

DESIGN & TECHNOLOGY

YEARS 3-4 and 5 -6
TEACHERS RESOURCE



3-4 FANTASTIC FABRICS

INTRODUCTION

Level - Years 3-4 (currently AusVELS Levels 3-4 may change with 2nd iteration due 2015)

Key Focus:

- Understanding how fibres and fabrics perform in different situations is critical when designing high performance sports clothing

Focussing questions

- What are the specific clothing needs of people playing different sports?
- What fibre and fabrics are available? What are their characteristics and properties, and how do they perform in different situations?
- How can sports clothes be better designed using increased knowledge of materials?

National Sports Museum exhibition focus

- Various displays within the museum, but particularly

AusVELS learning areas addressed

- Technologies – Design and Technologies
(currently take from the Australian Technologies Curriculum)
 - o Technologies and Society
 - o Technologies Contexts
- Materials Technologies (Textiles)
 - o Technologies processes and production skills
- Investigating, generating, evaluating
- Critical and creative thinking
- Science
 - o Materials testing

OVERVIEW

The purpose of this series of activities is to ask students to think about the materials that are used in different sports clothing. Students can draw on their knowledge and experience playing sport to think about what the players' needs are in terms of clothing comfort and performance.

The unit contains a range of pre-visit activities that include discussions, research and practical exploration tasks to develop an understanding of the area prior to a museum visit. Students will be asked to consider the fabric requirements of different sporting events/activities, and research fibres and fabrics,.

At the National Sport Museum, there are a number of student activities teacher can choose from. Students can:

- compare the sports clothing of different eras on display, considering their use of fabric, and gradual changes in shape and style.
- Observe, feel and respond to a range of fabric samples

Post visit activities ask students to develop annotated design drawings of clothing for a chosen sporting area.

Developing a work program using the activities

Teachers can choose to:

- Select one or two individual tasks to do with their class
- Use a series of related tasks
- or complete most of the tasks as a complete unit of work.

Before the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time	
Fabrics in sport	Introduction to considerations of requirements in sport	Discussion and group activity	Worksheet 1	Post-it notes (brainstorm alternative to worksheet)	Intro and discussion Group activity	5 min 15 min
What fibre/fabric is that	Knowledge of fibres and fabric construction	Puzzle activity and worksheet	Worksheet 2	Samples (if possible)	Worksheet activities	10 mins
How do fibres really perform?	Knowledge of testing process	Materials testing	Worksheets 3 a, b and c	Simple materials testing equipment Fabric samples Camera	Introduction Testing Report	15 mins 20 mins
Fibre information	Knowledge of fibre and decision making	Written response	Worksheet 4	Highlight pens	Worksheet activity	15 mins

During the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time	
Clothing that changes	Comparing clothing from different eras	Observations and written response to questions	Worksheet 5	Pencils	Observation and written activity	15 min
Hands-on fabric	Experiencing different fabrics	Observations of fabric samples	Worksheet 6	Fabric sample pack (in gallery)	Observations and written activity	15 mins

After the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time	
Sports clothing (writing the brief)	Understanding and defining the needs of the situation	Identifying the requirements and needs, developing a design brief	Worksheet 7		Brief writing	30 min
Your clothing design	Developing design ideas	Design drawing and analysis	Worksheet 8	Drawing equipment	Design drawing	30-45 mins

BEFORE THE VISIT

ACTIVITY 1: FABRICS IN SPORT

Focus question: Do different sports have different clothing needs

Resources:

- Worksheet 1
- Post-it notes, large sheets of paper (alternative)

Discussion starter

Ask students what sports they play – write a list on the board, or on an interactive screen. Choose one of the sports (it could be the example of surfing on Worksheet 1) and tease out the types of physical activity that sport involves, and some of the aspects that might have an impact on fabric choice and the design of clothing.

Group task

Divide students into groups (it could be based on sports they play). Students then need to choose a sport (preferably that they have some knowledge of, but try to get a range) and answer the questions about this on their worksheet. Alternatively, students could brainstorm about a number of sports by writing aspects related to each on post-it notes that they attach to a large mind map.

Report back

Bring the groups together when task is complete, and review ideas as a class

ACTIVITY 2: CHOOSING THE BEST FIBRES AND FABRICS

Focus question: what are the differences between various fibres and fabrics?

Resources:

- Worksheet 3
- Fabric samples of different fibre content and fabric construction
- Access to the internet or information sources

Developing fibre and fabric knowledge - worksheet activity

Explain how fibres are grouped or categorised according to where they are sourced. It would be really helpful if you could source physical examples of different fibre/fabrics to show to students. Ask students to complete the categorising table. Students can then discuss and complete the section on fabric construction and characteristics.

