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| **Design Challenges (20 Minute Makes)** | **AGE 11-14** |
| **Objectives**  | **Background**  |
| * Use new skills to evaluate a systems and control product.
* Apply accurate cutting skills to the production of a systems and control product.
* Use new skills to understand various types of mechanisms.
 | This 1 hour session is the 7th of a series of 10 lessons, it is the first half of a 2 hour design challenge where students explore the development of a simple mechanism toy. |
| **The Big Questions** | **Curriculum Links**  |
| * How can we develop a simple mechanism to use in a toy?
* Can a toy inspire self confidence in young children?
 | Design & Technology KS3 PoSDesign:* use research and exploration, such as the study of different cultures, to identify and understand user needs
* Use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses

Technical knowledge:* understand how more advanced mechanical systems used in their products enable changes in movement and force
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| **Unit Summary** |  |
| * This unit of work is a series of 5 design challenges that cover a range of materials areas with students challenged to create a small product in only 20 minutes, within a 2-hour session. Different spiritual, moral, social and cultural themes are explored across the sessions, and a large emphasis is placed on the evaluation of the success of the students’ small product prototype.
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| **(Title)** | **AGE 11-14** |

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| **1 Resources**  | **5 Plenary**  |
| * Student PowerPoint
* Design challenges student workbook
* Thin white card
* Scissors
* Paper fasteners
* Litter grabber (optional)
* Mechanism examples - reverse-motion linkage, parallel-motion linkage, bell-crank linkage, treadle linkage (optional)
 | *5 minutes*Students carry out a self-assessment considering which aspects of spiritual, moral, social and cultural issues they have explored through their design work |
| **2 Starter**  |
| *5 minutes*Students look at the image of the litter picker (or physical example if available) and discuss, in pairs or small groups, what is the product used for, how does the product function, who has the product been designed for (target audience) and what two materials have been used to make the product? This is then fed back to the class and any misconceptions corrected by the teacher. |
| **3 Introduction**  | **6 Follow up session**  |
| 10 minutesThe design brief is introduced, and students are asked what the purpose of creating the mechanism toy might be?The use of mechanisms is explored to gauge students’ prior knowledge / learning on the topic, some examples are given that students may be familiar with (corkscrew, wheelbarrow, mechanical clock) and others can be listed, sketched and detailed. | Students continue the design challenge in the second half of the challenge and will produce a simple card model of their chosen mechanism toy, and provide a detailed evaluation to support further improvement and progress with similar work. |
|  **4 Activity** |  |
| 5 minutesTo help students visualize how the animals shown may help young children be inspired discussion should take place of how animals persevere in different situations, and how their qualities and skills are all different.To develop design ideas an explanation should be given of the different ways of producing design ideas, and ideally a sketch of an animal showing the part(s) which move can be drawn, in colour with labels, they should ass annotation to explain where could this idea be used and what materials could it be made from?15 minutesStudents produce 3 design ideas for their mechanism toy, they should be different, in colour, and labelled and annotated.5 minutesUsing either the provided website <http://www.bbc.co.uk/schools/gcsebitesize/design/systemscontrol/mechanismsrev3.shtml> or if available examples of mechanism models or products using the mechanisms shown students should explore the different motions produced. The most suitable one(s) for their toy should be selected (from reverse-motion linkage, parallel-motion linkage, bell-crank linkage, treadle linkage).15 minutesUsing the mechanism example students produce a selection of card mechanisms, further examples can be found at <http://www.technologystudent.com/cams/link1.htm> students can use cards strips approximately 10mm wide to produce their linkages, and these can be fixed to the paper and each other using paper fasteners.  |