

Remote education lesson examples: key stage 2 science

October 2020

Lesson overview

This lesson is:

- on air resistance
- the third in a sequence of 6 lessons about forces
- for year 5

Substantive knowledge

Gravity

Pupils will know:

- gravity is a non-contact force
- unsupported objects will fall towards the Earth because of the force of gravity between the Earth and the object

Friction

Pupils will know:

- friction is a force that acts between surfaces that are moving, or trying to move, over one another - it slows the moving objects down
- the force of the friction is determined by the material of the two objects - the rougher the surface, the more friction is experienced

Air resistance

Pupils will know:

- air resistance is a frictional force that acts between a moving object and the air
- the larger the surface area of an object, the more air resistance it will experience

The disciplinary knowledge to be taught is:

- measuring and observing - making accurate measurements of time using a stopwatch
- measuring and observing - taking repeat readings where necessary

Water resistance

Pupils will know:

- water resistance is a frictional force that acts between a moving object and water
- the larger the surface area of an object, the more water resistance it will experience

The disciplinary knowledge to be taught is:

- recording and presenting - setting up a table to record results
- recording and presenting - presenting information using a bar chart
- analysing and evaluating - explaining causal relationships from an investigation

Levers

Pupils will:

- know a lever is a very basic machine made of a rigid bar with a fulcrum along its length - it allows a smaller force to have a greater effect
- identify examples and uses of levers in real life

Pulleys and gears

Pupils will know:

- pulleys and gears use similar principles as levers to reduce the amount of force required to have a given effect
- pulleys consist of a rope that passes around the edge of a wheel, and are used to lift heavy objects
- gears are sets of wheels with teeth that slot together, and are used to increase a turning force

All resources and tasks referenced in this lesson plan can be viewed on the [year 5 science, week 3](#) webpage, a Microsoft Sway presentation that was produced for pupils to access at home, through which they were taught asynchronously. You can also access our [guidance on how to produce Sways](#).

Example year 5 science lesson plan for remote education

This lesson plan was provided by United Learning to help teachers consider how they might adapt their usual classroom practice for remote teaching.

Schools have shared a range of lesson plans annotated with tips and ideas they have found useful when teaching remotely.

The purpose of the lesson plans is to help teachers consider how they might adapt their teaching practice for the remote context. The examples are intended as a source of ideas, not as teaching resources or lessons the department expects schools to teach. They do not reflect departmental endorsement of any particular approach to remote teaching.

The department does not expect teachers to create formal lesson plans.

Task	Adaptation for remote teaching
<p>Review</p> <p>Pupils review the prior knowledge that is required for them to access the lesson ahead.</p> <p>Pupils complete an online quiz. They will need the answers for the next part of the lesson.</p>	<p>Pupils review only the prior knowledge required for the lesson (for example, the definition of surface area) to avoid cognitive overload.</p> <p>Microsoft Sway</p> <p>Using 'Stacks' in the Sway means that:</p> <ul style="list-style-type: none"> • pupils cannot see the correct answer immediately and they need to actively retrieve the information • pupils receive immediate feedback on their answer.
<p>Teach new content</p> <p>Teach the idea that air resistance is a frictional force that acts between a moving object and air.</p> <p>We start by watching a video on air resistance. It reviews some previous knowledge, and then builds on it.</p> <p>Pupils get ready for the video by getting 2 pieces of scrap paper (they need to</p>	<p>Readily available videos</p> <p>When teaching remotely we often introduce and teach new content through videos. Where possible, we use those that are already available online (for example, BBC Teach), but if we can't find a good quality video, we create our own using voiceover PowerPoints. This ensures we can deliver new content accurately and in small steps, which we've found to be important when teaching remotely.</p>

