

Technology

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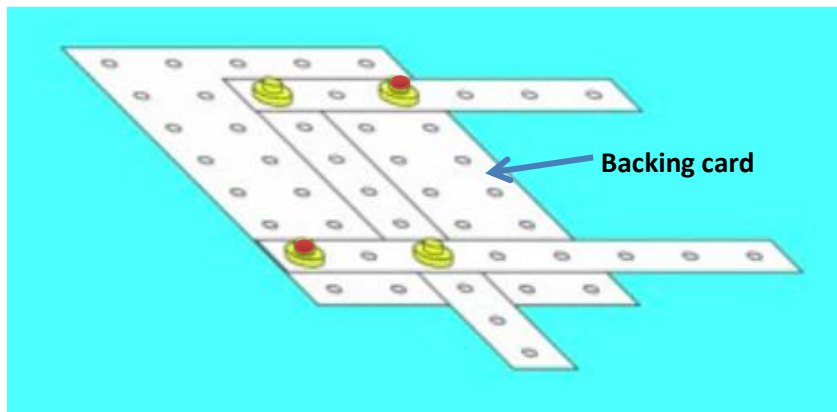
Name _____

Form _____

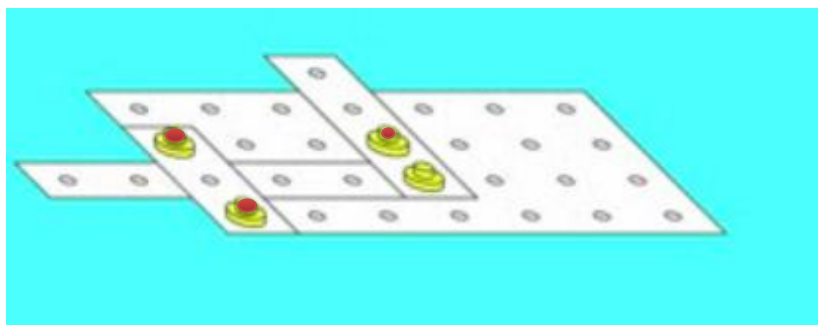
Current Project

Linkages

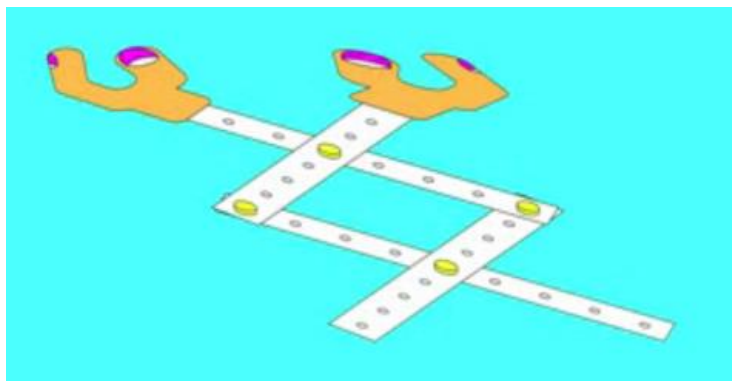
Pivots with red dots do not move and are fixed to the backing card.



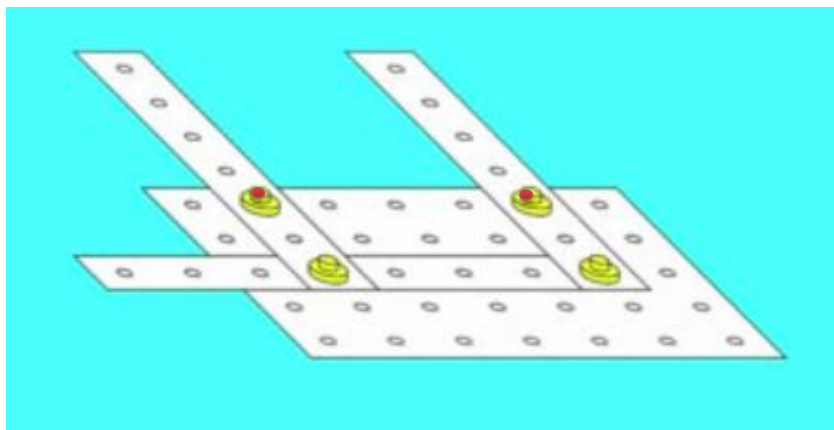
"Jaws"



"Flag"



"Hands"



"Two Flags"

Pulleys

Name.....

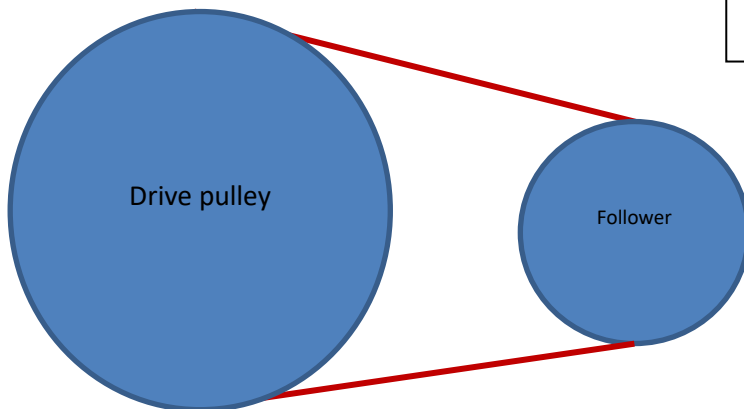


A pulley has a groove around the edge to stop the belt falling off

The drive pulley is the one we are turning...
The follower is the pulley being turned

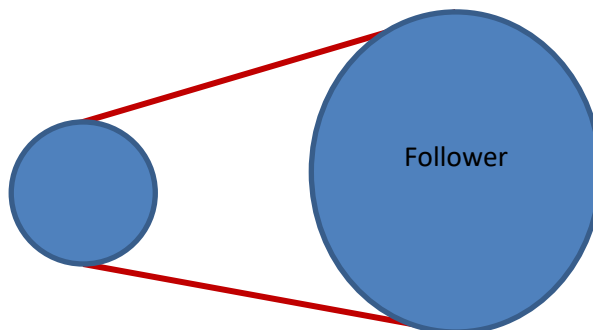
Pulleys

A pulley can either be used to **change the direction** of a force or to **make a force bigger (or smaller)**



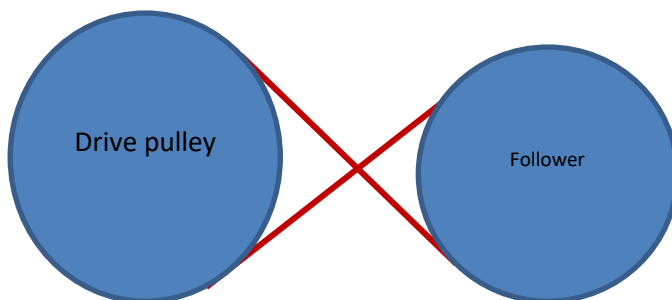
Large drive pulley, small follower:

The follower moves **faster/slower** than the drive pulley



Small drive pulley, large follower:

The follower moves **faster/slower** than the drive pulley



What happens if we cross the belt over?

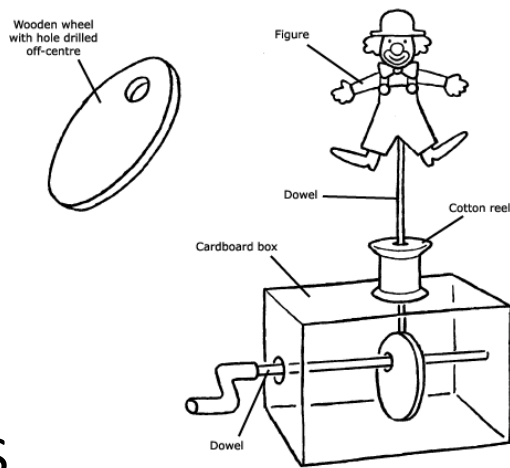
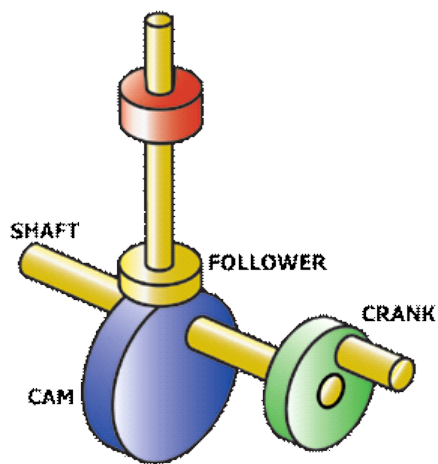
If the pulleys are the same size the follower moves faster/slower/ in the

Other things to try:

