

# Junior Certificate Technology

## Ordinary Level

### Design Folio

**Year**

20XX

**Design Task**

A

**Examination Number**

123456

**School Roll Number**

98765A

**Note:**

The content layout in this exemplar design folio follow the headings as outlined in the Technology Design Tasks document (SEC Ref . S.67).

The content itself serves as a guideline only to the brief presented.

# Analysis of chosen task

Rewrite the design brief **chosen** in the space provided:

Design and make a lightweight bridge structure which spans a distance of 400mm. The bridge must automatically illuminate when it gets dark.

In your own words, list the **important elements** of the **above** design brief:

- The bridge must be **lightweight**.
- The bridge must **span 400mm**.
- It must **illuminate** (light up automatically) when it gets **dark**.

In your own words, list some of your **own** specifications for the **above** design

- I must make a lightweight bridge. It must be safe to use and not break under pressure.
- It must include an electric circuit to light up the bridge when it gets dark.
- My bridge must look well and have no sharp edges or loose parts.
- The bridge must be at least 400mm long.
- The bridge must be strong and durable to resist bad weather.
- The bridge and circuit must be completed by 30th April.

**Note:** A specification is a list of things that your design must do so that it works well.

# Research – Investigation of existing solutions

Describe the form(s) of research carried out (e.g. internet, books, catalogues, visit to shops, local area of interest, interview etc.)

- It may help to examine **existing solutions** to the design brief.
- This may include researching suitable **components, mechanisms** and/or **circuits**.

List form(s) of research:

I looked at bridges in my local area and took some photos of them.

I also did some research on the internet. I visited the following websites:

[www.garrettsbridges.com/design](http://www.garrettsbridges.com/design)

[www.reuk.co.uk/lightdependentresistor.htm](http://www.reuk.co.uk/lightdependentresistor.htm)

[www.technologystudent.com](http://www.technologystudent.com)

[www.polymorf.net/engineer](http://www.polymorf.net/engineer)

[www.matsuo-bridge.co.jp](http://www.matsuo-bridge.co.jp)

What did you find out?



A bridge constructed from steel in my town



A bridge made from reinforced concrete over a local motorway



A bridge constructed from stone near my school



A bridge made from steel



A suspension bridge using steel cables as ties



A truss bridge made from stuts and ties

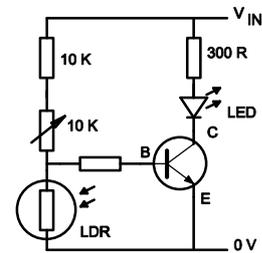
# Research – Investigation of existing solutions

What did you find out? (continued)



## LIGHT DEPENDENT RESISTORS

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000 000 ohms, but when they are illuminated with light, resistance drops dramatically.



LDR – Light sensor suitable for circuit  
([www.technologystudent.com](http://www.technologystudent.com))

A possible circuit using a potential divider

What information have you found which might be useful in developing your design ideas?

There are lots of different bridge types:-

Girder, Truss, Arch, Cantilever, Cable – Stayed & Suspension.

- The girder is a very simple basic bridge.
- A cable bridge contains cables which are stretched to support the bridge.
- The truss bridge is made up of struts and ties.
- If I want the bridge to illuminate at night I must use an LDR.
- The LDR must be connected as part of a transistor circuit so that it is sensitive to changes in light levels.

