

Year 4. Lego WeDo

The children were introduced to the LEGO WeDo kits last year. Their primary focus was on motors and gears. One lesson has been designed to refresh their memories of it and to provide a simple opening lesson for any children who may have missed lessons last year or for children who may need more support. Lesson 1 may need to be extended into the second lesson, however, if it takes the children longer to reacquaint themselves with the hardware and the software. The teacher should try to ensure that the advantages and disadvantages of pulleys are discussed as part of lesson 1, then refer back to this later in lesson 4 to see if the children have retained this knowledge. Teachers should try to refer the children's experiences with the kit back to real-life examples – how sensors may be used in shop doorways, for example, and encourage children to think of their own examples. Children are encouraged throughout to work co-operatively, and time should be taken in the first lesson to establish with the children how LEGO WeDo lessons will be organised within the classroom. Throughout this unit, the children should develop their skills in refining and reviewing their designs, as well as gaining additional knowledge and experience with the mechanisms themselves, with the new addition of sensors and pulleys this year.

Adaptive teaching – Recommended tried and tested practise in these lessons:

Due to the nature of Computing lessons and the common 'firefighting' required in lessons with technical issues or children who are individually confused over what may be considered small stumbling blocks, it is recommended that teachers put time and effort into reinforcing the use of school-wide learning ethos and systems (for example, the use of the 4B's – brain, board, buddy, boss) to encourage children to try to solve their problems in the right way rather than going straight to the teacher, or lessons will quickly become unmanageable. It is also recommended to follow our school's use of the Rosenshine model of mastery teaching strategy and teach lessons in a series of stages, with short, simple tasks being set, and children who finish early can be given encouragement to support and 'lifeguard' other students. This has twofold benefits; the process of teaching others cements and secures pupils' own mastery as well as ensuring the teacher isn't overwhelmed with personal requests for help. If one-to-one support is unavailable for high need children, it is a good idea to make sure these children are sat next to or near a higher ability student who may act as peer support for them, and these children are monitored carefully throughout lessons to ensure they stay on task and understand each objective given. Ensure that any hardware support that is required for individual's SEND requirements are adjusted appropriately and are tied to those students' individual log ins (e.g. Zoom tools or screen tints for students with visual impairments etc). Teachers should have a knowledge of Pupil Premium children, particularly those who have been seen to struggle in Computing lessons, and these children should be monitored alongside those with SEND during lesson time to help ensure they access lessons along with the rest of the class.

Knowledge covered:

NC	Ladders Objectives
(2.1) Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts	Y4 - CS1 (KPI) - I can recognise an error in a program and debug it so that it works.
(2.2) Use sequence, selection, and repetition in programs; work with variables and various forms of input and output	Y4 - CS2 - I understand that algorithms (step by step instructions) will help the user to solve problems. Y4 - CS3 - I recognise the need to test and retest whilst a program is being developed (using my prediction skills of what MIGHT work).
(2.3) Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs	Y4 - CS4 - I understand that a program is built up of sequences of instructions that are in order. Y4 - CS5 - I can understand that many programs can follow more than one route (more than one thing can happen) (e.g. IF THEN statements). Y4 - CS6 - I understand that repeating instructions can save time and make a program more efficient. Y4 - CS7 - I can explain what a variable is and include them in my programming.
(2.4) Understand computer networks including the Internet; how they can provide multiple services, such as the world wide web; and the opportunities they offer for communication and collaboration.	
(2.5) Use search technologies effectively, appreciate how results are selected and ranked, and be discerning in evaluating digital content.	
(2.6) Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information.	

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(2.7) Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact.

Medium Term Lesson Plan:

