

# Key Stage Two - Design Technology

## Spinnaker Structures

### Pre-Visit Activity (2 - 4 hours)

This activity is adapted from the QCA Unit 3d 'Photograph Frames' and should be undertaken before your visit to the Spinnaker Tower.

### Main Learning Outcomes:

To know and describe ways of making strong and stable structures.

To know how to strengthen paper and card in different ways.

### Resources Required

For this activity, you will need:

- Selection of free standing items
- Variety of construction kits
- Variety of paper and card, including corrugated card
- PVA glue, masking tape, paper fasteners, scissors, stapler and staples, double-sided tape, hole-punch
- Pipe Cleaners

### Activity Outline

1. Begin by asking children to look at the selection of free standing items, e.g. mug tree, music stand, tripod etc. And ask questions such as *Why is it important that these items are strong and stable? How are different products designed to be strong and stable?* Highlight the fact that some products are made stable by having a wide base.
2. Next ask the children to work in small groups and to use construction kits to design and build a series of stable structures such as a chair, a bridge etc. Discuss as a class, the shapes that give a structure its strength and also highlight the importance of a wide base once again.
3. Now give each group a limited amount of pipe cleaners and ask them to investigate ways of making free-standing structures using just the pipe cleaners.

### National Curriculum Links:

**DT:** 1b, 1c, 1d, 2a, 2d, 2e, 3a, 3b, 3c, 4a, 4b, 5b  
**English:** En 1 2a, 2b, 2c, 2d, 3a, 3c, 10a, 10b



# Key Stage Two - Design Technology

## Spinnaker Structures (2)

### Activity Outline continued:

4. Discuss which structures have the most strength, once again looking at the design and any joins made.
5. Clear away all free standing items, construction kits and pipe cleaners and assemble your class to watch you demonstrate/model of ways to stiffen and strengthen paper and card by rolling, folding and layering.

**FOLDING:** paper/card can be strengthened by being concertinaed. A platform can be built by applying a layer of card or paper to both sides of the concertina. Also, folds can be used as joins and to stabilise. A strip of card folded in half, with each end folded back on itself, can create a good structure (triangle).

**ROLLING:** paper/card rolled into tubes can be an especially strong structure, especially if used in conjunction with a set of other tubes. The tubes can also be fixed together to form a platform or strong base. Also, they can be used *inside* a larger tube to make a stable structure.

**LAYERING:** paper/card can be layered as in the concertina platform—by layering one concertina onto another, you can create quite a strong, reinforced base. Also, corrugated card can be stuck together to create an extra strong base but only if the corrugated parts are stuck together at *right angles*. Also show how and why you use cardboard corners and how by adding a length of wood to a piece of card can improve it's strength.

**JOINING:** Demonstrate different techniques for joining paper and card together, e.g. using small amounts of PVA glue, stapling (using more than one staple), paper fasteners, double-sided and masking tape.

### Important Vocabulary

Folding  
Support  
Reposition

Layering  
Stiffen  
Adhesive

Rolling  
Sturdy  
Joint

Structure  
Stable  
Strength



# Key Stage Two - Design Technology

## Spinnaker Structures (3)

### Activity Outline continued:

6. Now ask children to practice making each of the joins and to assess which joints are best. Ask them to assess how much PVA glue is really needed to make a strong joint, the best way to apply tape to a joint and if the tape can be repositioned if it is placed wrongly to begin with etc.
7. When groups have assessed the joining methods and you have discussed their findings altogether, ask them to use ONE piece of A4 paper, some PVA glue and a pair of scissors to build a small chair with 3 or 4 legs. Remind them to think about good ways to fold paper for maximum strength and stability and the best joining methods to use for this task. Encourage children to add some design element to their chair so although it is functional and strong, it also looks appealing but stress this is only to be tackled once the chair has been completed.
8. Give children plenty of building time to finish their chairs before displaying them all at the front of the class and looking at the different ways people tackled the task and the designs created. How stable and strong are they? Which designs are best and why?
9. Bring activity to a close by consolidating the concepts and ideas discussed within the session.

### Extension Ideas

Suggest children practise the techniques they have learnt at home and create some interesting structures of their own. Encourage them to bring them in to show others what they have created.



