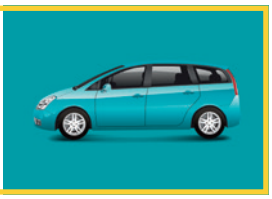
HANDOUT

# What do Civil Engineers do?

Circle the projects that you think civil engineers *do* do!

| | | | |
|---|---|---|---|
| **Rollercoaster** |  | **House** |  |
| **Stadium** |  | **Supermarket** |  |
| **School** |  | **Toilet** |  |
| **Aeroplane** |  | **Train Station** |  |
| **Power Station** |  | **Electricity Supply** |  |
| **Block of Flats** |  | **Cars** |  |
| **Roads** |  | **Train** |  |
| **Water Plant** |  | **Airport** |  |

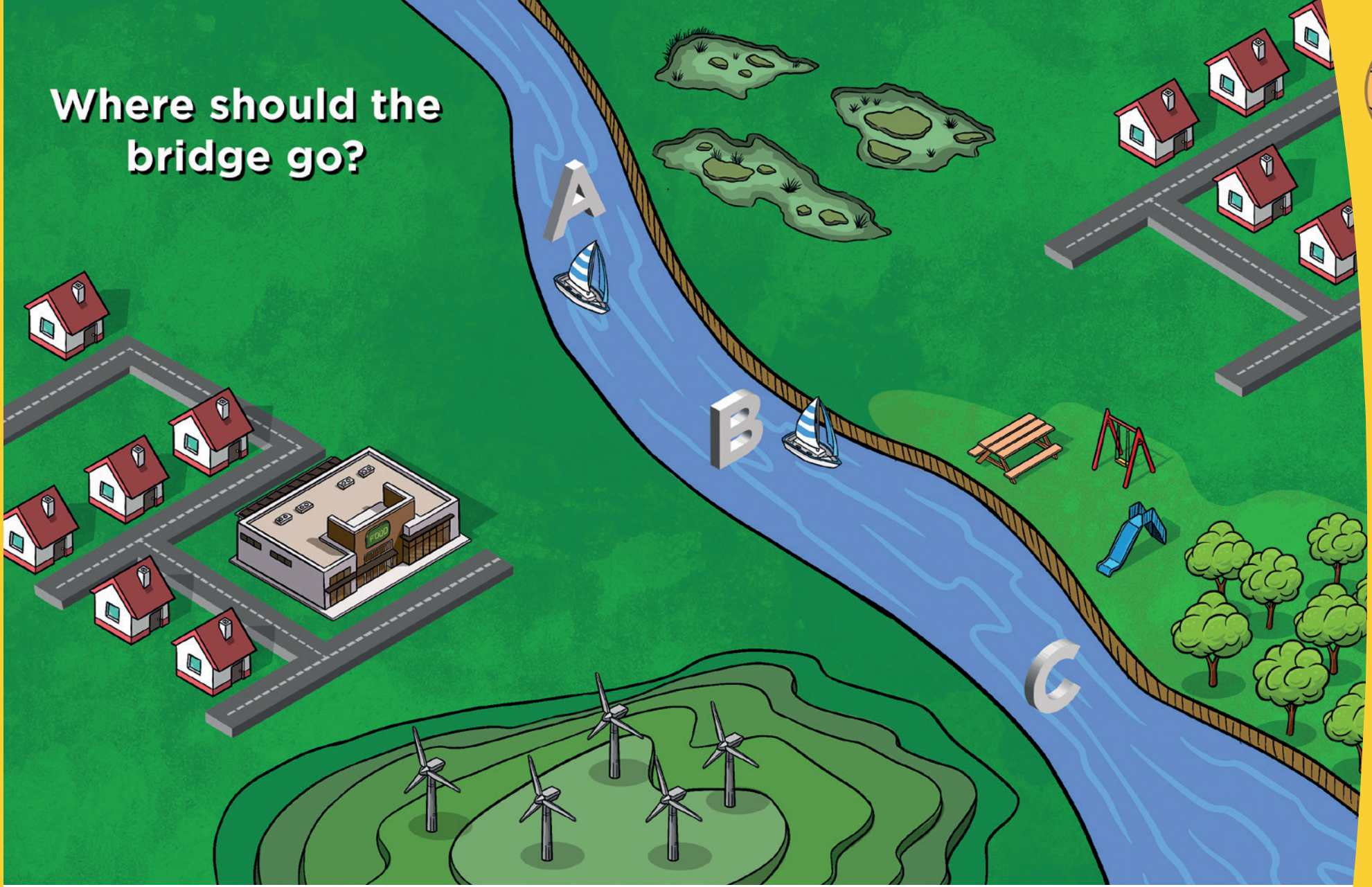
# What do Civil Engineers do?

