

YEAR 5 FORCES PLANNING

Class:

Term:

Subject: Science

Unit: Forces

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| <p>Differentiation and support (Detailed differentiation in weekly plans.)</p> <p>SEN: write up investigations on writing frames. Support from more able partners in mixed ability work. Additional adult support.</p> <p>GT: provide headings for experiment sections. Encourage predictions and conclusions that draw on scientific knowledge. Expect to use terms 'independent variable', 'dependent variable' and 'controlled variables'</p> | <p>English: writing up experiments in sequence using technical language and extracting information from texts and videos</p> <p>Maths: drawing results tables and graphs and measuring</p> <p>ICT: videos on IWB and simulations of experiments</p> <p>History: Historical insights and figures e.g. Galileo, Newton, Archimedes</p> <p>Art & D+T: understanding engineering and design challenges e.g. reducing air resistance, using levers etc</p> |
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To access the complete version of this [Year 5 Forces planning](http://www.saveteacherssundays.com/science/year-5/508/), and all of the resources to go with it, visit

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| W | Learning objective | Teaching activities | Resources | Assessment: Success Criteria |
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| 1a | <p>To show existing knowledge about forces</p> <p>(5 mins)</p> | <p>Children to complete given a mind map with named branches e.g. gravity, friction, buoyancy etc and add what they already know about each of these to the mind map</p> | <p>Mind maps</p> | <p>Formative assessment</p> |

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| 1b | <p>To understand gravity (55 mins)</p> | <p>Intro: Ask children to think about what a 'force' is and to try to describe a force Ask them to think, pair, share as many words to do with forces as they can Show children videos of:</p> <ul style="list-style-type: none"> • some astronauts in zero gravity conditions at https://www.bbc.co.uk/programmes/p0119ft9 (if the link does not work, Google 'BBC science clips Weightlessness in space') • a zero gravity flight at http://www.youtube.com/watch?v=PosRfeUoPHM (if link does not work, Google 'Brian Cox Experiences Zero Gravity video') – watch from 1 min 36 secs to 2 mins 6 secs (when zero gravity occurs on the flight) <p>Ask the children why they think the people in the plane and the space shuttle were able to float in the air and why we cannot do this in our classroom and why if I drop a book, the book falls to the floor instead of floating around Explain the following historical explanations that people had before Newton began to explain gravity correctly in 1666:</p> <ul style="list-style-type: none"> • the Ancient Greeks thought that objects fell because they were trying to find their natural places • even Johannes Kepler who showed that the planets moved in an elliptical, rather than in a circular motion still thought that there was some invisible framework supporting them <p>Newton showed that instead there was this invisible force called gravity acting on all objects, including us, all of the time Explain that:</p> <ul style="list-style-type: none"> • because gravity is a force, it can be cancelled out, and that this is what happens in the weightless flight • that an object needs to be massive to have a gravitational pull that we notice <p>Give children a balloon and a straw and ask them to keep the balloon in the air (http://www.lovemyscience.com/balloonchallenge.html) Read through non-chronological report on gravity, which explains:</p> <ul style="list-style-type: none"> • people's historical explanations for the position and movement of objects • what affects the strength of gravitational force between objects • what gravity helps to explain • the difference between mass and weight • when we can see the effect of the absence of gravity <p>Main: Children to answer comprehension questions using the non-chronological report on gravity (questions focused on science rather than English) Lower ability given an answer frame; higher ability to answer in full sentences in their books</p> <p>Plenary: Children to ask each other questions from the independent work or make up their own for a partner to answer (without looking at the non-chronological report) Revise the key points from the lesson</p> | <p>Check videos open and play OK and skip and / or close ads</p> <p>Non chronological reports</p> <p>Questions</p> <p>Answer frames</p> | <p>MUST: use the information about gravity to answer <i>some</i> of the questions correctly</p> <p>SHOULD: use the information about gravity to answer <i>all</i> of the questions correctly</p> <p>COULD: remember the information about gravity and be able to describe it in their own words</p> |
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| <p>2</p> | <p>To understand air resistance</p> <p>Investigation: Does the size of a parachute affect how effective it is?</p> <p>Decide how to test an idea, explaining how to make a simple test fair</p> <p>Identify patterns in results and use these to draw conclusions</p> <p>Explain results in terms of their scientific knowledge and understanding</p> <p>(2 hours)</p> | <p>Test the below experiment a week or so in advance of the lesson to see:</p> <ul style="list-style-type: none"> • how high the parachutes need to be dropped from to get different landing times • how much the size of the parachutes should be increased by <p><i>Experiment: In pairs / groups, have children create a set of parachutes, with each parachute being of a different size. Children need to drop the parachute and time how long it takes to reach the ground</i> <i>Have them repeat this a number of times for each parachute</i></p> <p>Ask children why things fall back to Earth when we drop them or when they fall e.g. why does someone who jumps out of a plane fall back to Earth? Revise key points about gravity:</p> <ul style="list-style-type: none"> • gravity prevents us floating off into space and causes objects to return to Earth when they fall or are dropped • larger objects have a greater gravitational force, and we only notice the effect of the gravitational force of stars, planets and moons • gravity explains why the planets orbit the sun, why the moon orbits the Earth and why the seas and the oceans have tides • how mass always stays the same and is a measure of the amount of matter an object contains, whereas weight is a measure of the pull of gravity on an object's mass <p>Ask the children what people can do to slow down how quickly they fall to Earth when they jump out of a plane (wear a parachute) Ask them to try to explain why a parachute slows down the fall of a sky-diver Watch the videos below: on air and water resistance at https://www.bbc.co.uk/bitesize/topics/zsxxsbk/articles/zxw6gdm (if link does not work, Google 'BBC Bitesize KS2 What are water and air resistance?') on air resistance and parachutes at https://www.bbc.co.uk/programmes/p011933f (if link does not work, Google 'BBC Bitesize video Could you use an umbrella to parachute?')</p> <p>Aim and prediction Discuss what investigation we could carry out using the equipment Think, pair, share (explaining what we will be doing if children don't suggest it in a timely way) Think, pair, share what might affect how quickly the parachutes fall to the ground Why are we going to repeat each trial more than once? (more reliable results)</p> <p>Method Think, pair, share what we would need to do to make a 'fair test'. Plan a fair test, with these conditions being the same:</p> <ul style="list-style-type: none"> • The material that the parachute is made from • The force with which we drop it e.g. don't throw it one time and then gently drop it the next • The object attached to the parachute • The height from which we drop it • The wind (if outside) <p>Discuss how changing these things would be unfair and why this is the case. Explain controlled, independent and dependent variables for G+T</p> | <p>Check video opens and plays OK</p> <p>Material for parachutes e.g. tissue paper, string</p> <p>Objects to attach to parachute e.g. Lego men</p> <p>Stop watches</p> <p>Scissors</p> <p>Place to drop parachutes from</p> <p>Investigation frames</p> <p>Graph frames</p> | <p>MUST: plan and carry out an experiment by using an investigation frame, <i>with</i> adult support</p> <p>SHOULD: plan and carry out an experiment by using an investigation frame, <i>without</i> adult support</p> <p>COULD: link predictions and conclusions to scientific knowledge and use scientific language</p> |
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| | | <p>Emphasise need to be careful when dropping the parachutes e.g. not to lean to far over the edge</p> <p>Investigation and Results Model how to draw a results table. What will it need to include? Explain how to calculate a mean average by adding up the results and dividing them by the number of tests carried out</p> <p>Carry out the investigations</p> <p>Discuss whether we should use a bar graph or a line graph? Why? (we can use a line graph because we have two continuous units of measurement: time and length) Model for children how to draw a line graph Revise how to use tick list on investigation frame for drawing a graph correctly</p> <p>Conclusion Think about:</p> <ul style="list-style-type: none"> • Did our predictions match our results? Why / why not? • What scientific language could we use? • Evaluation – how could we have made a better 'fair test' / how could the investigation be improved? • Reliability – did we get the same result each time we repeated the test? If not, why not? Did other pairs / groups get similar results to us? If not, why not? | | |
| 3 | <p>To understand air resistance</p> <p>Investigation: Children to design their own investigation</p> <p>Decide how to test an idea, explaining how to make a simple test fair</p> <p>Identify patterns in results and use these to draw conclusions</p> <p>Explain results in</p> | <p><i>Experiment: Each child to pick a variable to change and setup an investigation to test how changing this variable affects the parachute e.g. does adding a heavier weight to the parachute make it fall more quickly to the ground?</i> <i>Have them repeat each trial a number of times</i></p> <p>Revise key points about gravity:</p> <ul style="list-style-type: none"> • gravity prevents us floating off into space and causes objects to return to Earth when they fall or are dropped • larger objects have a greater gravitational force, and we only notice the effect of the gravitational force of stars, planets and moons • gravity explains why the planets orbit the sun, why the moon orbits the Earth and why the seas and the oceans have tides • how mass always stays the same and is a measure of the amount of matter an object contains, whereas weight is a measure of the pull of gravity on an object's mass <p>Revise how we designed parachutes in the last lesson and tested whether the size of the parachute made it more or less effective Explain the term variable (something that can change or be changed) Explain that we are going to be doing investigations with parachutes again, but today the children can choose which variable to change (apart from the size of the parachute)</p> | <p>Check video opens and plays OK</p> <p>Different materials for parachutes e.g. string, tissue paper, tin foil, cling film, plastic bag etc</p> <p>Weights to attach to parachutes / Objects to attach to parachute of different weights and weighing scales</p> <p>Stop watches</p> | <p>MUST: plan and carry out an experiment by using an investigation frame, <i>with</i> adult support</p> <p>SHOULD: plan and carry out an experiment by using an investigation frame, <i>without</i> adult support</p> <p>COULD: link predictions and conclusions to scientific knowledge and use scientific language</p> |

