KEY STAGE 3 DESIGN & TECHNOLOGY

Book 1 - Electronic Textiles
Teacher's Resources

Light Stitches
www.lightstitches.co.uk

Teacher Resources
Light Stitches Book 1
E-Textiles

Contents

Introduction

This project Light Stitches Book 1 E-Textiles Teacher's Resources has been designed and aimed specifically at year 9's as an introduction to product design to encourage the mixing of different D&T elements. It could however also be used quite successfully in primary schools with suitable resources or for older students as well. The contents of this book are intended for teacher's planning for e-textiles. The information and resources are designed for you to choose some or the entire scheme and projects. There is a separate e-textiles project book for the students or as another reference for the teacher.

This project would be ideal as a starter project going into GCSE work. In these days of tight budgets these items could also be made by a class as group work. By dividing the class into 3 groups and each one working on each design and its development as a group with a presentation to the rest of the class at the end, this way only 3 items are made instead of over 20 thus reducing costs.

The 'electronic textiles projects' are ideal for producing a realistic design and to make it suitable for a retail market. They become unique smart projects by their inclusion of LEDs and the use of conductive thread and switches.

Any specialised components you may require such as LEDs, battery holders and conductive thread are available from Light Stitches or Rapid electronics. There are also some ready made kits available.

Please see our website for the latest projects. We hope you find all the information and resources useful and that the students find this to be an enjoyable scheme of work. There is also a Power Point Presentation available and videos with each product found on our YouTube channel Light Stitches.

If you have any problems, please do not hesitate to contact us at sales@lightstitches.co.uk.

Conductive Thread

The mixed properties of electronics and textiles was unheard of until a few years ago. 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 and sensors 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 top just the spool for the side of the design you wish to have the circuit on.

The conductive thread used by Light Stitches is a medium weight and comes on a bobbin of approximately 6M or 150M reel. 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.

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.

Conductive Hook & Loop

Hook and loop has been around for decades, it is used in various applications and designs which are always evolving. It is often described as "Velcro" but this is a trade name so we will call it conductive hook and loop.

The hook and loop is spray coating with liquid silver. Silver is used because it possesses the highest electrical conductivity of any element. It also has the highest thermal conductivity of any metal. Electrical conductivity measures an object's ability to accommodate the transport of an electric charge.

Electrically conductive hook and loop is used in all sorts of projects regarding radio frequency or electromagnetic interference. Essentially, it can protect equipment or people from high-intensity electromagnetic fields. It can also prevent the escape of signals from secure facilities. This makes it especially useful in the military, government buildings, hospitals, and private or classified organizations.

The resistance of electrically conductive hook and loop has a maximum of 1.8 ohms per square inch on the hook, and 1.4 ohms per square inch on the loop. The closure combines for 0.8 ohms through resistance and has a cycle life of around 5,000 closures.

For E- Textile project usually a 10cm long strip of conductive hook & loop is used. This conductive strip is used where you need to make a complete circuit by simply forming a connection between the hook and loop pieces. You can use this hoop and loop to light LEDs with a simple on/off switch. Hook & Loop strips are extremely versatile touch fasteners.

Hook and Loop fasteners are Ideal for making many projects including light up dog collar or other wearable projects including a reflective jacket. It is used in the same way you would use conductive thread.

DESIGN AND TECHNOLOGY SCHEME OF WORK KS 3				**DESIGN AND MAKE**	
PROJECT TITLE: LIGHT STITCHES (1) E-textiles Teacher's Resources				**10 x 1 HOUR SESSIONS**	
WEEK	**LEARNING OBJECTIVES**	**TEACHING ACTIVITIES**	**LEARNING OUTCOMES** Students should:	**ASSESSMENT**	**HOMEWORK**
1	To understand the design brief. To gain an understanding of conductive thread. To understand the assessment booklet and their interactive role in it.	Start introduction with demonstration of the e textile product Distribute and talk through the design brief sheet Use Power Point presentation (PPP) to discuss thread and how it differs from sewing thread. Students to complete Thread worksheet. Distribute and explain the assessment booklets.	Understand the goal of the design brief. Understand the different properties in conductive thread compared to sewing thread. Understand the benefits of assessment	Completion of – What am I being asked to make? Threads worksheet	Research – collect pictures of textiles which are designed with road safety in mind.

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
2	To understand how to write a basic specification using ACCESS FM A = aesthetics C = cost C = client E = environment S = safety S = size F = function M = materials To recognize the usefulness of research.	Link to previous lesson with use of demonstration kit and outline of the lesson contents. Explain ACCESS FM and how it relates to the design of a product. It is important to get this across to the students. This task could be done in groups with analysis of findings at end of session. The students could be split according to ability or with peer teaching in each group. Using the research provided plus the pupils' own research set for homework analyse the appropriate choices, why and why not.	Be able to apply ACCESS FM to the writing of a design specification. Understand how to select appropriate research.	Completion of – My Design Specification Complete the research sheets with the homework from last week.	Using the design sheet – prepare at least 2 design ideas, coloured and with annotation to explain your idea – remember to keep in mind the demonstration kits as to how your design will work and keep your designs within your specification criteria.

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
3	To appreciate other people's designs and be able to analyse their appropriateness.	Links to previous lessons by demonstrating the original model again. Using the product analysis photographs and the worksheet pupils (working in groups) analyse the products	Understand designers' thoughts when designing and how to analyse their function and appropriateness in design	Completion of – product analysis sheets Presentation of results	E- textile products mood board – Produce a mood board of any suitable e-textile products. Use a range of resources Internet Papers Magazines Catalogues Leaflets

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
4	To understand circuits To appreciate the difference between the different switches.	Link to previous lessons by the demonstration kit again but this time concentrating on the design of the light pattern and how the circuit works. Use the power point to help demonstrate how the circuit works. Understand the different switches and which would be the most appropriate for the design ideas. Using their previous homework pupils will analyse their two initial ideas in their groups using the star diagram to help them choose the best design.	Students will create a small circuit to light one LED using a switch and conductive thread. They will understand the difference between batteries holders with switches, without switches and soft switches . Also, which is most appropriate battery holder to use and when. To analyse their designs and choose the best one based on results.	To complete the tasks on the worksheets with experiments and tasks – differentiation can be shown by success of ideas and experiments, also the diversity of their design work Alternatively, with group work a small analysis of the learning achieved.	To choose the best of their design ideas and develop it using the knowledge learnt today about circuits and battery holders. Produce an A4 drawing with colour and annotation in readiness for next lesson. Use the exemplar work provided to show what is expected. Extension work word search available – look at different designs that use different switches.

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
5	To interpret their design and suggest a process plan for making their design, changing where necessary.	Teacher to demonstrate a process plan and link to the industry a one off batch, mass and continuous. Students to continue with making a process plan and finalise their design whilst assessment takes place.	Will understand the importance of considering the making process. Will understand where they are with their understanding of the project and what they need to do to achieve more.	Assessment lesson where each student discusses their design with the teacher and receives progress with this project. Assessment sheet completed up to the design stage with explanation given as to what is required from the student in order to achieve more. Grade achieved on success of circuit.	To write five rules of safety in the textiles workshop based on their previous knowledge. This will form part of their contract to be able to work safely in a workshop environment and will be signed by the student after checking by the teacher next week prior to starting any work. Extension task – what could have been done to improve on the designs i.e. quality, finishing etc.

