

Topic: Ecological Relationships 1-3		Duration: 12 Weeks	Composite:
<p>Key vocabulary:</p> <p>Ecosystem</p> <p>Population</p> <p>Habitat</p> <p>Producer</p> <p>Consumer</p> <p>Food web</p> <p>Biomass</p> <p>Ecosystem</p> <p>Distribution</p> <p>Abiotic</p> <p>Biotic</p> <p>Pollutants</p> <p>Competition</p> <p>Predation</p> <p>Parasite</p> <p>Mutualist</p> <p>Biodiversity</p>	<p>Core knowledge Components</p> <p>Describe some relationships between organisms in a habitat.</p> <p>Use data from sampling to estimate the number of individuals in an area.</p> <p>Link abiotic factors to distribution of organisms.</p> <p>Give examples of the environmental impact of some pollution events.</p> <p>Give examples of case studies where reintroductions have increased biodiversity.</p> <p>Give examples of other types of relationships that are parasitic and mutualistic.</p> <p>Explain the impacts of human activities on diversity including fish farming, introduction of non-native species and eutrophication.</p> <p>How can the impact of human activity that has reduced biodiversity be reversed?</p> <p>Describe the processes in the water cycle.</p> <p>Describe the processes in the carbon cycle and how each part of the process functions.</p> <p>Explain the impact of burning fossil fuels.</p> <p>State the role of microbes in the nitrogen cycle including decomposers, nitrifying bacteria and denitrifying bacteria.</p>	<p>Powerful knowledge components crucial to commit to long term memory</p> <p>Be able to identify producers, primary consumers, predators, and top predators in a food chain.</p> <p>What is a quadrat used for?</p> <p>How can you ensure quadrat sampling is as accurate as possible?</p> <p>Name examples of abiotic and biotic factors.</p> <p>What is bioaccumulation?</p> <p>What is meant by biodiversity?</p> <p>What is a parasite?</p> <p>What is a mutualist?</p> <p>What does non-native mean?</p> <p>What activity is responsible for eutrophication?</p> <p>Why does eutrophication lead to fish death?</p> <p>What is desalination?</p> <p>What is distillation?</p> <p>Name the process that removes CO₂ in the carbon cycle.</p> <p>Name 2 other process that release CO₂ in the carbon cycle.</p> <p>Why do plant need nitrogen?</p> <p>How do plants obtain nitrogen?</p>	<p>Links to previous and future topics</p> <p>Yr 7 Ecology / moving and breathing.</p> <p>Yr8 Microbes and plants.</p> <p>Yr10/11 -CB9 Ecosystems and material cycles</p>

Topic: Healthy Lifestyle		Duration: 4 weeks (6 lessons)	Composite:
Key vocabulary: Recreational drug Nutrition Biome Deficiency Carbohydrate Protein Lipid Fibre Enzyme Catalyst Carbohydrase Protease Lipase Reagent Substrate Denature Concentration Optimum	Core knowledge Components <p>Know what recreational drugs are and some of the health implications of sustained use.</p> <p>Analyse statistical data to work out health impacts from recreational drugs.</p> <p>Explain the social impact of drug use.</p> <p>Identify the main food groups in common foodstuffs.</p> <p>State the reagents that can be used to identify food groups.</p> <p>Explain how enzymes are used in the gut to break down large macromolecules for digestion.</p> <p>How are temperature, concentration and pH related to enzyme activity?</p> <p>Importance of bacteria in our bodies as a way of maintaining good health.</p> <p>Examples of microbiota in different parts of the human body.</p> <p>Ways in which population of microbiota can be maintained for good health.</p>	Powerful knowledge components crucial to commit to long term memory Name 2 illegal recreational drugs. State the effect of alcohol on the body State the effect of smoking on the body State the use of carbohydrates, proteins, and fats in the body. What is the active site? What makes enzymes specific? What does Denatured mean? What is the optimum temperature for enzyme activity? What is the human biome?	Links to previous and future topics Year 7 cells, moving and breathing Year 8 Food and digestion, microbes Year 10/11 CB1 Key concepts in biology. CB5 Health and Disease

Topic: Chemical Reactions

Duration: 11 lessons

Composite:

Key vocabulary:

Acid
Base
Alkali
Ion
Indicator
Neutralisation
Burette
Pipette
Titration
Ionic
Excess
Concentration
Hydrated
Distilled
Exothermic
Endothermic
Precipitate
Catalyst
Oxidation
Reduction
Activation
Pure
Soluble
Insoluble
Formulae

