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| **Lesson 2** | Key question:  |
| **Building on from lesson 1:**  | Designing your windmill for a mouse  |
|  **Key DT focus*–*** *Skills developed with guidance* | **National curriculum links:** * Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
* Select from and use a wide range of materials and components, including construction materials, according to their characteristics
* Evaluate their ideas and products against design criteria
* Build structures, exploring how they can be made stronger, stiffer and more stable

Mathematics* Recognise and name common two-dimensional and three-dimensional shapes
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| **Teaching Objectives** | To make a stable structure**Success criteria:*** I can follow instructions to cut and assemble the supporting structure of my windmill
* I know that that the shape of materials can be changed to improve the strength and stiffness of structures
* I know that cylinders are a strong type of structure that are often used for windmills and lighthouses
* I understand what stable means and can ensure my structure has this property
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| **Key Vocabulary**: Client ● Design ● Evaluation ● Net ● Stable ● Strong ● Test ● Weak ● Windmill |
| **Resources****Have ready*** Demonstration model windmill made up from Lesson 1
* The children’s decorated structure nets and turbine templates from Lesson 1
* The children’s design criteria from Lesson 1
* Scissors
* Glue sticks
* Tape (preferably masking tape)

A5 stiff card for the base (one piece per pupil | **Locality context barriers to learning**New terminology, some children may not be very knowledgeable about the components of a windmill or have experience of seeing a windmill so may need extra support. Pre-teach terminology. Show lots of examples of windmills working. Model a high quality design so children have the same high standards, showing care and precision. Fine motor strength- adaptive scissors and easy templates used if necessary | **Protective Characteristics**Provide lots of different resources so children have free choice when designing their windmill.  | **Weblinks****Watch*** *Teacher Video:* *Assembling the structure (Lesson 1)* (see Lesson page)
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| **Before the session:** **Have ready*** Demonstration model windmill made up from Lesson 1
* The children’s decorated structure nets and turbine templates from Lesson 1
* The children’s design criteria from Lesson 1
* Scissors
* Glue sticks
* Tape (preferably masking tape)

A5 stiff card for the base (one piece per pupil**Retrieval task:** Recap from last lesson – What are we making?What are the three components of a windmill?**Oracy Starter:** Show pupils your pre-made windmill and recap the different parts as described in Lesson 1:* **Supporting structure:** the part that makes the windmill stand up
* **Turbine or sails:** the pieces that move in the wind
* **Axle:** the point from which the turbine/sails move

Ask pupils to identify the:* Shape of the structure
* Materials used

Hand out the children’s design criteria from Lesson 1 and recap the design criteria from Lesson 1, getting children to share their design ideas.Ask the children how will they ensure that their structure is stable and strong?**Main teaching:** The children will create their structure nets that they decorated in Lesson 1. If any children have not finished decorating their windmill nets, make sure that they have some extra time.Demonstrate to the class how to cut the net out and how to assemble the cylinder (see *Teacher Video: Assembling the structure*). Model how to cut the net out slowly and carefully so that the children can keep to the lines of the template. Ask the children to predict how the structure will look if these cut edges were rough and jagged. Make sure that the children spot the tab on the cylinder template and that they do not cut this off. Alternatively, they could just create a slight overlap, resulting in a slightly narrower cylinder.Discuss where the glue will go and suggest drawing dots or lines on these parts so the children can remind themselves when they get to this stage.Give children time to complete their windmill structures.When most children have assembled the structure of their windmill, bring them together as a class and model attaching this to the base (as demonstrated in the *Teacher Video: Assembling the structure*).Pupils who did not make a roof in Lesson 1 can make one this lesson as an extension. Do not attach the roofs yet as the children will need access to the top of the cylinder to attach the turbine, which will be done in the next lesson.Questions to Ask the children: What are the three key features of a windmill?What materials are used?How has it been made?What does stable mean? (Object does not easily topple over.) |
| SEN Provision | **PKF** | WTS | EXS | GDS |
| **Pupils needing extra support:**Might need to work as part of a guided group, whereby an adult completes one part of the structure, then gives pupils in the group time to complete the step before moving on.Could use cylindrical objects to wrap their net around first to help achieve the right shape. | **Pupils working at greater depth:** Should work independently to cut and assemble their own structure.Should produce accurate cuts and a cylinder of an even thickness throughout.**Pupils with secure understanding indicated by:** Making stable structures from card, tape and glue, which will eventually support the turbine (made in Lesson 3).**Pupils working at greater depth indicated by:** Cutting and sticking with accuracy to create a strong and stable structure with the cylinder being of an even thickness throughout. |
| **End of lesson reflection** Showcase three examples of completed structures. These examples could be selected based on effort, assembly and quality of finish. Ask those children whose examples you picked to explain:* What went well
* How it would be ‘even better if…’
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| **Outcomes*** **Majority To make a stable structure with support**
* **Most To make a stable structure**
* **Some Should work independently to cut and assemble their own structure.**
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| **Lesson evaluation notes and next steps** |