

Wearable Tech

The main focus is on understanding a range of products and the materials and processes used in their manufacture.

- Be able to evaluate existing products that are considered to be wearable technology
- Generate a number of ideas that include the use of technical fibres and fabrics that will enhance the experience of the wearer and can be considered as wearable technology

Designing

- There are opportunities to design products inspired by the examples included here and in further research, that incorporate different technologies into wearable products.

Making

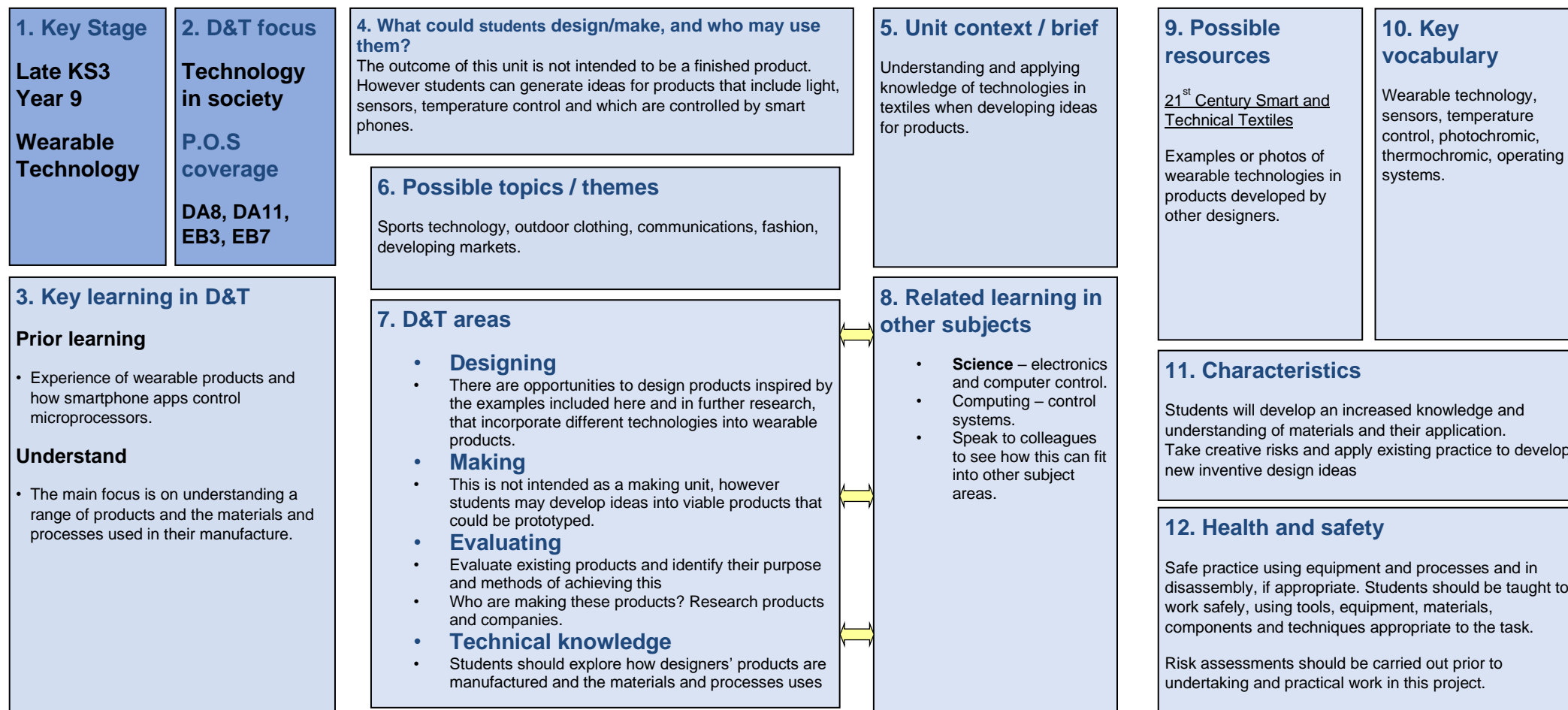
- This is not intended as a making unit, however students may develop ideas into viable products that could be prototyped.

