KING'S LYNN ACADEMY

KNOWLEDGE ORGANISER

Year 11 Autumn Term 1

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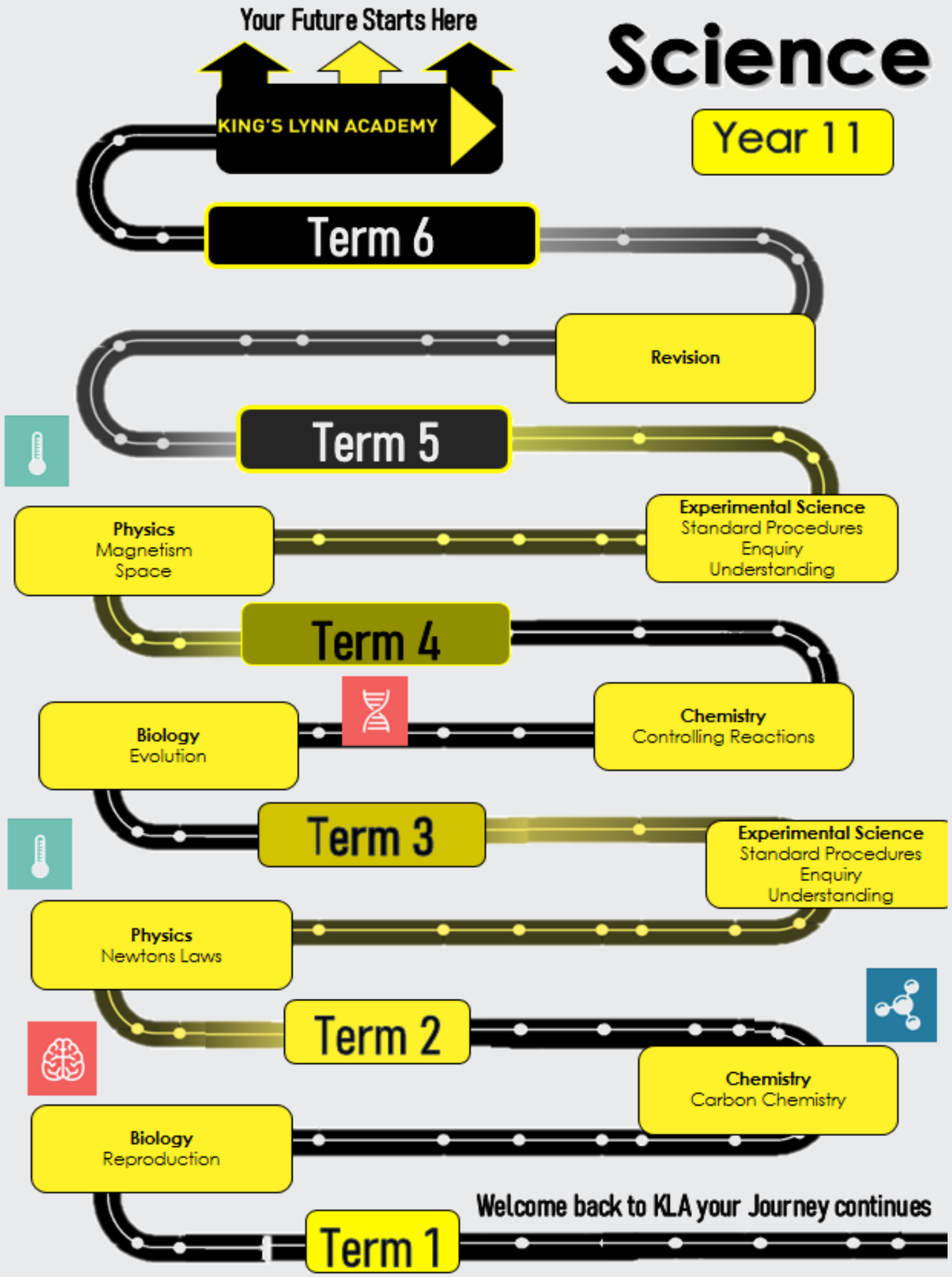


Year 11

Physics
Knowledge Checklist

	KNOWLEDGE CHECKLIST	R	A	G
		KNOWLEDGE PROGRESS		
1	Force = mass x acceleration			
2	Stopping distance: The total distance needed for a car to come to a complete stop			
3	Thinking distance: The distance covered by a car when a driver is reacting to needing to stop and before they start to brake			
4	Braking distance: The distance covered by the car once braking starts.			
5	Momentum: Momentum is the product of mass and velocity . Momentum is also a vector quantity – this means it has both a magnitude and an associated direction.			
6	Velocity: The velocity of an object is its speed in a particular direction. Velocity is a vector quantity because it has both a magnitude and an associated direction.			
7	Resultant: The resultant force is the single force that has the same effect as two or more forces acting together.			