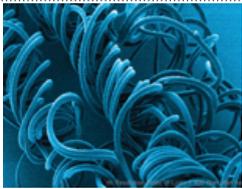
Teachers' cheat notes

Here are the answers for some of the questions:

1. What do you know about fibres

Protein	from an animal source
Cellulose	from a plant
Regenerated	a naturally formed fibre that is chemically altered
Synthetic	a completely manufactured fibre

2. Fibre examples

Natural		Man-made	
Protein	Cellulose	Regenerated	Synthetic
 Wool	 Cotton	 Rayon	 Nylon
 Silk	 Bamboo	 Acetate	 Lycra

ACTIVITY 3: TESTING FIBRES**Focus question: What happens to fibres when they are put through scientific testing?**

(Or as close to scientific testing as can be managed in the classroom)

Resources:

- Worksheet 5
- Fabric samples
- Variety of equipment as required for individual tests
- Measuring equipment
- Cameras, or phones for recording test process

Materials test planning and process

Set up the classroom with a number of mini testing stations. Supply students with the samples and equipment they need, or, if they are organised, they can help by providing some of the equipment.

Each test worksheet has a list of requirements and a step-by-step procedure. Just a note about the fabric samples – try to make these as similar in weight and construction as possible – then you are more likely to be testing the fibre, rather than the different fabric construction. The main point of scientific testing is to only change one variable (here, this is the fibre) – all the other aspects of the test should be controlled and the same for all tests.

Divide students into groups of 3-4, and after a quick explanation of each test, ask them to complete one of the materials test, following the test procedure and recording their results and making some judgements.

***Images used in worksheets in this section are from: VCE PD&T: Units 1-4, 3rd edition, Livett, J and O'Leary, J (Cengage, 2011)*

Test 1: Absorbency and water travel (wicking)**Equipment needs:**

- 3 fabric samples
- - 100mm x 100mm
- 3 pieces of paper towel
- a tray
- a small container of water
- food colouring
- an eye dropper
- a ruler
- a camera

Test 2: Elasticity – ability to stretch**Equipment needs:**

- 3 fabric samples
- - 200mm x 40 mm
- a piece of paper
- a camera
- 3 weights (all the same) that can be hooked or tied onto a sample
- a frame or rod to suspend the sample
- pins
- a ruler

Test 3: Wrinkle resistance – scrunch test

Equipment needs:

- 3 fabric samples (100 mm X 100 mm)
- Window card (Card that is roughly 150-200mm square with a window of 50mm X 50mm cut out)
- Ruler

Test 4: Durability – ability to withstand rubbing

Equipment needs:

- 3 fabric samples
- 3 wooden blocks
- masking tape cork sanding block or second set of wooden blocks
- sandpaper

**Not much detail is given in the worksheets about how to convert data into graphs.
It would be helpful to go through this with students beforehand.

ACTIVITY 4: USING FIBRE INFORMATION

Focus question: What are some of the other qualities of different fibres, and which would be the best to choose for different sporting situations.

Resources:

- o Worksheet 4
- o Fabric samples, if available

Information building and analysis activity

Students read through the information provided and highlight the particular fibre qualities that are relevant to their chosen sport. Difficult terms are defined at the bottom of the table. Students then put all information they have learnt together to make a decision about the best fabric choice for their sport

DURING THE VISIT

Two different Museum activities have been provided – teachers should choose one activity for students to complete during their visit.

ACTIVITY 5: CLOTHES CHANGE

Focus question: How has sport clothing changed over time?

Resources:

- Worksheet 6
- Pens, pencils

Gallery display area:

- Student choice – either the Olympic gallery area, the Football gallery, the Cricket gallery, or other clothing displays for various sports

In the museum - observation and comparison

Students choose a form of sporting activity that they are involved in, they like, or they have worked on in earlier activities. Using the worksheet questions as a guide, they carefully look at and notice the changes between the sports clothing of different eras.

Discussion – you could ask the students why they think the clothes have changed, and what advances have been made to make it easier to produce fabrics that perform better for more recent outfits?

ACTIVITY 6: HANDS-ON FABRIC

Focus question: What do different fabrics/fibres look and feel like?