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
6	To show their understanding of the Health and Safety (H&S) in a textiles workshop To build and consolidate on their previous knowledge of pattern making	Link to previous lesson's homework with the H&S contract Teacher to demonstrate how to create one basic pattern and students to create their pattern from this information Students to cut out their patterns from paper and move on to using fabric if ready Students to practice their sewing technique on sewing machines	Will understand the need for H&S in a textile's workroom Will build and consolidate their previous knowledge of pattern making Will understand how multiple products can be made of the same product Will improve their skills in using a sewing machine and in pattern laying out	Feedback on pattern task and on their sewing skills on a machine	Make a paper drawing of your circuit required for your design

WEEK	LEARNING OBJECTIVES	TEACHING ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
7	To create the pattern pieces To consolidate their previous knowledge and accurately cut out the pattern pieces To understand how multiple copies can be made of the same product	Students to practice their sewing machine technique on the practice sheets. Students to cut out their patterns and then their fabric.	Students will learn how to sew with more accuracy on a machine. Students will learn how to use a pattern and how multiple items can be made.	Individualised attention around the classroom, providing one-to-one feedback formatively.	To write a record of what they have done up to now. Where did their design come from, what influenced them, what process did they use to get where they are up to now, how difficult did they find using the tools, was their process plan correct or has it been modified. This information can help later in their evaluation.

WEEK	LEARNING OBJECTIVES	TEACHER ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
8	To understand how to stitch their e-textile product To understand how to assemble the product	Teacher to demonstrate how to use hand stitching in the design to cover the circuit if needed. Lesson is broken down into small demo pieces to explain how to assemble. The Power Point can help with the circuit sewing again.	Students will stitch their battery cover and sew their circuit.	Individualised attention around the workroom providing one-to-one feedback formatively.	Design a name for your product. Draw in full colour a 'flyer' which could be given to potential customers to explain the functions of your product. Worksheet – advertising my product .

WEEK	LEARNING OBJECTIVES	TEACHER ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
9	To appreciate the quality finish of a product To accomplish completion of project including any missed paperwork	Teacher to demonstrate the final product and how to combine the components along with the last minute jobs. Emphasise the quality of the finished product and expectations.	Students will appreciate the quality of a finished piece and take on responsibility for their own learning	Assessment based on the quality and success of the final outcome.	Record of completed worksheets obtaining any missed sheets and completing for homework – What I've done up to now worksheet Extension task – How could I improve the original design i.e. quality, finishing, etc

WEEK	LEARNING OBJECTIVES	TEACHER ACTIVITIES	LEARNING OUTCOMES Students should:	ASSESSMENT	HOMEWORK
10	To understand the purpose of evaluating and the benefits of same To comprehend how well they achieved throughout the project and how they could achieve more next time by assessment tutorial	Teacher to explain the purpose of evaluation and the lessons to be learnt for future tasks. All students to complete the evaluation sheets in full sentences Working in small groups they can evaluate their peers work and relate it back to the design specification, how well it meets the specification.	Understand the importance of evaluating their own product and each other's work.	Assessment marking sheet to be completed based on final product, completed paperwork, evaluation and discussion with student.	None

Lesson Plans – week one

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources **LESSON TITLE** 1. Understanding the design brief	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply):** To understand the design brief. To gain an understanding of Conductive thread. To understand the assessment booklet and their interactive role within it.

RESOURCES:
Demonstration products, The Design Brief – Worksheet, Threads worksheet, Assessment booklets. Samples of wire and threads are also useful. Small pieces of thread and needles.

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

L E S S O N S E Q U E N C E		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Introduce the design brief with a demonstration of the e-textile products. Explain their functions and show how the product lights up.		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Explain and discuss design brief. Using the power point to help, explain the difference between normal sewing thread; wire and conductive thread. (Use of samples are useful, maybe with a piece of wire sewn onto a piece of fabric by over sewing it down. Show how it affects the properties of the fabric i.e. drape.) Take feedback Students complete individual work sheets. The worksheet needs small pieces of thread and a needle to allow the students to untwist the thread and see how it is made up. Discussion and explanation of assessment for learning booklet and role the student plays in self- assessment along with the advantages for them.		
	PLENARY (include assessment of learning outcomes) : Completion of what am I being asked to make worksheet and setting of homework		

HOMEWORK: Homework – research – collect pictures of e-textile work.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Understand the goal of the design brief and understand the basics of the difference between, thread, wire and conductive thread.
Some students will be able to:
Explain how thread is made, how wire is made and the advantages of conductive thread
Some students will have progressed even further and will be able to :
Be able to see other applications for the use of conductive thread

Link to next lesson:
Writing a product specification

Role of Classroom Assistant (if applicable)

Notes

Lesson Plans – week two

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources **LESSON TITLE** 2. Writing a product specification	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** To understand how to write a basic specification using ACCESS FM To recognise the usefulness of research
RESOURCES: Demonstration products, My Design specification worksheets, research sheets, Design sheets.	
CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues	

LESSON SEQUENCE		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson with use of demonstration products and précis of lesson contents		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Explain ACCESS FM and how it relates to the design of a product. Students to complete – My Design Specification This task could be done in groups with analysis of findings at end of session as plenary. The groups could be split according to ability of with peer teaching in each group. Using the research provided plus the pupils' own research set for homework last week, analyse the appropriate choices, why and why not.		
	PLENARY (include assessment of learning outcomes) : Completion of what am I being asked to make worksheet, word searches and setting of homework		

HOMEWORK: Homework – using the design sheet – prepare at least 2 design ideas, coloured and with annotation to explain your idea – remember to keep in mind the demonstration products as to how your design will work and keep your designs within your specification criteria.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Apply ACCESS FM to the writing of a design specification.
Some students will be able to:
Apply ACCESS FM to the writing of a design specification and how to select appropriate research
Some students will have progressed even further and will be able to :
Analyse others information and choose appropriate research, suggesting improvements

Link to next lesson:
Product analysis

Role of Classroom Assistant (if applicable)

Notes

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Lesson plans – week three

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** Appreciate other people's designs and be able to analyse their appropriateness
LESSON TITLE 3. Product Analysis	

RESOURCES:
Demonstration products, Product Analysis worksheets

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE	For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson with use of demonstration products, division of class into groups and reminder of group working rules. (If none available the class could be asked to set up 5 rules as a starter)		
MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Using the product analysis photographs and the worksheet, pupils (working in groups) analyse the products. (Set a time limit) Each group to present their findings to the rest of the class		
PLENARY (include assessment of learning outcomes) : Discussion of purpose of a mood board.		

HOMEWORK: Homework – using previous discussion to help – produce a mood board of any suitable e-textile products.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Understand a designer's thoughts when designing and how to analyse their function and appropriateness in design.
Some students will be able to:
Use another designer's thoughts to help in designing their product and apply improvements highlighted from the product analysis presentations
Some students will have progressed even further and will be able to :
Use the product analysis to create a totally unique product

Link to next lesson:
Understanding of a basic circuits.

