



Light Stitches

E-Textiles for Education



SMART MATERIALS

Attaching electronics to textile projects using conductive thread

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Introduction

The contents of this booklet are intended as an aid to teachers when planning.

The information and resources are designed so you can choose parts of or the entire scheme and project to fit in with the way Design & Technology is taught within your school but with less paperwork for you, as the teacher, to have to design or research yourself.

There are worksheets for differing abilities and 'levellers' or 'bell work', i.e. word searches; crosswords, etc; items that can be used as starters and plenaries and work sheets can be copied in sufficient quantities for your classes. Tips to stretch the gifted and talented are also included.

This project 'Light Stitches' has been designed and aimed at yr7s as an introduction to both textiles and electronics and to encourage the mixing of different D&T elements thus encouraging creativity in later school life, especially D&T. It could however also be used quite successfully in primary schools with suitable resources or for older students to encourage creative possibilities.

The 3 projects included are a heart shaped purse, a pencil case and a mobile phone holder, something to encourage both genders. They become unique projects by their inclusion of electronic LEDs and the use of conductive thread. Initially this may seem rather daunting for the textiles teacher, unfamiliar with the world of electronics but it would seem just as daunting to an electronics teacher to ask him or her to make the textiles aspect!!! Either way, both aspects of these designs are very simple or there is no risk of electrocution! Alas no, you will start your class with the designated number and finish with same! The purse and the pencil case utilise the zip as a switch for the lights, which completes the very simple circuit. On the mobile phone cover, it is the press stud or conductive velcro which completes the circuit.

The kits include all the components needed for each student to make a whole product and some of the felt is self adhesive so there is no need for the usual appliqué. But there is nothing to stop you from including that if you wished into the scheme of work. There is very little designing in this project as it is aimed to learn certain basic skills but the designs could be altered by not using the templates enclosed but allowing students to design the shapes they wish to make the product more personal.

The assessment booklet has been designed to help encourage Assessment for Learning (AfL) into your assessment with students. The booklet is designed as a 5 page booklet to be held within their project folder with a front cover, entitled 3-2-1 Blast Off to encourage the fact that AfL encourages students to take more responsibility for their learning and can improve their level of achievement, the back sheet is intended that you print it on card and you could get the pupils to have a H&S lesson cutting them out with scalpels (quite useful across a number of subjects) and the three pages in the middle are the assessment sheets which you complete with the students playing an interactive role. This has been created based on much research from Government publications, guidelines plus information from other recognised experts on the subject. We have however, still kept in certain target grades, etc to allow space for the information that is always being requested from teachers and you are still expected to be working towards despite AfL guidelines!

Light Stitches is the first of our electronic/textiles projects utilising conductive thread and ready available electronic components and we have others in the pipeline. These will be based on simple circuitry and more advanced sewing which will be particularly of use to students who have already attempted 'Light Stitches'. Please see our website for the latest projects and look out for our advertising flyers in the post.

We hope you find all the information and resources useful and that the students find this to be an enjoyable scheme of work. If you have any problems please do not hesitate to contact us. Contact details are at the back of this Teacher's book. Thank you for purchasing our product.

Conductive Thread

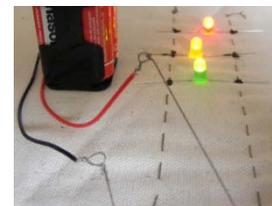
Until not too long ago the mixed properties of electronics and textiles was unheard of. With technology moving as fast as it has in recent years, the possibilities of clothing and accessories with visual and audio effects by the use of flashing lights, sensors and piezo-electronics has now been made much easier in a domestic situation with the availability of conductive thread.



Conductive thread is similar in properties to ordinary sewing thread but it also has the ability to conduct a small amount of voltage through it. It can do this as it has metal incorporated into it (usually silver, nickel, tin or copper) with a core of normally cotton or polyester. The thread is not insulated and therefore attaching it to a metal component within a circuit in place of the usual wires means the circuit is much more flexible allowing you to maintain many of the original properties of the material such as drape and feel. As it is a thread it also allows you to sew by hand or machine and even embroider designs into textiles. Its resistance properties are 4Ω per 100mm.

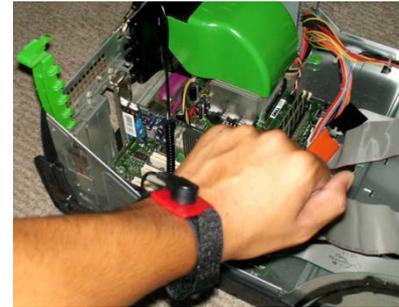
When using by machine it is not necessary for the second thread to be conductive thread too just the spool for the side of the design you wish to have the circuit on. The conductive thread used by Light Stitches and supplied with this class pack is a medium weight and comes on a spool of approximately 200yds. It is more gold in colour than silver due to the presence of a micron thick layer of natural silver on each of the 100+ component strands. Normal metallic fibres used in lames is much more sparse and broken, consequently a consistent, reliable circuit would not be possible.

The thread is much stronger than domestic poly/cotton thread, and somewhat thicker. If using on a machine you may wish to try a larger needle to help with threading up and less chance of fraying by being caught on the point of the needle.



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Conductive thread has medical uses (silver has antiseptic qualities) and is used to create 'soft' circuits. An example of one of its uses is a fencing jacket. The jacket is made with conductive material scoring areas which can become extremely worn with time. The jackets are expensive and fencers usually try to get them repaired by darning the worn areas. Conductive thread can be used for this quite successfully and also sewn into the fabric of a jacket where the conductivity of the material has been lost over time.

Workers working along side machinery, computers, etc are often required to wear antistatic clothing as the build up of static, whilst harmless to humans who can cope with static voltage of 2000-4000volts, electronic components can be burnt out or damaged with as little as a few volts. This can lead to machinery downtime, lost man-hours, returned products and warranty costs particularly in the semiconductor and electronics industries which can lead to 5 billion \$(US) of damage to products each year.

Properties of Acrylic Felt



Felt comes from woollen fleece originally but in this modern world there is acrylic felt derived from polyacrylonitrile. It has the advantage of being machine washable, very inexpensive to make and very versatile to use. It is easy to cut and handle, has a soft feel and drapes well. It is also available in many different colours and as in this kit can be found with self adhesive backing which makes it very simple to use for decorative purposes. Natural fibres tend to have a relatively short staple length and are spun and then woven together. Synthetic polymers can have an infinite length made from one long filament and can be melted or pressed together without the need for weaving. Acrylic felt is a non-woven material but one that can still be affected by heat or steam. Acrylic felt can still be used to create hats for example and steamed into shape just like hats are when using woollen fleece.



Left: a hat shaping machine on view in a museum in Portugal.

Right: The Fedora – a well known 'mafia' style hat which is normally made in wool felt but could be made from acrylic felt in the same way. The wool felt however normally provides for a better quality finish and softer feel although the synthetic equivalent has properties which are very close.



How the circuit works

This shows one of the simplest circuits. When the battery is inserted the Leds light up.

Resistors are used within circuits to protect components from damage, as Leds can be destroyed by voltages over 3 volts.

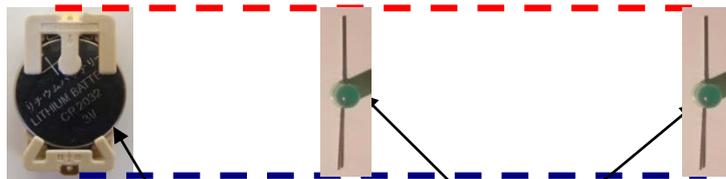
For this reason a 3volt cell battery is used, therefore the Led is safe from damage and can be sewn directly into textile projects. Voltages over this amount will require resistors to protect the Leds from damage.



Schematic drawing of circuit

Diagram 1

A simple circuit



Light Stitches Sewable coin cell battery holder

Flashing green Leds

Conductive thread

stitching from the + side of cell battery holder

Conductive thread

stitching from the - side of cell battery

Diagram 2

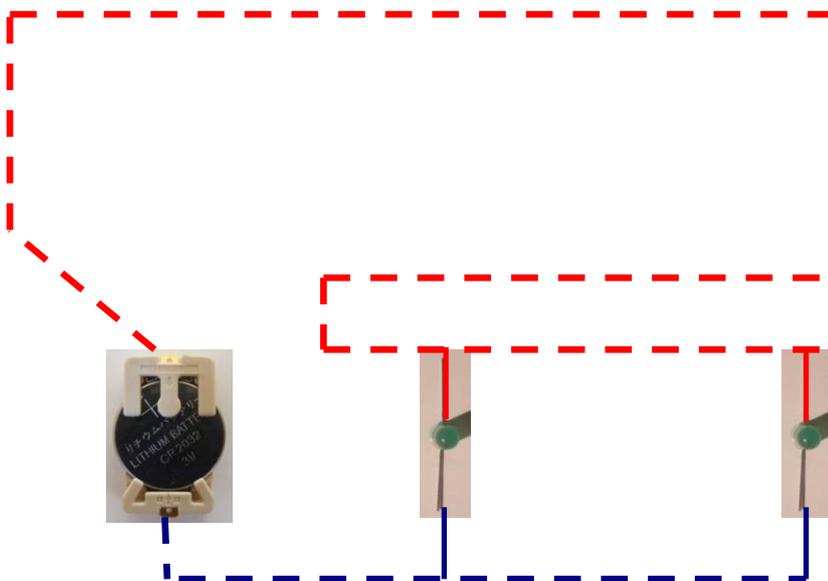
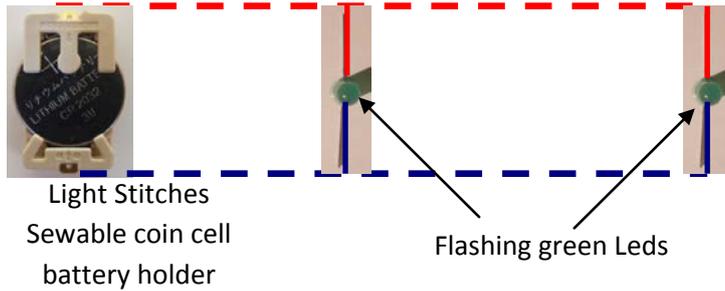


