# DT Curriculum

## Year 5: Structures – Bridges

| Unit Overview: |
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| In this unit children will: Pupils will be able to complete a bridge, with varying ranges of accuracy and reinforce their bridges as necessary. Pupils will be able to identify beams, arches and truss bridges and describe their differences. Pupils will be able to recognise that supporting shapes can help increase the strength of a bridge, allowing it to hold more weight. |

| National Curriculum | Common Misconceptions and barriers |
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| **Design**<br>• Designing a stable structure that is able to support weight.<br>• Creating a frame structure with a focus on triangulation.<br>**Make**<br>• Making a range of different shaped beam bridges.<br>• Using triangles to create truss bridges that span a given distance and support a load.<br>• Building a wooden bridge structure.<br>• Independently measuring and marking wood accurately.<br>• Selecting appropriate tools and equipment for particular tasks.<br>• Using the correct techniques to saws safely.<br>• Identifying where a structure needs reinforcement and using card corners for support.<br>• Explaining why selecting appropriating materials is an important part of the design process.<br>• Understanding basic wood functional properties.<br>**Evaluate**<br>• Adapting and improving own bridge structure by identifying points of weakness and reinforcing them as necessary.<br>• Suggesting points for improvements for own bridges and those designed by others<br>**Technical knowledge**<br>• To understand some different ways to reinforce structures.<br>• To understand how triangles can be used to reinforce bridges.<br>• To know that properties are words that describe the form and function of materials.<br>• To understand why material selection is important based on properties.<br>• To understand the material (functional and aesthetic) properties of wood. | **Some Pupils may think that:**<br>• Inaccuracy of shape choice to help support their bridges.<br>• Lack of importance for accuracy (measuring and sanding) to make a stronger bridge<br><br>**Some Pupils May have the follow barriers:**<br>• The ability to use varying tools to help them construct a bridge<br>• Cutting beams<br>• Filing wood<br>• Measuring accurately |

## Thematic progression

**This topic builds on:**

- Children build on their learning about free standing structures form Year 4 (Pavilions)

**This topic is a foundation for future learning in:**

- Year 6 will use the knowledge of materials to manipulate and strengthen materials

## Key Concepts

**Construction**
**Design and Development**
**Evaluate**
**Critical Thinking**
**Creativity**

**Cross Curricular Links**

Mathematics: Geometry – properties of shapes

Geography: Human and physical geography

# How do I construct a bridge?

## Powerful Knowledge – Disciplinary and Substantive

Substantive Knowledge

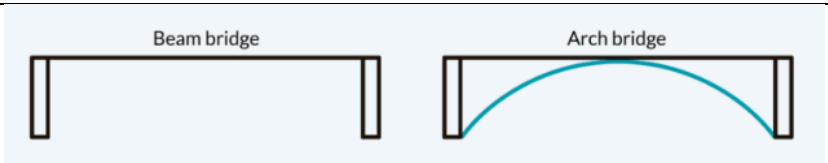
- *To understand some different ways to reinforce structures.*
- *To understand how triangles can be used to reinforce bridges.*
- *To know that properties are words that describe the form and function of materials.*
- *To understand why material selection is important based on their properties.*
- *To understand the material (functional and aesthetic) properties of wood.*

Disciplinary Knowledge

- *I can design a stable structure that is able to support weight.*
- *I can a frame structure with focus on triangulation.*
- *I can make a range of different shaped beam bridges.*
- *I can use triangles to create truss bridges that span a given distance and support a load.*
- *I can build a wooden bridge structure.*
- *I can independently measuring and marking wood accurately.*
- *I can select appropriate tools and equipment for particular tasks.*
- *I can use the correct techniques to saw safely.*
- *I can identify where a structure needs reinforcement and using card corners for support.*