Role of Classroom Assistant (if applicable)

Notes
Design a poster showing the group work rules for display in the classroom

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Lesson plans – week four

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources **LESSON TITLE** 4. Understanding circuits and the different battery holders	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** Will understand the difference between using different materials to use in e-textiles Will consolidate previous knowledge of materials Will understand how to complete a circuit

RESOURCES:
Demonstration products, Power point, word search, conductive thread, circuit boards, one led per student, Exemplar examples of final designs

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson with use of demonstration product, concentrating on the design of the light pattern, how circuits work and the different battery holders Use the power point to help		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Students to complete a one led circuit using the circuit board and the conductive thread. Needles can help to attach thread to board but not really necessary as to knot thread from positive terminal to positive leg on led is all they need to do and the same for the negative terminal and leg on led. Using the power point to help. Students to analysis the different battery holders they could use in their design. Students to complete worksheets.		
	PLENARY (include assessment of learning outcomes) : Quick fire questions on learning for today. Setting of homework		

HOMEWORK: Homework – Choose the best of their design ideas and develop it using the knowledge learnt today. Produce an A4 drawing in colour and with annotation ready for next lesson. Show exemplar work

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Understand the difference between the different battery holders and how to complete a circuit
Some students will be able to:
Design with confidence using the felt materials and be able to include an electronic circuit for lights within their design with a battery holder.
Some students will have progressed even further and will be able to :
Design their own complete circuit pattern to achieve their unique design

Link to next lesson:
Process planning and assessment

Role of Classroom Assistant (if applicable)

Notes:
Word search

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Lesson plans – week five

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** Will understand the importance of considering the making process Will understand where they are with their understanding of the project and what they need to do to achieve more
LESSON TITLE 5. Process planning and assessment	

RESOURCES:
Demonstration models, process plans, assessment booklets

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE	For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
INTRODUCTION (link to previous lesson or new unit of work): Display of design art work set as homework. Discuss each other's ideas		
MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Teacher to demonstrate a process plan and link to industry, one off; batch; mass & continuous. Students to continue with making a process plan and finalise their design whilst assessment takes place. Assessment lesson where each student discusses their design with the teacher and Receives feedback on their progress within this project Assessment sheet completed up to the design stage with explanations given as to what is required from the student in order to reach target level.		
PLENARY (include assessment of learning outcomes) : 5 minute quick fire questions on talk given at beginning of lesson based on process plans and the links to industry.		

HOMEWORK: Homework – To write 5 rules of safety in the textiles workshop based on their previous knowledge. This will form part of their contract to be able to work safely in a workshop environment and will be signed by the student after checking by teacher next week prior to starting any DMA.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
understand the importance of considering the making process and where they are with their understanding of the project
Some students will be able to:
Link their process to industry processes and identify how they can improve their performance to meet their target grade
Some students will have progressed even further and will be able to :
explain how it would be made in industry

Link to next lesson:
H&S and pattern making

Role of Classroom Assistant (if applicable)

Notes
What could be done to improve on the design here; i.e. quality, finishing, etc.

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Lesson plans – week six

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources **LESSON TITLE** 6. H&S and pattern making	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** Will understand the need for H&S in a textile workroom Will build and consolidate their previous knowledge of pattern making Will understand how multiple products can be made of the same product Will improve their skills in using a sewing machine and in pattern laying out

RESOURCES:
Demonstration products, 2 basic designs patterns, machine sewing practice sheets

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE	For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson's homework with the H&S contract.	
	MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Teacher to demonstrate how to create one basic pattern and students to create their pattern from this information Students to cut out their patterns from paper and move on to using fabric if ready Students to practice their sewing technique on sewing machines	
	PLENARY (include assessment of learning outcomes) : On the demonstration pattern – draw in the circuit. Set homework	

HOMEWORK: Homework – create a drawing of your circuit needed to fit into your pattern pieces

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Create their own pattern for their fabric and their circuit
Some students will be able to:
Suggest improvements to their design through modelling in paper
Some students will have progressed even further and will be able to :
To describe how multiple copies of their product could be made in detail

Link to next lesson:
Cutting out fabric and sewing

Role of Classroom Assistant (if applicable)

Notes:
What could be done to improve on the design here; i.e. quality, finishing, etc.

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Lesson plans – week seven

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources **LESSON TITLE** 7. Cutting out fabric and sewing	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply) :** Will understand the need quality in sewing their product Will build and consolidate their previous knowledge of sewing Will understand to use press studs, conductive thread and battery holders and how to attach them to fabric
RESOURCES: Demonstration models, 3 basic designs patterns, machine sewing practice sheets	
CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues	

LESSON SEQUENCE	For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson's homework with demonstration of how their circuit will lie on the fabric and where the battery holder will need to go		
MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Teacher to demonstrate pattern laying and how not to waste fabric Students to cut out their patterns from fabric if not already done so. Demonstration of marking on fabric, i.e. chalk, fabric pens, Students to mark on fabric where the circuit will go Teacher to demonstrate how to place circuit in the fabric Students to students to check their circuit drawing		
PLENARY (include assessment of learning outcomes) : Using their homework from previous week, use chalk to mark on fabric where circuit will go. If possible, use 2 different colours of chalk to highlight positive and negative.		

HOMEWORK: Homework – write a record of what they have done up to now. Where did their design come from, what influenced them, what process did they use to get where they are up to now, how difficult did they find using the tools, was their process plan correct or has it been changed? Etc.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Cut out their pattern pieces and place eyelets in correct places
Some students will be able to:
Confidently mark their fabric in the best way for the job they wish to do
Some students will have progressed even further and will be able to :
consider different battery holders for holding the LEDS

Link to next lesson:
Stitching circuits and adding a battery holder and cover if needed.

Role of Classroom Assistant (if applicable)

Notes
What could be done to improve on the design here; i.e. quality, finishing, etc.

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Lesson plans – week eight

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply):** Will understand how to assemble their product Will build and consolidate their previous knowledge of sewing their circuit and complete and test
LESSON TITLE 8. Stitching circuits and assembling battery holder and adding a cover if needed into the design	

RESOURCES:
Demonstration models, conductive thread & conductive hook and loop, battery holders with switch, press studs, LEDs, long nose pliers, hook and loop tape, Power Point, advertising my product worksheet

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Link to previous lesson's homework with demonstration where the circuit will need to go and how to create an accessible battery cover if needed.		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, activities, group/pair work etc): Some students to be using machines and assembling the battery covers whilst other students will hand stitch the circuit in place. The Power Point can help with the circuit sewing again This continues on a rolling programme until all have done both tasks. Students who manage both tasks in the lesson can then move on to assembly of the final product.		
	PLENARY (include assessment of learning outcomes) : Gather circuits around a table for each to show how theirs works. If it doesn't work, some students will be able to suggest what is required to help the others.		

HOMEWORK: Homework – design a name for your product. Draw in full colour a 'flyer' which could be given to potential customers to explain the functions of your product. For those with access to IT, this could be done on a PC as opposed to hand drawn.

