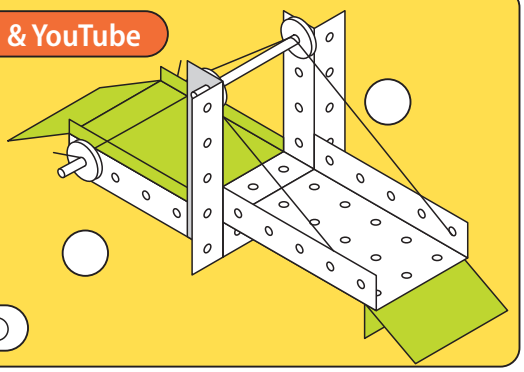
Visit TechCard at techcard.co.uk & Instagram & YouTube

# Drawbridge

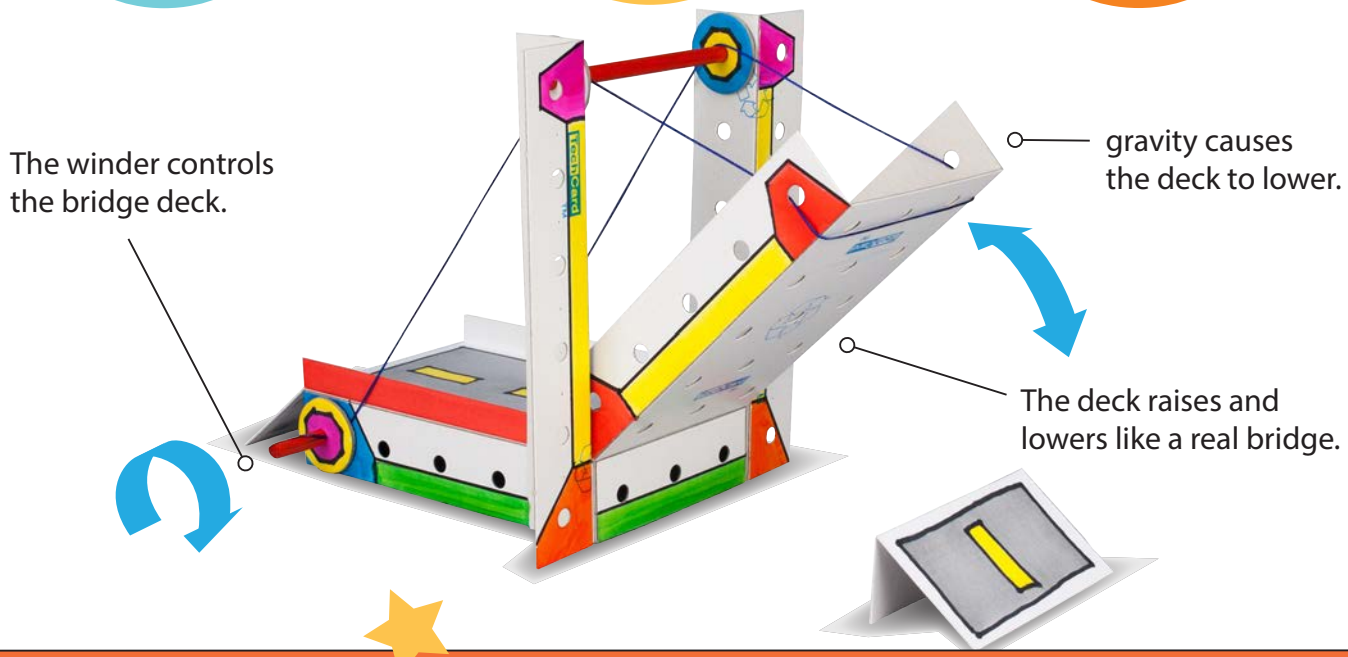


Build-it Kit  Skill Level ●●○○○

Build a Drawbridge and see how we can harness the force of gravity.

Explore hinges and winders & see how materials can transfer force.

See how to make with TechCard on our website.




Assembly videos on YouTube!

## Parts to make 1 model

| Structural Parts | | Mechanical Parts | |
|---|---|---|---|
| TechCard Girder | 2 | 300mm Dowel Axle | 1 |
| TechCard Base | 2 | 25mm Disc | 4 |

**Additional Materials**
600mm Thin String
A4 Size Thin Card

You will have parts left over towards other models.