- *I can explain why selecting appropriate materials is an important part of the design process.*
- *I can understand basic wood functional properties.*
- *I can adapt and improving own bridge structure by identifying points of weakness and reinforcing them as necessary.*
- *I can suggest points for improvements for own bridges and those designed by others.*

| | Key Question | DT Skill | Learning Objective | Vocabulary | Suggested Outcomes, Resources and Hooks for learning |
|---|---|---|---|---|---|
| 1 | What are arch and beam bridges?<br><br>**Prior Learning Links:** Free standing structures | Children develop their understanding of structures by investigating how different shapes affect their strength. | **I can explore how to reinforce a beam (structure) to improve its strength** | Beam bridge, Arch bridge, Strength, Technique, Corrugation, Lamination, Stiff, Rigid | **Pupils with secure understanding indicated by:** Identifying stronger and weaker shapes and points where structures typically failed. Recognise that supporting shapes can help increase the strength of the bridge and allow it to hold more weight.<br><br>**Pupils working at greater depth indicated by:** Recognising key factors that impact the strength of the bridge, including factors that they have not yet explored, for example, supports and materials. They can suggest a variety of ways to reinforce structures at the points at which they failed and provide verbal thoughts and solutions. |
| | **Think and Link** – Why do buildings need support? What do they look like?<br><br>***Warm up:*** Explain that we are going to be looking at bridges and how different shapes in the bridge structures are used to increase its strength to withstand a certain amount of weight.<br>ON KAPOW, Look through slides 2 – 5, these are beam bridges. A beam bridge is one of the simplest and most common bridge types, they have a main horizontal beam and vertical supports at either end.<br>Look through slides 6 – 9, these are arch bridges. Similar to a beam bridge, but with a curved support underneath the main horizontal beam.<br><br>Discuss the visual differences between a beam and an arch bridge, identify shapes within each beam and arch bridge design. Explain that a series of beam or arch bridges can be connected to create a longer bridge.<br><br>Ask the questions: What do the vertical supports/main horizontal beams look like? Do they look different? Do they have similarities? Can you spot any patterns? Shapes? | | | | |




Demonstrate how to model a beam bridge and convert it to an arch bridge by following the instructions below:

1. Refer to the Teacher video: Arch and beam bridge (KAPOW), set up the following materials:
Two piles of books/bricks/blocks so that the piles are the same height (about 10 cm high) and are about 15 cm apart from each other.
Place a single sheet of A4 card on top of the two piles to form a bridge.
2. Ask pupils to predict if the card can support the weight of the toy car (or other weight or object you have selected) when placed in the centre of the bridge. Once the children have given their yes/no predictions, carry out the test and watch the bridge collapse under the weight of the toy.
3. Ask the children if they can explain why the bridge collapsed (the card is not strong/rigid enough to withstand the weight alone).
4. Ask the children to work in pairs to discuss if there is a way in which we could support the weight of the toy using just one more sheet of thin card.
5. Try out the children's suggestions, making sure that you demonstrate the arch bridge by curving an A4 piece of card into an 'n' shape and placing it underneath your flat piece of card that is balanced on the piles of books/bricks/blocks. Make sure the arched piece of card is not bent or creased and that the top of the arch comes in contact with the flat piece of card above it.

**Key questions**

- Can you suggest other ways to make the bridge stronger and/or stiffer?
- Can you describe a beam and/or an arch bridge?
- Did your suggestions improve the strength of the bridge (structure)?

*Task: Explain to pupils that they are going to investigate how beam bridges can be made stronger by changing and redesigning the shape of the beam.*
*Play the Pupil video: Arch and beam bridge. (KAPOW)*
*Working in pairs, the children create a beam to arch bridge and test it using the weights which should be placed in the centre of their bridges.*

*Pause the class and explain lamination and corrugation techniques, that can be used to increase strength and stiffness. Ask the children to explore these in their next designs:*
*Lamination and corrugation (2:30 in the pupil video):*
*Glueing two or more layers of material together.*
*Sandwiching a concertina fold between two layers.*
*These techniques add more layers of material and glue in between the beams to provide extra strength and make the structure more rigid and stiff.*

*Hand out the Activity: Bridge design development. Ask the children to record their findings for each design in your designated unit of weight, alternatively provide them with scales and encourage them to record the results in grams as they work through different designs to improve the structure.*

*The children should record how much each bridge design can hold before it collapses.*

**Substantive Knowledge:**
*To identify strong and weak shapes*
*Recognise supporting shapes can help increase strength*
*Recognise that stronger ans sturdier materials will have an impact on the overall stability of the shape*