Try Connecting more than two pulleys

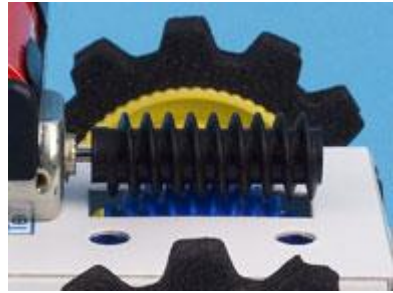
Try putting pulleys on both sides of the box

CAMS

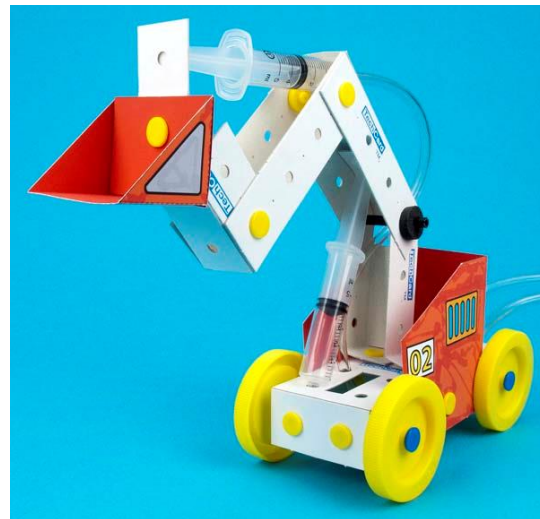
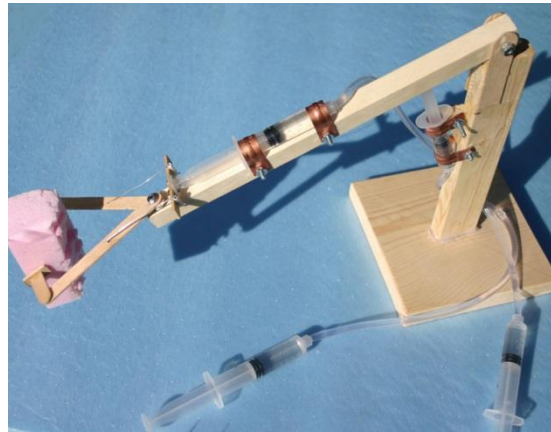
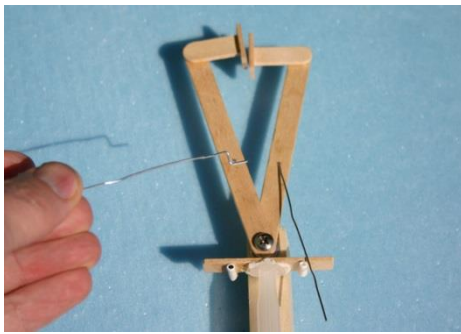


Gears



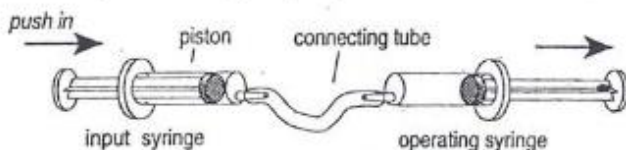


Pneumatics



Pneumatics

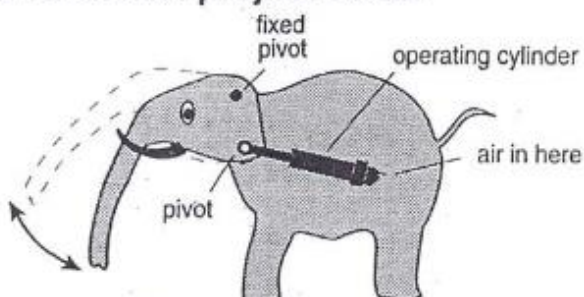
This page provides ideas for you to make models controlled by pneumatics. Syringes or Lego © pneumatic cylinders can be used to operate the model. Before making a model try operating the basic system. A syringe system is shown below.



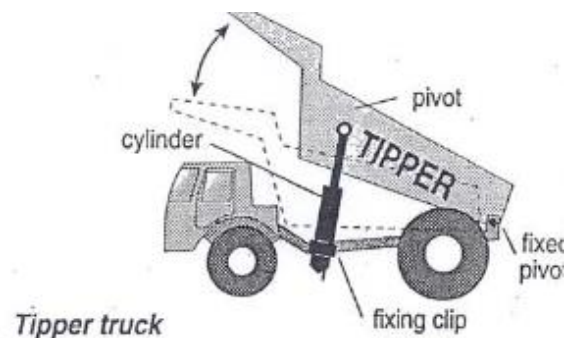
A simple syringe pneumatic system

If water is used in the cylinders instead of air you have a hydraulic system which will be more positive, but it can be messy when filling the cylinders up with water. See page 111 for theory knowledge.

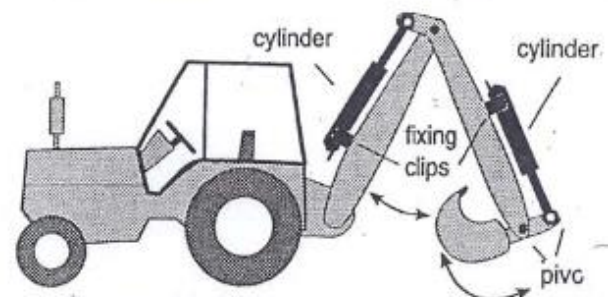
Pneumatic project ideas



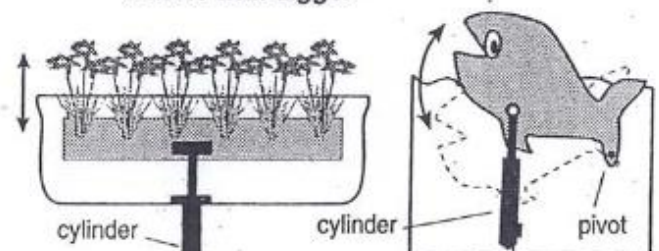
Elephant with moving trunk



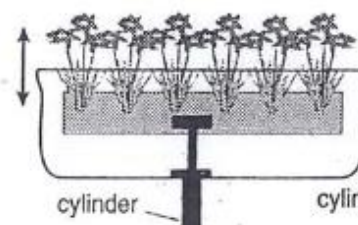
Tipper truck



Tractor with digger

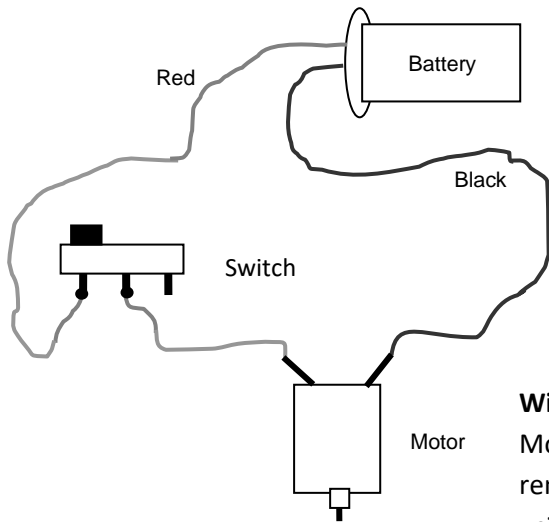


Fish out of water



Flowers growing

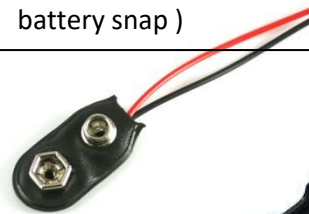
Making an electric car



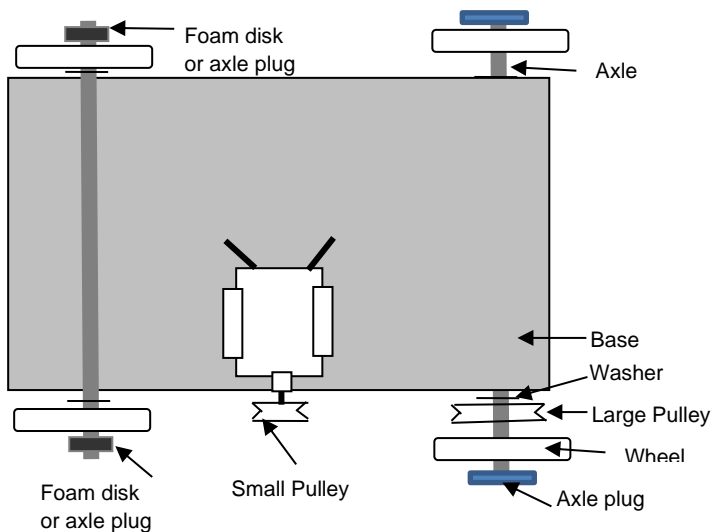
Wiring diagram

More ways to connect a switch are shown on the next page but remember the batteries may be put in a battery holder or connected using a battery connector (look at the pictures above)