Diagram 1 is exactly the same circuit as diagram 2 You will notice the red conductive thread track ----- in the diagram to the left has been extended, the need to extend your stitching can be to avoid an obstacle or to move the battery away from a unsuitable area or basically to stop a short circuit by the overlapping of the + ----- conductive thread with the - ----- conductive thread track. Generally to reach a specific area.

A simple circuit

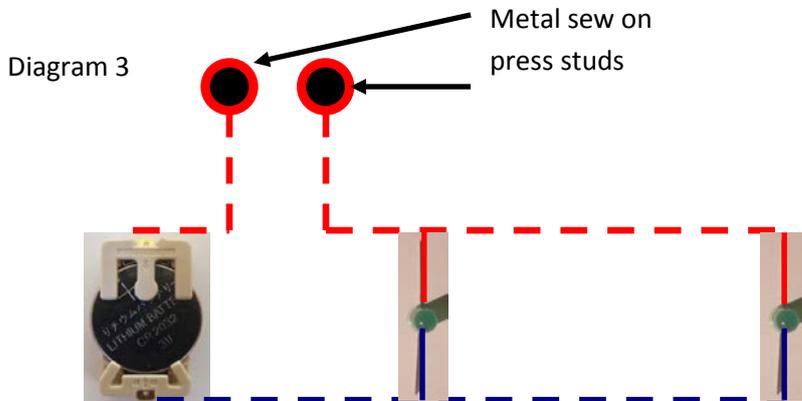
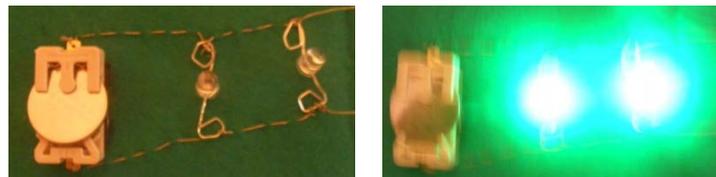


Returning to Diagram 1

If a switch needs to be added to your textile project, there are a number of ways in which this can be achieved.

A switch is a component which breaks and then reconnects a circuit.

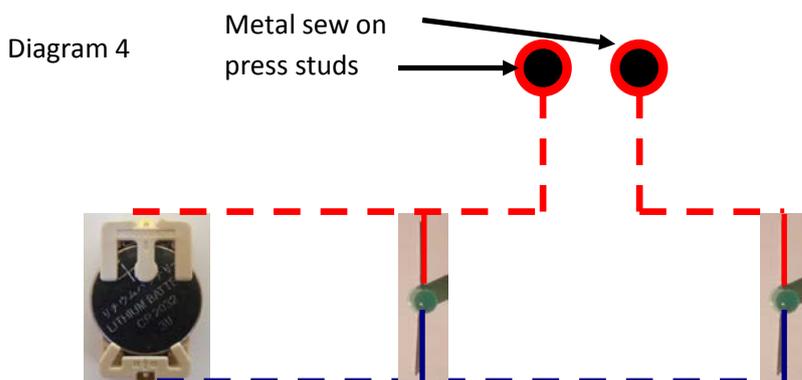
A sew on press stud can be made into a switch: for example when both parts of the press stud are sewn on with Light Stitches conductive thread and the press stud is fastened, the circuit is made and when unfastened the circuit is broken. This same principle can be used with zips and conductive Velcro.



How to add a switch to break the circuit.

As shown in diagram 3 the + **conductive thread track** is broken before both Leds which disconnects both.

When the press studs are disconnected both Leds will turn off and when press studs are connected both Leds will simultaneously flash.



How to add a switch to break part of the circuit.

As shown in diagram 4 the + **conductive thread track** is broken after the first led, which disconnects only one Led

The first Led will continuously flash, as that part the circuit has not been broken.

When the press stud is connected both Leds will simultaneously flash, and when disconnected only the first Led will continue to flash.



Diagram 2

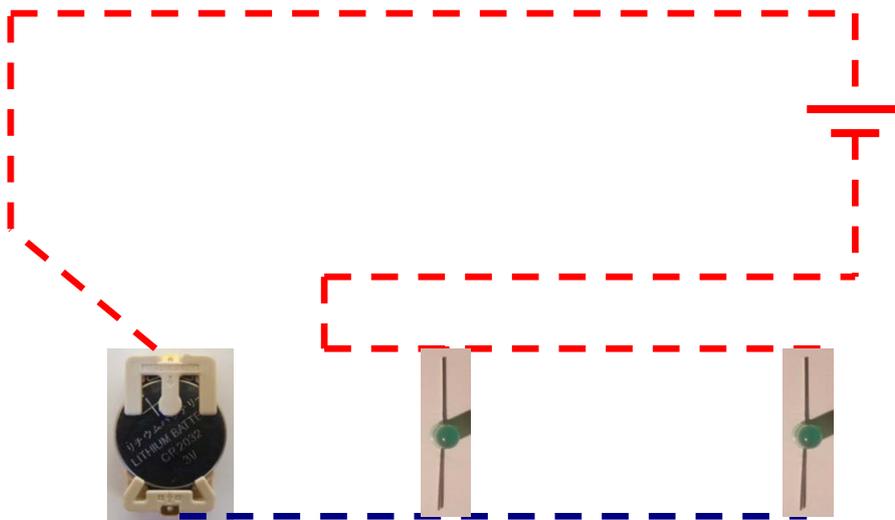
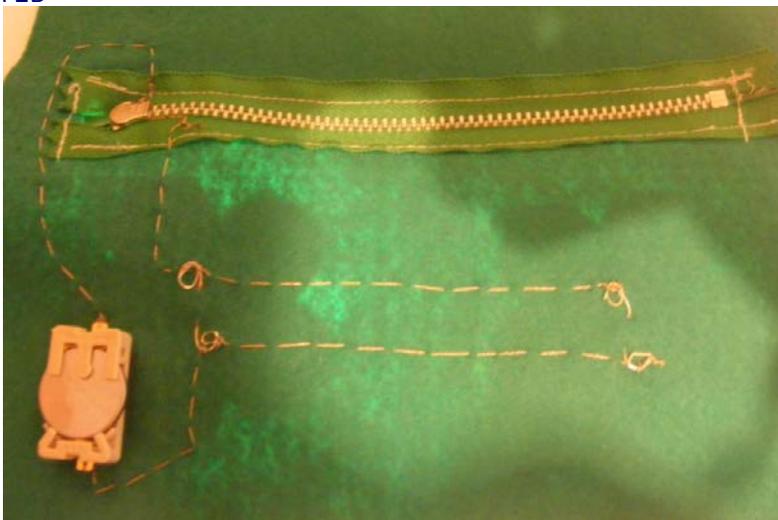


Diagram 2A



Diagram 2B



Returning to Diagram 2

You will notice the red conductive thread track ----- in the diagram to the left has been extended, Lets presume this is to accommodate a zip.

A metal zip can easily be made into a switch to turn on the leds (activate) or turn off the Leds (deactivate)

By connecting Light Stitches conductive thread directly on opposing sides of the metal zip, the circuit has a switch attached.

When the zip is open the circuit will be broke and the leds will turn off.

Alternatively when the zip is closed the circuit is complete and the leds will be turned on and flash simultaneously.

Diagram 2A

Shows the circuit avoiding the obstacle (zip) and the switch to operate the leds.

As the metal zip is closed the circuit would not be broken and the Leds will be turned on.

Diagram 2B

Shows the circuit working within the flower pencil case project.

Please remember Light Stitches conductive thread can be used to make various switches with sew on press studs, zips and conductive Velcro, all using the same circuit.