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| | **Disciplinary Knowledge:**<br>*I can identify beam and arch bridges*<br>*I can create a range of beam and arch bridge designs*<br>*I can identify stronger and weaker structures*<br>*I can find different ways to reinforce structures*<br><br>***Wrap up:*** At the end of the beam bridge investigation, ask the children to report back their findings as a class or in pairs and explain changes that they made to improve the strength of their beam bridges.<br>Ask the children the key questions and task them with completing the evaluation question 'Which bridge held the most weight? Why do you think this was? on the Activity: Bridge design development.<br><br>**Support Descriptors:** Can make fewer structures and test them, drawing simple conclusions. Use your demonstration piece as a visual model whilst they build a bridge design and provide verbal cues to guide their thinking if they are struggling to see other ways to improve the structure. Use slide 10 from the Presentation: Arch and beam bridges to share example answers on the Activity: Bridge design development sheet.<br><br>**Stretch Descriptors:** Should make a wider range of different structures and test them, drawing meaningful conclusions, identifying specific areas of weakness or strength. Provide with extra bridge design development sheets if they have already made a beam, arch, laminated and corrugated bridge beam to include their own ideas and designs. | | | | |
| 2 | What are spaghetti truss bridges?<br><br>**Prior Learning Links:** Arch and beam bridges **(materials and support)** | Children create spaghetti truss bridges, learning how different shapes can improve the strength of a structure. | **I can build a spaghetti truss bridge** | Beam bridge, Arch bridge, Truss bridge, Strength, Factors, Stiffness, Stability, Visual appeal, Aesthetics, Joint | ***Pupils with secure understanding indicated by:*** *Identifying beam, arch and truss bridges and describing their differences. Using triangles to create a simple truss bridge and supports a load (weight).*<br><br>***Pupils working at greater depth indicated by:*** *Articulating the difference between beam, arch, truss and suspension bridges and making an accurate and well-constructed truss bridge, explaining where some bridges are stronger or weaker than others.* |
| Think and Link – How is a bridge made stronger? What are the benefits of a strong bridge?<br><br>***Warm up:*** *Display slides 2-5 from the Presentation: Truss bridges and revisit the beam and arch bridge examples. Ask the children to complete the 'Match the name to the bridge' section on the Activity: Spaghetti bridge investigation.*<br><br>*There are various other factors that can increase the stability, strength and stiffness in the design of a bridge. Ask the children to briefly discuss what these factors could be with their partner and feedback their thoughts.* | | | | | |

*Share slide 6 – 10 and discuss any shapes and patterns the children notice, including the supports. If possible, outline the main shapes using your interactive whiteboard pen.*
*Explain that truss bridges use multiple tessellated beams in a triangle formation, which help to distribute (share) the load (weight) across the length of the bridge evenly, as a result, truss bridges are strong.*

*Ask the children: Can you remember what happens to a beam bridge when too much weight is placed on the central beam?*

***Task:*** *Explain to the children that in the next part of the lesson, they are going to make their own truss bridge out of spaghetti. The children will need to take extra care when using this material as it is brittle and can snap easily if too much pressure is applied to it.*

*Provide the children with spaghetti and masking tape, and set up the glue guns where they can be accessed under close staff supervision.*

*It may be useful to leave the Pupil video: Spaghetti truss bridge running on a continuous loop so the children can refer to it while they are working. The following is a summary of the instructions contained in the Pupil video: Spaghetti truss bridge.*

***Beams***
*Begin by creating the bridge beams. Tape or glue together thin bundles of spaghetti to make two long lines which span the distance the bridge needs to cover. Overlap the bundles at the joins to make sure they are as rigid as possible.*

***Triangles***
*To create the triangles for their truss bridge, the children need lots of bundles of smaller pieces of spaghetti (all equal in size).*
*To make these, take a single strand of spaghetti, measure it and break it into three equal pieces. Each piece will be roughly eight cm long. Then cut a piece of masking tape to the same length and stick it on the table as a quick method of measuring the spaghetti to make the triangles.*

*Then measure small bundles of spaghetti against the masking tape on the table, and break the bundle into three equal pieces. The children will need a pile of these little bundles to create the triangles for their bridge.*
*They then take three of these bundles and make a triangle, taping or glueing them together in the corners. The children will need as many triangles as necessary to span the length of the beams.*
*Once they have the three even length bundles, they tape or glue them together in the corners. They should then repeat this process as many times as necessary to produce the number of triangles needed to span the length of the beams.*

***Assembly***
*The children now have their beams and triangles and can assemble their bridges. They should make sure that they keep the two sides of the bridge parallel and use extra small bundles of spaghetti to connect the beams.*