HANDOUT

Answers

| | | | |
|---|---|---|---|
| Rollercoaster | ✔ | House | ✘ |
| Stadium | ✔ | Supermarket | ✔ |
| School | ✔ | Toilet | ✘ |
| Aeroplane | ✘ | Train Station | ✔ |
| Power Station | ✔ | Electricity Supply | ✘ |
| Block of Flats | ✔ | Cars | ✘ |
| Roads | ✔ | Train | ✘ |
| Water Plant | ✔ | Airport | ✔ |

# Where should the bridge go?




Road
Homes
Picnic Area
Playgound
Nature Reserve
Sailing Club
Wind Farm
Hills
Marsh Land

Where should the bridge go?

HANDOUT

HANDOUT

# Bridge builder's checklist

## Site Considerations

- [ ] Is this bridge over water or land?
- [ ] If it's over water, how deep is it?
- [ ] How high are the banks? Are they rocky or soft?

## People/Environmental Issues

- [ ] Is the waterway busy? Do tall ships pass through?
- [ ] What's the weather like? Is it very windy? Very cold? Very hot?
- [ ] Do earthquakes happen here?
- [ ] How will the bridge affect the land and wildlife in the area?
- [ ] Are there valuable fossil beds (archaeology) at the site?

## Structural Issues

- [ ] Is the bridge for trains or cars? Will pedestrians and bicycles use it?
- [ ] How wide is the gap?
- [ ] Can the gap be crossed with a single span?
- [ ] Which kind of bridge will work best?
- [ ] What materials are available?

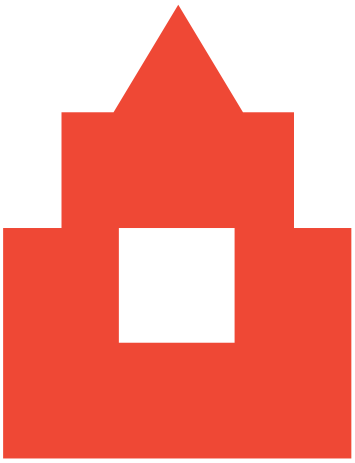
## Economic (Money) Issues

- [ ] How much money can be spent on the project?
- [ ] Will some bridges be out of the question because they're too expensive to build?

# Can you build it?

Can you build each of these plans from the wooden building blocks?

**A**



FRONT ELEVATION

SIDE ELEVATION

**B**

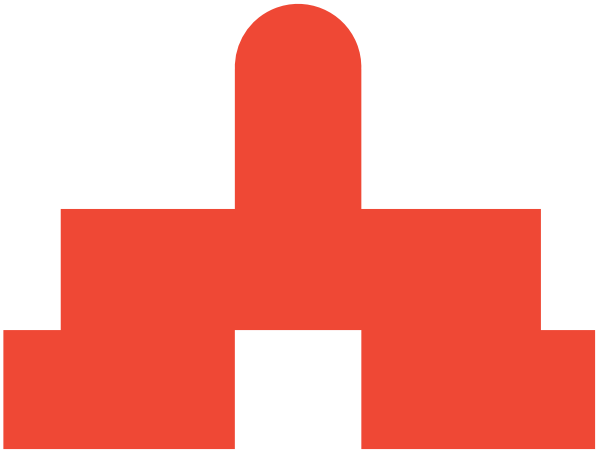


FRONT ELEVATION



SIDE ELEVATION

**C**



FRONT ELEVATION

SIDE ELEVATION

# Can you build it?

Can you build each of these plans from the wooden building blocks?