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| <p>terms of their scientific knowledge and understanding</p> <p>(1 hour 45 mins)</p> | <p>Aim and prediction Think, pair, share what might affect how quickly the parachutes fall to the ground:</p> <ul style="list-style-type: none"> • The material that the parachute is made from • The force with which we drop it e.g. don't throw it one time and then gently drop it the next • The object / weight of the object attached to the parachute • The height from which we drop it • The wind (if outside) • The shape of the parachute <p>Why are we going to repeat each trial more than once? (more reliable results)</p> <p>Method Revise how to make a fair test we keep all of the variables the same, except for the one that we are testing Explain controlled, independent and dependent variables for G+T</p> <p>Emphasise need to be careful when dropping the parachutes e.g. not to lean too far over the edge</p> <p>Investigation and Results Allow children to have a go at the following independently:</p> <ul style="list-style-type: none"> • drawing results tables • calculating mean averages • drawing a line graph (can use tick list on investigation frame for drawing a graph) <p>Help children as needed when they get stuck on any of the above</p> <p>Conclusion Think about:</p> <ul style="list-style-type: none"> • Did our predictions match our results? Why / why not? • What scientific language could we use? • Evaluation – how could we have made a better 'fair test' / how could the investigation be improved? • Reliability – did we get the same result each time we repeated the test? If not, why not? Did other pairs / groups get similar results to us? If not, why not? | <p>Scissors</p> <p>Places of different heights to drop parachutes from</p> <p>Investigation frames</p> <p>Graph frames</p> | |
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