***Testing***
*Once their bridges are finished, they can test them. Place the completed spaghetti bridge across two even piles of books (blocks or bricks) and slide a piece of card over the central beam of the bridge to cover any gaps.*
***Take a photograph at this point to record the final design.***
*Ask the children to predict how much weight (using a measurement object/unit of your choice) the bridge will hold and jot this on the board. Then test the bridge by placing items of the same weight and size (e.g. bean bags) onto the beam. Record the maximum weight the bridge will hold on the Activity: Spaghetti bridge investigation before cracking or breaking.*

***Key questions***

*How did your truss bridge compare to the beam and arch bridge in lesson 1?*
*What factors made your bridge stronger/weaker?*
*Would you change anything about your bridge design?*

**Substantive Knowledge:**
To identify beams and their purpose to support bridges
To know the difference between arch, truss and spaghetti bridges
To know triangles can create a simple truss bridge

**Disciplinary Knowledge:**
*I can identify arch, beam and truss bridges*
*I can use triangles to create truss bridges and test them*
*I understand how triangles can be used to reinforce bridges*

Wrap up: Ask children what improvements can be made to their designs? Specify what elements of the bridge you want the children to focus on for this question such as strength, accuracy, quality of the joints and aesthetics (visual appeal).

**Support Descriptors:** Should make simple truss bridges and will need extra support to check that they are being assembled correctly. Work in pairs. They may need to work from a photo of a spaghetti bridge. Provide with premade spaghetti triangles, to allow the children to focus on the building of the bridge structure.

**Stretch Descriptors:** Should make a sophisticated bridge from more accurate equilateral triangles, which are securely constructed and assembled with sufficient amounts of tape and glue. If they complete the truss bridge in plenty of time challenge them to suggest methods of further strengthening the bridge and if possible see if they can replicate or develop the bridge design in different materials such as lollipop sticks. Add labels to the photograph or sketch to identify where the bridge had weak points in testing.

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| 3 | How can I build a bridge?<br><br>**Prior Learning Links:** Strenghthening structures and use of materials | Children learn about material properties and why they are important. They learn to use tools including saws to build a wooden bridge. | **I can build a wooden truss bridge** | Mark out, Truss bridge, Hardwood, Softwood, Wood file/rasp, Sandpaper/glasspaper, Bench hook/vice, Tenon saw/coping saw, Assemble, Material properties | **Pupils with secure understanding indicated by:** Cutting the required beams to the correct size, using the Truss bridge cutting mat as a visual reference. Smoothing down the rough cut edges with sandpaper. Following each stage of the truss bridge creation as instructed by teacher.<br><br>**Pupils working at greater depth indicated by**: Planning and cutting the required beams to the correct size, using a ruler and square to measure accurately after being provided with the sizes on Slide 11 or on the Truss bridge cutting mat. Independently chunking each stage of the process for example, 'First I will… next I will, because…'. |

Think and Link – What is the purpose of a bridge? How is it strenghtened?

***Warm up:*** *Display Presentation: Materials – Wood*

*Slide 2*
*Hold up a rod of 8 spaghetti pieces taped together and put pressure on either end until it snaps.*
*Ask the children what happened and why?*
*Explain that we have looked at the strength of beam, arch and truss bridges by shape and support, but one factor, in particular, has not yet been considered. The materials.*

*Spaghetti is brittle and will snap under light pressure, although it was a good (cheap and easy) modelling material to practise building a truss structure.*

*Slide 3-4*
*Pose the question: What if we made a real bridge out of spaghetti?*
*Explain that materials chosen for a bridge must withstand the weather conditions and temperature changes outdoors, without leading to weakness.*

*Slide 5*
*Pose the question: Why do materials matter?*
*Each material has a set of properties. These properties need to match the intended use (function) of the product otherwise it could fail.*

*Slide 6*
*Discuss and review the words on the board, offer children to select a word to be defined if they are unsure about the words meaning. You could ask the children for examples of what materials or objects they think about when the word is read, for example, for 'fragile' they could answer with glass.*

*Slide 7 – 10*
*There are two main types of wood: hardwood and softwood. Every tree is different, but deciduous trees (leaf shedding) can be considered 'hardwood' and coniferous trees (needles, evergreen) 'softwood'.*

*Read through the facts for each, and to supplement the children's understanding use slide 9 – 10 to show the visual differences between deciduous and coniferous trees, and the density of each tree ring structure. The closer the rings are, the stronger and harder it tends to be.*