Lesson 1	L.I I can familiarise myself with LEGO WeDo hardware and software L.I I can control a physical system using a series of commands Y4 - CS1 Y4 - CS2 Y4 - CS3 Y4 - CS4 Y4 - CS5 Y4 - CS6 Y4 - CS7	S.C: I can create a sensor-based mechanism I can create a pulley-based mechanism	<u>Key Questions</u> What do you know/remember of Lego WeDo? How does it work? Would a robot work without a computer program behind it?	Reintroduce the children to the Lego WeDo boxes. Remind the children of need for manners, respect and organisation – we may need parts from other people's boxes in these lessons. Remind children of the preferred logistics of classroom organisation. Remind the children about some things that can be built with the kit for inspiration/ 'wow' moment: http://www.wedobots.com Let the children work through the mechanism challenges once again to refresh their memories. They should explore (only): Motor movements Gears Pulleys All programming skills/buttons Sensor – <u>Must do</u> Pulley – <u>Must do</u> NOT the tilt sensor, lever, crown gear, worm gear or cam. Sensors and pulleys are new this year. Discuss how pulleys have a lower efficiency than gears due to belts slipping small amounts and loss of power, but are often used in the real world due to being easier to set up and transport. All children must complete at least one pulley and one sensor-based mechanism, so teacher must make allowances for this depending on how the lesson progresses. Evidence use of the sensor and pulleys on Seesaw. Children to review their new learning.
Lesson 2	L.I I can create a mechanical kicker Y4 - CS1 Y4 - CS2 Y4 - CS3 Y4 - CS4 Y4 - CS5 Y4 - CS6 Y4 - CS7	S.C I can think creatively about a design I can problem-solve when building my robot I can use a sensor in my mechanism and program its function	<u>Key Questions</u> How does the kicker work? What kind of a program will we need? How has it been built?	Children look at example of mechanical kicker. Take ideas from the example (motor up high, certain small parts used to create vertical column) but encourage children not to get too hung up on having the exact same parts as the example. They can make the 'feet' of the kicker or the base of the unit in their own way. This is to help negate some issues over missing parts. Try to encourage creative thinking around any issues like this they may have. Challenge the children to build their kicker. Remind them it needs to stop after the kick, then return to its original position. Can they use a sensor so that it will kick whenever a paper ball is placed in front of it? Extension: Can they create a counter as a variable (using the 'display' function in the LEGO WeDo software) to count up the amount of shots the kicker takes? Evidence on Seesaw and review.
Lesson 3	L.I I can assess my design and make improvements Y4 - CS1 Y4 - CS2 Y4 - CS3 Y4 - CS4 Y4 - CS5	S.C I can examine my previous design and find strengths and weaknesses I can demonstrate an	<u>Key Questions</u> *Prior knowledge* What problems did you encounter when building it last time? How can you solve those	How could their kicker from the last lesson be improved? What problems did they encounter? What ideas inspired them from around the classroom? Today they will aim to improve on their work from the last lesson, and they will see how far they can get their paper ball to travel (competition). Challenge them to see if they can use gearing up for increased speed. Evidence on Seesaw and review.

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	Y4 - CS6 Y4 - CS7	improvement on a design	problems this time? Can you use a 'gearing up' mechanism to make the kicker move faster?	
Lesson 4	L.I I can build a mechanical goalkeeper Y4 - CS1 Y4 - CS2 Y4 - CS3 Y4 - CS4 Y4 - CS5 Y4 - CS6 Y4 - CS7	S.C I can take inspiration from an idea and make it my own I can use pulleys in my mechanism	<u>Key Questions</u> *Prior knowledge* Did 'gearing up' work with the last model to help it move faster? Were there any issues? What are the advantages and disadvantages of using pulleys in engineering?	Children look at example of mechanical goalkeeper. Take ideas from the example (using a pulley system, using certain parts to attach the goalie to the mechanism) but encourage children again not to copy it exactly. They can make the goalie in their own way, and no goal is necessary. Challenge them to create a goalkeeper who can move left and right. Remember, it will need to stop when it has moved a set distance. Extension: Can they add a goal? Can they use a sensor to move in the right direction when a paper ball approaches it?
Lesson 5	L.I I can assess my design and make improvements Y4 - CS1 Y4 - CS2 Y4 - CS3 Y4 - CS4 Y4 - CS5 Y4 - CS6 Y4 - CS7	S.C I can show careful thinking about my design I can demonstrate an improvement on a design	<u>Key Questions</u> *Prior knowledge* What problems did you encounter when building it last time? How can you solve those problems this time? Did anyone make their goalkeeper move in a different way?	How could their goalkeeper from the last lesson be improved? What problems did they encounter? What ideas inspired them from around the classroom? Today they will aim to improve on their work from the last lesson, and they will see how they can improve upon the movement of their goalie. Challenge them to see if they can use gearing up for increased speed. Evidence on Seesaw and review.