Edward Peake Church of England Middle School		
Topic: Forces. (Speed and Gravity)	**Year: 7**	**Strand: Physics**

Ideas you have met before

Movement

Speed is a measurement of how quickly distance is being covered. The speed of an object can be calculated by dividing the distance travelled by the time taken. Speed is measured in units such as metres per second (m/s) and kilometres per hour (km/h).

Force

Forces can be pushes, pulls or turning forces. They can be 'contact' forces – when objects are touching – or 'non-contact' forces – when the forces act at a distance. Force arrows drawn to scale show the size and direction of forces. A newton-meter allows us to measure the size of a force. Force is measured in newtons.

Gravity

Gravity is a non-contact force. Large objects, like planets, exert strong gravitational forces on other objects. These objects are attracted towards the planet. Gravity pulls objects towards the Earth. Gravity keeps the Moon in orbit around the Earth and the Earth in orbit around the Sun. Gravity affects objects such as people and rockets that are exploring space.

What will I know by the end of the unit?

Speed and acceleration

The greater the speed, the shorter the time taken to cover a certain distance. An object's motion can be represented on a distance–time graph, which can be analysed to find out more about the motion. A straight line on a distance–time graph shows constant speed and a curved line shows acceleration. The motion of two objects can be compared and their relative speeds calculated

Resultant force

All the forces acting on an object can be combined to find the resultant – a single force which has the same effect. If the resultant force is not zero, the object will speed up, slow down or change direction.

Gravity

Mass and weight are different, but related.
Gravity is a non-contact force that acts between all masses.
Every object exerts a gravitational pull on every other object.
A planet, like the Earth, has a gravitational field.
The gravitational fields of the Earth and other objects in the solar system affect space travel.

Vocabulary

Acceleration	To speed up. **Deceleration** is to slow down
Balanced forces	Forces are in balance when they are equal in size and acting in the opposite direction
Contact force	A force acting between objects that are physically touching
Control variable	A factor kept constant in an investigation
Correlation	How well sets of data are linked
Dependent variable	The variable that is measured in an investigation.
Distance	The length travelled in a journey
Equilibrium	a state of rest or balance due to the equal action of opposing forces.
Friction	is the resistance to motion of one object moving relative to another.

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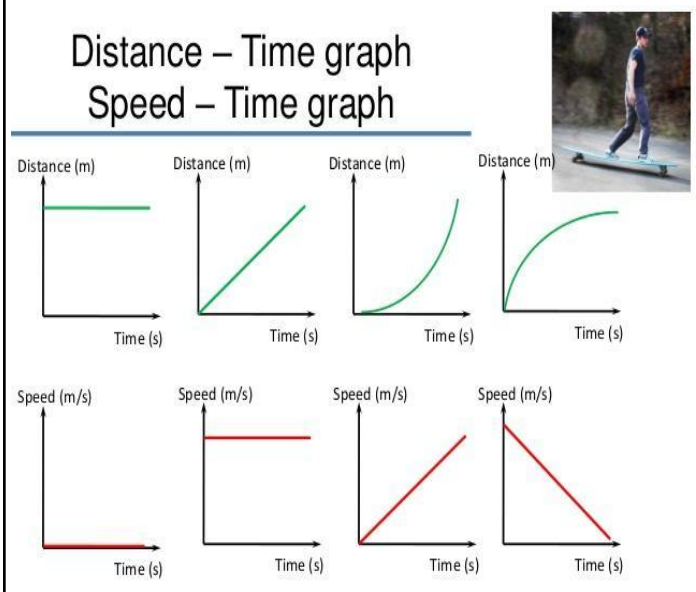
Force	An interaction between objects that causes changes in speed, direction and shape.
Gravitational field strength	The force between any two objects. We only notice gravity's pull if the objects are very large, like the Earth.
Independent variable	The variable in an experiment that affects the outcome. The outcome is measured and recorded.
Mass	A measure of how much matter is in an object. (g or Kg)
Newton (N)	The unit of force (N).
Newton meter	A piece of equipment that can be used to measure the size of the force
Normal contact force	The push force produced on objects when they push on something solid. Also called 'reaction'.
Non-contact force	A force acting between objects that are NOT physically touching. E.g. **Gravity**
Orbit	The path taken by a satellite, planet or star moving round a larger body. E.g. the Earth orbits the Sun. The Space Station orbit the Earth
Pressure	
Relative motion	The motion of an object as seen by as observer in motion
Relative speed	The speed of an object calculated by an observer in motion, so it depends on the observers speed too.
Speed	A measure of how far something travels in a certain time. E.g. m/s. The average speed is the overall distance travelled divided by the overall journey time
Time-laps sequence	A series of images of an object taken at time intervals. Then played back faster.
Weight	The force of gravity pulling down on an object in Newtons

Diagram	Key information
	A force can be a push or a pull. You cannot see forces, you can only see what the changes to objects that they cause. When a force is applied to an object it can lead to: •A change in speed (acceleration) •A change in the object's direction of movement •A change in the object's shape (squash or stretch the object). Speed = distance / time, measured in meters per second (m/s). Average speed is the total distance travelled / total time taken.