***Task:*** *Explain to the children that they will be creating wooden truss bridges over this and next lesson, and will need to use their understanding of bridge structures from the previous lesson as well as their cutting, measuring and glueing skills.*

***It may be useful to leave the Pupil video: Building a bridge running on a continuous loop so the children can refer to it while they are working.***

- *The following is a summary of the instructions and stages contained in the Pupil video: Building a bridge.* ***(model along with the children for clarity)***

*Stage 1: Wooden truss bridge measuring and marking out*
*For one bridge, you will need to cut 27 pieces of wood with 8 angled pieces as supports (see slide 11 on the Presentation: Materials – Wood).*

*Demonstrate how to measure, mark out, cut the wood and assemble with card corners.*

*The children could use the scale drawings on the Truss bridge cutting mat to help mark out the correct measurements onto the wood or measure it themselves using a ruler and set square to achieve an accurate right-angle.*

*To create the 45° angled supports, mark a right-angle with the set square and then draw a second line 10mm below it. Join the dots in opposing corners to create a 45° angle.*
*Cover the health and safety points:*

*Explain the dangers of using the saws – to carry with the blade facing downwards and to not blow sawdust after cutting. Make sure children are standing when sawing and keep their fingers away from the blade. After cutting the wood, the children should carefully sand down the rough edges to avoid splinters. Involve pupils in identifying how to use the equipment safely and how to prevent accidents and injuries.*

*Stage 2: Wooden truss bridge sawing and smoothing*
*After measuring and marking the wood pieces, using a:*

*Tenon saw and bench hook, secure the bench hook by pushing it up against a flat table edge away from the end of the table to avoid slipping off. Position your wood flat against the back guard, with the end of the wood to be removed over the edge and the mark to cut lined up to the end of the guard. Hold the wood with one hand against the guard, whilst using the other to carefully draw back the tenon saw to make a groove before sawing back and forth with the blade.*

*After sawing the wood, use sand or glasspaper to lightly smooth out the rough cut. However, be careful not to sand the ends too much otherwise they will become too small. This is simply to remove any sharp edges.*

*For the 45° angled edges, first cut the wood to size at a right-angle. Using sand or glasspaper placed facing upwards on the table, sand the cut end on the edge until it meets the 45° marked angle. This should not take long, as there should not be too much wood to remove.*

*Alternatively, cut the wood carefully at a 45° if clamped securely and lightly sand to remove any raw sharp edges.*

*Stage 3: Wooden truss bridge assembly*
*When all of the pieces are ready, use a glue gun to create a square with four right-angled wood pieces. Give it a moment to set, and then add and glue a 45° angled piece inside the square to triangulate the joint.*

*Create triangles for each end of the bridge, using two right-angled wood pieces and a 45° angled piece.*
*When all of the squares and triangles have been made (see slide 11 on the Presentation: Materials – Wood if unsure on construction or the Pupil video: Building a bridge) assemble them to form a truss bridge.*

**Substantive Knowledge:**
To know that measuring and cutting wooden frames will make an accurate and stable structure
To know that tools should be used safely and according to the health and safety

**Disciplinary Knowledge:**
***I can measure and mark out accurately on wood***
***I can select appropriate tools and equipment for particular tasks***
***I can follow health and safety rules***
***I can explain why selecting appropriating materials is an important part of the design process***

Wrap up: Before the end of the lesson, give pupils time to reflect on what they have already completed and plan what they will need to do in the next lesson.

**Support Descriptors:** Provide extra help by doing the making stages one at a time and reviewing with the children before moving on, this can break up the activity and also make it feel more manageable. Allow the children to work in pairs or small groups as a production line and switch stations. Use the Truss bridge cutting mat as a guide for cutting wood sections to the correct size.

**Stretch Descriptors:** Express the need to achieve a high-quality finish, sanded down, accurate with no gaps and secured at all joints effectively. Provide the extension activity Wood facts leaflet to expand and consolidate their knowledge of wood. Use a ruler and square to measure wood accurately, after establishing what size they need to be on the Truss bridge cutting mat.