## Parts to make 10 models

| Structural Parts | | Mechanical Parts | |
|---|---|---|---|
| TechCard Girder | 20 | 300mm Dowel Axle | 10 |
| TechCard Base | 20 | 25mm Disc | 40 |

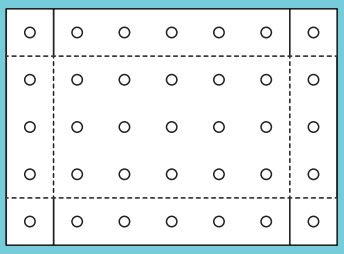
**Additional Materials**
6M Thin String
A4 Size Thin Card x 10

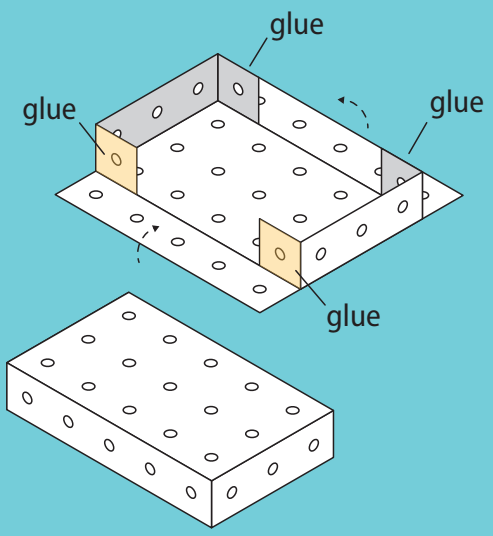
Based on pupils sharing off-cuts between them.

# Make the Drawbridge

Before you start see **'Make with TechCard'** on our website.

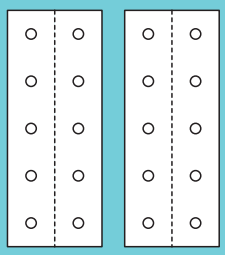
## 1 Make the base.





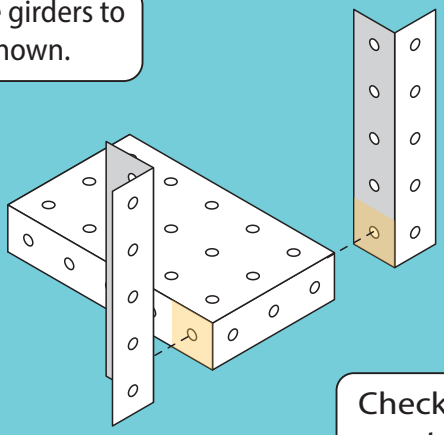

Fold and glue a TechCard base.

## 2 Add the towers.



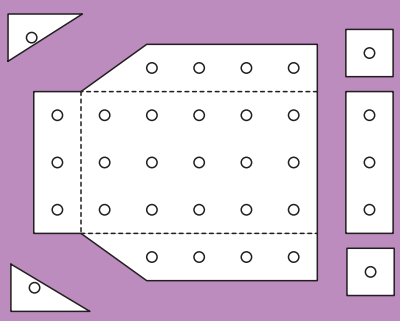
Cut two 125mm girders.

Fold and glue the girders to the base where shown.

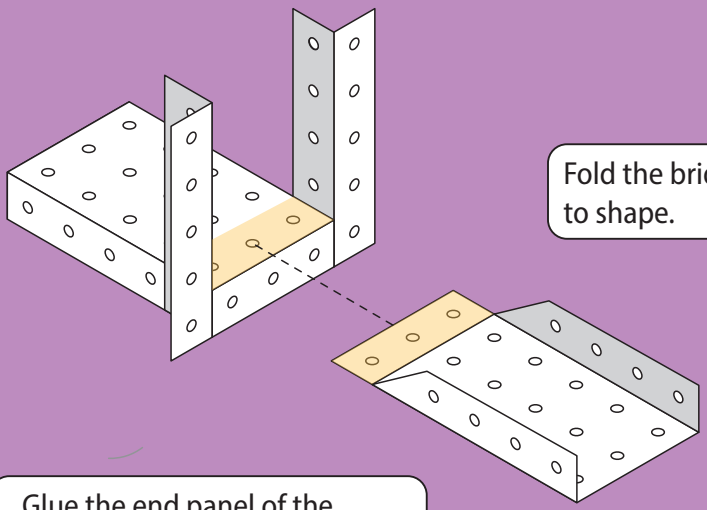


Check the girders are straight.

## 3 Make the bridge.



Cut a second base as shown.