Notes_____

High Flyers - Enrichment Task

The three laws of motion were first stated by Isaac Newton in his Philosophiæ Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy), originally published in 1687. [3] Newton used them to investigate and explain the motion of many physical objects and systems, which laid the foundation for classical mechanics. Limitations to Newton's laws have also been discovered: new theories are necessary when objects are very fast (special relativity), very massive (general relativity), or very small (quantum mechanics).

Year 11

Physics

Knowledge Questions

Below are a series of questions.

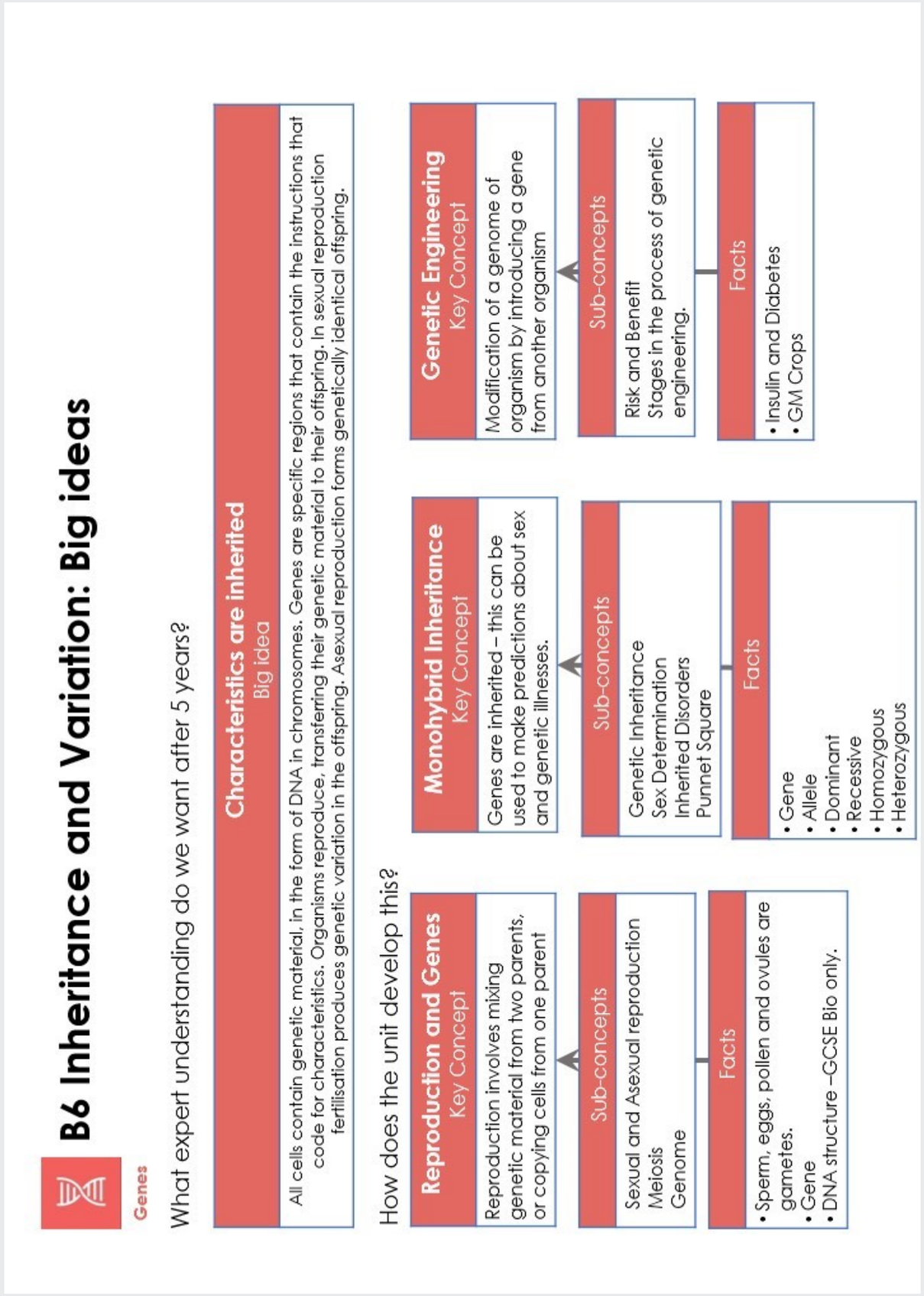
Use these to apply your knowledge and practice.