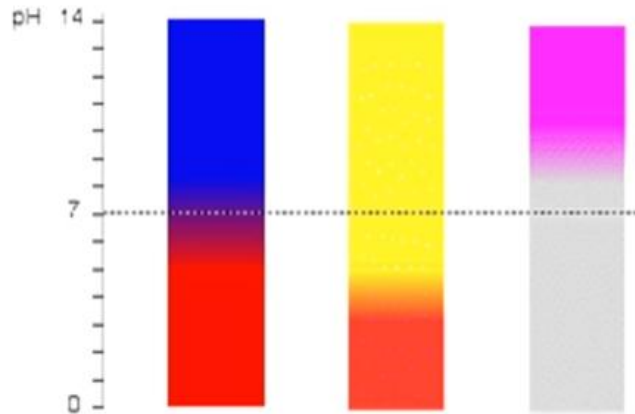
Core Knowledge in this unit:

Learn these formulae!

H_2SO_4 sulphuric acid
 HCl hydrochloric acid
 HNO_3 nitric acid

Learn these formulae!

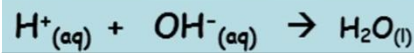
$NaOH$ sodium hydroxide
 KOH potassium hydroxide
 $Ca(OH)_2$ calcium hydroxide



Litmus

Methyl Orange

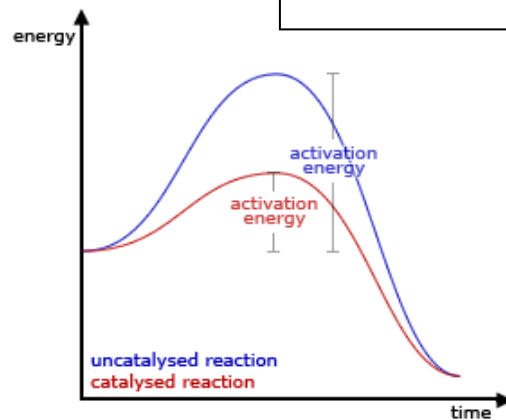
Phenolphthalein



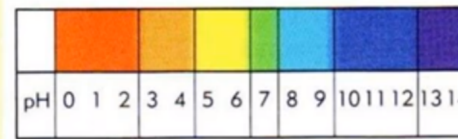
Acid-alkali Neutralisation

Ionic Equation

Distilled Water - water than has been purified by boiling and condensing which leaves impurities behind.



Powerful Knowledge components critical to commit to long term memory:



Burette



Pipette

Acid - A source of hydrogen ions in solution.

Alkali - A source of hydroxide ions in solution. A base that dissolves in water

Indicator - A substance which changes colour in acids and alkalis.

Concentration - a measure of how many particles are in a given volume.

Base - the chemical opposite of an acid.

Neutralisation - reaction between an acid and a base which produces water.

Precipitate - an insoluble salt.

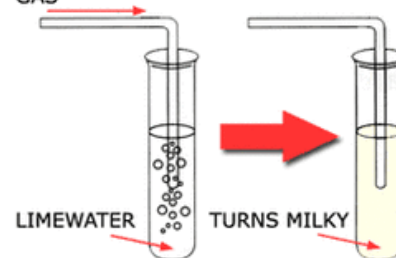
Exothermic - a reaction in which energy is given out to the surroundings overall.

Endothermic - a reaction in which energy is taken in from the surroundings overall.

Catalyst - something that speeds up a chemical reaction but is itself chemically unchanged.

Reactions such as combustion and respiration gain oxygen so are called '**oxidation**' reactions.

CARBON DIOXIDE GAS



Test for Hydrogen

Hydrogen makes a **squeaky pop** with a lighted splint



Links to previous and future topics

KS2 Materials

KS3 Elements, compounds and reactivity (Yr7)

KS3 Separations & Mixtures (Yr7)

KS3 Particles & Solutions (Yr7)

KS3 Solutions & Mixtures (Yr8)

KS4 States of Matter & Mixtures (Chem)

KS4 Chemical Changes

Topic: Forces in a Newtonian World

Duration: 11 lessons

Composite: Unit test

Key vocabulary:

Core knowledge Components and Powerful knowledge components (P) crucial to commit to long term memory

Links to previous and future topics

- Force
- Newton
- Speed
- Velocity
- Acceleration
- Direction
- Gradient
- Area
- Mass
- Weight
- Gravitational Field Strength
- Balanced
- Unbalanced
- Initial
- Final
- Friction
- Resultant
- Magnitude
- Braking
- Stopping
- Thinking
- Momentum
- Light gate

Year 10 Forces and Motion (Page 1)