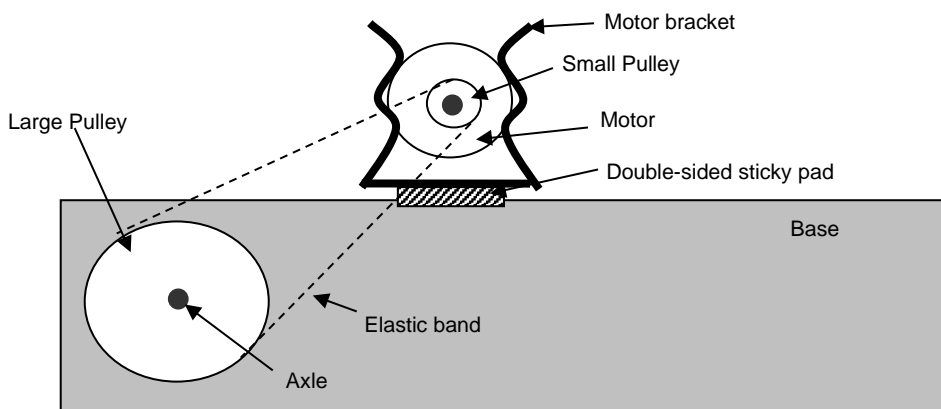
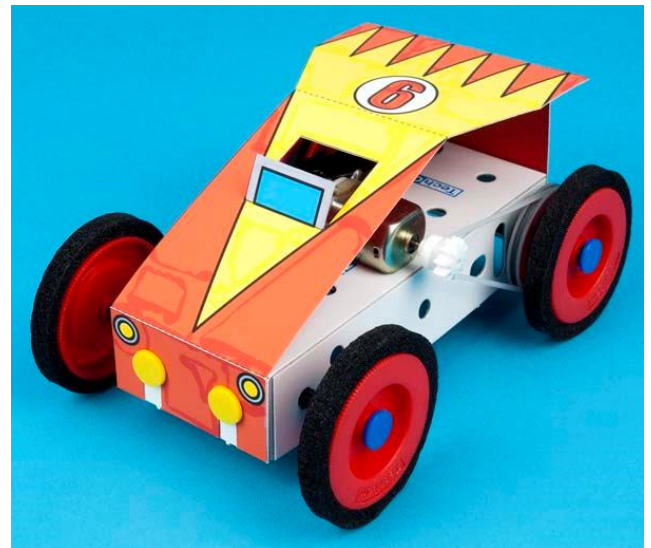
Battery clip (Battery connector, battery snap)



Battery holder



Top view


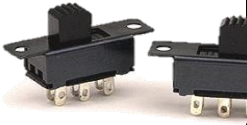






Side view

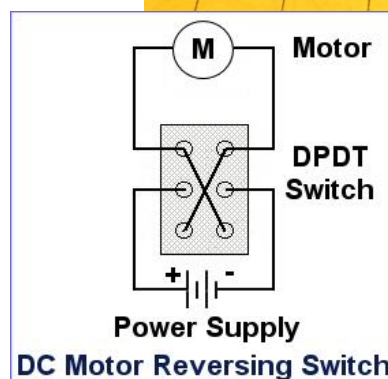
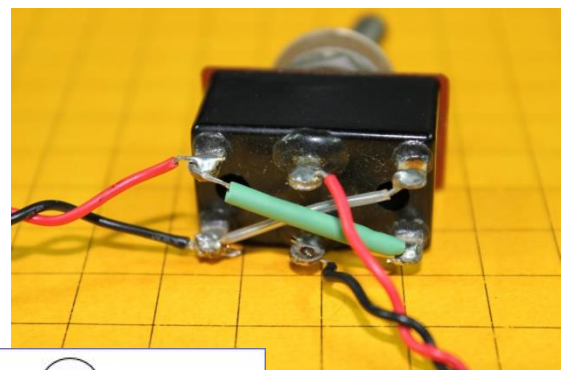
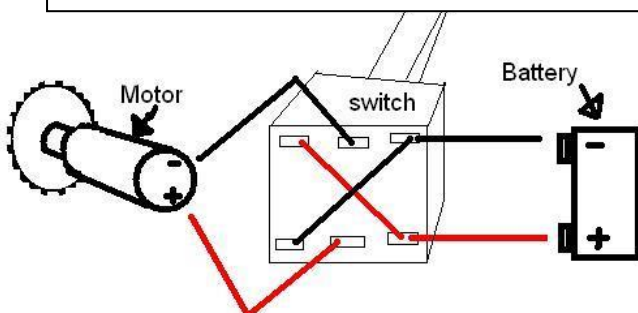


Using a switch

A switch is something that breaks a circuit and switches off the supply of electricity

Types of switch		
Rocker switch		Simple on-off switch. This is the simplest switch to use to turn something on or off.
Slide switch		As well as being a normal 'on/off' switch, this switch can also be used as a reversing switch for a motor This sort of switch, with 6 connections, is sometime known as a Double Pole Double Throw (DPDT) switch
Push button switch		Only on while it is being pressed. Good for flashing a light or buzzer, or firing a catapult
Toggle switch		Professional looking on-off switch.
Micro switch		This is a very sensitive switch operated by pressure. Example uses: shows a lid opening or a door closing
Reed switch		This switch is operated by a magnet being close to it. The switch could be inside a box and the magnet outside the box.

Wiring a DPDT switch as a reversing switch



Some other ideas

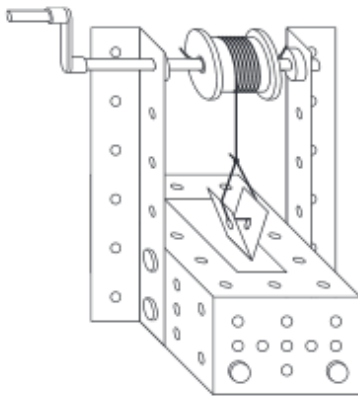


Air power (Pneumatics)

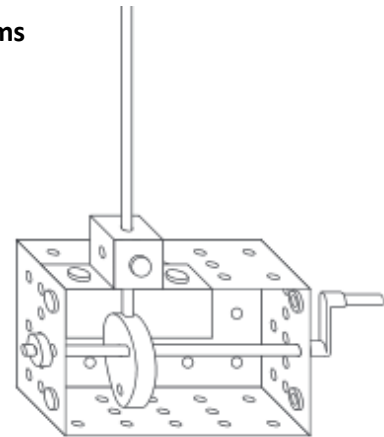
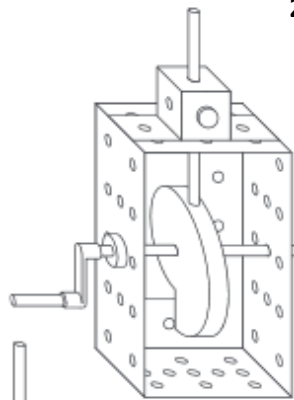


Some other mechanisms using Techcard

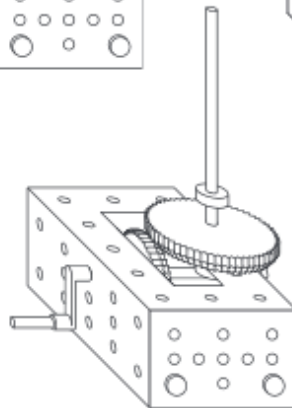
1. Winch



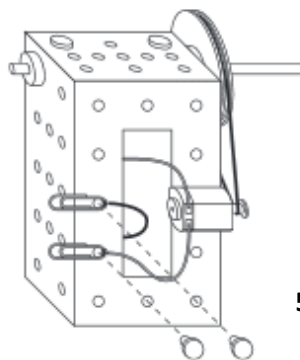
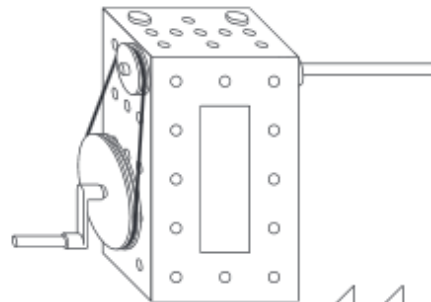
2. Cams