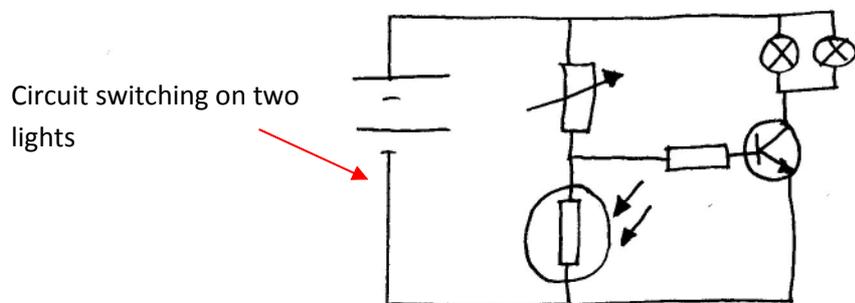
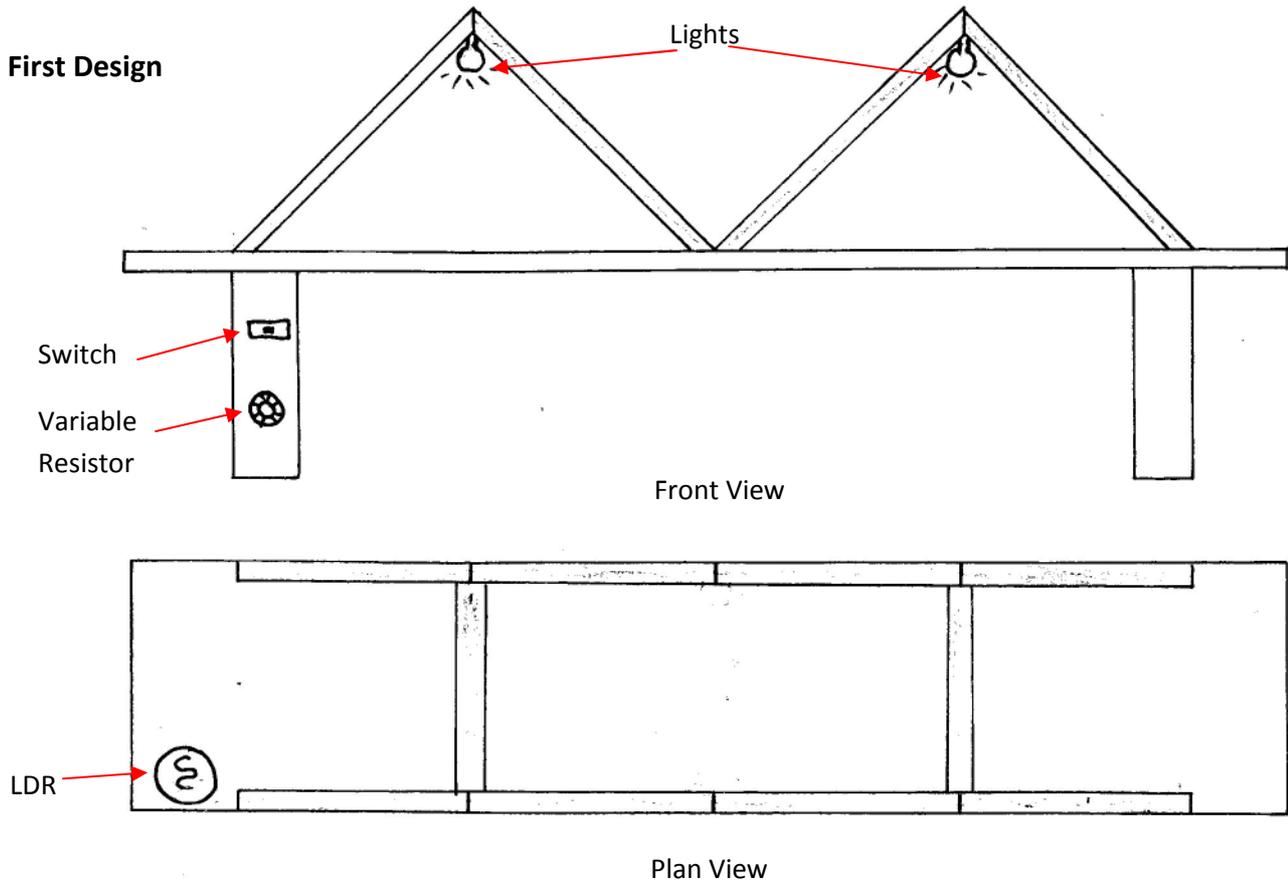
# Development of ideas

Make a sketch of at least one possible idea for your chosen task.

Explain briefly how your design(s) will work.