<p>make sure to ask a parent or carer that the paper they are using is scrap paper).</p> <p>The video requires pupils to demonstrate the effects of air resistance themselves using their own pieces of paper.</p>	<p>To support pupils to engage with remote teaching, we always make sure we are clear about what is needed for each stage of the lesson.</p> <p>Keep it simple</p> <p>This quick task helps to bring the asynchronous lesson to life and improve engagement, while not requiring unrealistic effort or specific equipment.</p>
<p>Practice</p> <p>Pupils practise the core, substantive knowledge taught in the previous part of the lesson.</p> <p>Before we move on to the next part of the lesson, pupils quickly recap the key knowledge. They should write down the answers to the questions (which you can view in the Sway resource) in their books - in full sentences</p>	<p>Focus on understanding</p> <p>If this were being taught in a classroom, the teacher would ask more questions, and the questions would gradually probe for a deeper understanding.</p> <p>This is challenging in a remote lesson (in terms of time, pupil engagement and ability to effectively provide scaffolding) so here we have chosen to prioritise and focus on pupils' understanding of the core, substantive knowledge only.</p>
<p>Teach new content</p> <p>Teach pupils about the relationship between air resistance and surface area. The BBC video in the Sway resource explains why objects of different shapes and sizes fall to the ground at different rates.</p>	<p>Add YouTube videos to Sways</p> <p>Where appropriate, videos from YouTube can be embedded directly into the Sway using an 'embed card'. You just need to find the embed code by right-clicking on the YouTube video.</p> <p>Where existing videos do not quite cover the core knowledge, we add text or explanations to supplement it (for example, the explicit reference in the Sway resource to surface area rather than 'long and thin' or 'short and wide' shapes).</p>
<p>Practice</p> <p>Pupils practise the core, substantive knowledge taught in the previous part of the lesson.</p> <p>Pupils use what they have just learned about air resistance and surface area to copy and complete the sentence from the Sway resource in their books: "Objects</p>	<p>Again, we focus on pupils recalling and applying the core, substantive knowledge from the lesson.</p>

<p>with a ‘something’ surface area will experience more air resistance. This means they will fall more ‘something’.”</p>	
<p>Model and give explicit instructions about the practical activity</p> <p>Pupils will practise the disciplinary knowledge of observing and measuring time with a stopwatch. They will do this through a practical activity (that you can view in the Sway resource), which demonstrates the effect of surface area on air resistance. This activity needs to be set up in the right way so that pupils can focus on practising the specific disciplinary knowledge.</p>	<p>Disciplinary knowledge</p> <p>In the United Learning curriculum, disciplinary knowledge is categorised into one of:</p> <ul style="list-style-type: none"> • scientific attitudes and planning • measuring and observing • recording and presenting • analysing and evaluating <p>Each of our units will focus on explicitly teaching knowledge from one or two of these areas.</p> <p>Readjust the focus for remote practice</p> <p>While this lesson was originally intended to focus on recording and presenting (specifically, setting up a table to record results and present data using a bar chart) we thought that this would be more challenging for us to model and teach, and for pupils to practise remotely.</p> <p>We therefore decided to focus on measuring and observing (specifically, measuring accurately with a stopwatch) for this lesson. We provided the investigation plan and table to record results, and we heavily scaffolded the conclusion writing.</p> <p>If this lesson were being taught in the classroom, the disciplinary knowledge would be taught using ready-made parachutes, but we adapted this so that it would be straightforward for pupils to complete at home (the helicopters could be made out of paper).</p> <p>We provided templates to make it easier for pupils to complete at home if they did have a printer, but we assumed many would not and so gave clear instructions for how to create the helicopters from scratch.</p>

<p>Questioning</p> <p>Questioning to check understanding: do pupils understand the nature of the activity and how it relates to what they have been taught about air resistance?</p>	<p>These questions (found in the Sway resource) help pupils relate the practical activity to the substantive knowledge they were taught earlier in the lesson, as well as the disciplinary knowledge.</p>
<p>Model</p> <p>Model the disciplinary knowledge of accurately measuring the time it takes for the helicopters to fall to the ground, and taking repeat readings.</p>	<p>Add reminders</p> <p>Reminders below the video on Sway make clear what pupils need to focus on when undertaking the activity (replacing the role of the whiteboard in the face-to-face classroom). Keeping them separate to the video means that pupils do not need to keep referring back to different parts of the video.</p>
<p>Practice</p> <p>Pupils practise the disciplinary knowledge of measuring with a stopwatch. They also write a short conclusion of their investigation.</p>	<p>The focus of this lesson is not identifying and explaining causal relationships - we have not taught this and so we heavily scaffold this task with sentences to copy and complete.</p>
<p>Formative assessment</p> <p>Pupils reflect on what they've learnt today.</p>	<p>Microsoft Forms</p> <p>Microsoft Forms allows you to create a different response for pupils to see when they select each different answer.</p> <p>We use these to address the specific misconceptions that pupils must have had for them to select the incorrect answer.</p> <p>Responses are collected by teachers and used to inform subsequent asynchronous (recorded) lessons. They could also be used as the basis for small, short synchronous (live) sessions with the teacher.</p>