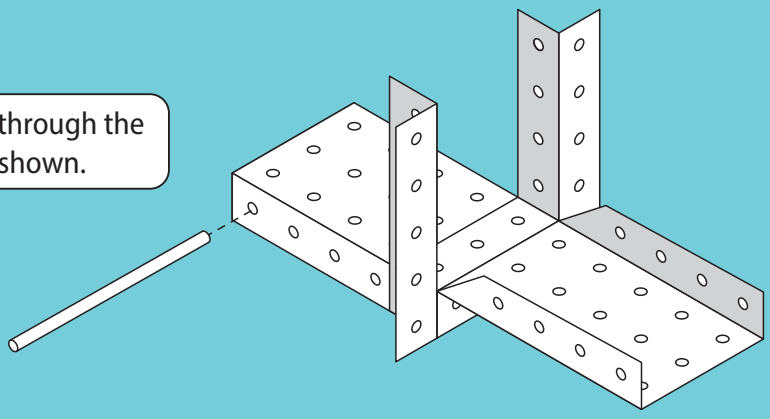
Fold the bridge to shape.

Glue the end panel of the bridge onto the base as shown.

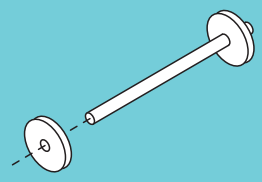
## 4 Fit the winder axle.

Cut two100mm axles.

Fit one axle through the base where shown.

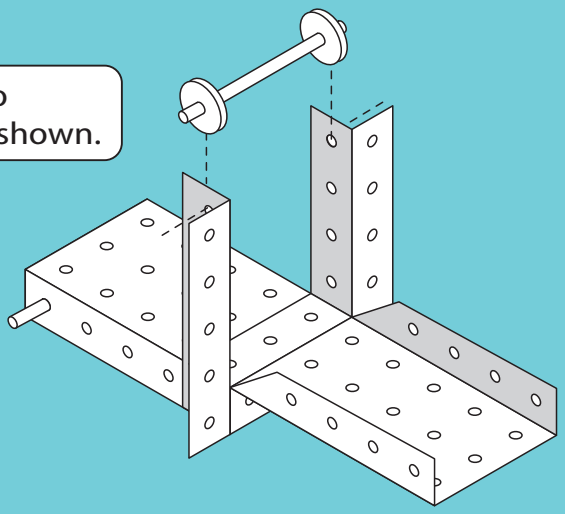


## 5 Fit the top axle.



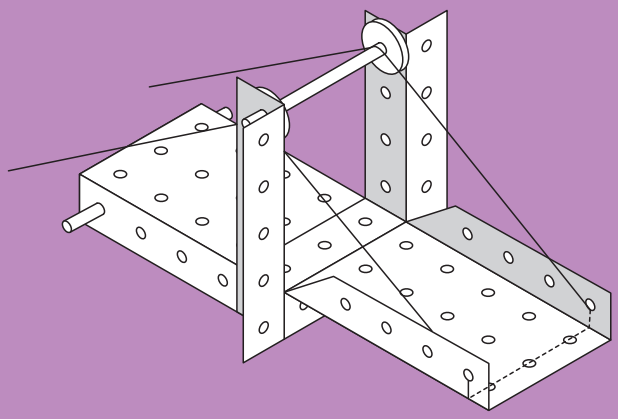
Fit two 25mm discs onto the ends of the second axle.

Fit the axle and discs into the top of the girders as shown.



## 6 Fit the string.

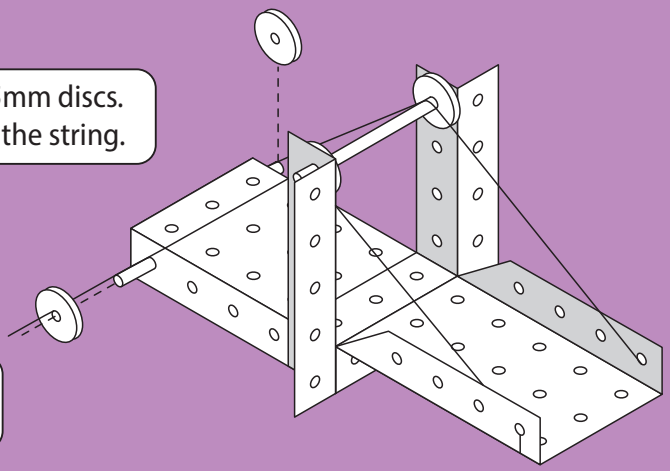
Carefully fit the string to the bridge following the drawing.