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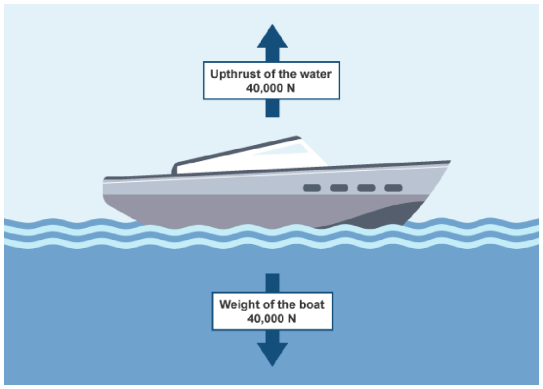
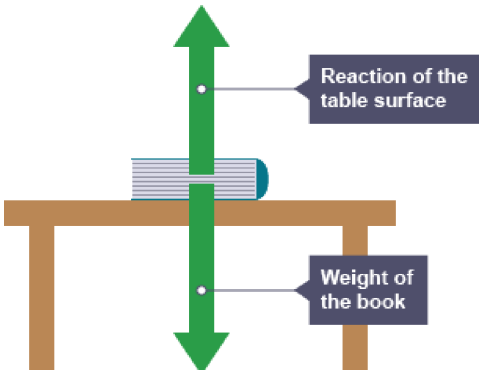
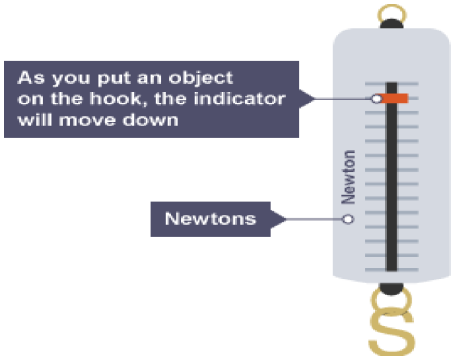
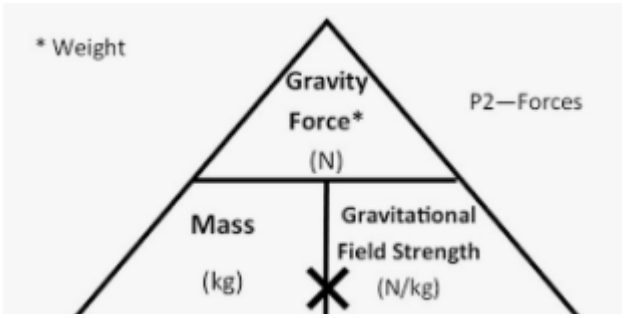
Force diagrams: -
A boat floating

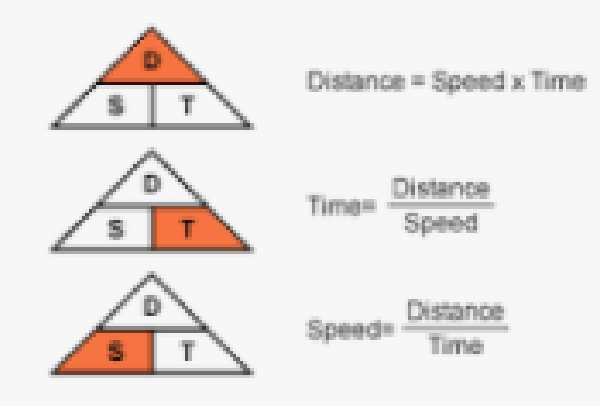


A book on a desk.









You can show what is happening to the position of an object on a distance time graph. The slope of the distance time graph is the speed.

The centre of gravity is the point at which all the weight of the object appears to act.

Forces can also be divided into 2 types, contact forces and non-contact forces.
1.**Contact forces** act between objects that are touching. Examples: **friction, normal contact force, thrust, upthrust, air resistance (drag).** Friction acts whenever an object is moving through a fluid (a fluid is a liquid or gas), or when one solid surface is moving along another solid surface.
2.**Non-contact forces** act between objects even if they are NOT touching.
Examples: **gravity, weight**, magnetic force.
The unit of force is the newton (N). This is named after Sir Isaac Newton, who developed a theory of gravity and showed how forces affect objects.

Force Arrows

Forces have a size and a direction. This means we show forces with arrows.
•The length of the arrows shows how large the force is.• The direction the arrow points show the direction the force pushes

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	or pulls. Diagrams that show the forces acting on objects, using arrows, are called free body force diagrams. **Resultant force** The resultant force acting on an object is the single force resulting from all the separate forces acting on it. In other words, the resultant force is the single overall force. **Weight and mass** The **weight** of an object **w (N)** in Newtons Is equal to the **mass** of the object **m(kg)** multiplied by the **gravitational field strength g (N/Kg)** or Newtons per kilogram the gravitational field strength on Earth is 10 N/Kg A 2KG book would weigh 20N on Earth. W=m x g The same book would be exactly the same size on the moon but it would weigh less because there is less gravity. **Gravity** Gravity is a pulling force and on Earth it causes all objects to accelerate towards the Earth at 10/S squared. It depends only on the gravitational field. Not the weight or mass. So, object accelerate at a lower rate on the moon Air resistance does however slow falling objects down.

Useful Websites
https://www.bbc.co.uk/bitesize/guides/zttfyrd/revision/1 https://www.bbc.co.uk/teach/class-clips-video/physics-ks3ks4-5-average-speed/z4mb42p https://www.educationquizzes.com/ks3/science/forces-01/ https://www.educationquizzes.com/ks3/science/speed-02/ https://sites.google.com/site/year7forces/products-services/balanced-or-unbalanced-forces