**Note:** Label all components (e.g. switches, LEDs etc.)

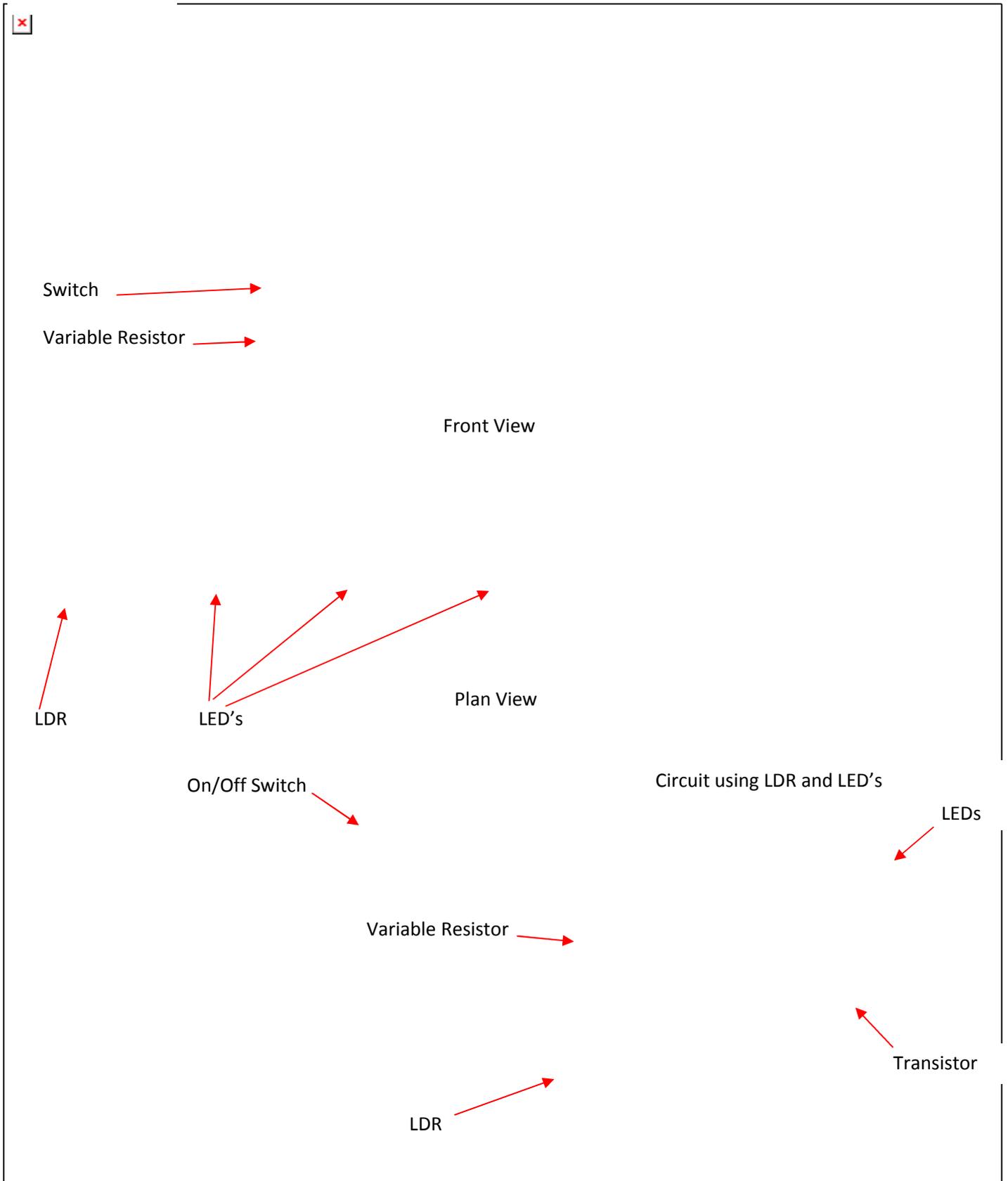
Colour may be used to enhance your ideas.



