



Objectives		Extra Information
<p>Lesson 2 – Whole Class Version.</p>	<p>INTRODUCTION TEACHING – Pulleys. (10 Minutes) Introduce your pupils to the term ‘pulley’, asking if they know what pulleys are and what they’re used for. Acknowledge any that connect ‘pulling’ with pulleys. Explain that pulleys are a device that help you lift or move an object by pulling. (GUIDANCE – It may help to copy diagram 1 of a pulley on the whiteboard, explaining that by pulling the loose end, the weight will be lifted.) Assure the class that if there is any confusion, that they will be making their own pulleys to see for themselves.</p>	<p>Materials Required:</p> <ul style="list-style-type: none"> ✓ Coat-hangers ✓ Tape ✓ Hangable weights ✓ String ✓ Measuring tape or Ruler ✓ Marker pens ✓ Whiteboard/IWB
<p>L.O:</p> <p>To Construct And Understand Pulley Systems.</p>	<p>STARTER ACTIVITY – Single Pulley System. (20 minutes) GUIDANCE – It may help to hand out or display the illustrated instructions provided.</p> <ol style="list-style-type: none"> ① Lay a coat hanger on the table. ② If your coat hanger has a crossbar, move to step 3, if not, tie a length of string between the ends of the hanger creating a cross bar, ensure string is taut. ③ Hang this hanger freely from the hook with space below. ④ Cut a length of string, no less than the height of the hanger and secure a weight to one end. ⑤ Pull the free end of the string through the hanger, resting it on the centre of the crossbar. ⑥ When the string is taut, mark the string where it touches the crossbar. ⑦ Pull the string, lifting the weight an appropriate height for your setup. ⑧ Note the height of the weight off the floor with your ruler and mark the string again, where it’s now touching the cross bar. ⑨ Measure the distance between the two marks on the string. 	<p>Key Words:</p> <p>Pulley Taut Accuracy/Inaccuracy Friction Stress Deform</p> <p>HA Extension: If they finish the main task quickly, have them think up the second line of their Nursery Rhyme.</p> <p>Traffic light expected lesson outcomes:</p> <ul style="list-style-type: none"> ✓ I can construct and understand a single pulley system. ✓ I can construct and understand a two-pulley system. ✓ I can construct and understand a two-pulley system and explain the benefits and disadvantages of multi-pulley system.