Evaluating

- Evaluate existing products and identify their purpose and methods of achieving this
- Who are making these products? Research products and companies.

Technical knowledge

- Students should explore how designers' products are manufactured and the materials and processes used.



Key Learning:

- Textiles isn't about just sewing clothes and cushions
- Technical textiles are hugely important to us and the way we live

Unit 1: Introduction to Textiles	Unit 2: Textiles in Society	Unit 3: Textiles in the Future	Unit 4: Textiles in the Past	Unit 5: Textiles in the Present
<p>Learning Objectives:</p> <ul style="list-style-type: none"> Understand the importance of textiles in society and the environment. Identify the different types of textiles and their uses. Explain the role of textiles in the fashion industry. 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> Understand the role of textiles in society and the environment. Identify the different types of textiles and their uses. Explain the role of textiles in the fashion industry. 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> Understand the role of textiles in the future and the environment. Identify the different types of textiles and their uses. Explain the role of textiles in the fashion industry. 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> Understand the role of textiles in the past and the environment. Identify the different types of textiles and their uses. Explain the role of textiles in the fashion industry. 	<p>Learning Objectives:</p> <ul style="list-style-type: none"> Understand the role of textiles in the present and the environment. Identify the different types of textiles and their uses. Explain the role of textiles in the fashion industry.

1

Late KS3 (Year 9): Technology in Society: Textiles

'Wearable technology'

DA8, DA11, EB3, EB7

2

Dress to express

Agree on garments, weight, colour and texture to inspire and react to emotions and feelings.

In 2017 Philip Design developed the **Wearable Black** designed with sensors that respond to changes in the wearer's emotions and project them onto the outer textile and skin.

Wearable Black incorporates electronics into many products, including the garment and a soundbar which allows users to create the sensation of touch and the texture of a hug over distance.

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Body sensors

Sportswear labels' athletes use compression technology to help with muscle stabilisation and improve the blood flow to muscles.

Nike have developed **Adidas' which** contains strategically placed 3D printed patterns and surface manipulation to make users more aerodynamic.

The **Wearable** is a full-body haptic suit that allows the wearer to experience virtual and augmented reality using sensors based on haptics, motion capture and the analysis of biological data. Users can see, hear and feel sensations as they interact with games or various equipment.

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Learning Objectives

By the end of the unit you will:

- Be able to evaluate existing products that are considered to be wearable technology.
- Generate a number of ideas that include the use of technical fibres and fabrics that will enhance the experience of the wearer and can be considered as wearable technology.

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Wearable technology

What do you understand by the term 'wearable technology'?

- In pairs, list as many examples of wearable technology as you can.
- What are the reasons people might wear technology on their bodies?
- Discuss how technical products can be incorporated into clothing for different uses.

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Hot or not

Garments that cool or heat the body depending upon the environment, for athletes, in the workplace and for everyday wear.

The **Smart Coat by Intel** - Nike includes a lightweight heating system which opens heat as a flexible polymer. Another example is the **Intel and Intel** Conductor.

Oronko fabric has embedded sensors that allow users to change shape in response to heat. The shirt's sleeves roll up and down when hot or cold.

The **modiwear** and **photochromic** allow colour change in response to heat and light.

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A T-shirt operating system

One of the most interesting of the Intel and Intel Conductor is the **Intel and Intel** Conductor. The user can use their status, health, mood and images. It includes a wide range of interactive technologies, including using an app on a mobile phone.

Watch the video.

The University of Birmingham has developed a number of smart garments including an embedded change colour system using conductive electronics that generates and stores power using body movement.

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Wearable technology - where are we now?

Wearable technology includes devices such as VR headsets, embedded smartphone controlled sensors and activity trackers such as Fitbit watches that monitor your health and fitness.