The idea above shows a truss bridge constructed from wooden parts. Triangulation is used to strengthen the bridge. Two lights are located on top of the bridge. The lights are activated with an LDR located on the bridge

# Development of ideas

## Second Design



This idea is based on a suspension bridge. Cables which are in tension support the bridge. The circuit contains LED's which are positioned in the centre of the road to work as 'cats eyes'. These are activated by an LDR.

# Selection and Justification of Solution

Which design idea are you making?

I am making the bridge in the first design and the circuit from the second design .

Give reasons why you have selected this design:

**Hint:** You can mention such factors as; functionality, size, shape, materials, colour, texture, processes, time, cost, subsystem used etc.

I chose design 1 as it was made mainly from wood. I enjoy working with this material.

I was not sure how strong the bridge in design 2 would be. I was afraid that it would be difficult to stretch the cables properly and that the finished design would be weak and look untidy.

I am going to make the circuit from the second design because it includes an on/off switch which gives full control of the circuit. Also I prefer to use the LED's in the second design. I am going to put these along the centre of the road to light up like 'cats eyes'. I will connect the LED's in parallel.

## Drawings for manufacture

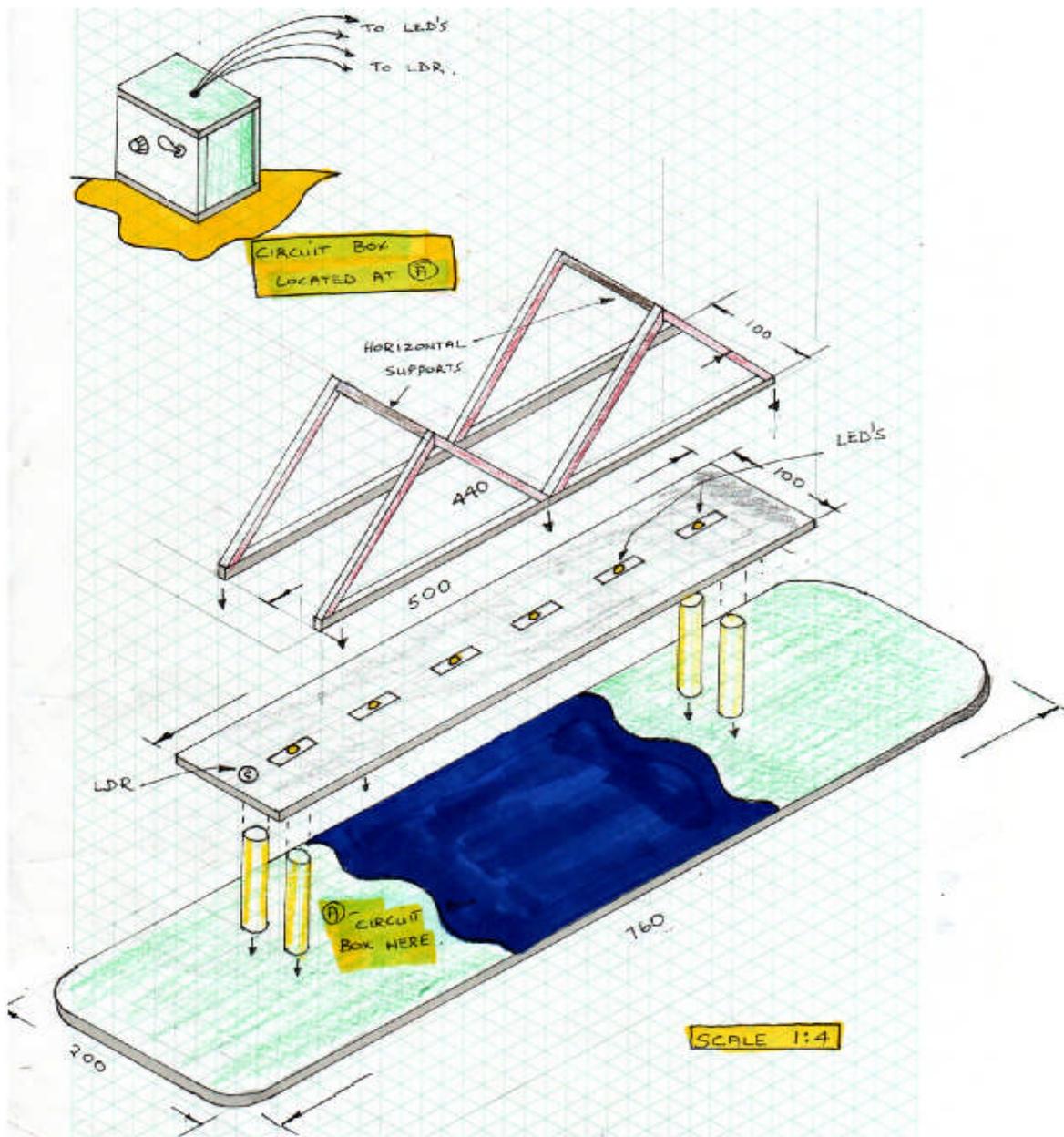
Make an orthographic projection or a 3D drawing of your final design.

