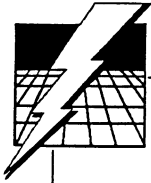


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# Introduction

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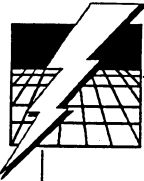
Finding out about structures can be fun. If you carry out the experiments and design projects suggested in this book, you will soon begin to realize how important it is to understand about structures.

Some tests and experiments will be easy to do, others will be harder. Work through them carefully and record what you find out. Sometimes you will need to look back in the book to refresh your memory. To help you do this, each chapter has 'key words' and ideas printed in bold type. Try and remember them and use them when you talk to your friends and teacher about your design ideas.

Sometimes you will need to discover things, so make guesses and see if you are right by reading on or testing and experimenting further.

Have some fun with your friends by playing the structures game in the middle of the book.

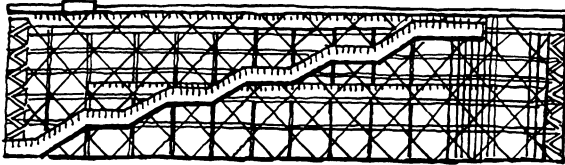
All these activities will help you understand more about the world of structures and how you can use this knowledge in design work.



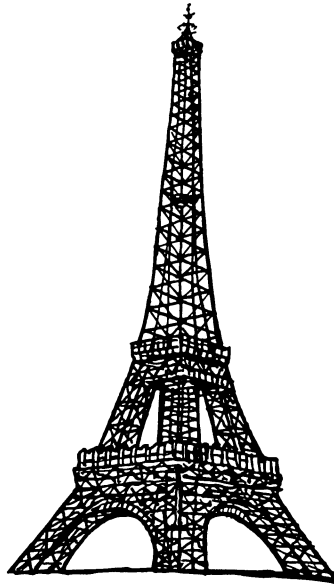
# What Is a Structure?

## Artificial Structures

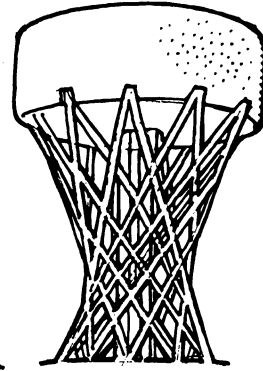
Is there a tower or bridge near your home or school?  
Is it made in a similar way to those shown in the pictures?  
What materials have been used to make it?  
How are the parts joined together?



The Pompidou Centre in Paris is an 'inside-out' building.



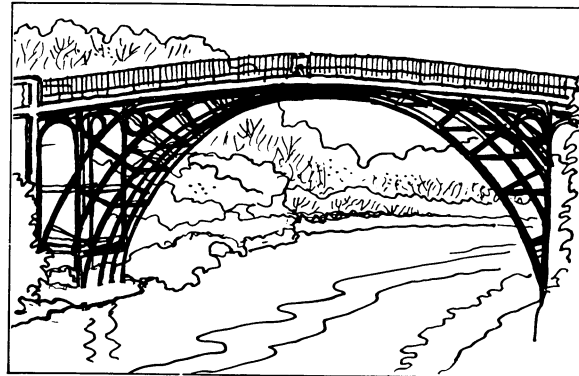
The Eiffel Tower. It is made of iron and is over 300 m tall.



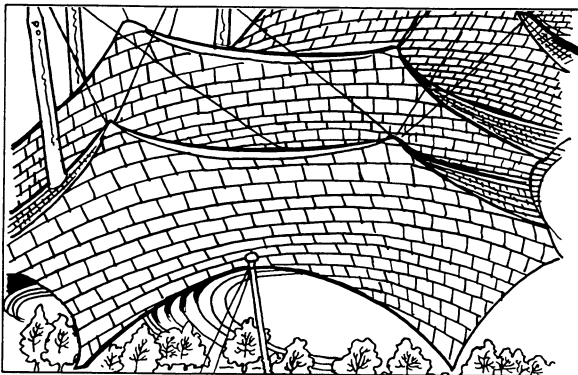
A water tower built of reinforced concrete.