Newtons Second Law
How does the second law link to the first and third law of motion?
What is the equation used that links force, mass and acceleration?
How does a scientist measure acceleration?

Stopping Distance
Why is stopping distance important?
What affects thinking distance?
What affects braking distance?

Momentum
Why is momentum a compound variable?
What is a closed system—why is this important in studying momentum?
How does understanding momentum help in designing safety systems for transport?

Notes_____



Triple Science? Get extra support here

Combined Science? Get extra support here

B6 Inheritance and Variation: Big ideas

Genes

What expert understanding do we want after 5 years?

Characteristics are inherited
Big idea

All cells contain genetic material, in the form of DNA in chromosomes. Genes are specific regions that contain the instructions that code for characteristics. Organisms reproduce, transferring their genetic material to their offspring. In sexual reproduction fertilisation produces genetic variation in the offspring. Asexual reproduction forms genetically identical offspring.

How does the unit develop this?

Cloning – GCSE Biology only
Key Concept

Cloning is used to create a genetically identical organism from an original plant or animal

Sub-concepts
- Risk and Benefit
- Ethics

Facts
- Tissue Culture
- Plant cutting
- Embryo transplant
- Adult Cloning

Notes

Year 11

Chemistry
Knowledge Checklist

	KNOWLEDGE CHECKLIST	KNOWLEDGE PROGRESS R	A	G
1	Crude oil: a mixture of hydrocarbons formed from plankton and ancient plants.			
2	Hydrocarbon: a molecule formed from Hydrogen and Carbon only.			
3	Homologous series: A family of hydrocarbons with a predictable relationship between carbon and hydrogen atoms.			
4	Combustion: Hydrocarbons burn in oxygen to produce carbon dioxide and water.			
5	Cracking: Hydrocarbons can be broken down (cracked) to produce smaller, more useful molecules.			
6	Unsaturated: A hydrocarbon with a Carbon-Carbon double bond. A test for unsaturation is that orange bromine water is decolourised.			
7	Alcohol: Alcohols contain the functional group –OH.			
8	Carboxylic acid: Carboxylic acids have the functional group –COOH.			
9	DNA: A double-stranded helix held together by complementary base pairs. The basic units of DNA are nucleotides. These nucleotides consist of a deoxyribose sugar, phosphate and base.			

Notes_____

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High Flyers - Enrichment Task

Peak oil is a term applied to the projection that future petroleum production (whether for individual oil wells, entire oil fields, whole countries, or worldwide production) will eventually peak and then decline at a similar rate to the rate of increase before the peak as these reserves are exhausted. The peak of oil discoveries was in 1965, and oil production per year has surpassed oil discoveries every year since 1980. However, this does not mean that potential oil production has surpassed oil demand.

Year 11

Chemistry

Knowledge Questions

Below are a series of questions.

Use these to apply your knowledge and practice.

Crude Oil
How is crude oil formed?
How is crude oil separated into useful fractions?
How do the properties of the different fractions of crude oil affect the uses that they can be put to?

Alkenes
What are the differences between an alkane and an alkene?
What are the differences between addition and condensation polymerisation?
How is the structure of DNA related to its function?

Notes

Key words	
1.	Reproduction: the production of offspring by a sexual or asexual process.
2.	Chromosome: a threadlike structure in the nucleus of a cell, made from DNA
3.	Gene: a section of DNA that has instructions to make a protein.
4.	DNA: Deoxyribonucleic acid (abbreviated DNA) is the molecule that carries genetic information for the development and functioning of an organism.
5.	Mitosis: the process of cell division which produces two identical cells with the same number of pairs of chromosomes
6.	Meiosis: the type of cell division that produces gametes. A human body cell contains 46 chromosomes arranged in 23 pairs. Human gametes only contain a single set of 23 unpaired chromosomes.
7.	Inheritance: a feature passed from parent to offspring during reproduction.
8.	Dominant: A dominant allele is a variation of a gene that will produce a certain phenotype, even in the presence of other alleles.
9.	Recessive: A recessive allele is a variation of a gene that will produce a certain phenotype when there are two copies of the allele present.
10.	Allele: A different form or variation of a gene. A pair of alleles (one from each parent) forms a gene.
11.	Homozygous: When both alleles present in a pair of chromosomes are the same (dominant or recessive).
12.	Heterozygous: When the alleles present in a pair of chromosomes are different (one dominant, one recessive).
13.	Genotype: The genes that an organism has for a characteristic.
14.	Phenotype: The characteristic that an organism has because of its genes.
15.	Genome: The whole genetic information of an organism.