# Key Stage Two - Design Technology

## Spinnaker Structures

### Visit Activity (1 hour)

This activity is adapted from the QCA Unit 3d 'Photograph Frames' and should be undertaken during your visit to the Spinnaker Tower.

### Main Learning Outcomes:

To identify the key structural design features of the Spinnaker Tower.

To make detailed sketches of the Spinnaker Tower.

### Resources Required

For this activity, you will need:

- Digital camera
- Clipboards
- Spinnaker Tower Factsheet
- HB pencils
- A4 drawing paper

### Activity Outline

It is advised that children are arranged into small groups of 4 prior to your visit and to have an adult supporting each group if possible. It is also important to take plenty of digital photographs of your day to support your post-visit activities.

1. Begin by asking children to look at the Tower from a number of different views. Discuss the shape and design and how it reflects the style of a spinnaker (a sail on a yacht). It may help to look at pictures of yachts prior to your visit.
2. Ask children to suggest how the tower was built and the type of materials and machinery used to construct it.
3. Ask each child to make some detailed sketches of parts of the tower, to show how the Tower is a strong and stable structure.

### National Curriculum Links:

**DT:** 1a, 1b, 2b, 2c, 3a, 3b, 4a, 5a

**Mathematics:** Ma3 2a, 2b, 2c

**Science:** Sc3 1a



# Key Stage Two - Design Technology

## Spinnaker Structures (2)

### Activity Outline continued:

4. Once children have completed their sketches and written some basic details, it will be time to go into the Tower. Remind children to look at all the aspects of the construction as they enter the Tower itself and as they use the lifts to ascend to the viewing platforms.
5. Once at the viewing decks, give children some time to gain an understanding of their position in relation to the locality. Ask children to locate: Isle of Wight, Gosport, Portsmouth, Chichester, Portsdown Hill and other well known local landmarks. This will be subject to change according to the visibility conditions during your visit.
6. Next, give each group an amazing facts sheet with information about the Tower's dimensions, construction etc. Ask each group to look at the interior design of the Tower and for any features they like and dislike, noting their thoughts on their worksheet.
7. Finally, ensure you have taken plenty of photos of your visit for use in post-visit activities.

### Important Vocabulary

Landscape  
Portrait  
Style

Concrete  
Landmark  
Transport

Vehicle  
Harbour  
Spinnaker

Materials  
Strength  
Design

Curve  
Angle  
View



# Key Stage Two - Design Technology Spinnaker Tower Amazing Facts!

Name:

Date:

## AMAZING FACTS!

Can you find some more amazing facts to add to the Tower?

The Spinnaker Tower **moves** 150mm in the wind!

The Spinnaker Tower weighs 30,000 tonnes!

The spire is 27m tall!

The glass floor is the largest in Europe!

The Spinnaker Tower stands at 170m high!

1200 tonnes of steel was used to construct the Spinnaker



# Key Stage Two - Design Technology Spinnaker Tower Thoughts and Ideas

Name:

Date:

## **My thoughts and ideas about the Spinnaker Tower**

Write down or draw any thoughts and ideas you have about the Tower.

### **What do you like/dislike?**

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### **Can you think of any improvements or additions you would make?**

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Use this box to write down any other important information, thoughts and ideas you find out about Spinnaker Tower:

# Key Stage Two - Design Technology Spinnaker Structures

## **Post-Visit Activity** (2 - 4 hours)

This activity is adapted from the QCA Unit 3d 'Photograph Frames' and should be undertaken after your visit to the Spinnaker Tower.

### **Main Learning Outcomes:**

To produce a new unique design for a tower that is free standing and stable.

To use basic construction techniques to build a tower.

## **Resources Required**

For this activity, you will need:

- Work completed during visit
- Digital images of the Tower
- Planning & Design Sheets
- Materials to build a Tower (variety of stiff sheet material e.g. card, paper etc, pre cut dowel & square section wood, PVA glue, scissors, masking tape, pencil, ruler, pipe cleaners)

## **Activity Outline**

Ensure children's work at the Tower is collated and photos are readily available for children to look at.