Include dimensions on your drawing.

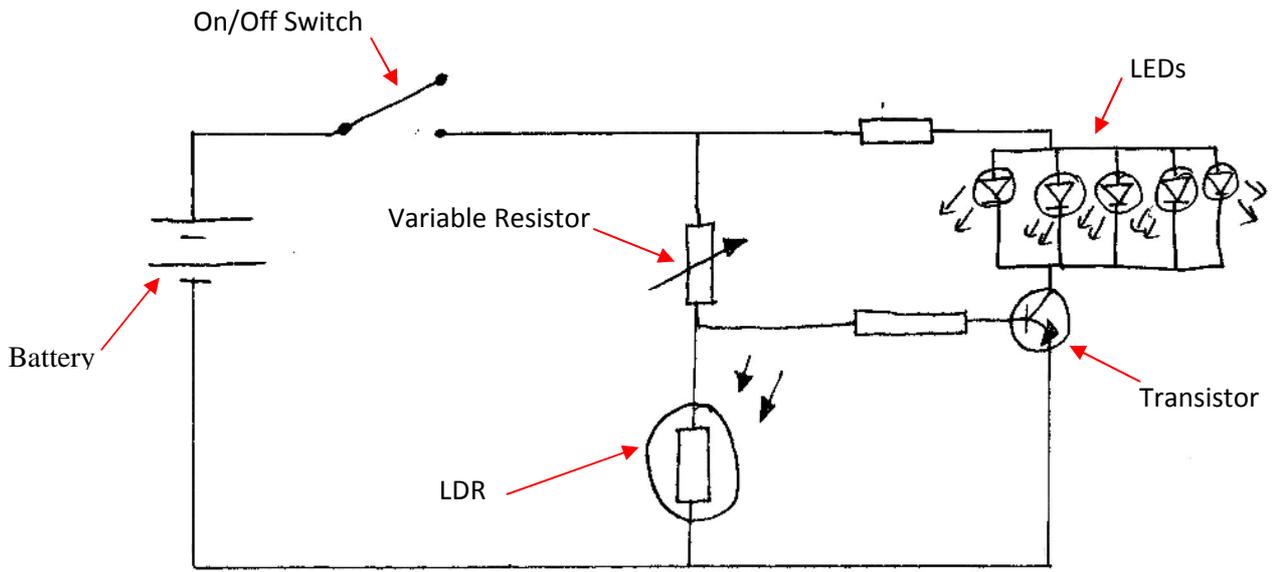
Include the subsystem in your drawing (circuit diagram and/or mechanism).

**Hint:** This section should include the size and shape of all parts of your design and should show how they are to be assembled.

## Drawings for manufacture



# Circuit Diagram



# Plan of manufacture

List the steps taken to manufacture your design.

**Hint:** Remember to include each part and the subsystem.

## Bridge

I marked out and cut out the plywood for the base & the road surface on the scroll saw.

I drilled the holes in the road for the LED's and LDR.

I cut out the four pillars for the bridge.