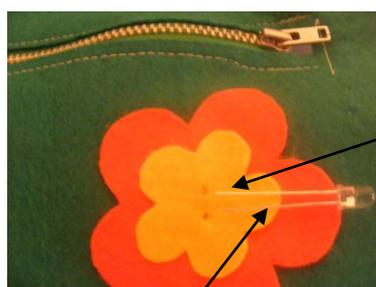
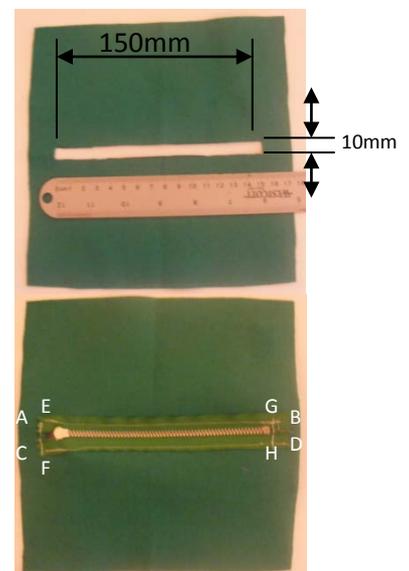
Making up the pencil case – Flower Shaped

Contents of kit- 200mm x 200mm green felt
140mm x 90mm adhesive backed light green felt
110mm x 70mm adhesive backed yellow felt
2m of Light Stitches conductive thread
1 x 6" green metal zip
1 x sewable coin cell holder
2 x 5mm flashing green LED
1 x piece of hook and loop tape
1 x CR2032 Coin cell battery

2 x flower shaped templates from within the class pack (you can also draw the small centre bud if required).

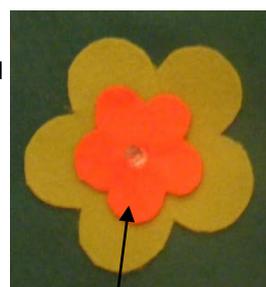
You will also need a darning needle to create a hole through the felt, a pair of long nosed pliers, a fabric marker pen (or the like) and the usual basic sewing equipment, i.e. needle, scissors, thread, etc)

1. using a fabric marker pen or other means as per your available resources, Exactly centre of the green felt, mark, then cut out 10mmx 150mm rectangle as shown, to insert metal zip.
2. Place the zip underneath the slot so that the zip lock foot and the teeth can be seen clearly.
3. Pin and then tack into position.
4. Using a sewing machine on normal straight stitch, sew from A-B, then from C-D then from E-F and then G-H. This forms a box around the zip, holding it firmly in place. (Dependent on the ability of the students, I would normally encourage reverse/forward start and finishing but also invisible start and finishing by pulling the back thread gently until a loop of top thread appears. Pull this through to the back and knot them together).
5. Turn material over
6. Using the template draw and cut out the large sized flower from light green and orange adhesive backed felt.
7. Peel off the backing and place in desired position on dark green felt.
8. Using the template, draw and cut out 1 small flower.
9. Peel off the backing and place in the middle of the large flower. Attach as shown below.
10. With a darning needle push a hole in middle so that the legs of the LED can be inserted through to the back of the flowers.



Short Leg of Led (- Cathode)

Long Leg of Led
(+ Anode)



LED in position

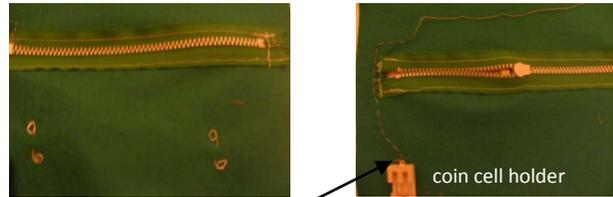


Small flower

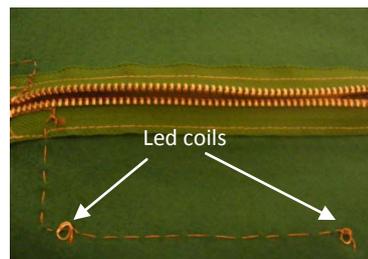
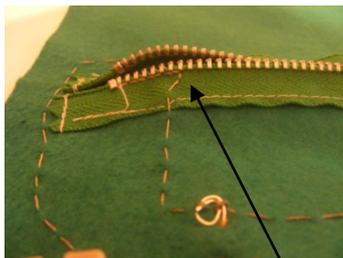
The Light stitches material may be edited for use in colleges provided the original

Attaching electronics Leds to the flower pencil case

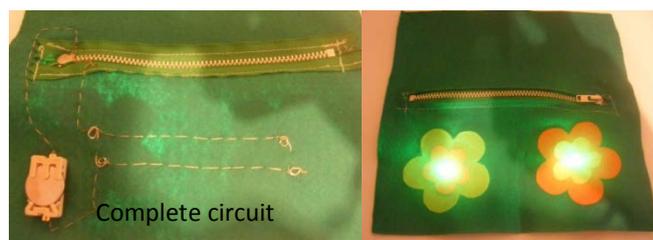
11. You'll notice that one leg of the LED is longer than the other; the long leg is the positive and the short the negative.
12. Turn flower pencil case over as shown. Then Using a pair of long nose pliers, coil each leg round so that they lie flat as a coil against the felt. (repeat for both leds)



13. Loop conductive thread through eyelet of coin cell battery holder, and secure with a couple of knots. Take the 2 pieces of self adhesive hook & loop tape and attach sewable cell holder in position as shown in photograph.
14. Using a small running stitch take your stitching up to the top layer of the teeth of the zip and starting at the very end use running stitches working in between the metal teeth (approximate 6 teeth), then turn around and take the running stitches in the gaps back to the end of the zip. Use the metal teeth as a guide to the size of your stitches and keep your stitches close to the teeth. When you reach the end of zip, fasten off as shown.



15. Starting approximately six teeth away from the end of the zip, use running stitches and work towards the end of the zip, working in between the metal teeth, then turn around and take the running stitches in the gaps back to the starting position. Using the remainder of the conductive thread loop around the Led coils to connect the leds as shown above.
16. Loop conductive thread through the remaining eyelet of coin cell battery holder, (- **negative end of battery holder**) and secure with a couple of knots. Using a small running stitch take your stitching across from the coin cell holder and connect the remaining led by looping around the led coils fasten off .



17. Insert coin cell battery to check circuit.
18. Remove coin cell battery, then position as shown with the zip open, pin, then tack together around the outside edge. Using a 1cm seam allowance stitch around the pencil case.



19. **Troubleshooting** – If the LED is not working
- Check the battery is in the correct way round
 - Check that the stitching does not cross over itself anywhere
 - Check that there are no loose threads causing a short circuit
 - Check that the correct ends of the thread have been attached to the correct ends of the LED (positive end of battery through to positive leg of LED and same for negative)

Making up the Camper Van key ring

Kit Contents



- Easy-sew Battery holder
- Coin cell Battery
- 2 white LEDs
- Conductive Thread
- Soft Switch felt pad
- Metal key ring
- Black Felt
- Orange and white self adhesive felt
- Assembly instructions and template

You will Need:

- Needle
- Long Pointed Pliers
- Scissors
- Sewing Machine (or can be hand sewn)

Assembly Instructions:

- 1.** Cut out the templates and use them to cut out shapes from the relevant colour felt.
Either draw around the templates or pin on to felt in order to cut out.
The camper van shape should be cut out on a double layer of black felt so you have 2 camper van shapes to use as front and back.



- 2.** Taking one of the black van shapes to use as the front, stick on the orange bonnet, badge and white windows.

- 3.** Push the LEDs through the white felt lights and from the front to the back of van. Sticking the felt lights onto the felt as you go.





Make sure the positive leg (longest) is pointing up and negative leg is pointing down.

Use the pliers to bend each LED leg around into a loop.



4. Knot one end of the conductive thread onto the negative hole on the battery holder. Make sure the knot is tied securely.

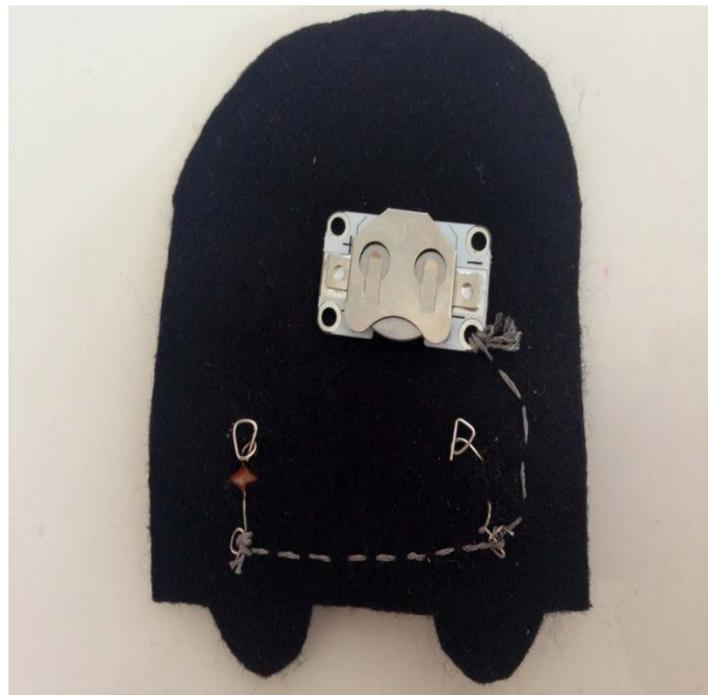
5. Place the battery holder (with coin) in position as shown in the picture.