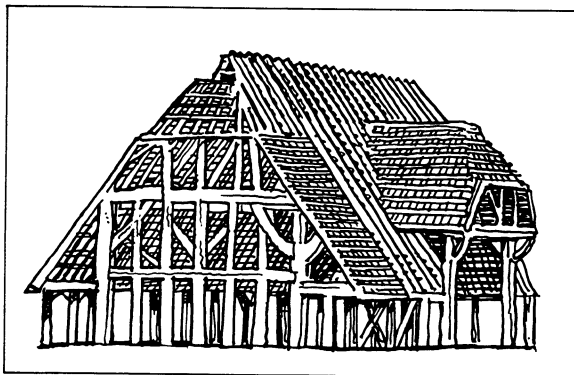
The steel structure is on the outside of the Pompidou Centre.



The first bridge to be built of iron at Ironbridge, Shropshire, was completed in 1775.



The Munich Olympic Stadium has an acrylic (plastic) sheet roof held up by steel cables and steel tubes called pylons.



A barn structure built of wood in about 1800.

# What Is a Structure?

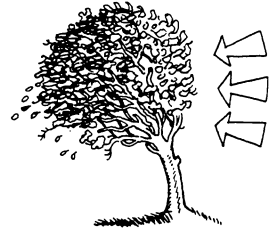
## Structures in the Natural World

Trees grow tall and spread their branches so that their leaves are open to the light. The trunk supports the branches and leaves.

The trunk and branches must be able to resist the wind if the tree is not to get damaged or blown over.



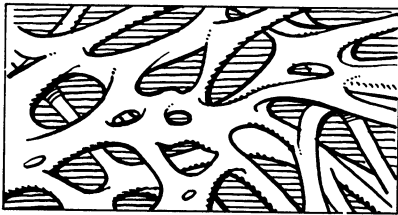
The trunk supports the branches and leaves.



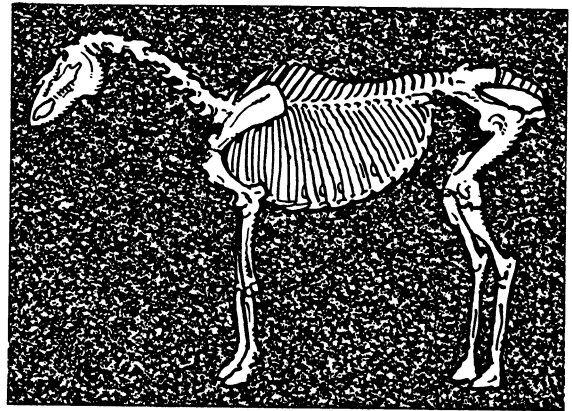
The trunk and branches deflect (move) when resisting strong winds.

Here are some more examples of structures in nature.

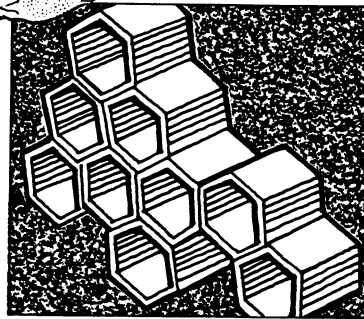
The wings of a bat are stretched out by bone and cartilage.



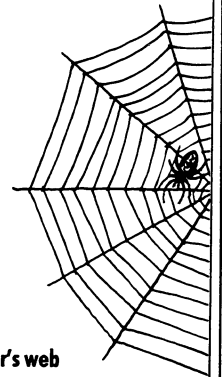
The micro-structure of bone.



The skeleton of a horse.



Honeycomb structure made by bees.



A spider's web

### Fact File

- Some natural structures, like the bracken plant, can grow as tall as 4.5 metres.
- The world's tallest trees grow to a height of 415 metres and belong to the Douglas fir family.