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Produce a successful circuit with battery holder and cover if appropriate
Some students will be able to:
Recognise how this design could be utilised in lots of different textile products
Some students will have progressed even further and will be able to :
Consider other ways to 'hide' the battery but still have accessibility and to help their peers troubleshoot

Link to next lesson:
Final stitching, assembly and testing

Role of Classroom Assistant (if applicable)

Notes
What could be done to improve on the design here; i.e. quality, finishing, etc.

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Lesson plans – week nine

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply):** Will appreciate the quality of a finished piece and take on responsibility for their own learning
LESSON TITLE 9. Final stitching, assembly and testing	

RESOURCES:
Demonstration products, conductive thread, battery holders with switch or without switch, press studs, LEDs, long nose pliers, hook and loop tape, Power Point. What I've done up to now worksheets

CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues

LESSON SEQUENCE		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Brief discussion of coming towards end of project and how important this lesson is as they all aim for a finished product		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, VAK activities, group/pair work etc): Demonstrate the final product and how to combine the components along with the last minute jobs. Students to take into account the quality of their finished items as they finish off the final jobs to end up with a completed project		
	PLENARY (include assessment of learning outcomes) : Group discussion on the project, preparing for next week's evaluation lesson. Discussion of each other's product names and display of advertising flyers		

HOMEWORK: Homework – From assessment booklet check out any worksheets not completed. Ensure these are done over the next week as non-completion will affect mark achieved over entire project

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Produce a successful completed product
Some students will be able to:
Suggest ways to improve on the quality of theirs and others finished products
Some students will have progressed even further and will be able to :
Take on responsibility for their own learning and check out what they need to do in order to ensure themselves of the best mark

Link to next lesson:
Evaluation and assessment

Role of Classroom Assistant (if applicable)

Notes
What could be done to improve on the design here; i.e. quality, finishing, etc.
How could I improve the original design i.e. quality, finishing, etc

Teacher Resources
Light Stitches Book 1
E-Textiles

Lesson plans – week ten

SUBJECT/CLASS CODE	DATE	PERIOD	MALES	FEMALES	TOTAL

UNIT/MODULE LIGHT STITCHES (1) E-textiles Teacher's Resources	**AIMS/OBJECTIVES (e.g. to know, to understand, to apply):** Will understand the importance of evaluating their own product and each other's work
LESSON TITLE 10. Evaluation and assessment	
RESOURCES: Assessment books, evaluation sheets	
CROSS-CURRICULAR LINKS (e.g. Lit/Num/ICT/CEG/Citizenship) Environmental issues	

LESSON SEQUENCE		For coursework/project lessons individual assessment sheets should be used to monitor progress regularly	TIME
	INTRODUCTION (link to previous lesson or new unit of work): Explain the purpose of evaluation and the lessons to be learnt for future tasks		
	MAIN ACTIVITIES (include timings, starter activity, differentiation, VAK activities, group/pair work etc): All students to complete the evaluation sheets in full sentences Working in small group they can evaluate their peers work and relate it back to the design specification, how well it meets the specifications, etc. Teacher to assess each student utilising the assessment marking sheet based on final product, completed paperwork, evaluation and discussion with student.		
	PLENARY (include assessment of learning outcomes) : Group discussion on the project, how did they feel about the project; what skills did they learn; etc		

HOMEWORK: None

Learning Outcomes : By the end of the lesson:
Most students will be able to:
Understand the importance of evaluating their own product and each other's work
Some students will be able to:
Critically evaluate their own and other's products
Some students will have progressed even further and will be able to :
Will be able to suggest what they can do in the future to improve their mark plus suggest how they can help others to improve

Link to next lesson:

Role of Classroom Assistant (if applicable)

Notes

LEVEL 4	TICK BOX	LEVEL 5	TICK BOX	LEVEL 6	TICK BOX
I collected ideas from more than one place i.e. 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 me 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. Pro Desktop 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 and 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			Paper drawing of circuit		
Design Ideas			What I have done up to now		
Mood Board			Adverting my product		
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 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	

ASSESSMENTS SHEETS	DATE	TEACHER		DATE	TEACHER
The Design Brief			Word search		
Threads			Process plan		
My Design Specification			Sewing machine practice sheet		
Research			Advertising my product		
Product analysis			What I've done up to now		
Star Diagram			Learning pyramid		
My Design Sheet			Record of completed worksheets		

INTERIM ASSESSMENT
Student's comments

WWW (what went well) –
EBI (even better if) –

Target grade

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

FINAL ASSESSMENT
Student's comments

WWW (what went well) –
EBI (even better if) –

NC LEVEL ACHIEVED	**EFFORT**	**SIGNATURE OF STUDENT**
	DATE	**SIGNATURE OF TEACHER**

Name:

Project:

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' accessories, made from felt with flashing lights. They want you to design either a purse, bracelet/wristband 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? (battery holders etc.)

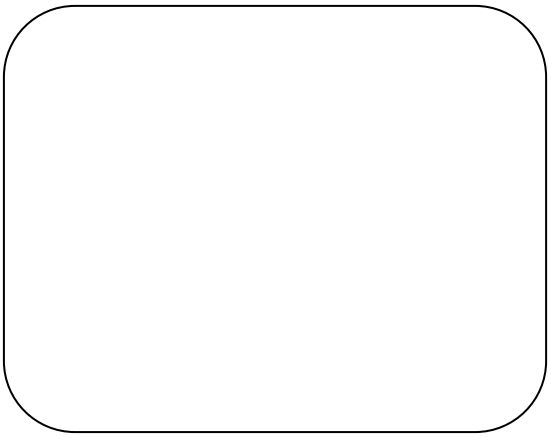
2. What materials will I be using and why are these suitable? (cotton, felt etc.)

Worksheet - Threads

Name_____

Threads
Using the sample piece of thread, you have been given and a needle, lie the thread on a piece of paper. Hold one end so that it cannot move and use the needle fray out the edges.

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



2. Describe what you have found.

Worksheet – My Design Specification

Name _____

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?**	

Worksheet – Research – higher ability

Name _____

Read your design brief and then using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. search for ideas for a purse, pencil case or wristband.

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.

Worksheet – Research – Middle ability

Name_____

Read your design brief and then using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. search for ideas for a purse, pencil case or wristband.

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 function?
Q4. Is the product made out of suitable material?

Worksheet – Research – Lower ability

Name_____

Read your design brief and then using different types of research, i.e. books; the internet; photographs; catalogues; visiting shops, etc. search for ideas for a purse, pencil case or wristband.

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 .....