Electronic and digital technologies are increasingly being incorporated into garments where they have the ability to interact with the body and control micro-environments and express emotions.

Developments for the military and gaming industries often lead the way in allowing individuals to interact with technologies directly.

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Dress to impress

Robotics, film and music have led the way with incorporating electronics into garments.

Uchi owns into a dress by fashion designer Pierre Cardin featured in his space race inspired 1967 collection.

The 1979 film **The Electric Blue** featured Robert Redford wearing a suit that lit up himself and his horse.

The **Black and Pink** performed during half time at the Super Bowl 2011 using LEDs on their and other performers' suits.

Lady Gaga and Katy Perry have both worn outfits that incorporated technologies to help their stage acts.

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Your turn...

Look at the four categories:

- Light-up garments or accessories
- Sensors in garments
- Temperature controlled garments
- Garments controlled by the wearer via smart phones

What would you use technology for in a garment?

Create sketches to show your thoughts and ideas, include annotations and exploded diagrams to help you explain these in detail.

You must include what the garment is made from and how this fabric might have special properties to enable the wearer to benefit from the wearable technology.

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Learning objectives

In this unit of work you have been focusing on these learning objectives. How well have you done and which ones need further work?

Late KS3 (Year 9): Technology in Society: Textiles

'Wearable technology'