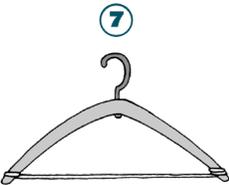
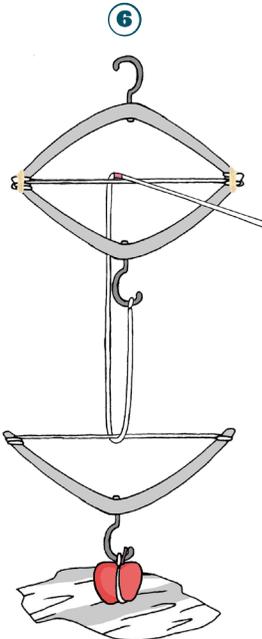
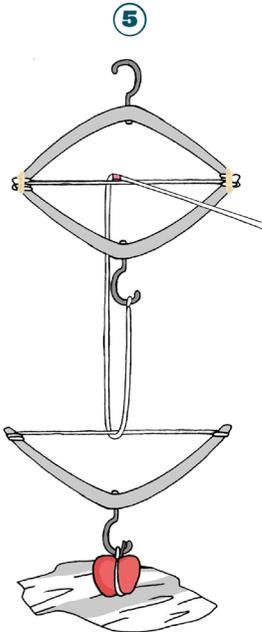
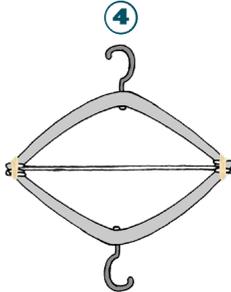
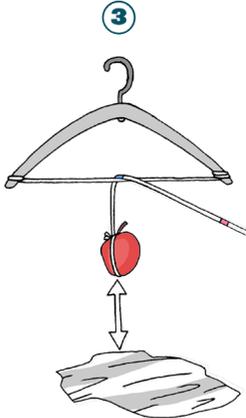
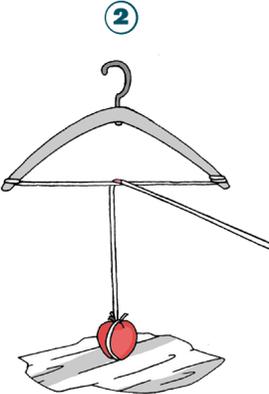
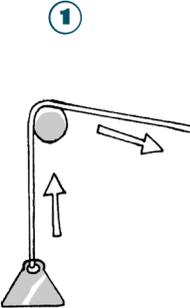
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	<p>Mini-Plenary: After the class has taken the results, ask them if they notice anything. Lead them towards the idea that the height the weight was lifted and distance between the two marks -the distance pulled- are the same (or very close). Explain that the inaccuracy in the results could be down to friction or stress in the system causing the string to stretch. If the class is unfamiliar with friction, ask them to think of sliding on a smooth floor in socks or barefoot, explain that friction is what stops you sliding barefoot. If they are unfamiliar with stress, explain that in Science stress is when something is pulled apart or crushed and too much can permanently deform an object. With the class familiar with the mechanics of a single pulley system ask them to think of a two pulley system and what it may offer, if you have time, ask them what they think it would look like, then tell them that we will make one and compare the two systems.</p> <p>MAIN TASK – Two Pulley System. (20 Minutes) GUIDANCE – It may help to hand out or display the illustrated instructions provided.</p> <ol style="list-style-type: none"> 1 Lay two hangers flat on the table with bases touching. 2 If your hangers have cross bars, tape the bars together to create a 'double hanger' and move to step 4, if not, tie a length of string between the ends of one of the coat hangers creating a crossbar, ensure the string is taut. 3 Tape the both ends of your string less coat hanger to the ends of your other coat hanger, creating a 'double hanger.' 4 Hang this 'double hanger' freely from one of the hooks, with space below. 5 Take your third coat hanger from the previous activity and secure a weight to the hook. 6 Cut a length of string, no less than twice the height of the 'double hanger' and secure one end to the lower hook of the 'double hanger.' 7 Pull the string through the weighted hanger and back through the top gap in the 'double hanger.' 8 Pull the string until taut and centre string on both cross bars. 	



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	<ul style="list-style-type: none"> ⑨ Mark the string where it touches the crossbar of the 'double hanger.' ⑩ Pull the string, lifting the weight an appropriate height for your setup. ⑪ Note the height of the weight off the floor with your ruler and mark the string again where it's now touching the cross bar. ⑫ Measure the distance between the two marks on the string <p>Mini-Plenary: After the class has taken this second set of results, ask them firstly to compare the height the weight was lifted with the distance between the two marks - the distance pulled. Ask the class what they notice, are they nearly the same again? Tell them the height lifted should be half the distance pulled (or very close). Explain that with more pulleys there will be more friction and that the results may be even less accurate because of this. Now ask the class to compare the results from each system, try to lead them towards the idea that the extra pulley means they have to pull further to lift the weight. Ask if they noticed anything whilst doing the experiment, if the weight felt heavier, lighter or the same? Try to lead them towards it feeling lighter, and ask them if they know why? Explain that this system makes the weight half as much by making you pull it twice as far.</p> <p>PLENARY – (10 minutes) Discuss with the class, now that they know what a pulley is and how it works; where pulleys might be used in day to day life? If they are having trouble remind them that a pulley can make heavy things light so things like lifts etc. Also explain that pulleys don't have to be to lift things up, they can be used to pull things along like curtains or stage props. Ask the class to consider what they think would happen if they added even more pulleys and to imagine what it would look like? Discuss how with more pulleys the weight could be made much less but you'd have to pull much more string and that the system would get very complicated. Ask them to think about how complicated a 10 or 20 pulley system might be to make?</p>	



REFERENCE SHEET





Reflection	Child's Progress