Worksheet – My Design Sheet

Name_____

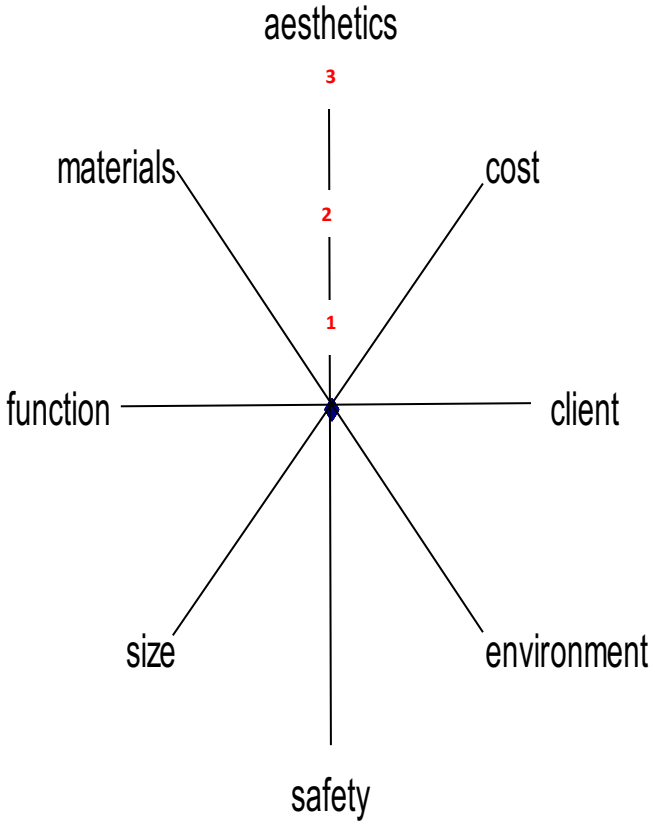
Draw 2 different designs which meet with your design specification. They should be coloured and annotated to explain your idea. Remember to keep in mind the demonstration products you have seen and how your designs will work.
(Use more plain sheets of paper if necessary)

Worksheet - Product Analysis

Teacher notes
The score card can be used to help analyse either real products which you have brought in or use the following page to use as product analysis.

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

Product: _____



Product Analysis

What are the strengths of this product?

_____
_____
_____

What are the weaknesses of the product?

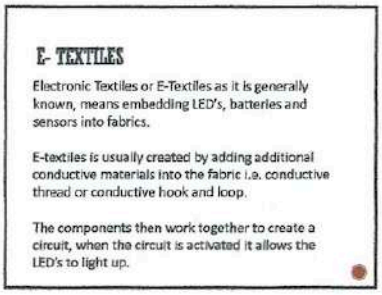
_____
_____
_____

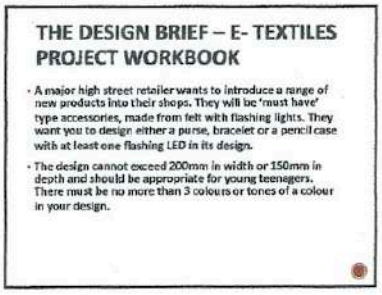
How can the product be improved?

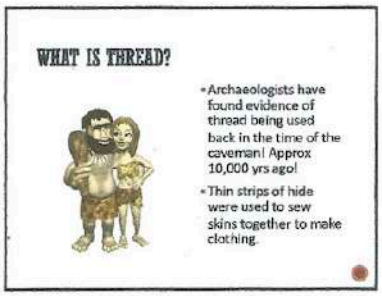
_____
_____
_____

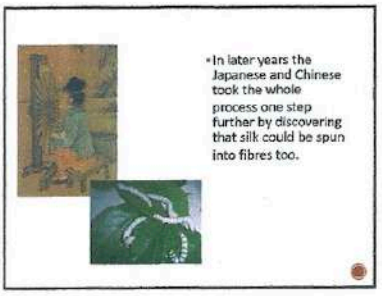
Product analysis photographs – a selection of e-textile products from Light Stitches that use different switches and LED's.