Notes

Know the facts	
1	Sexual reproduction means mixing genes from two parents
2.	Asexual reproduction is the copying of genetic information from a single parent.
3	Sperm, eggs, pollen and ovules are gametes.
4.	Genes are inherited – this can be used to make predictions about sex and genetic illnesses.
5.	DNA is a double helix structure made from alternate pairs of four bases, with a spine of glucose and phosphate molecules.
6.	Punnet squares are used to show the probability of inheriting a genotype or a phenotype from a parent.
7	Genetic modification inserts new genes into an organism. It is commonly used to place a gene in a plasmid of a bacteria.
8	Uses for genetic modification include using bacteria to produce human insulin and creating pesticide resistant crops.
9	There are ethical issues with genetic engineering. Some people consider it morally wrong.
10	Cloning can be used to create a genetically identical copy of an organism.

Structure determines properties : Big ideas

Matter

What expert understanding do we want after 5 years?

Structure determines properties

- The properties of a substance depend upon the type of atoms it contains and the strength of the bonds holding them together. The properties determine the uses the substance is suitable for.

How does the unit develop this?

Crude Oil
Key Concept

Crude oil is a finite resource found in rocks. Crude oil is a mixture of a very large number of compounds. Most of the compounds in crude oil are hydrocarbons, which are molecules made up of hydrogen and carbon atoms only.

Sub-concepts

The many hydrocarbons in crude oil may be separated into fractions, each of which contains molecules with a similar number of carbon atoms, by fractional distillation.

Facts

- Properties of hydrocarbons depend on the size of their molecules, including boiling point, viscosity and flammability. These properties influence how hydrocarbons are used as fuels.
- The complete combustion of a hydrocarbon produces carbon dioxide and water.
- Hydrocarbons can be broken down (cracked) to produce smaller, more useful molecules.

Alkenes (Triple only)

Alkenes are hydrocarbons with a double carbon-carbon bond. Alkene molecules are **unsaturated** because they contain two fewer hydrogen atoms than the alkane with the same number of carbon atoms.

Sub-concepts

Addition
Polymerisation

Facts

- Alkenes react with hydrogen, water and the halogens, by the addition of atoms
  - Alcohols contain the functional group –OH.
  - Carboxylic acids have the functional group –**COOH**.
  - Alkenes can be used to make polymers such as poly(ethene) and poly(propene) by addition polymerisation.
  - Condensation polymerisation involves monomers with two functional groups.

Year 11

Biology Knowledge Checklist

	KNOWLEDGE CHECKLIST	KNOWLEDGE PROGRESS R	A	G
1	Sexual reproduction means mixing genes from two parents.			
2	Asexual reproduction is the copying of genetic information from a single parent.			
3	Sperm, eggs, pollen and ovules are gametes.			
4	Genes are inherited – this can be used to make predictions about inheritance of sex and genetic illnesses.			
5	DNA is a double helix structure made from alternate pairs of four bases, with a spine of glucose and phosphate molecules.			
6	Punnet squares are used to show the probability of inheriting a genotype or a phenotype from a parent.			
7	Genetic modification inserts new genes into an organism. It is commonly used to place a gene in a plasmid of a bacterium.			
8	Uses for genetic modification include using bacteria to produce human insulin, and creating pesticide resistant crops.			
9	There are ethical issues with genetic engineering—some people consider it morally wrong.			
10	Cloning can be used to create a genetically identical copy of an organism.			

Notes

	Know the facts
1	Crude oil: a mixture of hydrocarbons formed from plankton and ancient plants.
2	Hydrocarbon: a molecule formed from Hydrogen and Carbon only.
3	Fractional distillation: The many hydrocarbons in crude oil may be separated into fractions, each of which contains molecules with a similar number of carbon atoms, by fractional distillation.
4	homologous series: A family of hydrocarbons with a predictable relationship between carbon and hydrogen atoms
5	Combustion: hydrocarbons burn in oxygen to produce carbon dioxide and water.
6	Cracking: Hydrocarbons can be broken down (cracked) to produce smaller, more useful molecules.
7	Unsaturated: A hydrocarbon with a Carbon Carbon double bond. A test for unsaturation is that orange bromine water is decolorised.
8	Alcohol: alcohols contain the functional group –OH.
9	Carboxylic acid: Carboxylic acids have the functional group –COOH
10	DNA: a double-stranded helix held together by complementary base pairs. The basic units of DNA are nucleotides. These nucleotides consist of a deoxyribose sugar, phosphate and base.

Notes

Year 11

Biology Knowledge Questions

Below are a series of questions. Use these to apply your knowledge and practice.