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| 4 | How do I finalise a bridge?<br><br>**Prior Learning Links:** Frame structure | Pupils continue to build their truss bridges, reinforce and evaluate them. | **I can complete, reinforce and evaluate my truss bridge** | Reinforce, Truss bridge, Wood sourcing, Softwood, Hardwood, Evaluate, Quality of finish, Accuracy, Joints | **Pupils with secure understanding indicated by**: Supported completion of the bridge in a varying range of accuracy and finish but able to identify some areas for improvement through evaluating the success of their bridge, and reinforce as necessary.<br><br>**Pupils working at greater depth indicated by:** Independent completion of the bridge in a to a higher quality of accuracy and finish, able to identify all areas for improvement through evaluating the success of their bridge, and reinforce as necessary. |

Think and Link – What is a successful bridge? What would be the KTS for a bridge?

Display the Presentation: Sourcing wood.

Slide 1

Ask the children what they can remember about wood from last lesson, and see what they can recall by asking the questions:
Why wood and not spaghetti?
Why is it important that we choose suitable materials?
What are the two main types of wood?
Can you remember their differences?

Slide 2 – 5

Recap soft and hardwood facts from last lesson (Lesson 3 – Building a truss bridge).

Slide 6

Trees grown for their wood, are planted in privately owned forests, sometimes called tree nurseries. This is a pine tree farm.
Ask the children:
What type of wood is a pine tree?

Softwood.
How did you identify the wood type?
It is a coniferous tree.

Slide 7

When the trees have grown large enough, they are harvested and cut into logs. It takes pine trees around 40 years to grow before they are ready. English oak take up to 150 years!
Ask the children:
Why is time an important factor when harvesting wood?
There would be approximately three harvests of a pine tree farm before an oak tree farm would be ready for one harvest.

Slide 8

The logs are transported to a processing plant. They are cut down into lots of different sizes and forms. These logs have been cut into planks.
Ask the children:
Can you think of any other forms of wood?
We are using wooden square rods for our truss bridges.

Slide 9

They are now ready to be sold and shipped to warehouses and DIY stores. They will be used for building and creating thousands of different wood products and structures.

Slide 10

It is very important for the planet that tree farms stick to a set amount of land and replant every tree after each cycle.

Task:

Continue construction of the wooden truss bridges
Reinforce the health and safety rules and recap the practical skills and demonstrate the correct use of tools, focusing on any observed issues from last lesson.

Get pupils to complete their wooden truss bridges, emphasising that they should focus on high-quality making. This involves taking the time to measure and cut materials accurately and smoothing down rough cuts and edges using sandpaper.

They should experiment with applying a small amount of pressure to their bridge and identifying areas which look particularly weak. They can then add card triangles to reinforce joints.

Demonstrate to the children how to measure the central beam of their bridge to cut and fold a piece of card over the top of the beams to form a platform that in reality cars, pedestrians or animals would use to cross.

Evaluate

Hand out the Activity: Truss bridge final evaluation and tell the children to:

Stick a photograph (or more) and describe the best parts of their truss bridge.
Rate each of the points for the quality of finish, the accuracy of joints and the overall build.
Explain what you would do differently or change about your truss bridge.
Write four skills and four facts that you learnt over the duration of this project.

Wrap up:

Ask pupils to walk around the classroom and examine each other bridges. Encourage them to identify their favourite bridge and describe the quality of the:

Finish, how smooth is the wood?
Joints, are there any gaps?
Aesthetics, how does it look overall?
Discuss these as a class to establish which features the most successful bridges had in common.

**Substantive Knowledge:**
*To understand some different ways to reinforce structures.*
*To understand how triangles can be used to reinforce bridges.*
*To know that properties are words that describe the form and function of materials.*
*To understand why material selection is important based on their properties.*
*To understand the material (functional and aesthetic) properties of wood.*

**Disciplinary Knowledge:**
*I can complete my wooden truss bridge*
*I can identify points of weakness and reinforce them as necessary following testing*
*I can evaluate my truss bridge against a specification*

**Support Descriptors:** Provide extra help by doing the making stages one at a time and reviewing with the children before moving on, this can break up the activity and also make it feel more manageable. Allow the children to work in pairs or small groups as a production line and switch stations. Use verbal and visual prompts, such as photographs and video clips taken through lesson 3 – 4 to support the final evaluation.

**Stretch Descriptors:** Express the need to achieve a high-quality finish, sanded down, accurate with no gaps and secured at all joints effectively. Employ them as 'Construction assistants' to support the rest of the class or an assigned pupil if they finish their truss bridge ahead of schedule and can do no more to improve its strength. Explain in detail the status of their finished truss bridge with regards to the quality of finish, accuracy of the joints and overall build referring back to skills and tools used. Discuss what they would change if they were to do the truss bridge project again.