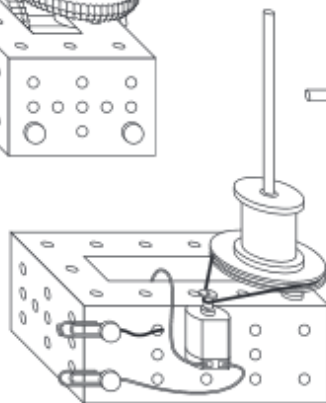
3. Gears



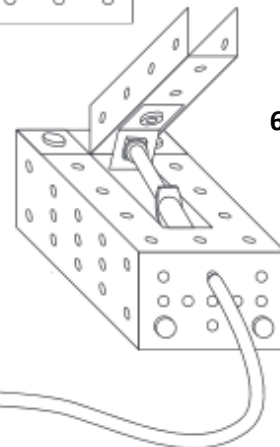
4. Pulleys



5. Pulleys and motor

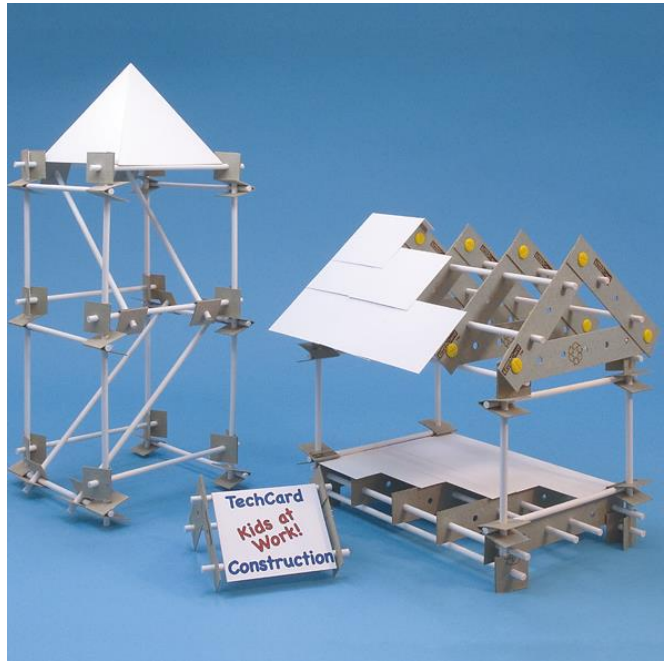
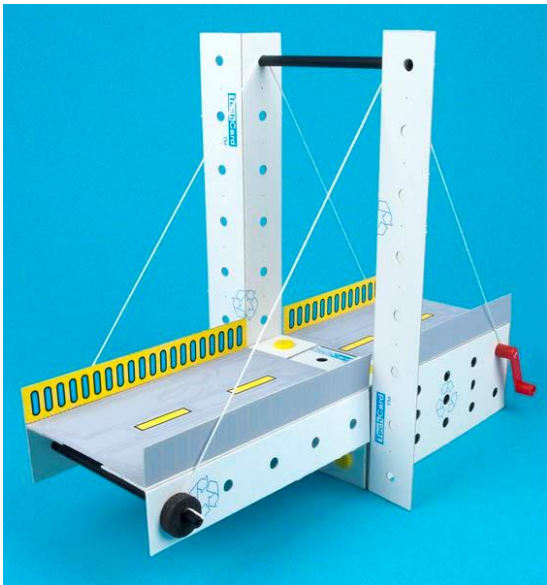


6. Pneumatic mechanism

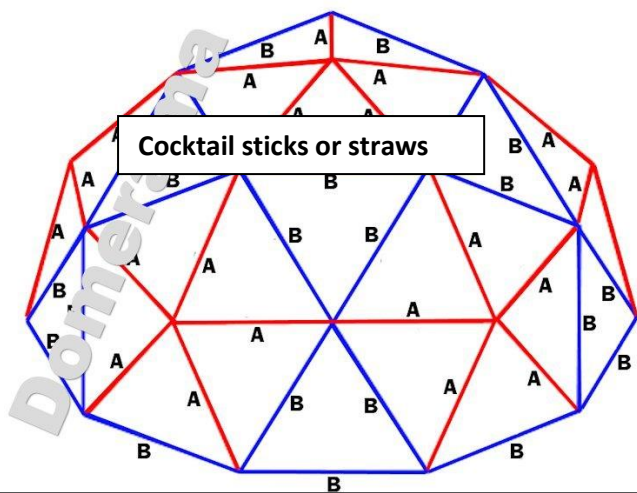


Kits and Packs

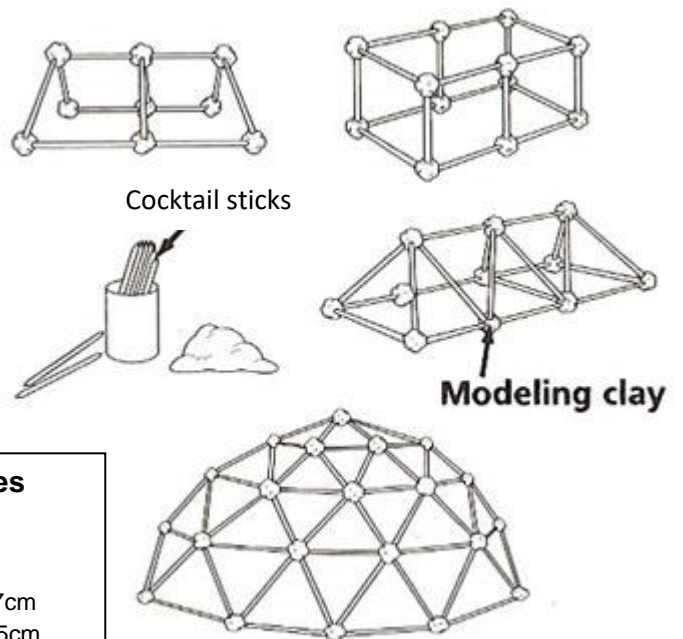
Structures



Geodesic domes



Using straws or cocktail sticks

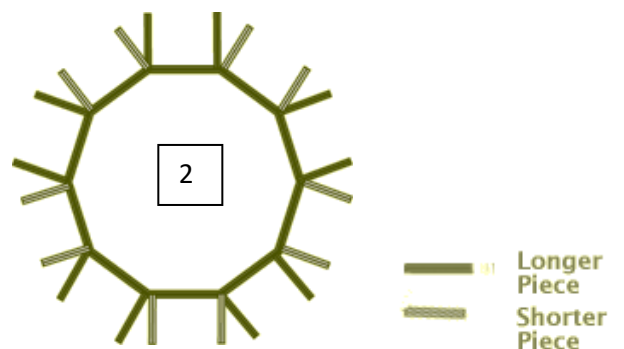
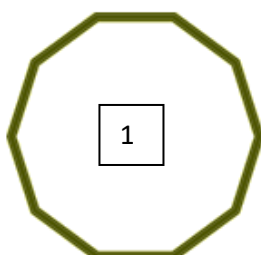


What you need to build four domes of different sizes

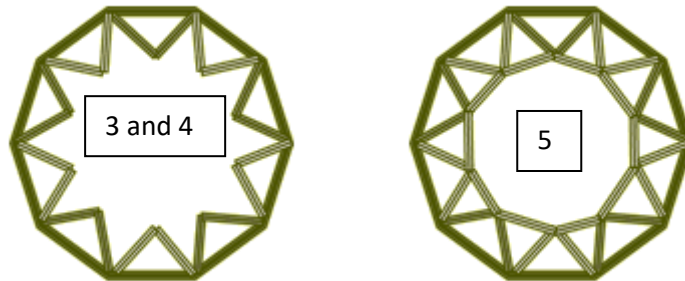
		Small	Medium	Large	
30 short tubes	A (Red)	8.8cm	11.5cm	17.7cm	57cm
35 long tubes	B (Blue)	10cm	13cm	20cm	65cm
Diameter of base		32cm	42cm	68cm	210cm

<http://www.desertdomes.com/rev2calc.html>

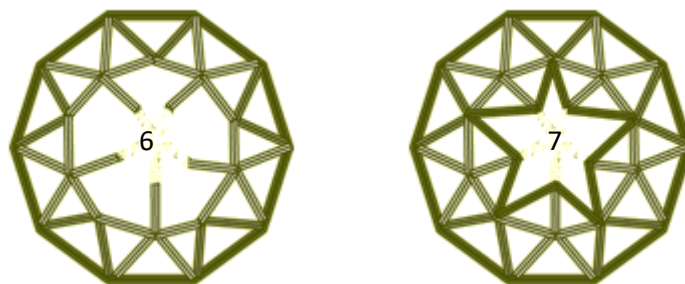
1. Create the base by taping ten of the long tubes together to form a closed geometric shape called a decagon.



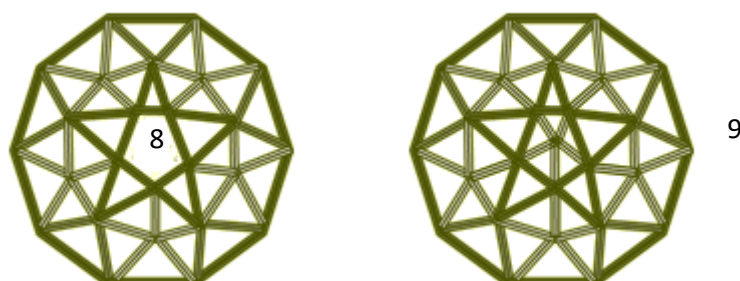
2. Tape a long tube and a short tube to each of the ten joints of the decagon. The tubes should be arranged to produce an alternating pattern of long pairs and short pairs.
3. Use masking tape to secure the tops of the adjacent short tubes together to form a series of five triangles.
4. Likewise, form a series of five larger triangles by securing together the tops of the adjacent long tubes.