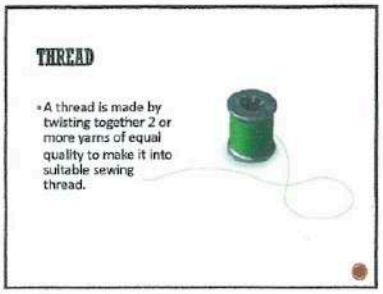
Power Point slide view

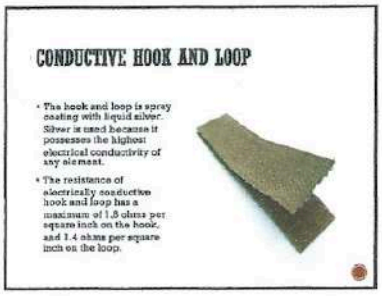




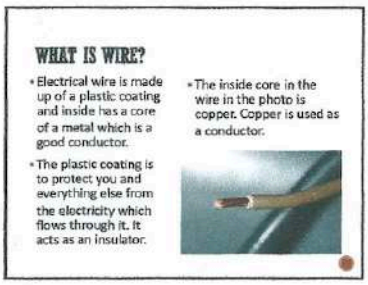


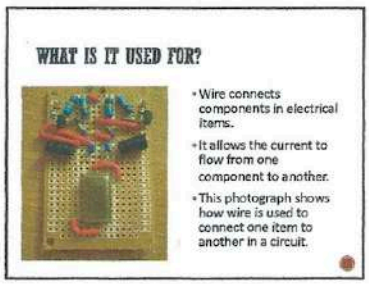


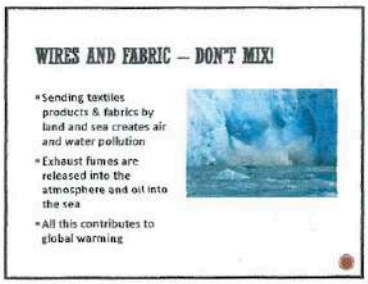


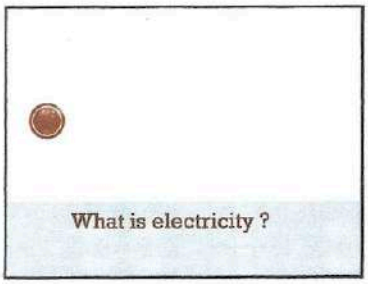


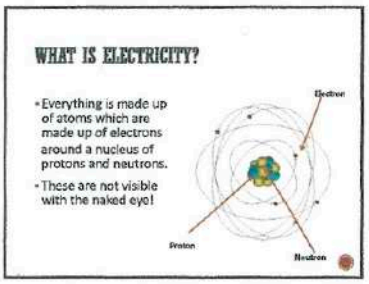
Power Point slide view

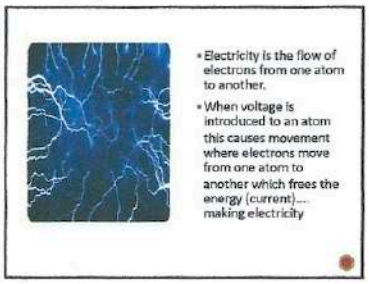


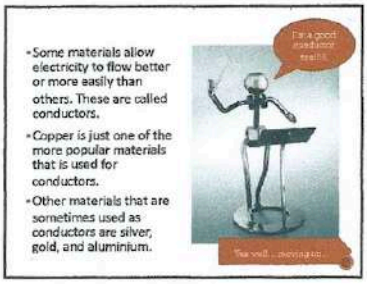




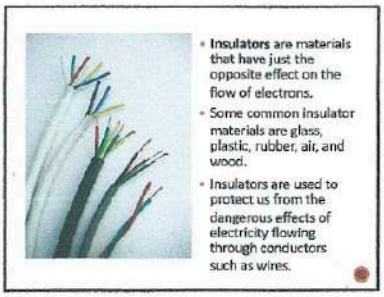


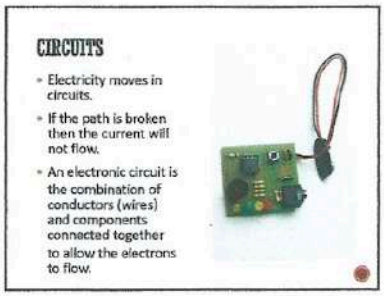


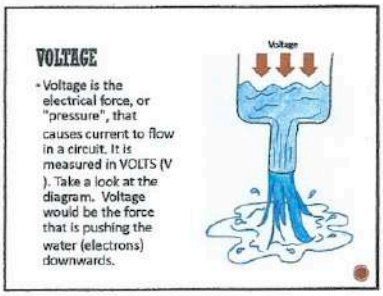


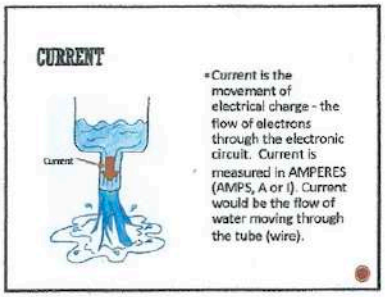


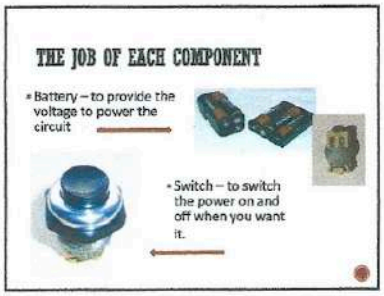
Power Point slide view

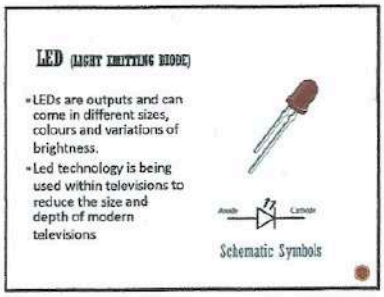


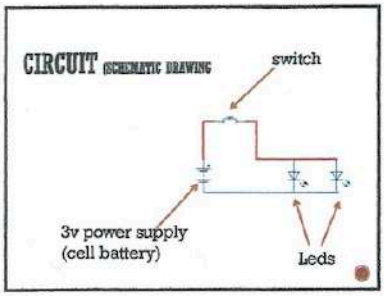


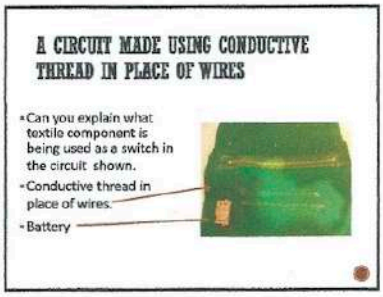


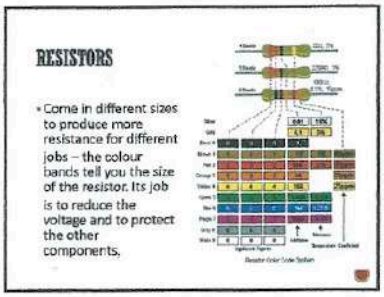












Word search – E-Textiles

Words used – find the words listed below on this e-textile word search.

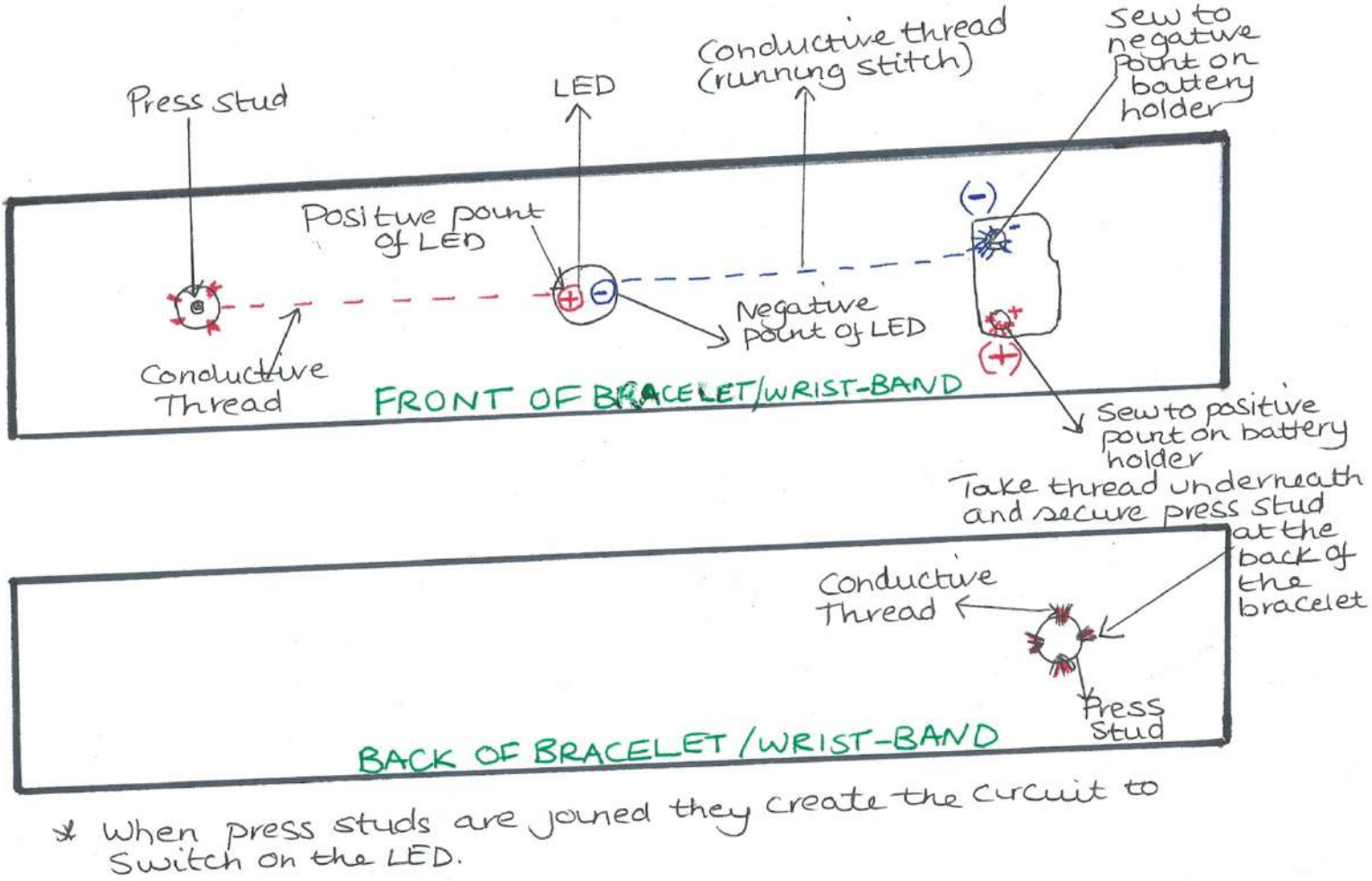
Battery holder, design, felt, key ring, pencil case, press stud, product, purse, soft switch

G V B U C Q V D H Q L O B Y M
E O L F X Y N X E V N A B U Z
Y S E G Y M L V F S T W B Y D
H L A P R O D U C T I L X D U
T Y U C M S P B E E M G X J T
X V S S L V E R N A R O N Y S
G W P Z V I Y L M Y J R H K S
U K O M F H C T I W S T F O S
J D J R O V J N B S G P M F E
L J P L X K I J E N Y U O K R
Q W D W H R W S I P L R L F P
D E I W B I U R P Q L S X U N
R R W I E J Y C C W Q E U U P
C Q S P Y E T X W B U M X U Q
M V K S K O V I L C N K X V A

Circuit example –Bracelet/Wristband Circuit

This simple circuit uses one LED, a battery holder, press stud and conductive thread. Once the circuit is complete the bracelet can then be decorated. An alternative idea could be as a festival wristband or a safety wristband using reflective material.

