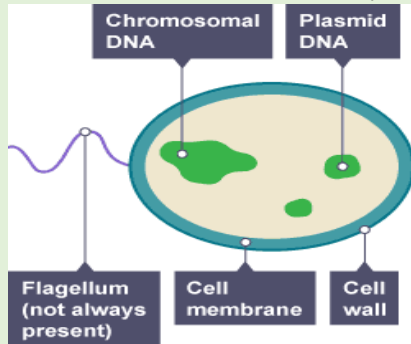
Examples of pathogens: bacteria, fungi or viruses.



Not all microbes cause diseases, some can be useful, for example, Yeast is used to make bread and alcohol.

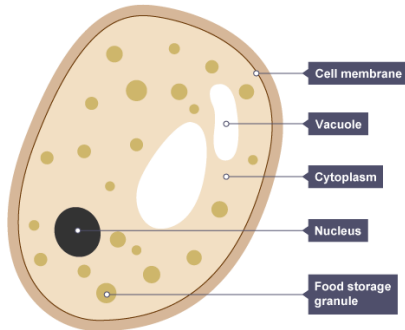
### 2. Bacterial cell:

Example: salmonella which causes food poisoning



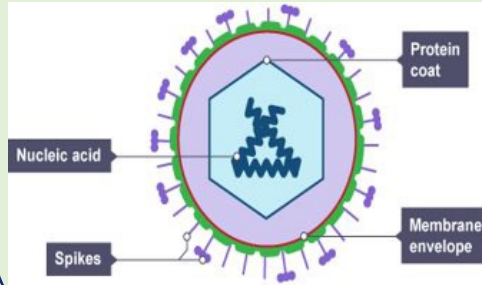
### 3. Fungal cell:

Example: athletes foot.

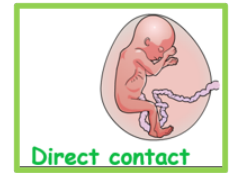
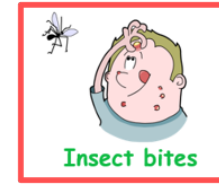


### 4. Virus particle

Example: Coronavirus



### 6. How are pathogens spread?

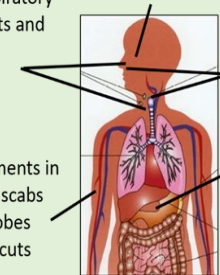


## KS3 Science Microbes and Disease

### 7. Stopping pathogens:

**Cilia** – tiny hairs found in nose and respiratory system that wafts and traps dust

**Skin** – barrier that stops microbes entering body



**Mucus** – in nose and respiratory tract that traps dust and microbes

**Stomach** – stomach acid kills microbes

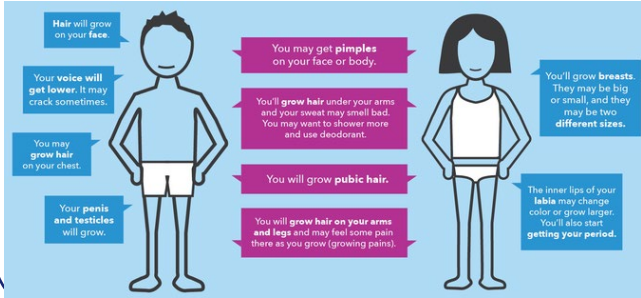
**Platelets** – fragments in blood that form scabs to prevent microbes getting through cuts

### 5. Pathogen facts:

Bacteria	Fungi	Viruses
Unicellular organisms	Can be uni- or multi- cellular	Smaller and more simple than cells
Smaller and more simple than animal and plant cells	More similar to our cells than bacteria, larger	A protein coat surrounding some genetic material
Have not nucleus	Unicellular examples include yeast	Require a host cell to reproduce
Often have a flagellum for moving	Multicellular examples include mushrooms	

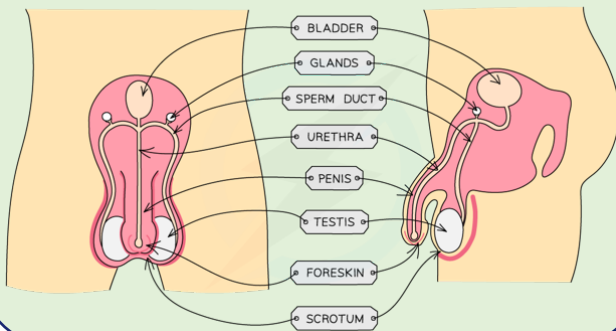
## 1. Puberty and Adolescence

As a child develops into an adult, their body prepares for reproduction.