5. Connect the adjacent tops of these ten triangles together using a new row of short tubes. As you join these together, you'll form a zigzag like pattern that begins to curve the dome surface.
6. Locate the alternating joints where four short tubes come together. Tape a short tube to each joint and position it straight out from the joint as shown in the diagram.

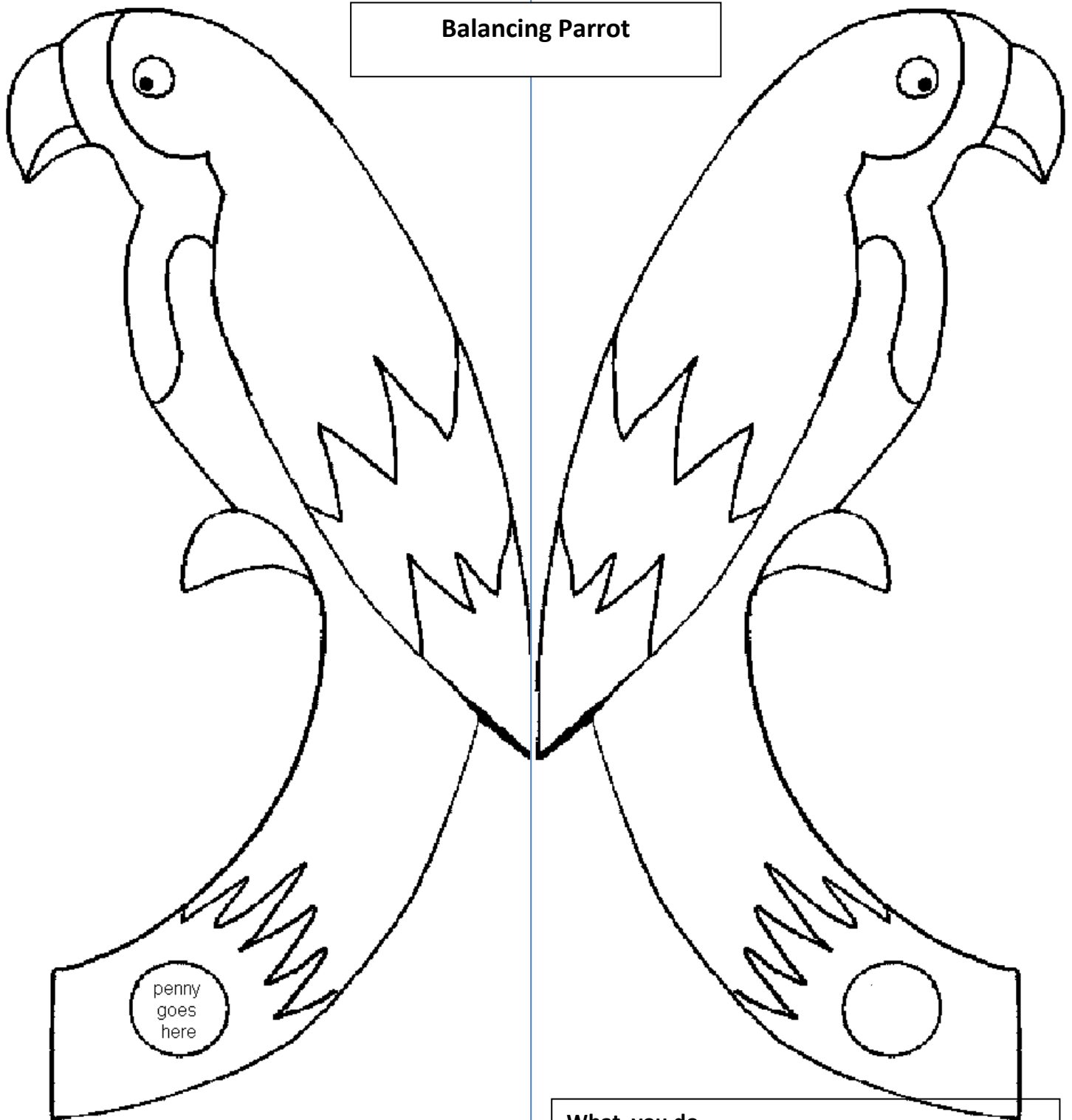


7. Connect the end of this tube to the adjacent joints using two longs. When this step is completed, you will have formed a distinct 5-sided star pattern in the dome's framework.
8. Connect the tops of these triangles with a row of longs. This produces a pentagon.



9. Connect a short to each joint of the pentagon. These five shorts should meet in the centre of the dome. Secure this final joint. That's it!

Balancing Parrot



What you need:

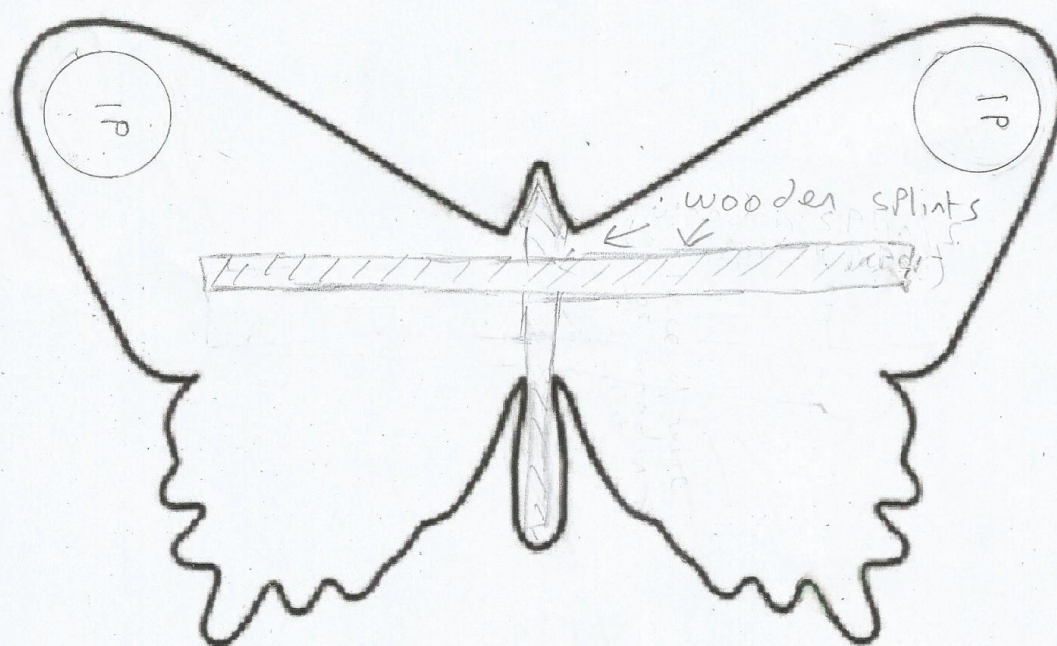
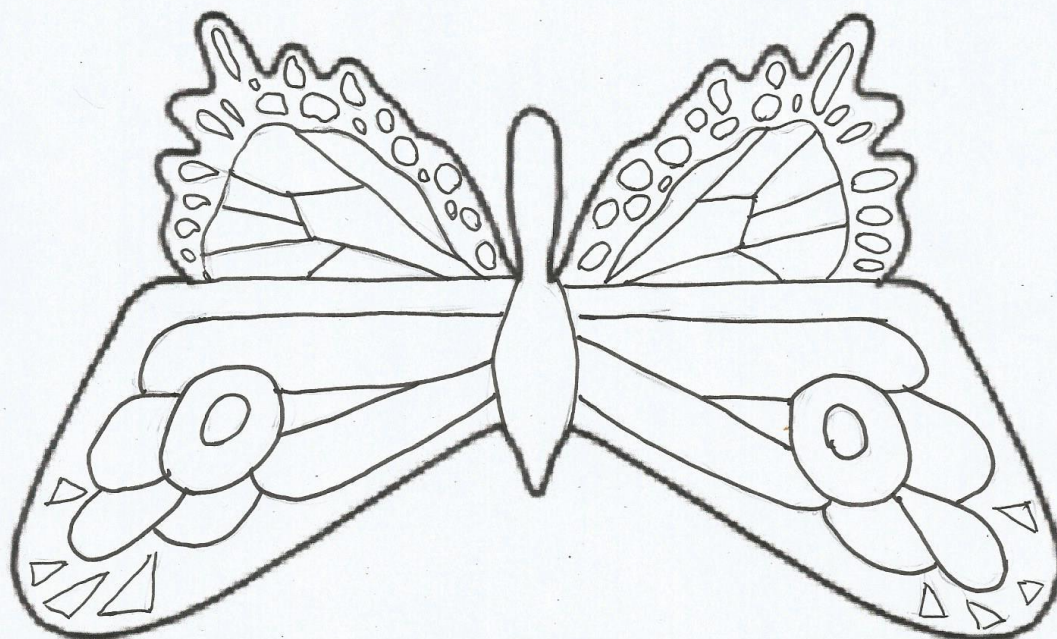
- This sheet
- One sheet A4 card cut lengthways down the middle (this is to make your model stiffer) (you only need one side of the card, save the other side for another parrot!)
- One 1p coin
- Glue stick
- Brightly coloured pens or crayons

Remember: Do not cut out the parrot until AFTER you have coloured him and glued the two halves together.