Diagram below shows the bracelet circuit



Worksheet – Process planning (higher ability)

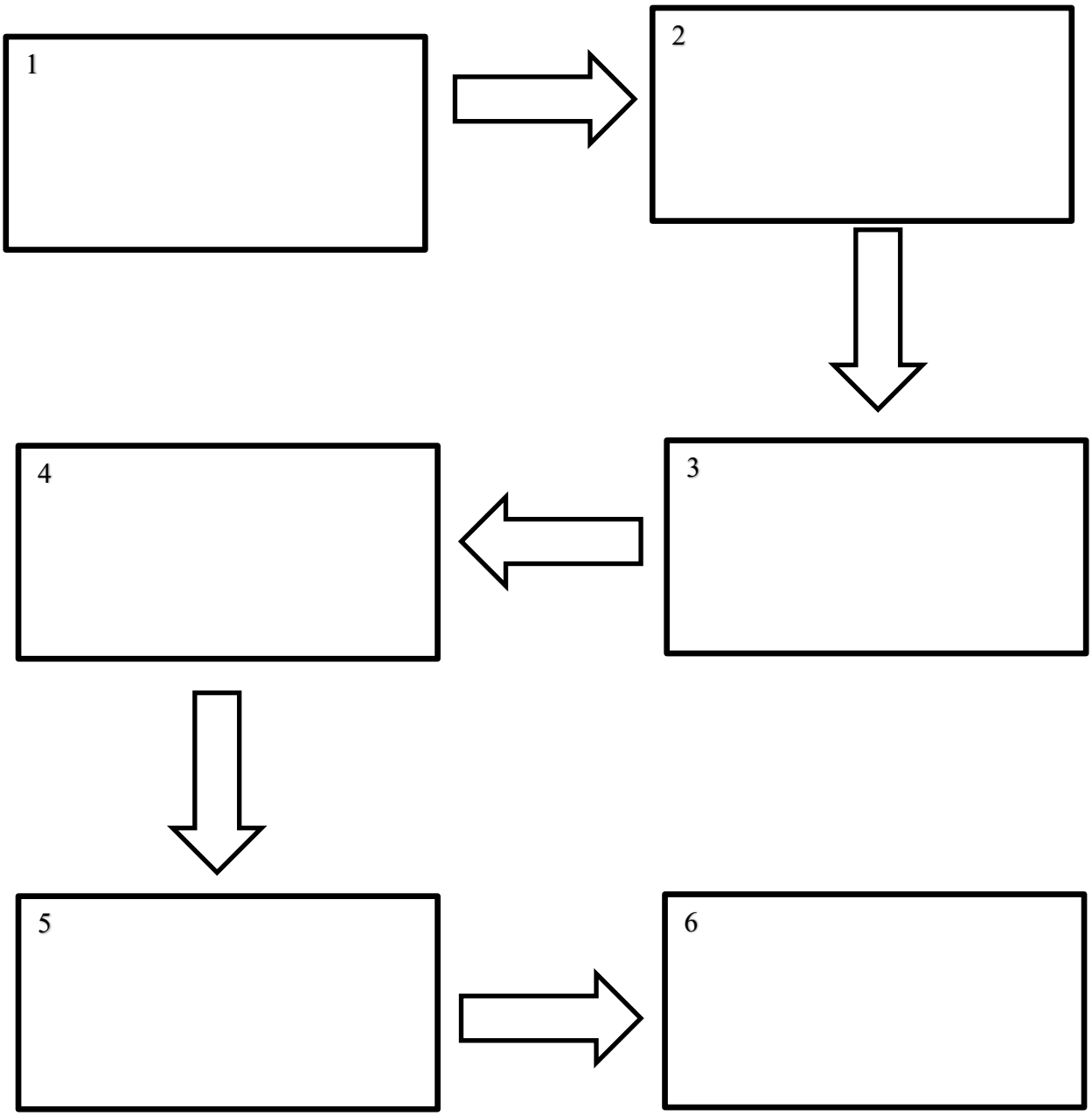
Name _____

Create a process plan of your design. For example: the first task you think might be first could be 'machine all pieces'? You could use a diagram or chart to show this.

Worksheet – Process planning (middle ability)

Name _____

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



Worksheet – Process planning (lower ability)

