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| **Lesson 1** | Key question:  |
| **Building on from year 1-** |  Creating a moving picture/story book. Making and using sliders.  |
| **Teaching Objectives** | To look at objects and understand how they move **Success criteria:** * I understand that mechanisms are a collection of moving parts that work together in a machine
* I know that there is always an input and output in a mechanism
* I can identify mechanisms in everyday objects
* I understand that a lever is something that turns on a pivot
* I understand that a linkage is a system of levers that are connected by pivots
* I can help devise whole-class design criteria for what our moving monster should do
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| **Key DT focus*–*** *Skills developed with guidance* | **National curriculum links:** **Evaluate*** Explore and evaluate a range of existing products

**Technical knowledge*** Explore and use mechanisms [for example, levers, sliders, wheels and axles] in their products
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| * **Key Vocabulary**: Axle
* Design Criteria
* Input
* Linkage
* Mechanical
* Output
* Pivot
* Wheel
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| **Resources****Have ready*** A selection of mechanical and non-mechanical objects
* *Presentation: Moving monster examples* (see Lesson page)
* Links providing additional information on levers and linkages:
* Robives – Linkages (see Lesson Plan)
* Robives – Levers (see Lesson Plan)
* Your own demonstration moving monster toy, which you can make by following the Teacher Video from Lesson 4.
* *Presentation: Levers and linkages* (see Lesson page)
* A4 paper for the children to sketch their favourite toy
 | **Locality context barriers to learning** New terminology and concepts being introduced. Ensure that children have different ways to explore and learn new learning. New words could be displayed in class and revisited regularly.  | **Protective Characteristics** When designing model different patterns/colours and allow children to have their own free choice. Consider target market- who are you designing this for? Age/gender | **Weblinks****Watch***Teacher Video:* *Pivots, levers and linkages*(see Lesson page |
| **Before the session:** **Watch*** *Teacher Video:* *Pivots, levers and linkages*(see Lesson page)

**Have ready*** A selection of mechanical and non-mechanical objects
* *Presentation: Moving monster examples* (see Lesson page)
* Links providing additional information on levers and linkages:
* Robives – Linkages (see Lesson Plan)
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* A4 paper for the children to sketch their favourite toy

**Print*** *Activity: Levers and linkages,* page one printed (see Resources) - one per pupil
* *Activity: Design criteria template* (see Resources) - for completion in or after the lesson and copying and handing out in Lesson 2
* **Retrieval task:** Explain what DT is? What have you made in DT? Why is it important to create a design? We are going to be learning about mechanisms. Do you recall what this means? How did you make your moving picture? What method did you use?

**Oracy Starter:** Ask pupils to act out the four types of motion:* **Linear** – movement in a straight line in one direction (like a train on a track)
* **Reciprocating** – movement in a straight line back and forth (like a paper guillotine)
* **Rotary** – movement in a circular motion (like clock hands)
* **Oscillating** – movement along a part of a circle (like a clock pendulum)

Show pupils a selection of different everyday products, some of which include:1. **Simple mechanisms**, such as:
* a toy car (wheels and axle)
* a can opener (gears)
* a hole punch (lever)
* an interactive greetings card (sliders)
* some toy cranes (some have pulley systems as well as levers, wheels and axles).

and1. **Products that are non-mechanical**, such as:
* a teddy bear
* a doll
* a pencil (not a propelling pencil)
* a ruler
* a chair (but not a folding chair)

Ask pupils the following questions:* Can you name any components (for example, wheels, buttons, handles)?
* Can you identify which products are mechanisms/mechanical and which are not mechanical?
* Can you identify any types of motion used/produced in the mechanisms?
* Can you explain what a mechanism is (see ‘Key Questions’)?
* Can you identify specific types of mechanisms within the objects (such as a slider, wheel and axle)?

**Main teaching** Explain to the children the design brief for this project: “Design and make a moving monster toy for children using levers and linkages.”Display *Presentation: Moving monster examples* and give pupils an idea of what they will be making. The monster will be made from card and a paper-fastener/split pin linkage system. It will include a monster’s head, which can open and close as you control the linkage from the handles. The *Teacher Video: Making my monster* in Lesson 4 will explain how to make the monster. **Investigation** (15 minutes)Explain to the children that before they start they need to investigate levers, linkages and toys in more detail with the following two ‘Product Analysis’ activities:* **Product Analysis 1**: Levers and linkages

Give each pupil a copy of *Activity:* *Levers and linkages* and ask them to label the pivots (a central point from where something can turn, like your elbow)in the diagrams. You can go through the answers using *Presentation: Levers and linkages* – slide 1 is the same as the *Activity: Levers and linkages* and slide 2 shows the answers. (Click the mouse for each circle to appear in turn from top left to right and then bottom left to right.)* **Product Analysis 2**: Toys

Ask pupils to sketch their favourite toy and write three reasons why they like it so much. \*If children finish both activities, they should interview another pupil about their favourite toy and the reasons why they like it.Questions to Ask the children: What is a mechanism? A collection of parts that work together to create a movement – for example, a bicycle.What is an input/output? * Input: something which starts a system, for example: pushing a bicycle.
* Output: the result of the input – for example bicycle wheels turning.

What is a lever/linkage? * Lever: something which turns on a pivot – for example: door handle.
* Linkage: a system of levers – for example: skeleton.

What are levers and linkages used for? Creating movements and different types of motion.Can you demonstrate/explain the four types of motion? See ‘Attention Grabber’.Can you identify a lever/linkage?Can you name any products that use levers and linkages? Scissors, seesaw, wheelbarrow.What is a pivot? A central point from where something can turn, like your elbow. |
| SEN Provision | **PKF** | WTS | EXS | GDS |
|  **Pupils needing extra support:** Repetition and physical examples of products from the Activity: Levers and linkages.Could focus on maybe 1 or 2 toys and how they work. Choose 1 mechanism to focus on  | **Pupils with secure understanding indicated by:** Using key terms accurately. Identifying the correct terms for levers, linkages and pivots. Analysing popular toys with the correct terminology.**Pupils working at greater depth indicated by:** Applying technical knowledge to more sophisticated mechanisms. Using a wider range of observations when analysing products. Identifying a more sophisticated design criteria. **Pupils working at greater depth:** Challenge the children to find items from within the classroom that have levers and linkages, similar to those shown in the Activity: Levers and linkages. |
| **End of lesson reflection** Based on their own experiences and their interviews, take suggestions from the class to devise a whole class, three-point design criteria for what the children’s moving monster toys should do. For example, they should be fun, colourful, interactive, etc.) Record the design criteria. The children will need to copy these into their design briefs in Lesson 2.The design criteria will be used to evaluate and assess pupils’ work during the design, making and evaluation stages.  |
| **Outcomes****Majority To look at objects and understand how they move****Most . Analysing popular toys with the correct terminology****Some Using a wider range of observations when analysing products. Identifying a more sophisticated design criteria** |
| **Lesson evaluation notes and next steps** |