Name: _____

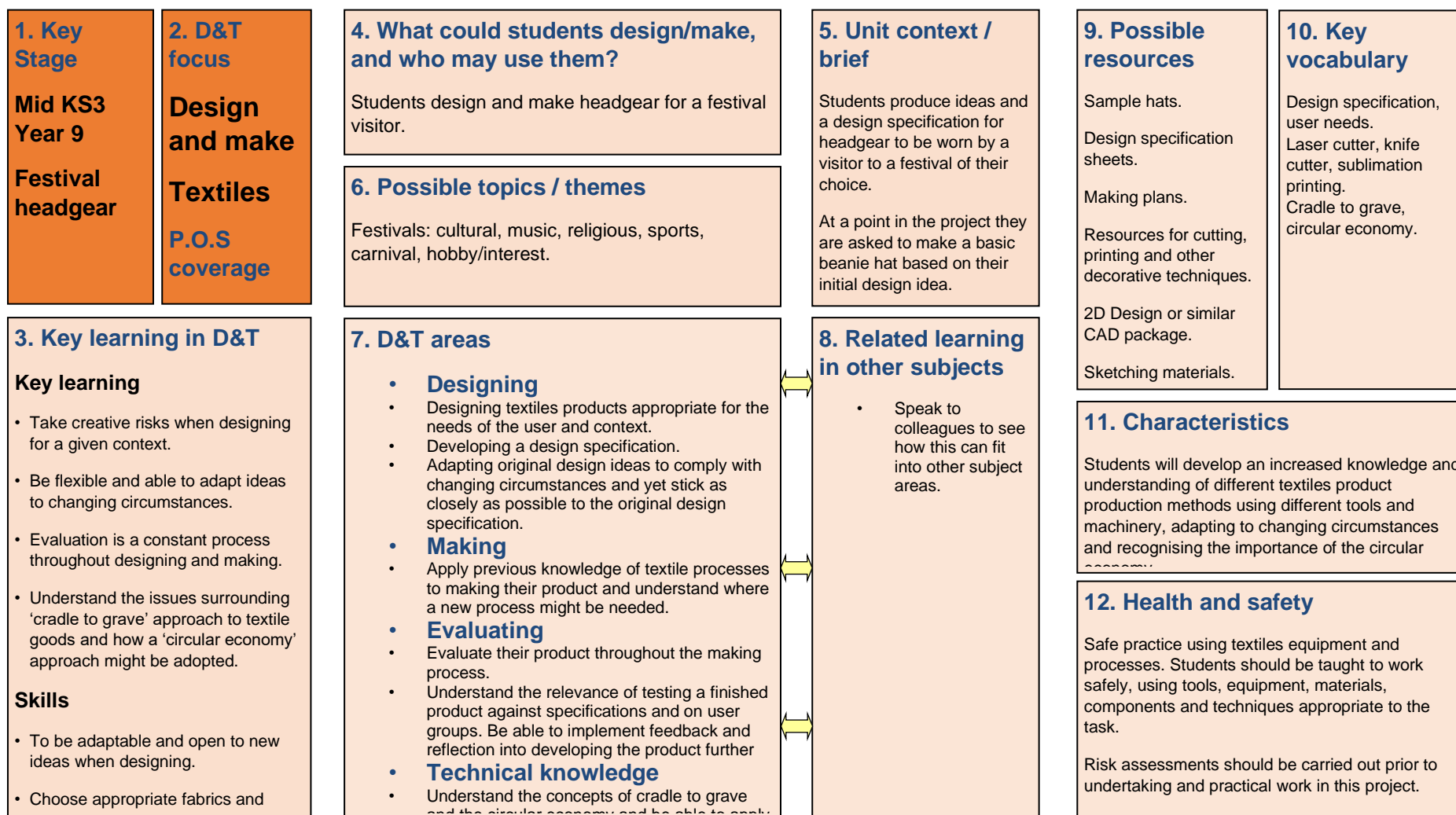
Assessment objectives

Be able to evaluate existing products that are considered to be wearable technology.	1	2	3
Generate a number of ideas that include the use of technical fibres and fabrics that will enhance the experience of the wearer and can be considered as wearable technology.			

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By the end of the unit students will:

- Understand the design specification and generate a range of design ideas that meet it
- Adapt your original design ideas in order to comply with changing circumstances and yet stick as closely as possible to the original design specification
- Understand the need to model your ideas, evaluate and refine them accordingly, using CAD/CAM if available
- Apply previous knowledge of textile processes to the development and execution of your product and understand where a new process might be needed
- Evaluate your product throughout the making process in order to achieve a well-made, finished hat in the time given
- Understand the relevance of testing a finished product both against specifications and also on user groups. Be able to implement feedback and reflection into developing the product further
- Demonstrate understanding of the concepts of cradle to grave and also the circular economy and be able to apply it to your final product



<p>1. Personal Information</p> <p>Name: _____ Address: _____ City: _____ State: _____ Zip: _____ Phone: _____</p>	<p>2. Medical History</p> <p>Current medications: _____ Past medical conditions: _____ Allergies: _____</p>	<p>3. Social History</p> <p>Smoking status: _____ Alcohol consumption: _____ Occupational history: _____</p>	<p>4. Family History</p> <p>Family members and their health status: _____</p>
<p>5. Physical Examination</p> <p>Vital signs: _____ General appearance: _____ Heart: _____ Lungs: _____ Abdomen: _____ Extremities: _____</p>	<p>6. Laboratory Tests</p> <p>Complete blood count (CBC): _____ Basic metabolic panel (BMP): _____ Urinalysis: _____</p>	<p>7. Imaging Studies</p> <p>X-ray results: _____ Ultrasound results: _____ CT scan results: _____</p>	<p>8. Specialist Consultations</p> <p>Referrals and specialist reports: _____</p>
<p>9. Patient History</p> <p>Chief complaint: _____ History of present illness: _____ Past medical history: _____</p>	<p>10. Social History</p> <p>Living situation: _____ Support system: _____ Insurance status: _____</p>	<p>11. Family History</p> <p>Family members and their health status: _____</p>	<p>12. Patient Education</p> <p>Health education and counseling: _____</p>
<p>13. Physical Examination</p> <p>Vital signs: _____ General appearance: _____ Heart: _____ Lungs: _____ Abdomen: _____ Extremities: _____</p>	<p>14. Laboratory Tests</p> <p>Complete blood count (CBC): _____ Basic metabolic panel (BMP): _____ Urinalysis: _____</p>	<p>15. Imaging Studies</p> <p>X-ray results: _____ Ultrasound results: _____ CT scan results: _____</p>	<p>16. Specialist Consultations</p> <p>Referrals and specialist reports: _____</p>
<p>17. Patient History</p> <p>Chief complaint: _____ History of present illness: _____ Past medical history: _____</p>	<p>18. Social History</p> <p>Living situation: _____ Support system: _____ Insurance status: _____</p>	<p>19. Family History</p> <p>Family members and their health status: _____</p>	<p>20. Patient Education</p> <p>Health education and counseling: _____</p>

