SCIENCE

Biology

- Systems in Organisms
- Environmental Biology

Chemistry

- Particles
- Chemical Reactions

Physics

- Energy
- Forces

BIG IDEAS

OUR MANTRAS

Our Scientists have deep knowledge of relevant, modern scientific principles

Our Scientists aim for mastery over their skills and knowledge in Science

Our Scientists are responsive to their own learning and are always striving to improve

Our Scientists communicate their ideas using science specific vocabulary

Our Scientists are cultured investigators

Our Scientists question what it means to be a Scientist in the 21st century

Our Scientists are enriched by the opportunity to interact with the Scientific community

PEDAGOGICAL PRINCIPLES

Mastery

Extended Writing & Vocabulary

Teacher modelling

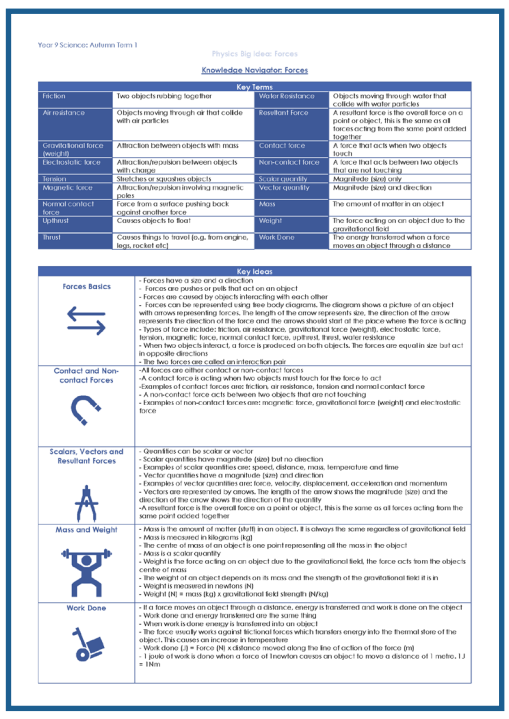
LEARNING STRATEGIES

Flashcards

Look, Cover, Write, Check

Dual Coding

CHECKLIST FOR A TOPIC



Year 9 Sciences: Autumn Term 1

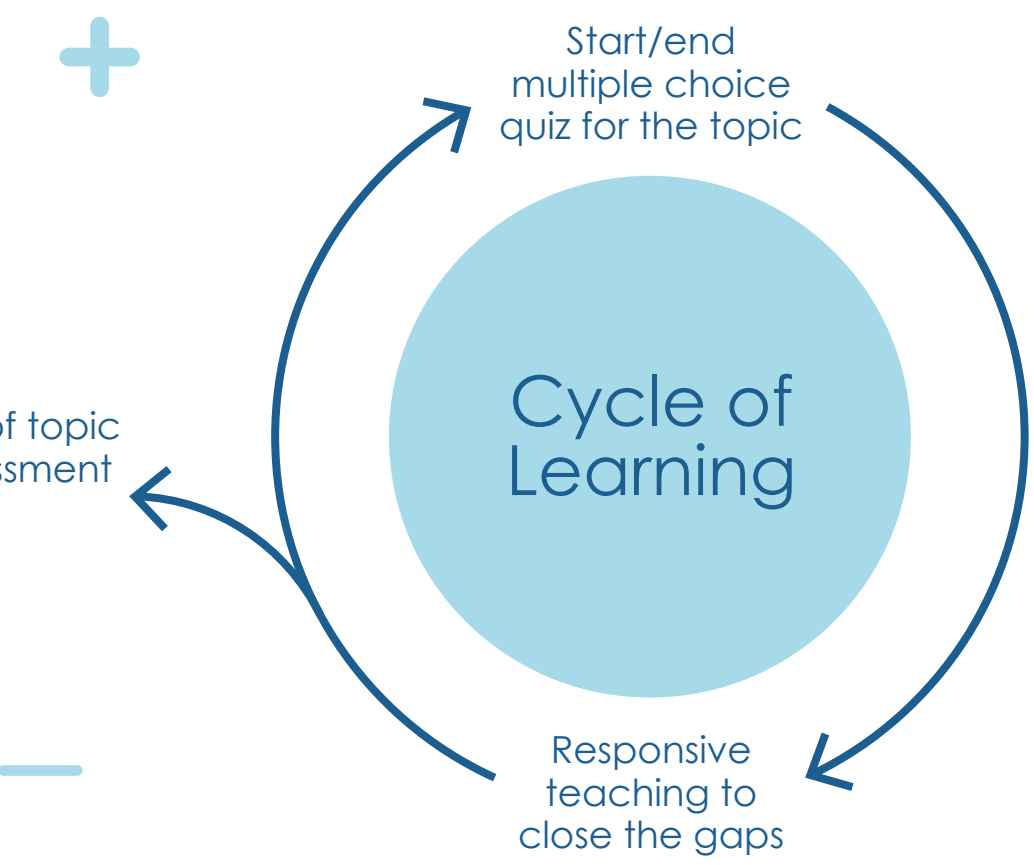
Physics Big Idea: Forces

Knowledge Navigator: Forces

Key Terms			
Friction	Two objects rubbing together	Water Resistance	Objects moving through water that collide with water particles
Air resistance	Objects moving through air that collide with air particles	Resultant Force	A resultant force is the overall force on a point or object, this is the same as all forces acting from the same point added together
Gravitational force (weight)	Attraction between objects with mass	Contact force	A force that acts when two objects touch
Electrostatic force	Attraction/repulsion between objects with charge	Non-contact force	A force that acts between two objects that are not touching
Tension	Stretches or sprashes objects	Scalar quantity	Magnitude (size) only
Magnetic force	Attraction/repulsion involving magnetic poles	Vector quantity	Magnitude (size) and direction
Normal contact force	Force from a surface pushing back against another force	Mass	The amount of matter in an object
Upthrust	Causes objects to float	Weight	The force acting on an object due to the gravitational field
Thrust	Causes things to travel (e.g. from engine, legs, rocket etc)	Work Done	The energy transferred when a force moves an object through a distance

Key Ideas	
Forces Basics	- Forces have a size and a direction - Forces are pushes or pulls that act on an object - Forces are caused by objects interacting with each other - Forces can be represented using free body diagrams. The diagram shows a picture of an object with arrows representing forces. The length of the arrow represents size. The direction of the arrow represents the direction of the force and the arrows should start at the place where the force is acting - Types of force include: friction, air resistance, gravitational force (weight), electrostatic force, tension, magnetic force, normal contact force, upthrust, thrust, water resistance - When two objects interact, a force is produced on both objects. The forces are equal in size but act in opposite directions - The two forces are called an interaction pair