Sew the battery holder in place sewing through the hole and felt.

Stitch a running stitch (not to be seen on the front of fabric) down to the negative leg of the right LED first.

Sew the conductive thread around the LED leg and felt making sure it is knotted before stitching to the next negative LED.

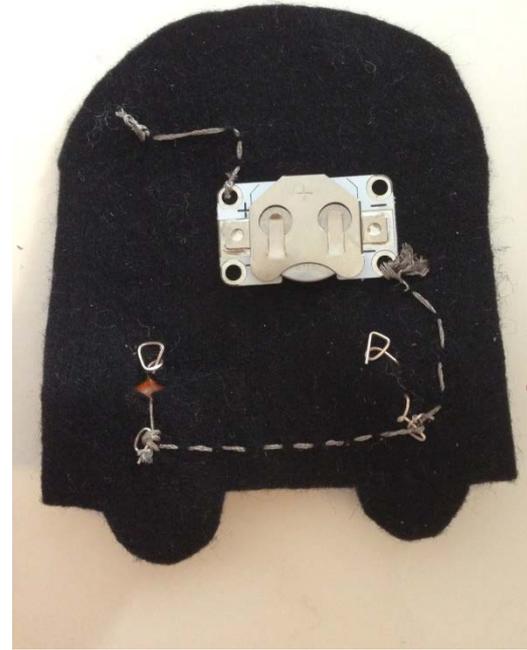
Sew a couple of stitches beyond the last LED leg and then knot tightly. Cut thread.



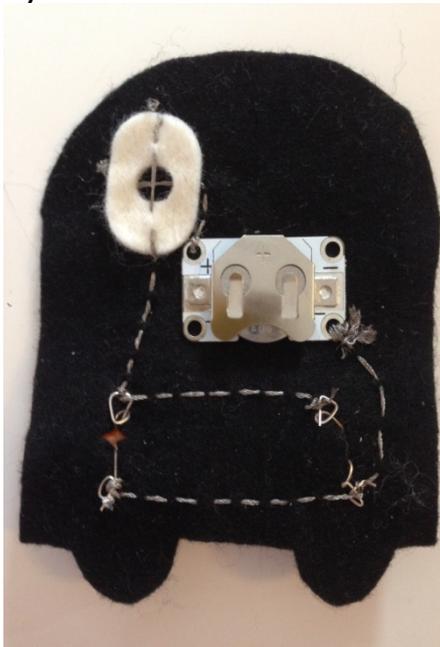
- 6.** Knot conductive thread to the positive hole on the battery holder.

Stitch as shown in the picture up to where the soft switch is going to be placed (in the window), ending with a longer stitch that will be seen under the hole of the felt pad.

Knot and cut thread



7



- 7.** Stick the soft switch in place over the conductive thread.

Sew the conductive thread to lay over the top of the Soft Switch and then running stitch to the positive legs of the LEDs. Sew each LED leg as before finishing with a knot .

You should find that when the soft pad is pressed it acts as a switch to turn the van lights on.

8. Attach the other black felt van shape to cover the components and become the back of the camper van. Add the key ring tag to the top of the van ready to sew in place. Using a sewing machine (or hand sew), stitch around the shape, just inside the border.



9. Attach metal key ring and Stick on white self adhesive felt bumper

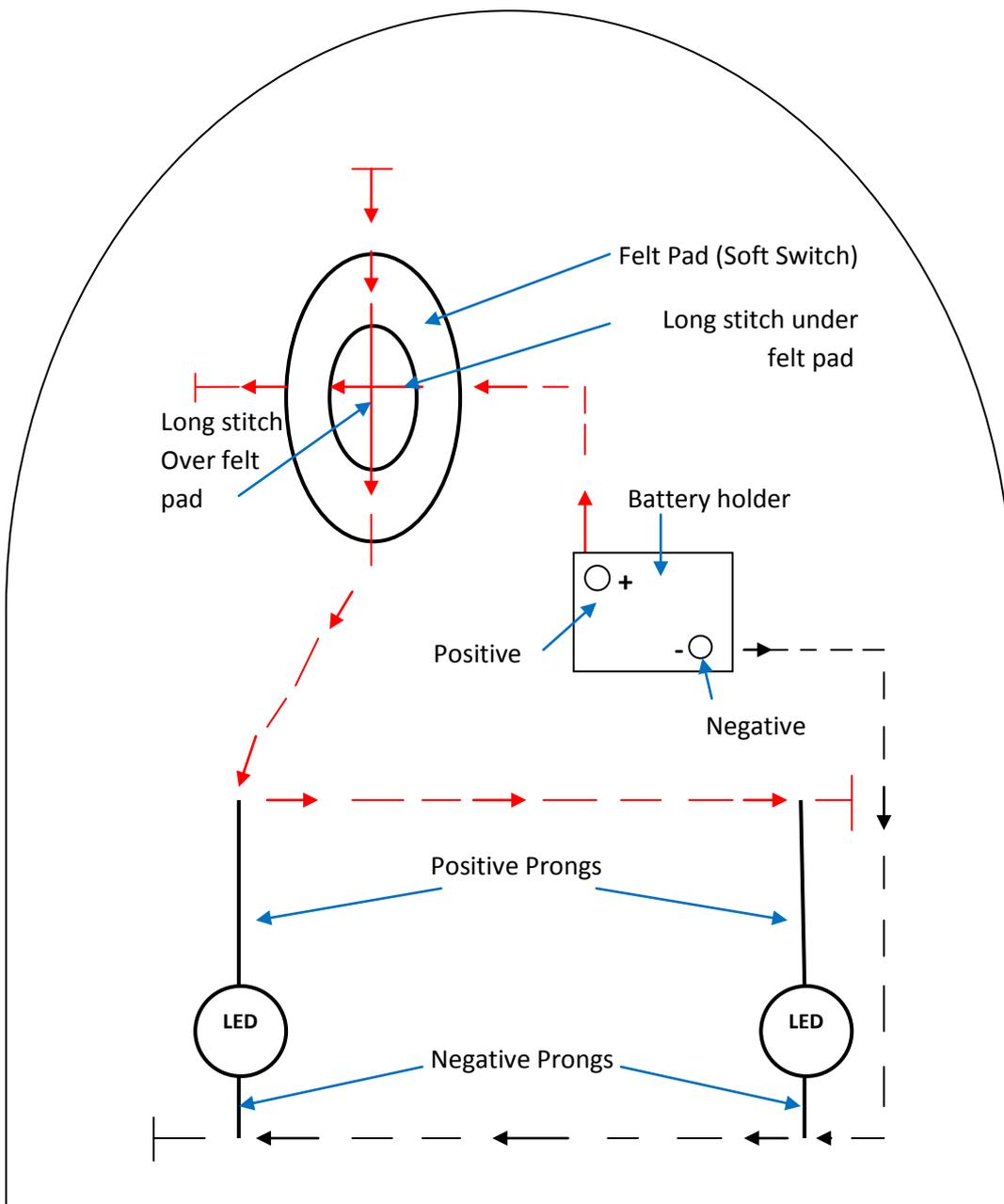


You will see that when the soft pad is pressed in the camper van window, it acts as a switch to turn the van lights on!