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Festival headgear

Most festivals include hats/headgear of some sort:

- Functional
- Outrageous
- Cultural
- For identity
- Part of a costume
- Part of a uniform
- Promote a sense of belonging



Design brief

Develop a range of headgear for a festival of your choice

- Write down the type of festival that you are designing for
- Write a design specification for your headgear

Factors you might include:

- Is it for protection? From what?
- Is it to make you stand out in the crowd? How?
- Is it there that you belong to a group?
- Yes – help/calm a horse?
- Will you wear it for long periods of time?



Beanie hat

The basic beanie hat pattern



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Making specification



Go back to the design question – what were the most important features?
(We need to convert this into a making question – what do we need to consider?)

- Fabric choice** – what will the fabric be made of? What properties does the fabric need to have?
- Size** – is it a size, are there? What properties would the fabric need to have?
- Look** – a more bolded look for a certain range of people? So what would need to be considered?
- Seams** – how will we join the fabric? Applique, print, etc. the fabric or sewed?
- Time** – what is the timescale for making the hat? What will affect progress?

Consider the *link* between choice of fabric and the type of decoration required.
Can all fabrics be coloured in the same way?
Can all fabrics be embroidered with the same result?

Late KS3 (Year 9):
Design and make:
Textiles
'Festival headgear'

DM4, NIB6, NIB8, NIB10, NIB11, EA3, EA4, EA5 DM4, EIB, EIB3

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Learning Objectives

By the end of this unit you will:

- understand the design specifications, and generate a range of design ideas that meet it
- adapt your original design ideas in order to comply with changing requirements, and put them in context, as part of the design specification
- understand the need to communicate ideas, evaluate and refine them accordingly, using CAD/CAM/robotics

Design brief

Design a range of ideas that meet your design specification

- Start with a definition and translation to a single, precise statement of intent. What are we trying to design and what do we have to consider in our design brief?
- Next the creative thinking, develop your ideas (what you want to do) to start thinking about what might happen if you could make your idea work (what you might do).
- For example, if you could create digital design you were able to design that had a core of it could give you the results of being together and could finish it.
- It is to make your design very simple, have a few simple ideas - don't worry about whether they are realistic or impossible or appropriate to do at this stage.



Evaluation

Evaluating design ideas against the design specifications:

- Look at your designs – which ones fit your specific aims and how?
- Which is/were 1) the most careful and why?
- Could you modify them to improve them – how?
- Swap designs with a partner – let them look at your specifications and see which of your designs worked the best – why?
- Did they agree with you?



Choosing equipment and techniques


Lease cutting tools:

Good for:

- Cutting intricate shapes
- Cutting accurately – lots of the same shape
- Cuts most fabrics, including felts and denser
- Cuts very fine fabric easily when they are mounted on a card base line
- Can engrave to give surface decoration effects

Do not use for:

- Cutting vinyls or false leather





Choosing equipment and techniques

Before you start:

- Cutting and
- Cutting non-woven fabrics
- Cutting fine fabrics (where mounted on the transfer paper)
- Thick and cut into non-woven fabrics
- Press on the vinyl and fabric
- Stripping materials to help it bond clearly

Do not use the

- Cutting the non-woven fabrics
- Very intricate cutting



Learning Objectives

By the end of this unit you will:

- Apply previous knowledge of trade processes to the development and execution of your product and understand what success means for you (control)
- Reduce your product throughout the development process in order to achieve a well-made, finished and on time product
- Understand the relevance of meeting a finished product benchmark: production and the cost of the product, the ability to engineer feedback and effectiveness into developing product further
- Document your understanding of the concepts of value to generate and share this value, necessary and able to apply to your final product



Types of festival

		
Religious	Carnival	Night
		
Hockey Day	Day	Day

Plot twist!