**D**

FRONT ELEVATION

SIDE ELEVATION

**E**



FRONT ELEVATION



SIDE ELEVATION

**F**

FRONT ELEVATION

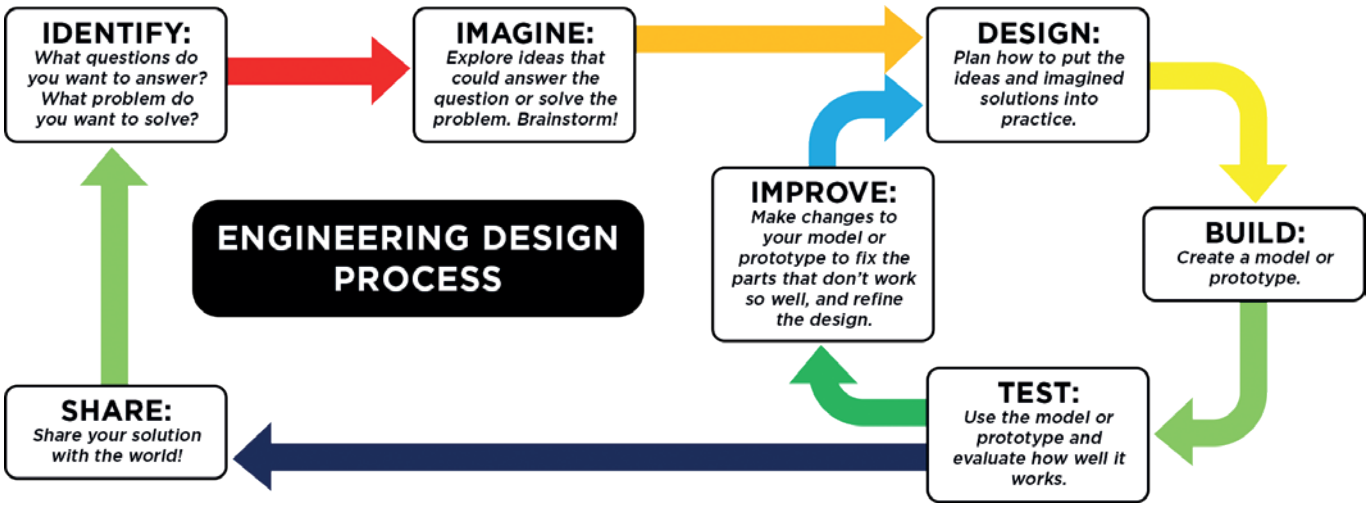
SIDE ELEVATION

# Design Challenge

This challenge uses the engineering design process to complete the challenge to build a stable structure as tall as possible, using only the following materials:

- 100 wooden toothpicks
- 50 jelly sweets
- Sewing thread
- A lump of modelling clay/plasticine for the base

The structure must stand up in the breeze from an electric fan.




1) What is the problem?

2) Research and imagine: How do skyscrapers and other tall structures stay up? How can the toothpicks and sweets create a stable shape? Look at the picture of the Eiffel Tower – what do you notice?

# Design Challenge

3) Design: Sketch out some ideas of your structure (on separate sheets), including as many details as you think are important.

4) Once you have some different designs, look carefully and critically at each design. What are the advantages and disadvantages of each? Use this to help you select the best design, remembering that the aim is to build a tall, stable structure.

   Once you have evaluated each design, start to construct your structure.

5) Now test your design in the 'wind' from an electric fan.

   Is the structure stable?

   Does it use all of the materials?

   Is it the tallest structure?

   What worked well?

   What didn't work?

   Can you build it taller and still be stable?

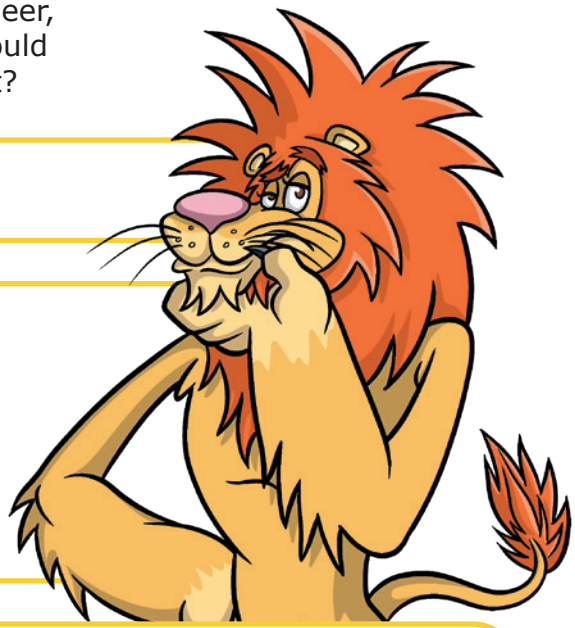
6) Return to your design and make improvements as needed.

7) Communicate your ideas: share your design and the design process you took with the rest of the group. Report the ideas you came up with, and the results of your tests. How did you improve your design?

# Standing on the shoulders of giants

*"If I have seen further, it is by standing on the shoulders of giants"* Isaac Newton

Using the template below, find out about a famous engineer, scientist or inventor. Can you think of a question you would like to ask them about their work or what they found out?



Name:

When did they live?

Where were they born/did they live?

What did you find out about their life?

Draw/find a picture

What did they discover or find out?

What question would you ask them?