

Meden School Curriculum Planning							
Subject	Physics	Year Group	8	Sequence No.	6	Topic	Speed and Motion

Retrieval	Core Knowledge	Student Thinking
What do teachers need <b>retrieve</b> from students before they start teaching <b>new content</b> ?	What <b>specific ambitious knowledge</b> do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to <b>development of our students thinking, encouraging them to see the inequalities around them</b> and 'do something about them!'
	<p><b>L1&amp;2 Speed</b> is a measure of how far an object as travelled compared to the time taken. Speed is distance divided by time. Speed can be measured in <b>miles per hour (mph), kilometres per hour (km/h)</b> or <b>metres per second (m/s)</b>. The standard measurement of speed is metres per second. <b>Velocity</b> is another term related to speed but it is not the same, velocity is speed in a given direction. Velocity is <b>displacement</b> divided by time, where <b>displacement</b> is a distance in a given direction. Moving objects change their speed all of the time and so the term "<b>average speed</b>" is used to describe the speed of an object found by dividing the total distance travelled by the total time taken. <b>Speed guns</b> used by the police measure the time taken for a lazer beam to reflect back from a car. They take two measurements very close together. Because light travels at 300,000,000m/s they can calculate the distance travelled between the two measurements and can therefore calculate speed.</p> <p><b>L3&amp;4 Distance -time graphs</b> have distance on the <b>y-axis</b> and time on the <b>x-axis</b>. Straight lines with <b>gradients</b> represent constant speed, <b>horizontal lines</b> represent <b>stationary objects</b>. Steeper lines represent faster speeds. A curve upwards means <b>acceleration</b> and a levelling off curve means <b>deceleration</b></p> <p><b>L5 Velocity-time graphs</b> have velocity on the y-axis and time on the x-axis. Straight lines with an upwards gradient represent constant acceleration, horizontal lines represent constant speed, straight lines with a downward gradient represent constant deceleration. Curves represent changing acceleration.</p> <p><b>L6 Acceleration</b> is a measure of how quickly an object changes its speed. Acceleration is a <b>vector</b> quantity meaning it has a <b>magnitude</b> and a direction. There are types of acceleration: increasing velocity, decreasing velocity and changing direction. Acceleration is calculated by working out the change in velocity (Final velocity – initial velocity) and dividing by the time taken, the unit for acceleration in m/s/s or m/s<sup>2</sup>. <math>\Delta v</math> is a way of representing "change in velocity" in an equation because "<math>\Delta</math>" the Greek letter delta is used to represent the words "change in", it is a mathematical symbol.</p>	How do speed cameras work? <b>Speed guns</b> used by the police measure the time taken for a lazer beam to reflect back from a car.

<p>KS2 Forces are pushes or pulls, forces speed up objects, slow them down or change their direction. Friction occurs between moving objects. Rough surfaces cause more friction. Air and water resistance slows objects down. Streamlined objects have less resistance.</p>	<p><b>L7 Light-gates</b> measure speed by timing objects as they pass through a <b>light beam</b>. <b>Variables</b> are things that can be measured during an experiment. The <b>independent variable</b> is the variable being investigated and changed by the experimenter, the <b>dependent variable</b> will be measure to see the effect of the independent variable and <b>control variables</b> need to be kept the same to ensure that results are valid. Repeats are used to ensure results are <b>precise</b>. <b>Anomalous results</b> are ones that don't fit the expect pattern and are excluded from any calculations or conclusions.</p> <p><b>L8 Friction</b> acts on all moving objects on Earth because all moving objects will experience <b>air resistance</b> due to the <b>Earth's atmosphere</b>. They will also experience friction if they are in water and this would be called <b>water resistance or drag</b>, moving objects will also experience friction is they are in contact with a surface eg tyres on a road. Moving objects in space like satellites and space probes do not experience friction as there is no atmosphere. <b>Resistive forces (friction)</b> always act in the opposite direction to motion. <b>Drag</b> is the name given to the resistive force caused by movement through a fluid. <b>Fluids</b> are classed as liquids or gases. Drag is therefore another term for air resistance or water resistance. To increase the speed of a moving object you need to either increase the driving force or decrease the drag, however faster speeds automatically increase the size of the drag force. To reduce the amount of drag on an object its shape needs to become more <b>streamlined</b>. This allows the fluid to flow over it more easily and therefore reduces the friction. Streamlined shapes are wedged shaped with smooth curves.</p> <p>L9. <b>Terminal velocity</b> is the maximum top speed an object can reach. This occurs when the drag force is the same <b>magnitude</b> but in the opposite direction of the driving force. In the case of a free-falling object gravity provides the "driving force". Falling objects accelerate when their weight is greater than drag, as their speed increases so does the drag until the size of the drag force is equal to the weight, acceleration stops, and the object reaches its terminal velocity. A parachute causes the drag force to increase, this decelerates the object causing the drag force to decrease until it matches the weight again.</p> <p>L10 Careers in <b>aerospace, aeronautical engineers</b> design and work on aeroplanes where as <b>astronautical engineers</b> design and work on vehicles which will live the Earths atmosphere and travel in space.</p>	<p>Design of Formula One Cars Why do professional swimmers and cyclists shave their arms and legs.?</p> <p>STEM careers have been traditionally white, male dominated. Women like Maggie Aderin-Pocock a Black, British space scientist are pathing the way for more equality and diversity in this field.</p>
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