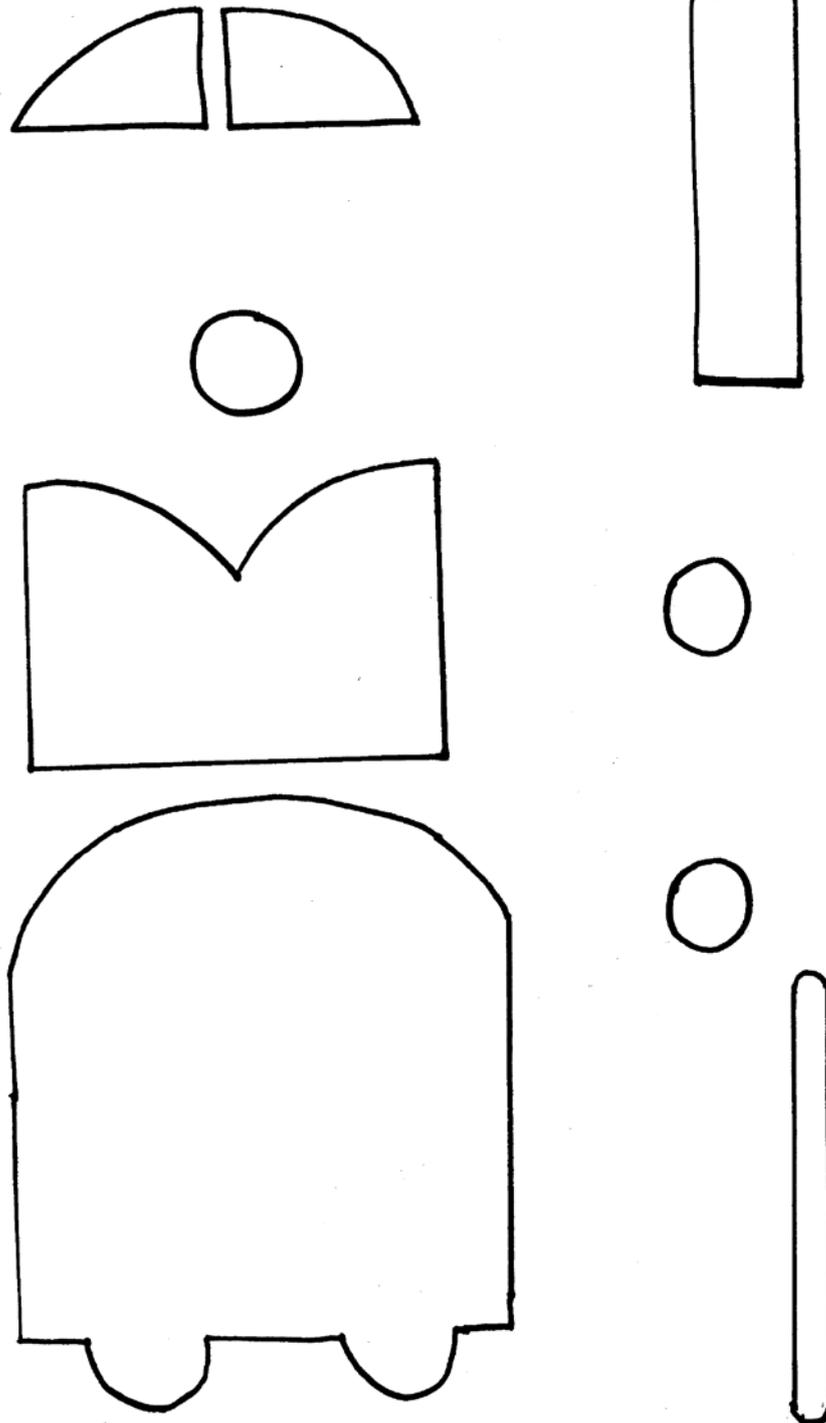
Diagram of the circuit

- - - - - = Positive conductive thread stitching

----- = Negative conductive thread stitching



Template for Camper Van Key Ring kit



Making up the purse – Heart Shaped

Contents of kit- 300mm x 150mm red felt
120mm x 100mm adhesive backed bright pink felt
80mm x 80mm adhesive backed dark pink felt 2m
of conductive thread
1 x 4" red metal zip
1 x sewable coin cell holder
1 x 5mm flashing red LED
1 x CR2032 Coin cell battery
1 x piece of hook and loop tape

3 x heart shaped templates from within the class pack

You will also need a darning needle to create a hole through the felt, a pair of long nosed pliers, a fabric marker pen (or the like) and the usual basic sewing equipment, i.e. needle, scissors, thread, etc)

20. Using the largest template draw 2 large hearts on the red felt using a fabric marker pen or other means as per your available resources.
21. In one of the hearts draw the rectangle which makes the slot for your zip.
22. Cut out both hearts and cut out the rectangle from one heart.

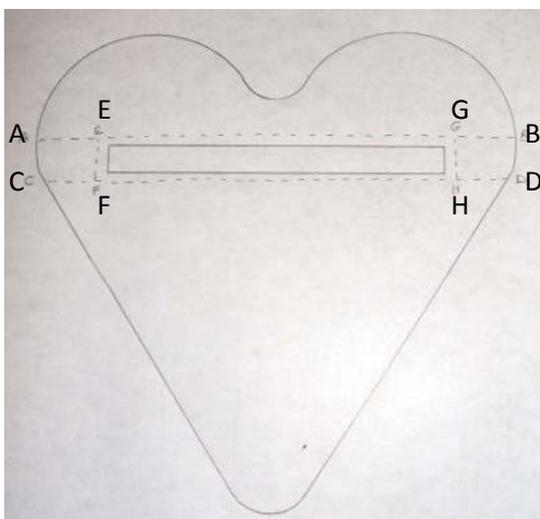


23. Place the zip underneath the heart with the slot so that the zip lock foot and the teeth can be seen clearly.

24. Pin and then tack into position.

25. Using a sewing machine on normal straight stitch, sew from A-B, then from C-D then from E-F and then G-H. This forms a box around the zip,

holding it firmly in place. (Dependent on the ability of the students, I would normally

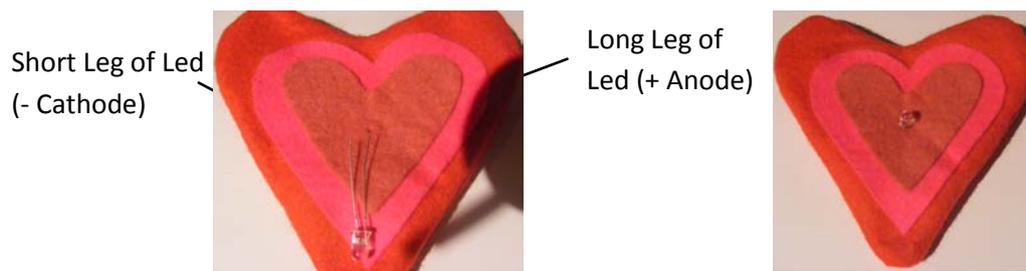


encourage reverse/forward start and finishing but also invisible start and finishing by pulling the back thread gently until a loop of top thread appears. Pull this through to the back and knot them together).

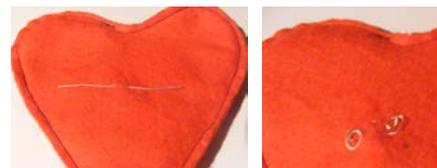
26. Open the zip.

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27. Place the hearts right sides together, with the zip open and pin, then tack together around the outside edge.
28. Using a 1cm seam allowance stitch around the heart from J-J.
29. Finish off all the machining threads by snipping close to the stitching.
30. Snip the curves, and then trim the 1cm seam down close to the stitching to reduce bulk.
31. Turn purse right side out through zip.
32. Using the template draw and cut out 1 middle sized heart from the bright pink adhesive backed felt.
33. Peel off the backing and place in the middle of the whole red heart.
34. Using the template, draw and cut out 1 small heart.
35. Peel off the backing and place in the middle of the middle sized heart. Attach as shown
36. With a darning needle push a hole in middle so that the legs of the LED can be inserted through to the back of the hearts.

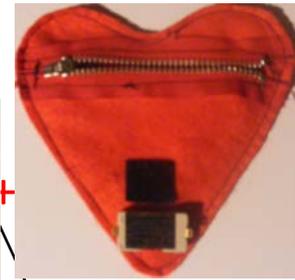


37. You'll notice that one leg of the LED is longer than the other; the long leg is the positive and the short the negative.
38. Turn purse inside out through zip then Using a pair of long nose pliers, coil each leg round so that they lie flat as a coil against the felt. If you should forget which leg is which, the plastic LED cover also has a slightly flat piece on the bottom ridge of the Led; this is the negative side.
39. Attaching the electronics follows.



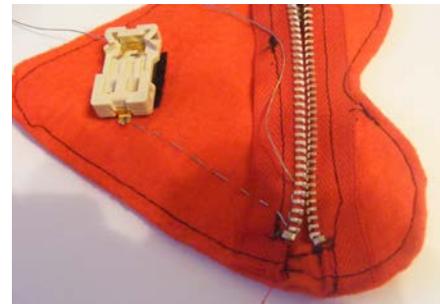
Attaching electronics Leds to the heart pencil case

1. Take the 2 pieces of self adhesive hook & loop tape and attach one piece to the back of the battery holder and the other to the inside of the zipped heart as shown in the photograph.
2. Place the battery holder in place on top of the hook & loop tape with the negative end to the left. (The battery holder has one end negative and one end positive, just like batteries have negative and positive terminal or ends.



If you look carefully you will see a small negative mark embossed between the metal prongs.)

3. Thread a sewing needle with the conductive thread, ensuring the eye is narrow enough to go through the metal terminal. Knot the end of the thread and make a few stitches through terminal hole just catching the top layer of the felt (so your stitching doesn't show through to the right side.)
4. Using a small running stitch take your stitching up to the bottom layer of the teeth of the zip and starting at the very end use running stitches working in between the metal teeth, then turn around and take the running stitches in the gaps back to the end of the zip. Use the metal teeth as a guide to the size of your stitches and keep your stitches close to the teeth. when you reach the end of zip fasten off as shown below.

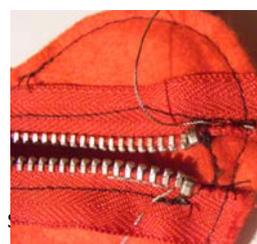


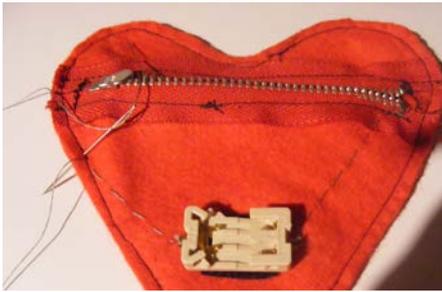
5. Turn the heart over to reveal the coiled led legs, Attach firmly to the left coil (as if you were sewing down a press stud) with a few small stitches through the coil of the positive leg.
- 6.
7. Now using the loose end of the conductive thread stitch from the positive coil heading left towards the top of the zip on the opposing side. Light Stitch through the top layer of felt only (as shown)



Coiled led legs

8. Turn heart over and attach to zip as explained above in section 4





9. (The final steps) Thread a sewing needle with the conductive thread, ensuring the eye is narrow enough to go through the metal terminal. Connect to the terminal with a couple of Knots, by just catching the top layer of the felt it secures the holder firmly into position.