Reproduction and Genes
What is the difference between sexual and asexual reproduction?
What is the genome of an organism?
What is the structure of DNA and why is it important?
Monohybrid Inheritance
What does a gene code for?
What is the difference between a dominant and recessive allele ?
Describe a common genetic disorder and the issues that can arise for parents.
Genetic Engineering
How are different genes inserted into an organism?
Why is genetic engineering important for people with diabetes?
What ethical issues are linked to genetic engineering?

High Flyers - Enrichment Task

The 25 April 1953 issue of the journal Nature published a series of five articles giving the Watson and Crick double-helix structure DNA and evidence supporting it. The structure was reported in a letter titled "MOLECULAR STRUCTURE OF NUCLEIC ACIDS A Structure for Deoxyribose Nucleic Acid", in which they said, "It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material." In 1962, after Franklin's death, Watson, Crick, and Wilkins jointly received the Nobel Prize in Physiology or Medicine.[203] Nobel Prizes are awarded only to living recipients. A debate continues about who should receive credit for the discovery.

Triple Science? Get extra support here

Combined Science? Get extra support here

Notes

Key words	
1	Alkane: Alkanes are organic compounds that consist of single-bonded carbon and hydrogen atoms. The formula for *Alkanes is* C_nH_{2n+2}
2	Alkenes are a homologous series of hydrocarbons that contain a carbon-carbon double bond. The number of hydrogen atoms in an alkene is double the number of carbon atoms, so they have the general formula CnH2n.
3	Viscosity: How "thick" a liquid is. Treacle has a higher viscosity than water.
4	Flammability: How easily a chemical compound burns
5	Distillation: separating a mixture using the different boiling points of the components.
6	Fraction: A mixture of separated crude oil containing molecules with a similar boiling point.
7	Polymerisation: a chemical process where smaller molecules are chemically joined to make larger molecules
8	Addition: a process that alkenes go through to make polymers.
9	Condensation: a process that amino acids and carboxylic acids go through to create polymers.

Know the facts	
1	Newtons second law: Force is proportional to the mass of an object and it's acceleration. Force = mass x acceleration
2	Stopping distance: The total distance needed for a car to come to a complete stop.
3	Thinking distance: The distance covered by a car when a driver is reacting to needing to stop and before they start to brake.
4	Braking distance: The distance covered by the car once braking starts.
5	Reaction time: The length of time taken for a person or system to respond to a given stimulus or event.
6	Momentum: The product of mass and velocity . Momentum is also a vector quantity – this means it has both a magnitude and an associated direction.
7	Safety features: Modern cars have safety features. These focus on reducing the change in momentum by increasing the time taken for the collision to happen.
8	Velocity: The velocity of an object is its speed in a particular direction. Velocity is a vector quantity because it has both a magnitude and an associated direction.
9	Resultant: The resultant force is the single force that has the same effect as two or more forces acting together.
10	Equilibrium: If the size and direction of the forces acting on an object are exactly balanced, then there is no net force acting on the object and the object is said to be in equilibrium.
Key words	
1	Acceleration: Rate of change of velocity or speed – measured in metres per second squared.
2	Proportional: Two linked variables increase or decrease by a constant ratio.
3	Conserved: Maintaining a quantity at a constant; not lost or destroyed.

Triple Science? Get extra support here

Combined Science? Get extra support here

Notes

Forces

P5 Newton's Laws: Big ideas

What expert understanding do we want after 5 years?

Forces predict motion
Big idea

Objects interact. The overall effect of forces on an object depends on their sum. Objects in equilibrium have constant motion, but change velocity with a resultant force. Newton's laws and the equations of motion can predict motion.

How does the unit develop this?

Newtons Second Law
Key Concept

The acceleration of an object is proportional to the resultant force acting on the object

Sub-concepts

Proportionality, Graphing, use and application of equations. Required practical - acceleration

Facts

- F = m a
- inertial mass
- Proportional
- Approximate
- Investigation of factors that have an effect on the acceleration of an object.

Stopping Distance
Key Concept

The concept of stopping distance is important in road safety. It uses ideas from Newtons laws and important concepts from Biology about reaction time

Sub-concepts

Thinking distance.
Braking distance.

Facts

- Thinking distance is changed by the reaction time of the driver. The reaction time of a driver depends on how alert they are and why.
- Braking distance can be changed by the condition of the road or the vehicle.

Notes

Momentum – higher tier only
Key Concept

Momentum is a property of moving objects that depends on mass and velocity

Sub-concepts

Momentum is conserved in a closed system.

Facts

- Momentum = mass x velocity
- Safety features in vehicles often depend on reducing momentum change.

Notes