What you do

1. Decorate the parrot using bright colours
2. Fold the paper carefully in half so that the two pictures are exactly over each other
3. Place a sheet of card between the two pictures to stiffen the paper and glue it to one side of the paper
4. Glue a 1p carefully where shown and then glue the other side of the paper to the card
5. Carefully cut out the parrot.

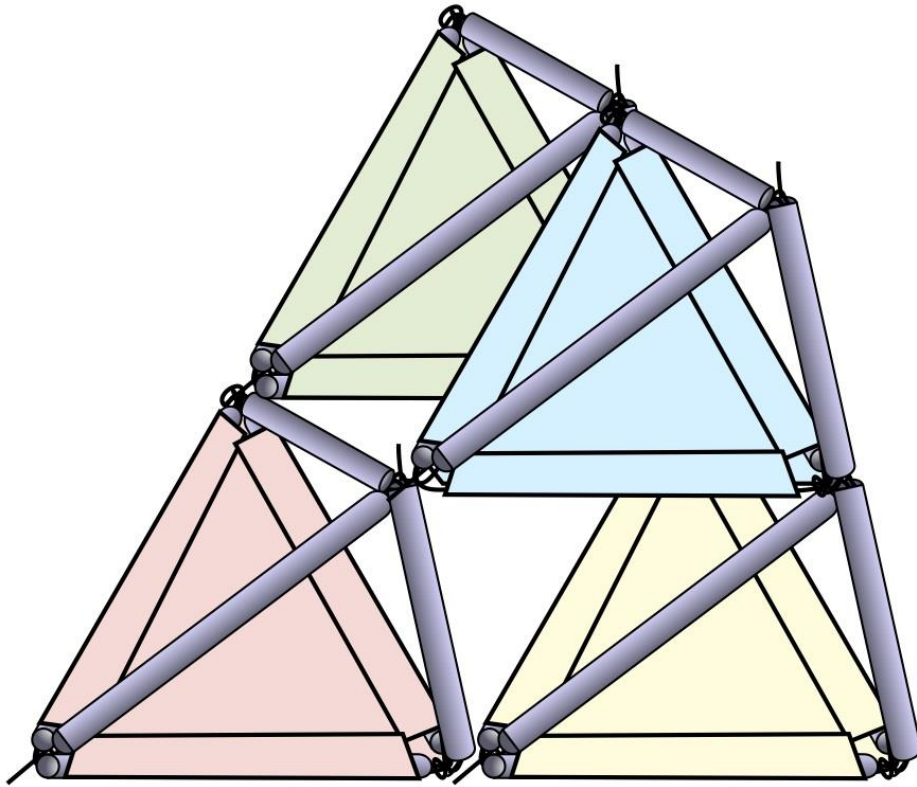
Balancing Butterfly



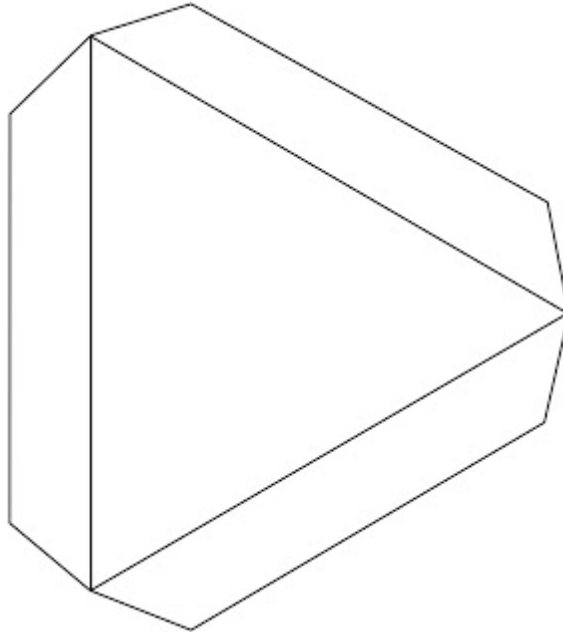
What you need: This sheet. Half a sheet of A4 card (to make the model stiffer). Two 1p coins. 2 wooden splints (or lolly sticks). Glue stick. Felt tip pens or crayons.

What you do: Remember: cut him out AFTER colouring and gluing together the two halves.

1. Decorate the butterfly using bright colours
2. Fold the paper carefully in half so that the two pictures are exactly over each other
3. Place a sheet of card between the two pictures to stiffen the paper and glue it to one side of the paper
4. Glue wooden splints to the card where shown. This supports the paper and stops it being too floppy
5. Glue two 1p coins carefully where shown and then glue the other side of the paper to the card
6. Carefully cut out the butterfly.
7. Test your butterfly: Balance him carefully on your finger. Try balancing him on the end of a pencil or ruler.

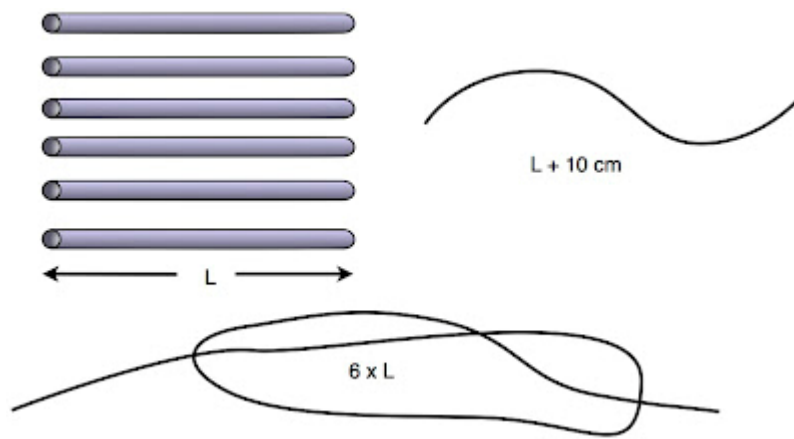


1. Cut out a coloured triangle with flaps



You'll need 64 copies in several different colors. You should make a few more because someone will mess up during construction.

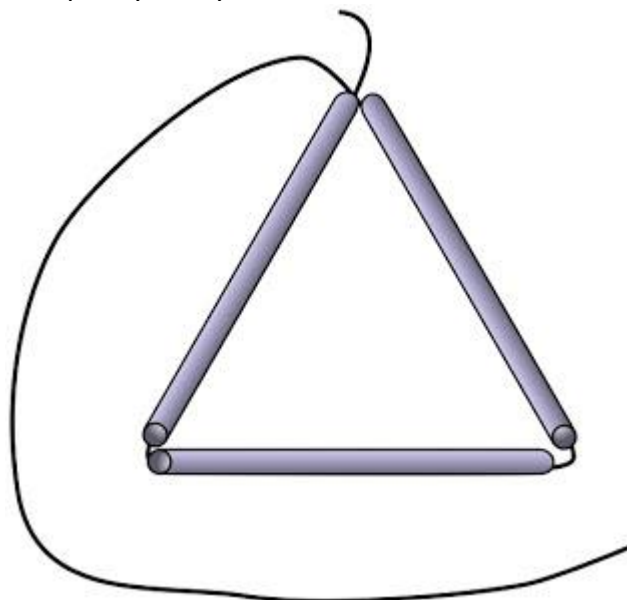
2. Straws and String. Each tetrahedron requires 6 straws and we'll be making 64 tetrahedra all together. You'll need two different lengths of string: 64 long pieces that should be the length of 6 straws, and 64 short pieces that should be 10 cm (4 inches) longer than one straw.



I cut these myself ahead of time by wrapping string around the backs of two chairs that I've spaced so that one wrapping of string is the right length. I simply wrap 64 times and then with one big cut of the scissors all of the strings are the right length. Easy! I wrap around a book to make the short lengths. If you're short on prep time, you can just supply string and have your builders cut their own lengths.