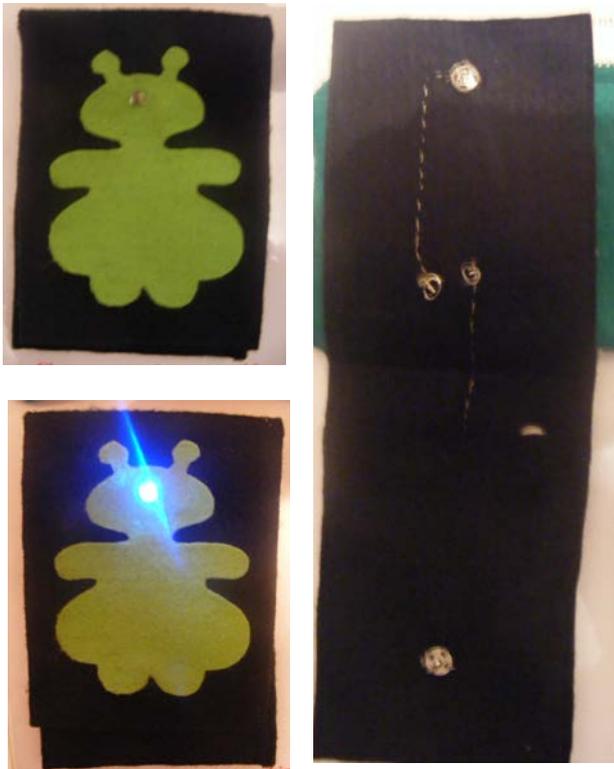
10. Using a small running stitch take your stitching to the remaining Led coil located on opposite side and firmly (as if you were sewing down a press stud) with a few stitches through the coil of the - Cathode leg.



- Cathode
Attach
small

11. Now insert the battery into the holder, shiny side up. The LED should now flash. Turn right side out, close the zip and the LED should go off.
12. **Troubleshooting** – If the LED is not working
- Check the battery is in the correct way round
 - Check that the stitching does not cross over itself anywhere
 - Check that there are no loose threads causing a short circuit
 - Check that the correct ends of the thread have been attached to the correct ends of the LED (positive end of battery through to positive leg of LED and same for neg)

Attaching electronics using various Textile materials for switches



A metal sew on press stud can be used as a switch as explained earlier in Diagram 3.

The metal press stud in the open position breaks the

+ - - - - - track, turning the circuit off. (switching off Leds)

When the metal press stud is fastened the track is connected, turning the circuit on.(turning on Leds)

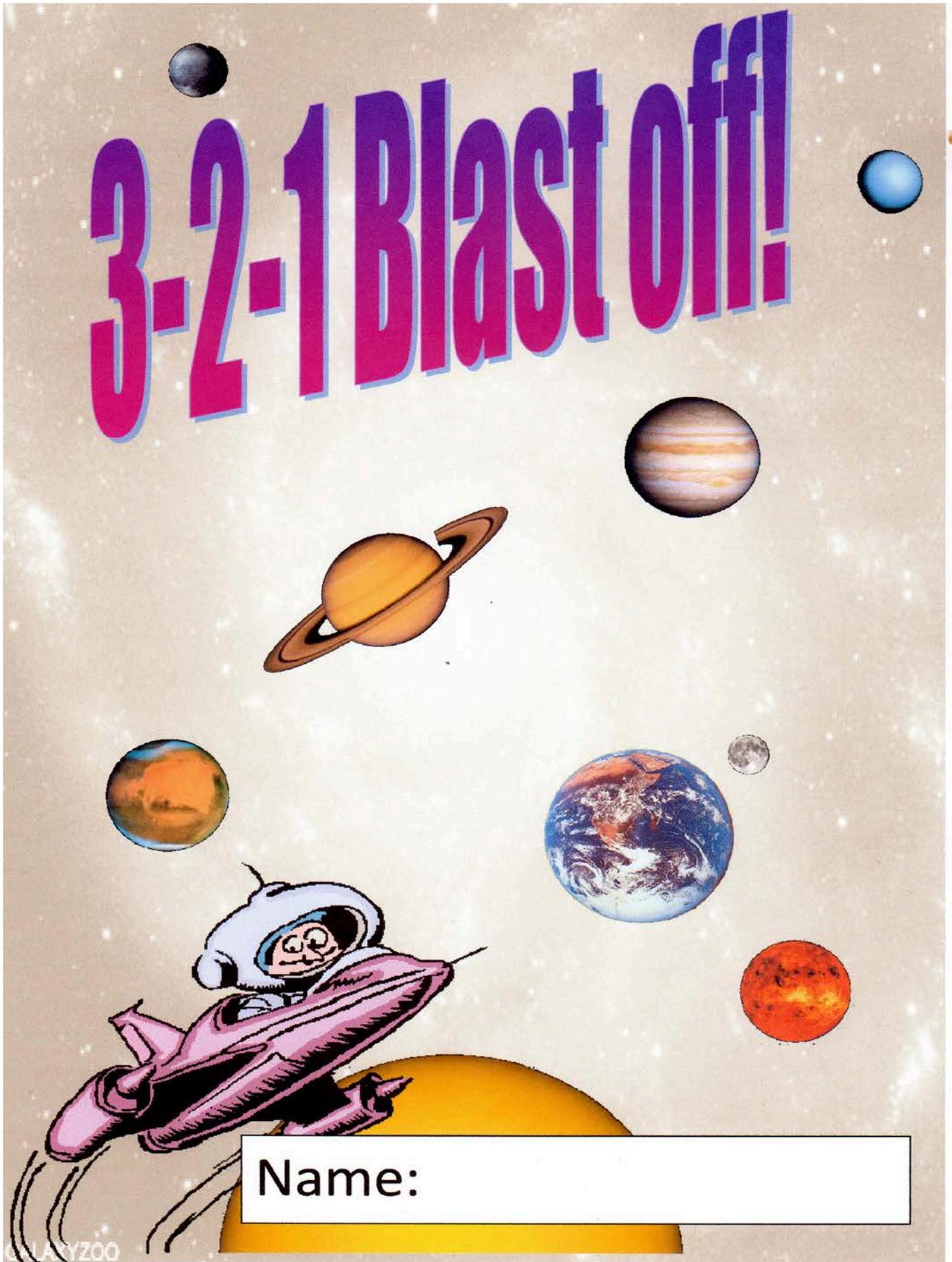


Conductive Hoop & Loop (Velcro™) can be used as a switch, it works in exactly the same way as the press stud. As explained earlier in Diagram 3.

The Conductive hoop & loop (Velcro™) in the open position breaks the

+ - - - - - track, turning the circuit off. (switching off Leds)

When the velcro is fastened the track is connected, turning the circuit on.(turning on Leds)



Name:

LEVEL 4	TICK BOX	LEVEL 5	TICK BOX	LEVEL 6	TICK BOX
I collected ideas from more than one place i.e. catalogues or the internet		I collected ideas from various sources, e.g. catalogues, the internet, the library, etc.		I explained how my research was useful in my design ideas	
I asked other people what they thought about my designs		I discussed my ideas with my teacher and other students		I made models to check my idea would work and also used CAD e.g. ProDesktop where appropriate	
I produced a process plan before I started		I wrote about my ideas and used drawing and modelling to check they would work		I discussed designs and ideas with fellow pupils and teacher, critically analysing which would function	
I labelled my ideas explaining how they would work		I analysed other people's products and ideas which helped me with my design		I produced detailed planning, e.g. flowcharts, sequence drawings to ensure I understood my making process	
My project solved the original problem		I drew a detailed process plan for making and evaluated how accurate it was at the end		I compared my final design to my specification, ensuring I met the requirements of the design brief	
My project looks like I wanted it to		My project looks like I wanted it to after making improvements as I went along		I worked with a range of tools, equipment, materials, components and processes	
I paid attention to the quality/presentation of my finished product		I paid attention to the finish/quality/Presentation of my finished project		I checked my process plan as my project developed and changed it as I went along	
I thought about improvements as I went along		I tested my final project myself and with others		I analysed my designs against the set criteria and selected the best design	
I used a range of tools/equipment correctly		I evaluated my project identifying improvements and explained how cost restraints may affect these		I explained any alterations, modifications and improvements and why I did these	
I evaluated my project identifying what was good & bad, how well it worked and how it could be improved		I described how my product could be made in multiple copies		I evaluated the way I have used sources of information and identified ways of improving the final product as it was being used	

HOMEWORK	DATE	TEACHER	DATE	TEACHER
RESEARCH				PROPERTIES & CHARACTERISTICS OF MATERIALS
DESIGN IDEAS				WHAT HAVE I DONE UP TO NOW?
CHILDREN'S MOOD BOARD				ADVERTISING MY BEAR
FINAL IDEA DRAWING				RECORD OF PAPERWORK AND COMPLETE IF NECESSARY
5 RULES OF H&S				NO HOMEWORK SET