Adapting to changing circumstances.

New Challenge:
 You are going to make a banner for – however, it must reflect the designs that you have previously created!

- What are the key features of your favourite designs?
- How could you adapt a banner for it in its original theme?
- Is it possible to keep to the design, save the colour? Or, if it needs modifying – how?




Beanie hat pattern

Basic Beanie Hat Pattern Piece

Add 1 inch around the brim?
 Add 1/2 inch more to pattern for seam?
 Add 1/2 inch to the seam piece?
 Add 1/2 inch to the seam piece?
 Add 1/2 inch to the seam piece?

Join pattern pieces together so just the top are separate.
 These will go on to make the top.

Digi

Choosing equipment and techniques

Sublimation printing

- Good for:**
 - Clean, professional quality print
 - Creative effects
 - Single multi print
 - Personal custom print
 - Very durable once printed – can be washed or torn in sunlight without fading
 - Best quality on polyester or nylon based fabrics

Direct use files

- Natural/flowe or 100% cotton fabric or wood felt
- Dark coloured fabric, because it is dyeprinting and light colours won't show up



Choosing equipment and techniques

Generational machines


- Do not use for:
 - Most physical quality tests on components
 - Unclear surface structure
 - Logic and wiring
 - Traces and locations
 - Small microchips
 - Special types with dissimilar fabric interface
 - Softwares

Do not use for

- Integrator alignment
- Large scale image that would take too long to create
- Back Fabric




Choosing equipment and techniques

- Dyeing
 - General
 - Changing the colour of the original fabric
 - Creating special coloured effects



Do not see fit:

- All types of fabric – check the fibre content and use the appropriate dye/fix

Choosing equipment and techniques

Printing and dyeing

- Good for
 - Most fabrics
 - Easy to do
 - Can design as you go to fit the product shape

Do not use for

- Damaged prints
- Lots of repeats as this will be time consuming







Choosing equipment and techniques

Stitched decorative effects

- Working on a wide variety of fabrics – as long as they'll provide the greater force of the machine
- Adding surface texture as well as design to the fabric
- Appliqué, free machine embroidery, couching, decorative stitched work, quilting

Do not use for:

- Large clunky items – the product needs to be kept simple if multiple layers are being sewn together



Developing patterns

Key considerations:

- Circumference of head measurement – divide it by the number of sectors in the hat and this gives you the base width of each piece.
- Measurement over the top of the head – from base of left ear over the top of head down to base of right ear. This will give the minimum length of each pattern piece. Add extra for ease or for a floppy effect.
- Sewn allowance – add at least 1cm to every side that is going to be stitched along. Otherwise your hat will be too small and stiff when!



Testing and evaluating

Testing against specifications

Look at your finished kit (continued)...

How can you evaluate it against the points on your specification?

Using radar charts in this is a convenient method.

Developing patterns

Key considerations:

- **Back-to-** will this be an attached piece or that gets folded over to make the band? This would work if the pattern piece was one long strip with just the girthity top sections. If that had to be made of separate pieces and a separate band will need to be made and pinned around the base and on the crown sections have been placed together. The same applies to a line.
- **Extra sections** – for example a seam flap that's going to be attached between the waist of the crown. Does them out there add or take from the way around.



Modelling prototypes

Why do we model our design? Can't we just start to make them?

- How do we know that the pattern pieces are the right size or the right shape?
- How will we understand exactly how the pieces go together and in what order?

Modelling allows us to refine ideas and make them pattern pieces that we know they are cut out of fabric – this saves time, money and disappointment when the end product doesn't fit.

It will improve the overall quality of your product.