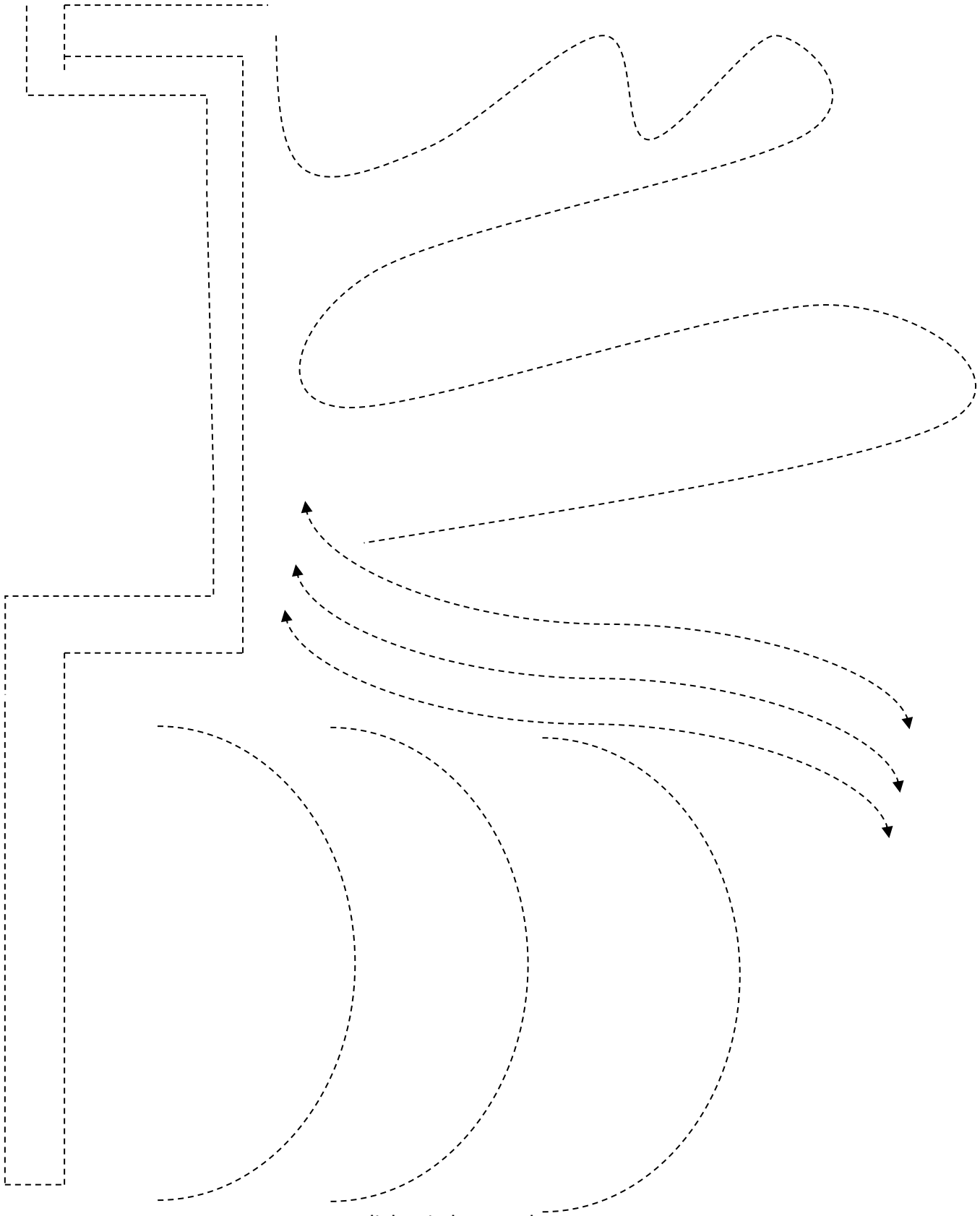
Name _____

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

- Attach pieces to blanket
- Sew on machine
- Sew in the components by hand
- Sew the pocket/flap for the circuit board
- Mark the fabric lining for where my electronic components need to be
- Cut out pattern pieces

1	2
3	4
5	6

Worksheet – Sewing machine practice sheets



Worksheet – Advertising my product

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 design.

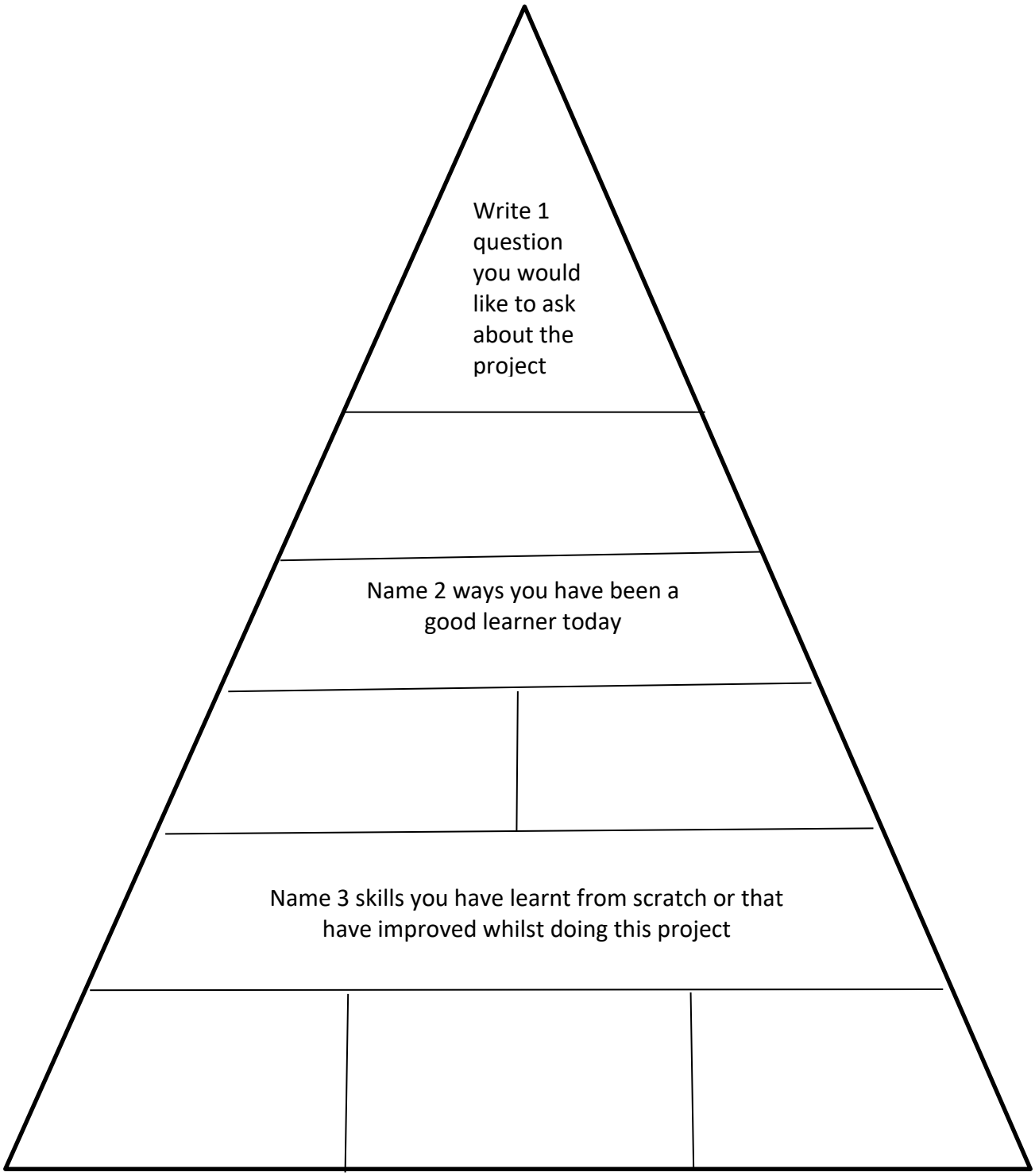
What I've done up to now

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.

Worksheet – Learning pyramid

Name _____



Worksheet – Record of completed worksheets

Name _____

Tick each one of the worksheet titles that are in your folder. If they are not there you will need to do them to get the best possible mark. Ask the teacher for another copy

TITLE OF WORKSHEET/BOOKLET	RAG
Assessment booklet	
The Design Brief	
Threads	
My Design Specification	
Research	
My Design Sheet	
Product Analysis	
Star Diagram	
E- Textile word search	
Process Planning	
Sewing machine practice sheets	
Advertising my product	
What I've done up to now	
Learning Pyramid	
My Evaluation	
Have I brought my assessment booklet up – to – date?	

Worksheet – Evaluation

Name _____

Answer the following questions in full sentences and as honestly as you can.

1. How well have you met the needs of the design brief?

2. Was your product successful or unsuccessful? Explain why.

3. What improvements could you make to your design?

4. What did you find difficult about the designing or the making?

5. Explain why you are satisfied or unsatisfied with your final piece.

6. What went well (WWW) and what would be even better (EBI)?

WWW –

EBI –