LEVEL 7	TICK BOX	LEVEL 8	TICK BOX	EXCEPTIONAL PERFORMANCE	TICK BOX
I used a wide range of sources of information to develop ideas and explained how they helped to develop my ideas		I used a range of strategies to fully develop and model appropriate ideas.		I sought out information to help my design thinking.	
I looked at different shapes and investigated the form and function before communicating ideas		I identified conflicting demands on my product.		I recognised how products contribute to lifestyle and choices of a variety of client groups as my ideas developed.	
I recognised the needs of different users and developed realistic designs		I responded creatively to the brief, suggesting ways forward and explaining how my ideas addressed the demands.		I responded creatively to the design brief and was discriminating in my selection and use of information sources to support my work.	
I produced detailed planning, e.g. with realistic timescales		I used my knowledge of materials to choose the best material based on its properties and characteristics for my design.		I interpreted and applied my knowledge and understanding creatively in new design contexts and communicated my ideas in new or unexpected ways.	
I adapted my methods of manufacture as changes developed		I used my understanding of others' designing by reinterpreting and applying learning in new contexts.		I used my understanding of others' designing in innovative ways.	
I worked with a range of tools, equipment, materials, components and processes taking full account of the material and tools characteristics		I organised my work, creating a gantt chart with timescales which I stuck to and amended as necessary.		I used a wide range of tools, equipment, materials, ingredients and components with a high degree of precision.	
I explained any changes I made giving sound reasons		I used a wide range of tools, equipment, materials, ingredients and components with precision.		My product is reliable and robust and fully meets the quality requirements given in the design proposal.	
I used appropriate testing to evaluate my product		I used accurate testing to inform my developmental work to solve technical problems.		Throughout the process I reflected critically and effectively.	
I modified my product in the light of the evaluation to improve its performance		I evaluated my project clearly identifying my findings and relating them to environmental, ethical and social and cultural dimensions.		I produced a clear evaluation with sound, innovative testing, utilising my findings to produce ways forward which related to the environment, ethical and social and cultural dimensions.	

ASSESSMENT SHEETS

DATE TEACHER

DATE TEACHER

The Design Brief		Word creator sheet		
Reclaiming, recycling etc diamond ranking sheet		Design ideas		
Reclaiming, recycling etc Word sheet		Process plan		
Reclaiming, recycling etc Wordsearch		Sewing machine labelling		
My Design Specification		Sewing machine practice sheet		
Product Analysis		What I've done up to now		
Star Diagram		Properties of materials		
Design brief wordsearch		Temporary fastenings and basic equipment		
Understanding colour tasks 1 & 2		Learning pyramid		
		Advertising my bear		

INTERIM ASSESSMENT

Student's comments

Target grade

INTERIM ASSESSMENT

Teacher's comments including steps which will help to improve your learning

FINAL ASSESSMENT

Student's comments

FINAL ASSESSMENT

Teacher's comments

NC LEVEL ACHIEVED	EFFORT	SIGNATURE OF STUDENT
	DATE	SIGNATURE OF TEACHER

Worksheet - Design Brief



NAME

The Design Brief

A major high street retailer wants to introduce a range of new products into their shops. They will be 'must have' type accessories, made from felt with flashing lights. They want you to design either a purse, or a pencil case with at least one flashing LED in its design.

The design cannot exceed 200mm in width or 150mm in depth and should be appropriate for young teenagers. There must be no more than 3 colours or tones of a colour in your design.

1. What am I being asked to make and what are all the components involved?

2. What materials will I be using and why are these suitable?



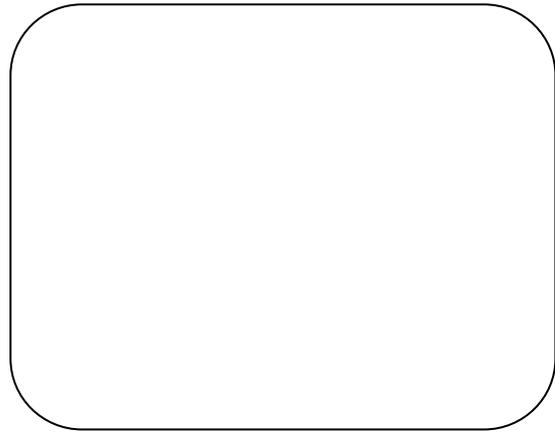
NAME

Threads

Using the sample piece of thread you have been given and the needle lie the thread on top of the piece of paper on the desk. Hold one end so that it cannot move and using the needle fray out the edges.

1. Place your piece of thread into this box with a small piece of self-adhesive tape.

Describe what you have found in full sentences.





NAME _____

My Design Specification

Designers use a specification when designing. This helps to guide your thinking and also gives you a set of criteria to judge your design against.

Using ACCESS FM to help you start, fill in each box with the information you know about the criteria your design must meet.

	What to think about	My design must.....
Aesthetics	Appearance. Use of colour, lettering, images, style.	
Cost	Value for money. Expensive or cheap to make?	
Client	The customer. How well does the product suit the client it is aimed at?	
Environment	Is the product environmentally friendly? Is it recyclable or refillable?	
Safety	Is the product safe to use? Are there any sharp edges or loose parts?	
Size	Is the product a good size?	
Function	Job. How well does the product do its job?	
Materials	Is the product made out of suitable materials?	

NAME _____



Research

Using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. Place your information here. Use extra sheets if necessary. You should use at least three different sources. Using the information provided by your teacher, annotate (write at the side and around it, using arrows to point to where you mean) with information about how this product meets or does not meet your specification.

NAME _____



Research

Using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. Place your information here. Use extra sheets if necessary. Use at least three different sources. You should answer these questions for each item you choose to go into your research.

Q1. Is this a suitable design?

Q2. Why is it a suitable design?

Q3 What is its functions?

Q4. Is the product made out of suitable material?

NAME _____



Research

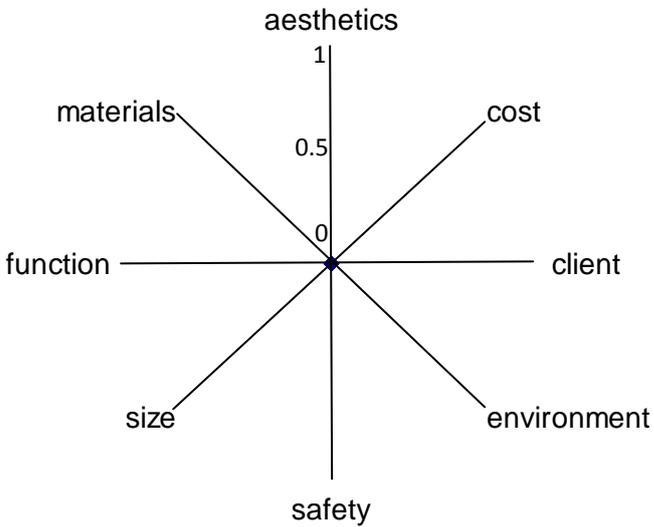
Using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. Place your information here. Use extra sheets if necessary. Use at least three different sources. You should complete these statements for each item you choose to go into your research.

A. The design used is.....

B. This is good because.....

C The function is the

Product analysis

<p>Product _____</p> 	<h2>Product Analysis</h2> <p>What are the strengths of this product?</p> <hr/> <hr/> <p>What are the weaknesses of the product?</p> <hr/> <hr/> <hr/> <p>How can the product be improved?</p> <hr/> <hr/> <hr/>
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Teacher notes

The above score card can be used to help analyse either real products which you have brought in or from previous classes or to analyse photographs of appropriate products brought in for research.

The following pages have some good products to use and can simply be laminated for use in more than one lesson.

Small groups work well for this exercise with a nominated spokesperson.

This score sheet can also be used towards the end of the design and make to help evaluate the finished products.