1. Firstly, ask children to sit in their groups they were assigned during the visit. Then share the images taken during the visit with the children. Put them into a slideshow if you wish.
2. Now ask children to look at the sketches and notes they made at the Tower with regard to the design and construction. Discuss what they noticed during their visit and some of the amazing facts they found out about the Tower, particularly those associated with its construction.
3. Ask children to also share their own thoughts and opinions about the Tower.

## **National Curriculum Links:**

**DT:** 1b, 1c, 1d, 2a, 2d, 2e, 3a, 3b, 3c, 4a, 4b, 5b  
**English:** En 1 2a, 2b, 2c, 2d, 3a, 3c, 10a, 10b



# Key Stage Two - Design Technology

## Spinnaker Structures (2)

### Activity Outline continued:

4. Now introduce the main task. Give children the design brief to design and build a second Tower but this time on the Gosport side of the harbour. This Tower will be similar in height and should have at least one viewing platform, but must be designed so that it **does not** look the same as the original Spinnaker Tower. More able pupils may be able to include a new feature e.g. a restaurant on the top floor, an 'walk around' outdoor viewing platform, searchlight display etc.
5. Give each child a set of Tower design worksheets and ask them to begin drafting some ideas for their design, reminding them of the brief they must work to and to remember the importance of stability and strength in their design.
6. Ask them to draw and label their final design idea, including some brief notes on how they aim to make sure the design is stable and strong.
7. Next ask children to complete the planning sheets - here they should make a list of materials they think they will need and also the order in which they should approach the build task.
8. Once children are ready, they can begin to build their designs. Ensure they have access to sufficient materials and tools.
9. Their towers may take more than one session to finish completely. Make sure children are encouraged to think about the quality of their finished product - provide additional materials for finishing touches.
10. Finally, ask children to evaluate their tower according to the design brief using the evaluation sheet in their design packs.

### Important Vocabulary

Design  
Stable  
Strength

Drafting  
Plan  
Evaluate

Joining  
Original  
Secure

Unique  
Steady  
Assess

Ideas  
Inspire  
Creative



# Key Stage Two - Design Technology Spinnaker Structures - Design Brief (1)

Name:

Date:

## Design Brief

You have been chosen to design a new tower for the harbour entrance on the Gosport side.

Your design must:

Be at least 40 cm tall

Be free standing

Be stable

Look different to the Spinnaker Tower

Have at least one viewing platform



You must be able to build your tower using the materials provided and using the folding, layering and joining skills you have previously learned.

Once complete, you should draw and label your design carefully.

**Draw some of your first ideas here**

## Key Stage Two - Design Technology Spinnaker Structures - Design Ideas (2)

Name:

Date:

### Design Criteria

I am going to design and make a new tower for the Gosport side of the harbour entrance. I want my tower to:

1.

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4.

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2.

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5.

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3.

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**Choose your favourite design and draw it in more detail. Make sure you include detailed labels.**

# Key Stage Two - Design Technology Spinnaker Structures - Planning Sheet (3)

Name:

Date:

## What will you need to make your design?

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Thin card

Card  
triangles

Paper

Wood strips

Corrugated  
card

Wood dowel

PVA glue

Sticky tape

Masking  
tape

Paper clips

Scissors

Paint

## Write down the order you will do things in when you make your tower

1.

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2.

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3.

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4.

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19.

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20.

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## Key Stage Two - Design Technology Spinnaker Structures - Final Design (4)

Name:

Date:

**Now your tower is finished, draw it once again here,  
including any labels needed to explain the final design.**

# Key Stage Two - Design Technology Spinnaker Structures - Evaluation (5)

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**A good designer evaluates their design once it is finished to see where they could make improvements in the future.**

**Evaluate your tower design:**

**Design Criteria** (copy these from sheet 2)

**How well does your tower meet the criteria?**

1. \_\_\_\_\_



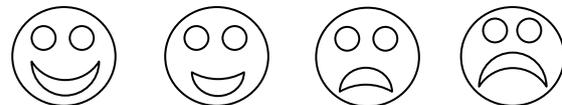
2. \_\_\_\_\_



3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_



**Overall Design**

What do you think about your overall design for a new tower?



**Future Improvements**

How could you make your design better? Write down your thoughts below:

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