## 7 Assemble the winder.

Pass the ends of the string through two 25mm discs. Fit the discs to the ends of the axle to trap the string.

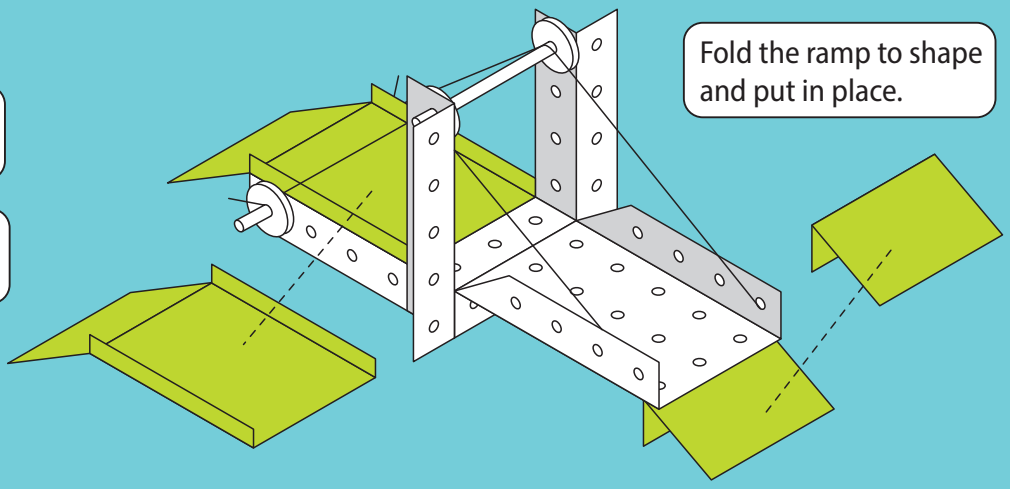
Adjust the string so it is equal on both sides.



## 8 Fit the ramp and deck.

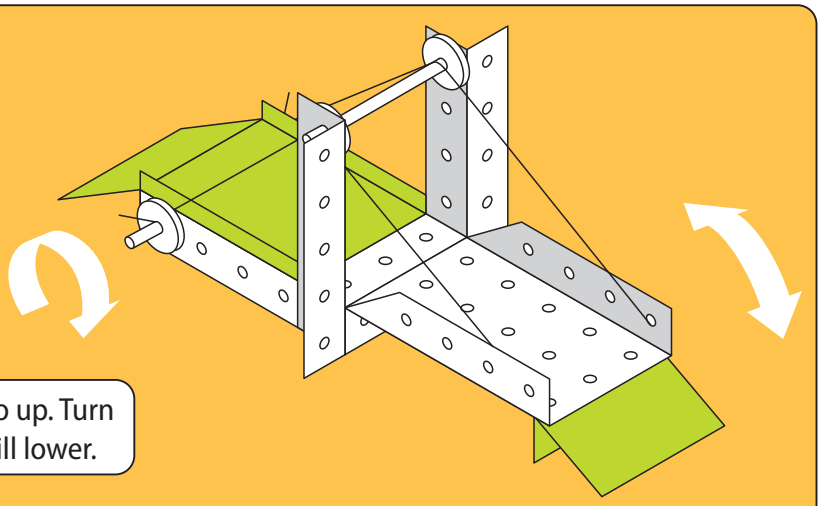
Cut out the panels for the deck and ramp.

Fold the deck to shape and fit in place.



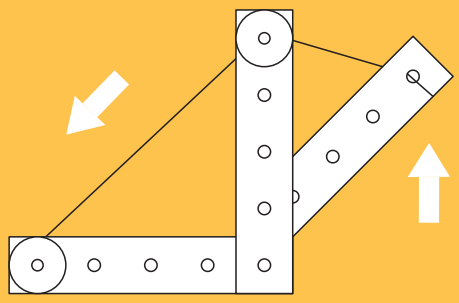
Fold the ramp to shape and put in place.

## 9 Operate the Draw Bridge.



Turn the winder and the draw bridge will go up. Turn the winder the other way and the bridge will lower.

## 10 How the bridge works.



Turning the winder creates a pulling force through the string. The string passes up and over the towers changing the direction of the pulling force. As a result, when the winder is turned, the bridge is pulled upward.

Turning the winder the other way lowers the bridge. The bridge drops because of the force of gravity acting on it and pushing it downwards. Gravity pushes the bridge downwards but its fall is controlled by the winder.

When raising the bridge, the pulling force is pulling against the force of gravity pushes down on the bridge.

# Card Panels