NAME _____

**Create a process plan of your design.
For example: the first task you think
might be first could be 'machine all**

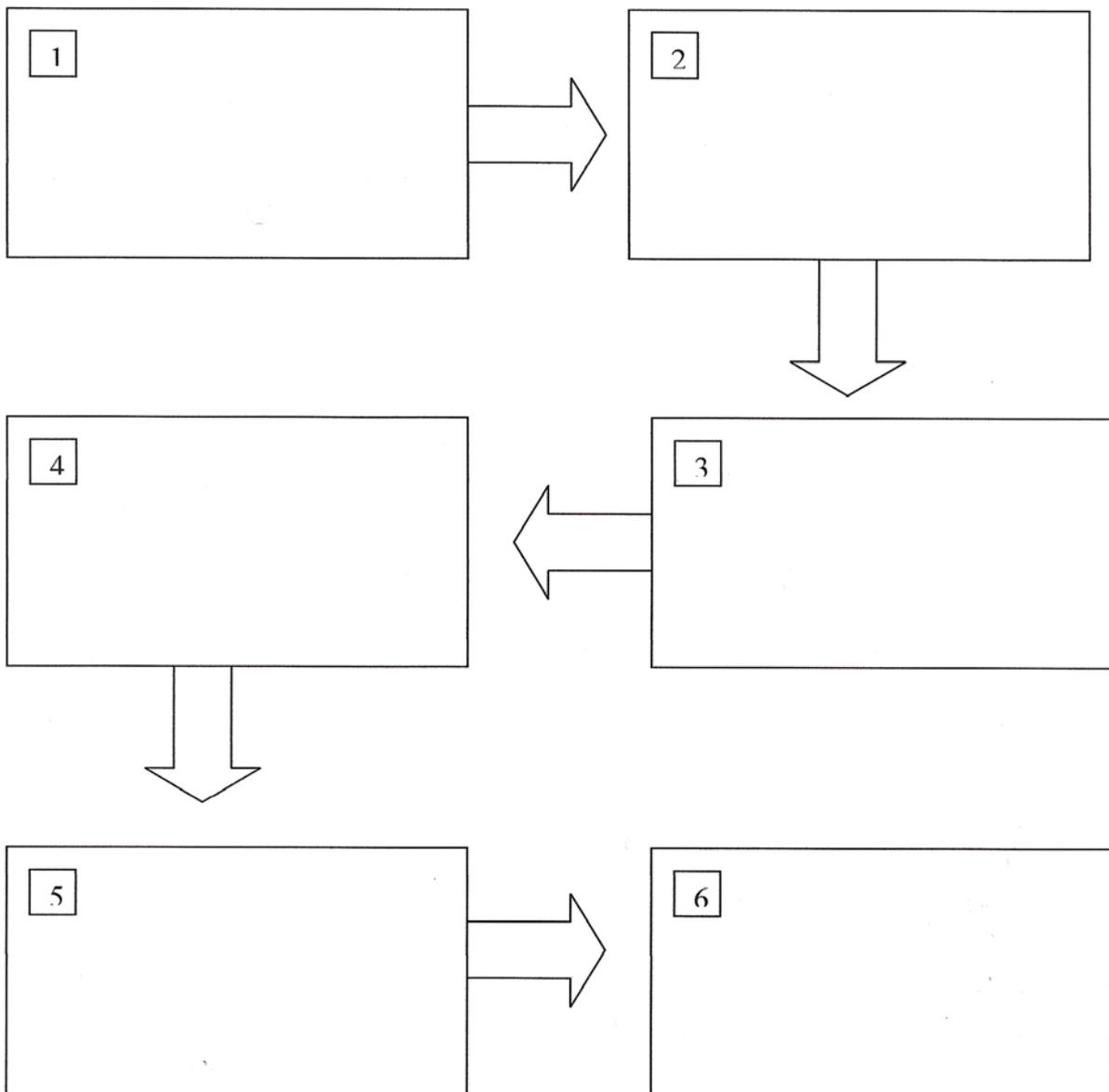
pieces'?



NAME _____

Create a process plan of your design.
For example: the first task you think
might be first could be 'machine all the

pieces NAME _____





Process Plan

Sort the following statements into the order you will use to make your product.

- Attach pieces together
- Attach electronics
- Cut out pattern pieces
- Sew on machine
- Plan route for conductive thread
- Attach adhesive backed felt

1	
---	--

2	
---	--

3	
---	--

4	
---	--

5	
---	--

6	
---	--



Name _____

1. Write 2 sentences showing what you know about each of the following materials. They must be complete sentences!

Fleece

Leds



TEMPORARY FASTENINGS & BASIC EQUIPMENT

NAME

In textiles before we start sewing we need to use what are known as temporary fastenings or fixings to hold the material together safely and securely before sewing.

We also have certain basic items of equipment that you need to learn the names of and how to use properly.

Label the pictures and write one sentence explaining what that piece of equipment is used for:

1. S _ E _ R _ These are only used for

.....

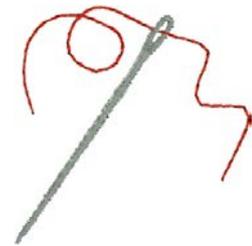


2. T _ P _ M _ A _ S _ R _ This is used



for _____

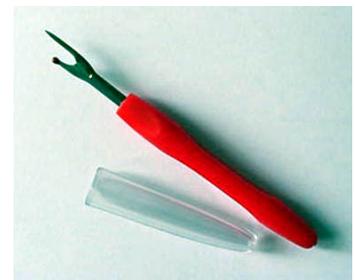
3. N _ E _ L _ This is used



for

4. S _ I _ C _ R _ P _ E _

This is used for



.....

5. T _ C _ I _ G

This is used for



GRADE ACHIEVED AND COMMENTS



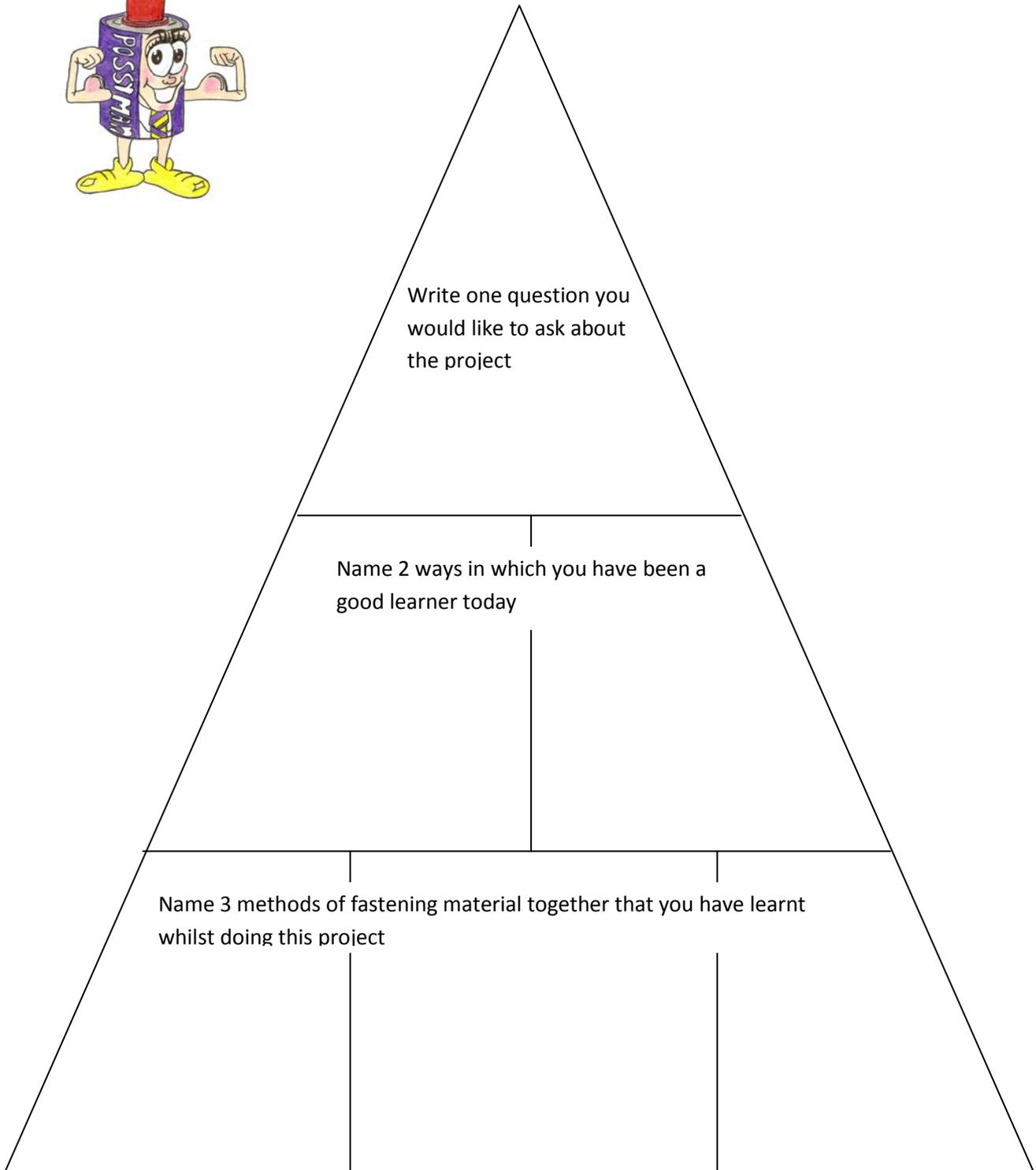
What I've done up to now

Name _____

Write in the box below what you have done up to now. For instance: Where did your design come from, what influenced you, what process did you use to get where you are up to now, how difficult have you found using the tools, was your process plan correct or has it been changed? You may add other information to this list. This information will help at the end of the project when you have to evaluate your product

Learning Pyramid

Name _____





Advertising my purse/pencil case or mobile phone holder

Name _____

You are to design a small flyer for distribution to potential customers in the local shopping centre. Think about what information would persuade someone to buy your product. It should be brightly coloured and informative, advertising the different functions of your chosen product.



Light Stitches
E-Textiles for Education

Website: www.lightstitches.co.uk

email: sales@lightstitches.co.uk