Learning objectives

In this unit of work you have been focusing on these learning objectives. How well have you done and which ones need further work?

Assessment objective	Assessed	Not assessed
<p>Assessment objective 1</p> <p>Students should be able to identify and generate a range of objects that represent</p> <p>Major concepts and ideas in science and technology (e.g. the scientific method and the scientific process, the scientific method and the scientific process, the scientific method and the scientific process)</p> <p>Students should be able to identify and generate a range of objects that represent</p>	<input type="checkbox"/>	<input type="checkbox"/>

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Unit 1										
Week	1	2	3	4	5	6	7	8	9	10
Big Ideas (key concepts)	Textiles isn't about just sewing clothes and cushions Technical textiles are hugely important to us and the way we live	Know and understand that textiles play a massive part in our everyday lives – apart from the obvious fashion and interior furnishing sectors Show through independent investigation an understanding of at least one type of technical textile and how it has been engineered for a specified end use Demonstrate an understanding of more than one example of the wider use of textiles	Develop detailed design specifications to guide their thinking use research including the study of different cultures, to identify and understand user need identify and solve their own design problems	To understand how to annotate and refine your design.	To know how to use a sewing machine.	To understand how to select appropriate materials and fabrics for your design.	To understand the process of sewing your hat together and overlocking	To understand the process of sewing your hat together and how to add surface decoration	To understand the importance of finishing your hat to a high standard whilst taking safety into consideration.	To understand how to evaluate your soft toy fully and use your evaluation to inform your work next year.
Lesson Topics Sequence	KO starter Project and term overview Talk through Ppt on wider use of Textiles, technical uses, smart and medical uses. HW further research on technical fabrics and smart materials Review Qs	KO stater LO and recap project Students design future uses of fabrics and technological advances in Textiles Review questions	KO stater LO and introduce project of designing and making a hat for festival use Mind map ideas for festivals and types of headwear Students design their own unique ugly doll Review questions	KO stater LO and recap project Students produce a range of design ideas and chose final idea for their product, adding annotation Review questions	KO self quizzing LO and recap Recap how to use a sewing machine Demo of making a pattern, students begin making their own pattern based on measurements Review questions	KO self quizzing LO and recap Demonstration of how to use a sewing machine for those not completed last lesson. Driving test Students making their own pattern. Review questions	KO self quizzing LO and recap Applique any pieces on hat Review questions	KO self quizzing LO and recap Sewing hat Review questions	KO self quizzing LO and recap Completion of hat and evaluation Review questions.	KO self quizzing LO and recap Completion of hat and evaluation Review questions.
Key Resources	Ppt Design sheets	Ppt Design sheets	Power point Design sheets Colours Examples Ppt	Power point Design sheets Colours Examples Ppt	Power point Sewing machines Design sheets Paper for patterns	Power point Sewing machines Design sheets Paper for patterns Pre-made patterns for support	Power point Sewing machines Design sheets Fabrics for hats stuffing	Power point Sewing machines Design sheets Fabrics for hats stuffing	Power point Sewing machines Design sheets Fabrics for hats stuffing	Power point Evaluation sheets

					Pre-made patterns for support Soft tape measures	Soft tape measures				
Key learning and skills	Textiles isn't about just sewing clothes and cushions Technical textiles are hugely important to us and the way we live	Know and understand that textiles play a massive part in our everyday lives – apart from the obvious fashion and interior furnishing sectors Show through independent investigation an understanding of at least one type of technical textile and how it has been engineered for a specified end use Demonstrate an understanding of more than one example of the wider use of textiles	IT Rm would help but not vital Paper Ppt	How to annotate & finalise designs and decide how they will become a reality	To know how to use a sewing machine Know how to measure and rrecord	Selecting suitable fabrics and materials Right and wrong side of fabric How to start constructing a 3D object from 2D fabric		Selecting suitable fabrics and materials Right and wrong side of fabric How to start constructing a 3D object from 2D fabric	How to evaluate purposefully H ow to evaluate, reflect and refine	