Core and Powerful (P) knowledge questions


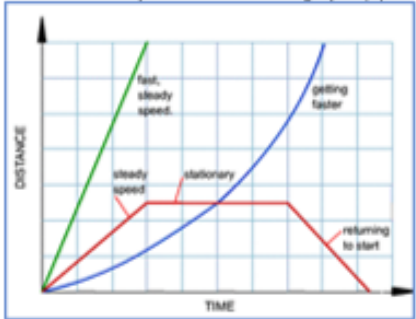
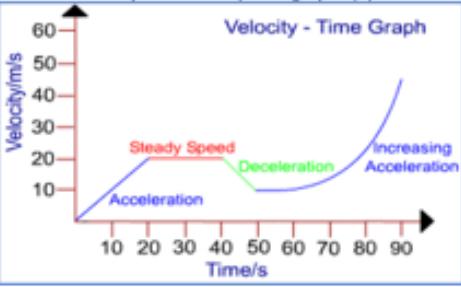

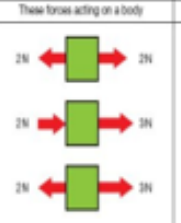
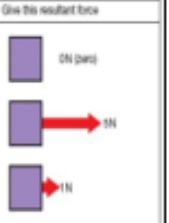


What is the difference between a scalar and a vector quantity? (P)
A **vector** quantity has size and **direction**.
A **Scalar** quantity has size **only**

Scalars	Vectors
direction	displacement
speed	velocity
mass	force (including weight)
temperature	acceleration
energy	momentum

State some everyday speeds:

- Walking 1.5m/s
- Running 3 m/s
- Cycling 6m/s
- Car 25m/s
- Train 50m/s
- Plane 250m/s

What are the units for distance, speed, acceleration, force, mass, time and momentum?

Distance, m	Speed, m/s	Acceleration, m/s ²	Force, N	Mass, kg	Time, s	Momentum kgm/s
<p>What equation links velocity, distance and time? (P)</p> $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$ 	<p>How do we interpret a distance time graph? (P)</p> 	<p>How do we interpret a velocity time graph? (P)</p> 	<p>What is the equation that links acceleration with change in velocity and time? (P)</p> $a = \frac{v - u}{t}$ 	<p>Which equation links acceleration with change in velocity and distance travelled?</p> $v^2 - u^2 = 2 \times a \times x$	<p>What happens to an object if there is a resultant force acting on it? (P) The object moves in a straight line at a steady speed</p> <p>What happens to an object if there is no resultant force acting on it? (P) The object accelerates</p>	<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;"> <p>These forces acting on a body</p>  </div> <div style="border: 1px solid black; padding: 2px;"> <p>Give this resultant force</p>  </div> </div> <div style="text-align: center; margin-top: 10px;">  <p style="background-color: yellow; padding: 5px; display: inline-block; font-weight: bold;">Required practical: Watch again: Investigating force, mass and acceleration</p> </div> 

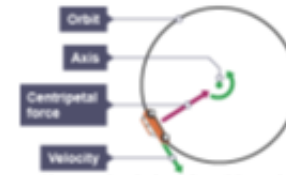
- KS2: Forces & Magnets, Forces
- Y7: Forces & Space
- Y9 Forces
- KS4: Forces & Motion; Forces & Matter

Year 10 Forces and Motion (Page 2)

Core and Powerful (P) knowledge questions

What is the name of the type of force that keeps an object moving in a circle? (H)
 Why is an object moving in a circle constantly accelerating? (H)

Objects travelling in a circular motion are prevented from moving off in a straight line by **centripetal force**. This resultant force pulls objects toward the centre of the circle, continually changing the direction that an object is travelling in to keep it in circular motion.



What does Newton's First Law of Motion State?

An object remains in the same state of motion unless a resultant force **acts** on it. If the resultant force on an object is zero, this means:

- a stationary object stays stationary
- a moving object continues to move at the same velocity (at the same speed and in the same direction)

What does Newton's Second Law of Motion State?

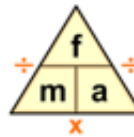
The law can be described by this equation which shows that the acceleration of an object is:

$$F = m \times a$$

- proportional to the resultant force on the object
 - inversely proportional to the mass of the object
- In other words, the acceleration of an object increases if the resultant force on it increases, and decreases if the mass of the object increases

What is the equation that links force, mass and acceleration? (P)

$$F = m \times a$$



What is weight?
 What is the difference between mass and weight?

Mass and weight are not the same!

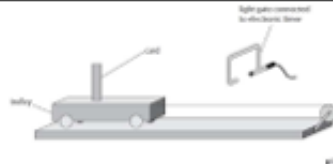
- **Mass** is the **amount of matter** in an object and is measured in **kilograms**. Mass is not a force. Mass will have the same value anywhere in the Universe, including space.
- **Weight** is a **force** and is caused by the pull of gravity acting on a mass. Like other forces, weight is measured in **newtons** and has both magnitude and direction.