I marked out and cut out the moulding for the sides of the bridge.

I drilled holes in the road and the base and screwed these to the dowels.

I glued the triangular frames of the bridge.

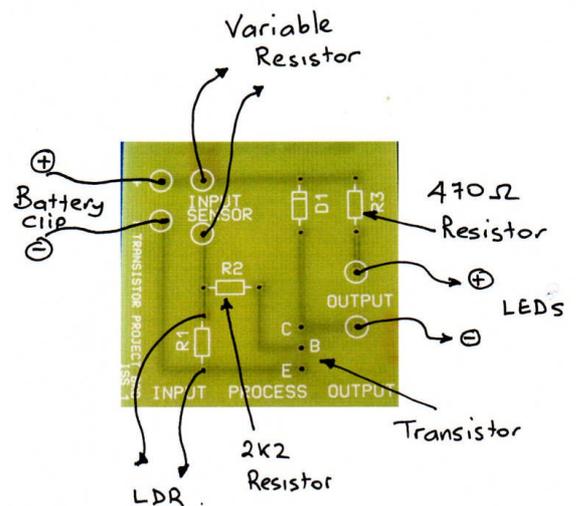
I glued the frames to the road.

## Circuit

I soldered wires to the LED's, switch, variable resistor & LDR.

I soldered the components to the PCB.

I tested the circuit to see if it was working.



## Circuit Box

I marked out the pieces and cut them out on the scroll saw.

I glued them together except for the side with the hinge.

I attached the hinge and clasp.

## Finish

I sanded all the surfaces lightly.

I painted all the wood.

I inserted the components in the correct places.

## Materials list and costing

List the materials you used to make your task in the following table.

Material	Length (mm)	Width (mm)	Thickness (mm)	Number Req.	Cost
Plywood	500mm	100mm	6 mm	1	
Plywood	760mm	200mm	9 mm	1	
Plywood	80mm	80mm	9mm	2	
Plywood	80mm	60mm	9mm	2	
Plywood	80mm	42mm	9mm	2	
Moulding	2.6m	8mm	8 mm	1	
Dowel	100mm	Dia 12	--	4	
<b>Total Cost</b>					<b>€4.75</b>

List the electronic components, mechanisms and other items(e.g.screws, hinges, paint etc.) you used to make your task in the following table:

Item	Cost	
Battery Clip	11c	
9V Battery	€2.00	
PCB Board	€1.75	
Transistor	10c	
LDR	€1.50	
Ultrabright LEDs x 6	€1.80	
2K2 Resistor	1c	
470Ω Resistor x 1	1c	
100kΩ Variable Resistor	50c	
Resistor Knob	30c	
Bezels x 6	36c	
Toggle switch	70c	
Hinge	25c	
Clasp,	25c	
Screws	30c	
Glue	In school	
Paint	€2.00	
<b>Total Cost</b>		<b>€11.94</b>

### Total cost of design task

<b>€16.69</b>
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# Testing

Does your finished design work?

Yes

Explain your answer:

The bridge spans 400mm and the lights come on when the LDR is covered.

In what ways does your finished design task meet/not meet the specifications you listed under 'Analysis of **chosen** task'?

Explain your answer.

It is a lightweight bridge made from strong but lightweight materials. I placed some metal weights on the bridge and it did not bend with the load. The wood has been painted making the bridge weatherproof.

The circuit works and the circuit is neatly hidden away in the circuit box under the bridge. All loose wires have been tidied up with cable ties.

# Evaluation

Identify one good aspect of your finished design task:

The bridge looks well. The circuit is reliable and the LEDs look well along the road. I painted the base blue and green to show the water and grass areas. It is sturdy and strong .

Identify one aspect for improvement in your finished design task:

There are some gaps where the side members of the bridge join up. I found it very difficult to join these accurately. Next time I would try and mark out the pieces more carefully and test out different glues for joining.

Identify a possible change (if any) you would make if completing the design task again:

The LED's are placed as 'cats eyes' along the centre of the bridge. Next time I would like to put some lights along the top of the bridge also.