Contact and Non-contact Forces	-All forces are either contact or non-contact forces -A contact force is acting when two objects must touch for the force to act -Examples of contact forces are: frictions, air resistance, tension and normal contact force - A non-contact force acts between two objects that are not touching - Examples of non-contact forces are: magnetic force, gravitational force (weight) and electrostatic force
Scalars, Vectors and Resultant Forces	- Quantities can be scalar or vector - Scalar quantities have magnitude (size) but no direction - Examples of scalar quantities are: speed, distance, mass, temperature and time - Vector quantities have a magnitude (size) and direction - Examples of vector quantities are: force, velocity, displacement, acceleration and momentum - Vectors are represented by arrows. The length of the arrow shows the magnitude (size) and the direction of the arrow shows the direction of the quantity -A resultant force is the overall force on a point or object, this is the same as all forces acting from the same point added together
Mass and Weight	- Mass is the amount of matter (stuff) in an object. It is always the same regardless of gravitational field - Mass is measured in kilograms (kg) - The centre of mass of an object is one point representing all the mass in the object - Mass is a scalar quantity - Weight is the force acting on an object due to the gravitational field, the force acts from the objects centre of mass - The weight of an object depends on its mass and the strength of the gravitational field it is in - Weight is measured in newtons (N) - Weight (N) = mass (kg) x gravitational field strength (N/kg)
Work Done	- If a force moves an object through a distance, energy is transferred and work is done on the object - Work done and energy transferred are the same thing - When work is done energy is transferred into an object - The force usually works against frictional forces which transfers energy into the thermal store of the object. This causes an increase in temperature - Work done (J) = Force (N) x distance moved along the line of action of the force (m) - 1 joule of work is done when a force of 1 newton causes an object to move a distance of 1 metre. 1 J = 1Nm

Knowledge Organiser



ASSESSMENT

Mastery

Extended Writing

Exam Questions