What does Newton's Third Law of Motion State?

Whenever two objects interact, they exert equal and opposite forces on each other

How do light gates work?

A **light gate** is connected to a device that measures the time the light is blocked when the card passes through it.



What is the equation that links momentum, mass and velocity? (H)



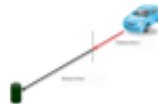
$$p = m \times v$$

What equation links change in momentum to force? (H)

$$F = \frac{(mv - mu)}{t}$$

How is overall stopping distance linked to braking and thinking distance?

$$\text{Stopping distance} = \text{Thinking distance} + \text{Braking distance}$$



Which different factors affect thinking and braking distance?



Thinking distance	Braking distance
Speed of car	Speed of car
Drugs and alcohol	Road conditions
Tiredness	Condition of tyres
Medication	Condition of brakes

Topic: Y9 Motion & Pressure in a Newtonian World	Duration: 11 lessons	Composite: Unit test	
Key vocabulary:	Core knowledge Components Powerful knowledge components crucial to commit to long term memory (IN RED BOX)		Links to previous and future topics
Speed Average Instantaneous Distance Time Relative motion Gradient Constant Acceleration Velocity Thinking distance Braking distance Stopping distance Atmospheric Pressure Force Area Compressed Incompressible Density Moment Pivot Lever Centre of mass Centre of gravity Mass Action Reaction Equilibrium Collision	<p><u>SPEED</u></p> <ul style="list-style-type: none"> • Constant speed means speed is not changing. The line is straight not curved on a distance-time graph. • To find out average speed using a distance-time graph – you measure the gradient <p><u>ACCELERATION</u></p> <ul style="list-style-type: none"> • An equation linking acceleration and changing speed is: $a = (v - u) / t$ • $v =$ final speed; $u =$ starting speed; $t =$ time (in seconds) • To find out acceleration from a velocity-time graph - measure the gradient • Constant acceleration on a velocity-time graph - the line is straight not curved <p><u>ROAD SAFETY</u></p> <ul style="list-style-type: none"> • Factors affecting thinking distance: alcohol, drugs, tiredness, distractions (e.g. mobile use, music, children), speed • Factors affecting braking distance: speed, road conditions, weather conditions, condition of tyres <p><u>PRESSURE</u></p> <ul style="list-style-type: none"> • Atmospheric pressure decreases as height decreases • Increasing Volume and decreasing Temperature decrease Pressure • Pressure in liquids is caused by liquid particles pushing against each other and container walls. It acts in all directions. • Liquid pressure increases with depth due to an increasing mass of liquid above • Some objects to float due to Upthrust force from water particles caused by liquid pressure <p><u>MOMENTS</u></p> <ul style="list-style-type: none"> • Moment = force x perpendicular distance from the pivot) • Law of moments is: Clockwise moment = anticlockwise moment; the objects are balanced • Centre of Mass is: the point in an object where all the mass of an object seems to act <p><u>ACTION-REACTION</u></p>	<p>POWERFUL KNOWLEDGE</p> <ul style="list-style-type: none"> • Speed is how far an object travels in a certain amount of time. Its symbol is 's'. Its unit is metres per second (m/s). • Instantaneous speed = the speed at a particular moment. • Average speed = <u>total distance travelled</u> / <u>time taken</u> • Relative motion = the difference between the speeds of 2 objects – how fast one object is compared to another) • Constant speed means speed is not changing. • Acceleration is the amount by which speed changes in one second. Its symbol is 'a'. Its unit is m/s^2. • The equation for Newton's 2nd Law of Motion is: $F = m \times a$. Units: Force = Newtons, mass = kilogrammes • Reaction time = time taken to react to an event • Thinking distance = distance travelled by a vehicle while the driver reacts • Braking distance = distance the vehicle travels between driver applying the brakes and the vehicle stopping. • Stopping distance = thinking distance + braking distance • Gas pressure is caused by collisions between gas particles and container walls. • Pressure is the force acting on a certain area; $P = F / A$ - Pressure is measured in Pascals (Pa) • A 'moment' is a measure of the ability of a force to rotate an object about a pivot. It is measured in Newton metres (Nm) 	KS2: Earth & Space, Forces, Uses of Everyday Materials Y7 and Y8: Particles and Solutions; Forces & Space; Heating & Cooling. KS4: Motion, Forces & Motion; Forces & their Effects, Particle Model; Forces & Matter

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| | <ul style="list-style-type: none">• Action-Reaction forces are the pair of forces acting on 2 objects that are interacting with each other.• What is the difference between action-reaction forces and balanced forces? Action-Reaction forces act on different objects, balanced forces act on the same object. | | |
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