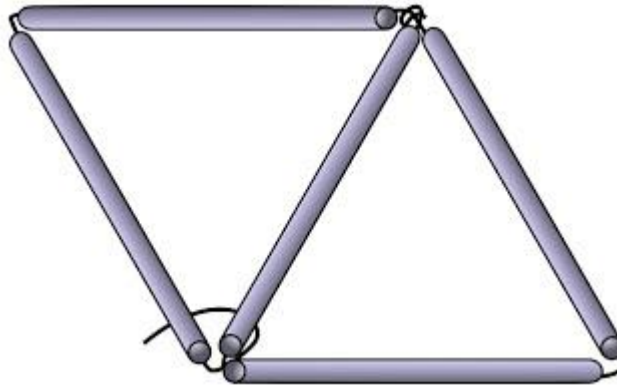
3. Starting the activity. If you're leading the activity it's good to have one tetrahedron built ahead of time to show as a model. Have scissors and glue sticks or tape available and distribute straws, string and paper. I usually have a group of about 30 builders, so everyone gets to make more than one.

4. String 3 straws on the long string and tie together to make an equilateral triangle. The knot must be close to the end of the string so there is still a long tail of string left. If your string is too soft or fuzzy, it may be difficult to get through the straw. If this is the case, the end of the string can be put in the straw and you can suck the other end of the straw and suck the string right through. It works well and is pretty funny.



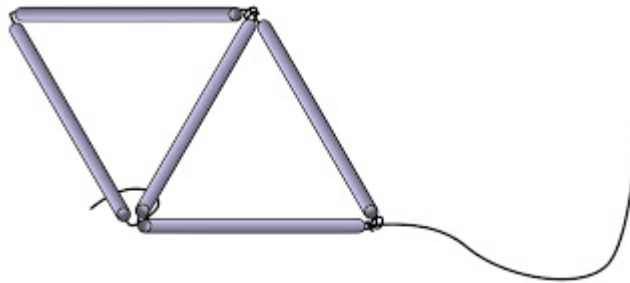
Questions: What kind of triangles are we making? (equilateral) Why are they called equilateral/what makes these equilateral?

5. Put two more straws on the end of the string and tie the end to one of the corners of the triangle to make a rhombus.

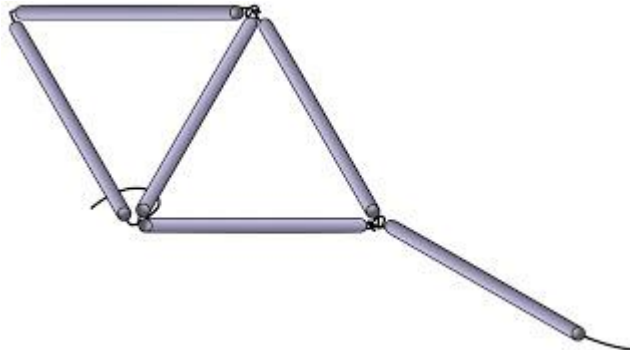


Questions: What shape is this? (rhombus) How do you know it is a rhombus? (all sides the same length) What other properties does this shape have? (it is a parallelogram, it has 60° and 120° angles)

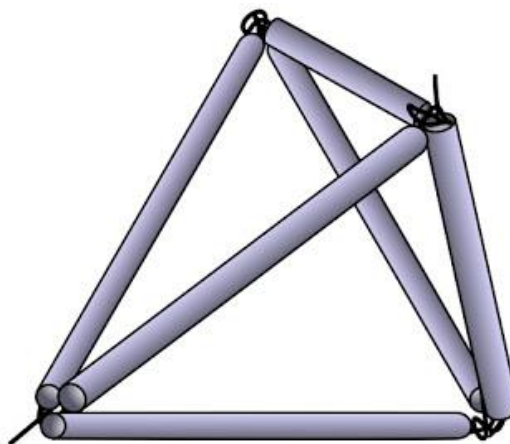
6. Tie the end of the short piece of string to the third corner of the triangle that is not already connected to the other triangle.



7. Slide the sixth straw on this string.

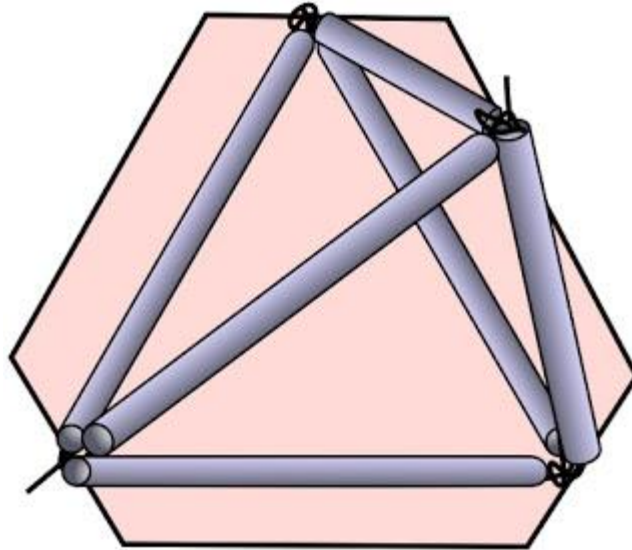


8. Tie the end of this string to the opposite corner of the rhombus. The structure folds to create a tetrahedron!

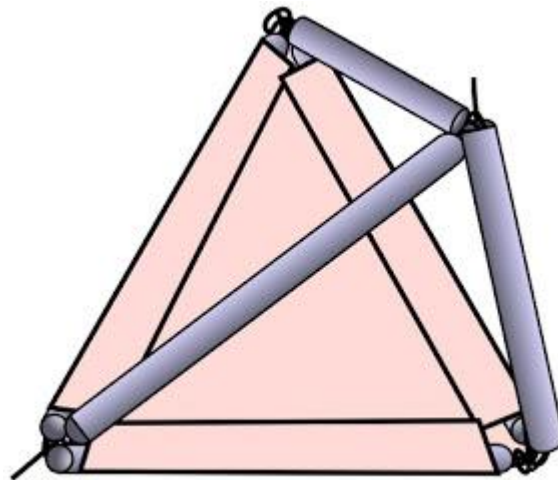


Questions: Describe this form: How many edges does it have? (6) How many faces? (4) How many vertices? (4) What is it called? (tetrahedron) What does tetra mean? (Greek for 4. There is a connection to the game Tetris: in Tetris all of the shapes are made from 4 squares)

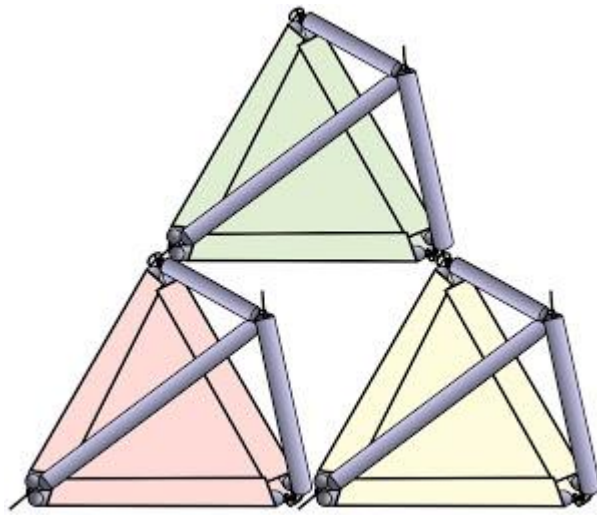
9. Cut out the triangle template. Participants can write their names in the triangle so the name can be seen from the bottom. Set the tetrahedron on top of the paper shape.



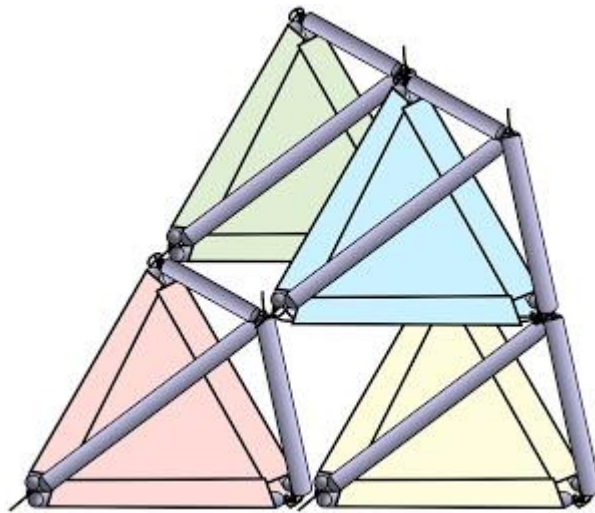
10. Fold the flaps over. It may help to pre-crease the flaps. Use tape or glue to attach the flaps to the inside of the triangle.



11. Make groups of 4. Set three tetrahedra together corner to corner as shown and tie the vertices together. There will be loose ends of string that will be useful for this. If not, cut small lengths of string to use.