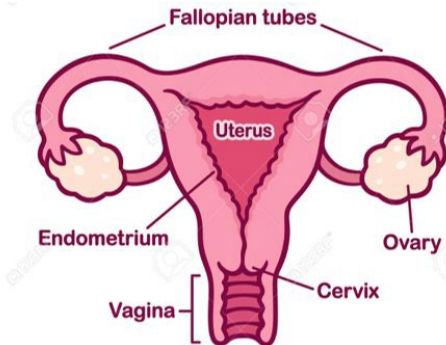
## 2. Male Reproductive System

**ROLE** – produce and store sperm cells for reproduction.



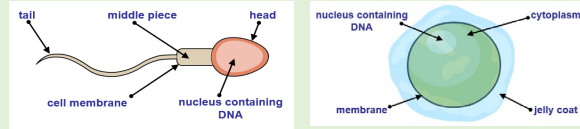
## 3. Female Reproductive System

**ROLE** – produce and release eggs cells for reproduction.



## 4. Gametes

Gametes are sex cells. Sperm cells are the male gamete and egg cells (ova) are the female gamete.



**ROLE:** join with the egg cell for fertilisation.

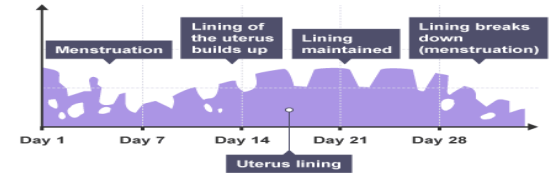
**SPECIALISATION:** tail to swim to egg.

**ROLE:** join with the sperm cell for fertilisation.

**SPECIALISATION:** Lots of nutrients and very large.

## 6. Menstrual Cycle

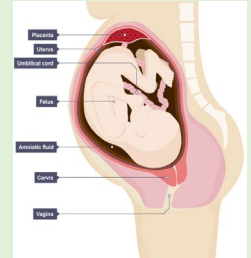
The menstrual cycle prepares the female body for pregnancy by causing eggs (ova) to mature and be released. It lasts for 28 days.



On about day 14, the mature egg cell is released from the ovary. This is called ovulation. If the egg cell does not meet with a sperm cell in the oviduct, the lining of the uterus begins to break down, the female experiences a period, and the cycle repeats.

## 7. Gestation and Pregnancy

A fertilised egg cell divides to form a ball of cells called an **embryo**. The embryo attaches to the lining of the uterus where it gets nutrients and oxygen. It begins to develop into a **foetus** and finally into a baby.



The foetus will grow an umbilical cord and a placenta. The placenta is responsible for removing waste substances, as well as providing oxygen and nutrients. The umbilical cord connects the foetus to the placenta.

The foetus is protected from bumps and knocks by the amniotic fluid sac.



KS3 Science

## Human Reproduction

## 5. Fertilisation

Fertilisation is when a sperm cell and an ovum fuse. Sperm cells are released into the female reproductive system during sexual intercourse (ejaculation). Only one sperm cell breaks through the cell membrane and enters the ovum, and only the head enters.



The nuclei fuse together, putting the mother and father's genetic information together. The fertilised ovum is now an embryo.

## 8. Birth

In humans, gestation lasts 40 weeks. This is the amount of time it takes for a foetus to develop into a baby. When the baby is ready to be born, the cervix relaxes and the muscles in the wall of the uterus contract. Muscle contractions increase in intensity and frequency, eventually pushing the baby out of the vagina.

Unfortunately, a baby can enter the world unhealthy. This can be due to inheriting diseases from one of the parents or due to lifestyle choices made by the mother:

**Smoking** leads to less oxygen diffusing from mother to foetus via the placenta.



Foetal Alcohol Syndrome (FAS) is when the mother drinks excessive **alcohol** whilst pregnant. This damages the baby's nervous system and brain.