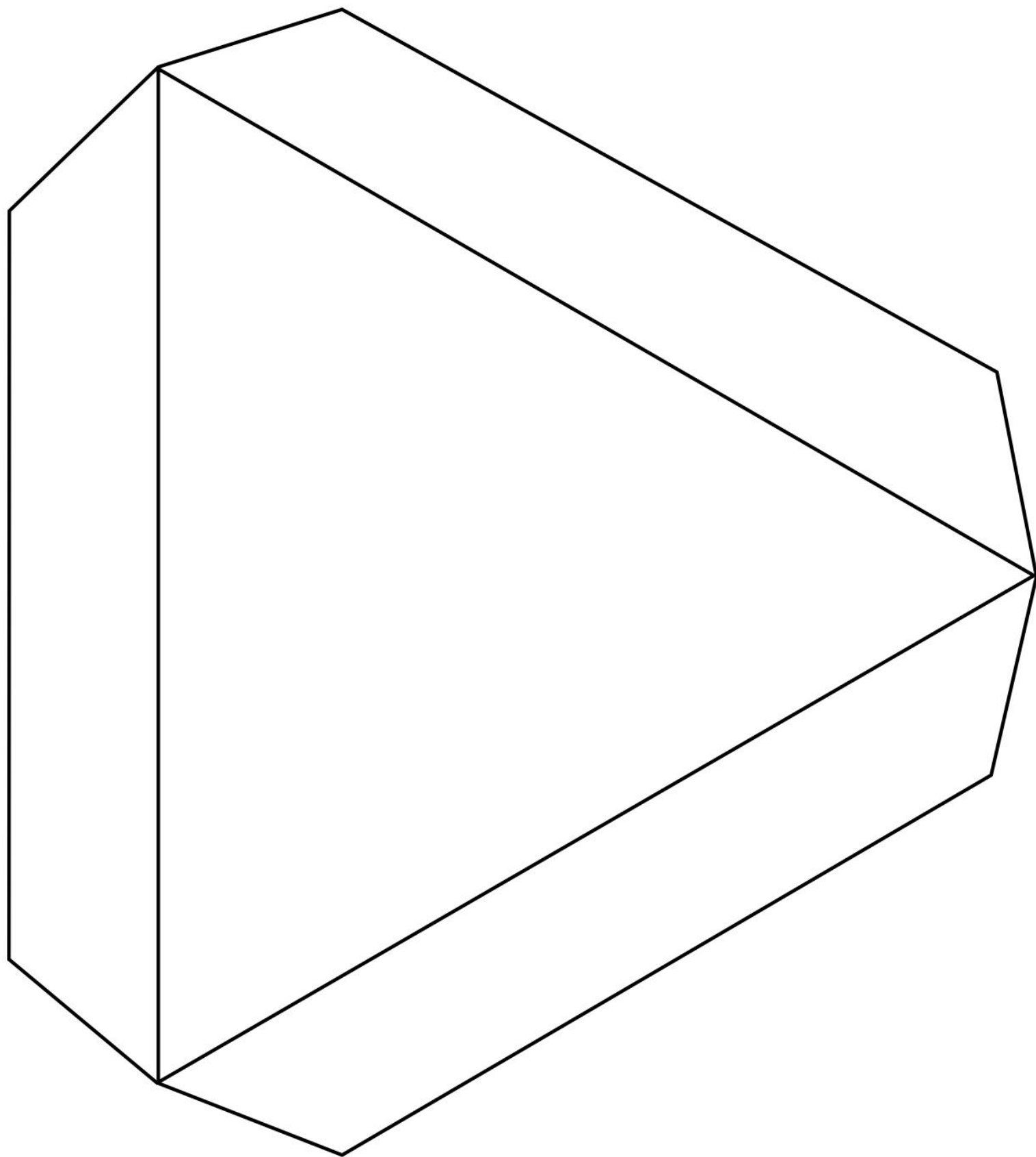
12. Set the fourth tetrahedron on top and tie the corners to the tops of the lower tetrahedra to make a large tetrahedron.



13. Four groups should now come together and connect their four large tetrahedra together in the same way to make an even bigger tetrahedron.

14. There will now be exactly 4 of these even bigger tetrahedron in the room. Connect these 4 together to make the giant full-size tetrahedron.

15. Find a place to hang it!



Materials

Properties (1 = high, 4 = low)

Material	Strength	Ease of use	Cost
Card	4 Weak	1 Easy	1 cheap
Plastic sheet	3	2	2
Wood	2	3	3
Metal	1 very strong	4 Difficult	4 expensive

Method to use to join materials together

Material	Card	Plastic sheet	Wood	Metal
Card		Double sided tape	Double sided tape Wood glue	Double sided tape
Plastic sheet		Double sided tape	Double sided tape	Double sided tape
Square Wood sticks	Double sided tape Wood glue	Double sided tape	Wood glue with card triangle supports	4mm nuts and bolts
Metal sheet (eg Meccano)	Double sided tape	Double sided tape	4mm nuts and bolts	4mm nuts and bolts

Notice we don't mention nails or screws.

These would split small bits of wood but would be the best way to join larger pieces of wood

Wood glue as well as nail or screw is even stronger

Other materials:

Foam sheets

Polymorph:

White granules that can be heated and moulded into any shape

Polymorph is quite expensive so we would only use a small amount at a time

Completed projects

[illegible]

Project Diary

Technology Project Form

Project:

Date started:

Items Used	Cost To be filled in by the teacher
Total	

I have finished this project

☐

I have taken photographs of this project

☐

I have written up this project and it is my technology folder

☐

I found this project Easy ■ OK ■ Hard■

Name:.....

ITEMS USED

[illegible]

Technology Assessment

Name:..... Form.....

Joining materials

I have used glue and card triangle to join together two pieces of wood	With help	By myself	☺	☹	☹
I can recognise and know how to use double sided tape	With help	By myself	☺	☹	☹
I can recognise and have used a nut and bolt.	With help	By myself			
I can recognise and have used a hammer and nails to join two pieces of wood	With help	By myself	☺	☹	☹
I can recognise and have used woodscrews to join two pieces of wood	With help	By myself	☺	☹	☹
	With help	By myself	☺	☹	☹
	With help	By myself	☺	☹	☹

Tools

I can recognise and know how to safely use a screwdriver	With help	By myself
I can recognise and know how to safely use a hammer	With help	By myself
I can recognise and know how to safely use a hobby saw	With help	By myself
I can recognise and know how to safely use a bench hook	With help	By myself
I can recognise and know how to safely use a hand drill	With help	By myself
I can recognise and know how to safely use a Spanner	With help	By myself
Other tools I have used		

Mechanisms I have made (Mechanisms have moving parts)

I have made a toy or mechanism using levers or linkages	With help	By myself	Form			
I have used wheels and axles to make a car (or other vehicle)	With help	By myself	Form			
I have used two pulleys to change the direction of a turning shaft	With help	By myself	Form			
I have used two pulleys to make a shaft go faster or slower	With help	By myself	Form			
I have used two cogs (gears) to speed up (or slow down) a moving shaft	With help	By myself	Form			
I have used a cam to make a shaft or lever go up and down	With help	By myself	Form			
I have combined a cam with pulleys to make a more advanced toy or mechanism	With help	By myself	Form			
I have used two syringes to make a pneumatic mechanism (eg a tipper truck or a moving arm	With help	By myself	Form			
I made a:-						
I can correctly wire up an electric motor to a switch and battery	With help	By myself	Form			
I have used an electric motor to drive the wheels of a car using pulleys or cogs	With help	By myself	Form			
I have made a model roundabout using cogs (gears) Which I decorated	With help	By myself	Form			
Other mechanisms I have made						
	With help	By myself	Form			
	With help	By myself	Form			
	With help	By myself	Form			
	With help	By myself	Form			
	With help	By myself	Form			

STRUCTURES

[illegible]

Bridges

I have made a beam bridge	With help	By myself	Form	😊	😐	😞
I have made a Truss bridge out of wood or card	With help	By myself	Form	😊	😐	😞
<div style="border: 1px solid red; padding: 5px;"> I made a truss bridge out of </div>						
Another bridge I made. This could be any other bridge like a suspension bridge or cantilever bridge	With help	By myself	Form	😊	😐	😞
<div style="border: 1px solid red; padding: 5px;"> I made this sort of bridge:= </div>						
Moving bridge. This could be any kind of bridge operated by a handle, motor or pneumatic (using two syringes) eg a drawbridge, swing bridge (r even a horse box door)	With help	By myself	Form	😊	😐	😞
<div style="border: 1px solid red; padding: 5px;"> I made a :- Operated by a :- </div>						

Vehicles

I have made a car or buggy that is unpowered	With help	By myself	Form			
I have made a powered car or buggy	With help	By myself	Form			
Wind powered						
Elastic band powered						
Electric motor powered						
Solar powered						
Rocket powered						
Other						
<div style="border: 1px solid red; padding: 5px; margin: 5px 0;">I made a:-</div>						