Resources:

- Worksheet 8
- Pens, pencils
- Fabric samples

Gallery display area:

- Hands-on trolleys

In the museum – visual and ‘touchy feely’ observation

Find the samples that are available on the hands-on trolleys – they should be joined together on a ring with information cards. Ask students to fill in the worksheet tables, first by identifying three of the fabrics, then handling all of the fabrics and making decisions about different fabric qualities.

AFTER THE VISIT

ACTIVITY 7: SPORTS CLOTHES: WRITING THE BRIEF

Focus question: What would a design brief for specific sports clothing be like?

Resources:

- Worksheet 9

Worksheet activity

Students work as individual designers, or in design teams to write a design brief for sports clothing for a specific sport, using the prompts of 'who, what, where, when, how' to guide their content. Students consider the main requirements of their design brief.

ACTIVITY 8: YOUR SPORTS GEAR DESIGN

Focus question: What design ideas can I develop that fulfil the design brief and work well?

Resources:

- Worksheet 10
- Drawing equipment

Worksheet activity

Students develop and draw a design for a sporting outfit for a specific sport, and write comments explaining their ideas. Encourage students to use colour and line clearly to communicate their ideas. They are asked to reflect on the good features of their design and how their design satisfies the design brief they wrote.

CURRICULUM LINKS

Indicators of student achievement and assessment strategies

The activities in these materials address the following AusVELS and Australian Curriculum learning areas:

Design and Technologies (Years 3-4) - Australian Technologies Curriculum

(Numbers identify content descriptors in from the Design and Technologies Scope and Sequence chart)

- Technologies and society - students explore factors, including sustainability that impact on the design of products, services and environments to meet community needs (4.1)
 - o by considering how the design of sports clothing meets the needs of those participating
- Technological contexts - students Investigate the suitability of materials ... for a range of purposes (4.4)
 - o By investigating the materials used in past and current sports clothing, and considering choices for their designs
- D&T processes and production skills - students critique needs or opportunities for designing and explore and test a variety of materials ... needed to produce designed solutions (4.5)
 - o by considering the specific fabric/fibre requirements of sports clothing, and choosing appropriately for their own designs
 - o by testing different fabrics and fibres
- D&T processes and production skills - students generate, develop, and communicate design ideas and decisions using technical terms and graphical representation techniques (4.6)
 - o by generating design ideas for a sports outfit
- D&T processes and production skills - students evaluate design ideas ... based on criteria for success, developed with guidance
 - o by considering requirements for their sports clothing design (particularly in the area of fabric choice) and using them to develop and evaluate their own designs

Mathematics - AusVELS

- Data representation and interpretation - Construct and compare a range of data displays
 - o By graphing data gathered during materials testing
- Using units of measurement - students solve problems involving the appropriate comparison of lengths,
 - o By measuring and collecting data during materials testing

Science – AusVELS

- Nature and development of science –
 - Science involves making predictions and describing patterns and relationships
- Science enquiry skills
 - Students safely use appropriate materials, tools or equipment to make and record observations, using formal measurements and digital technologies as appropriate
 - Use a range of methods including tables and simple column graphs to represent data and to identify patterns and trends
- Students experience these things through materials testing and reporting

Creative and critical thinking – Australian Curriculum

- Inquiring – identifying, exploring and organising information and ideas
 - investigate issues related to materials choice
 - critically analyse information and evidence according to criteria they have established
- Generate ideas, possibilities and actions
 - generate alternatives and innovative solutions for clothing designs
 - predict possibilities, and identify and test consequences when seeking solutions and putting ideas into action
- Reflecting on thinking and processes
 - evaluate and justify the reasons behind choosing a particular solution or strategy
 - explain intentions and justify ideas, and account for expected and unexpected outcomes against criteria they have identified

Strategies for assessment

- Monitoring levels of engagement in class discussion and group work
- Observing individual contributions to group work
- If students are asked to formally present research and/or findings of group work, develop a marking guide/rubric for assessing content and presentation
- Monitoring the use of appropriate and technical design language when students are developing and explaining their ideas
- Assessing the accuracy of measuring, carrying out trials and reporting group findings
- Assessing students' understanding of design concepts through their ability to develop appropriate designs and explain their design decisions through written and verbal comments
- Students' self evaluation of learning

5-6 SHINING LIGHT

INTRODUCTION

Level - Years 5-6 (current AusVELS Levels 5-6, may change with 2nd iteration due Term 4)

***Please note that these activities can be adapted for other levels – particularly for Years 7-8*

Key Focus:

- The Olympic torch is designed to be an important symbol of the games and to suit the needs of the people carrying it

Focussing questions

- What is the purpose of the Olympic torch? Who is involved in the relay?
- What factors are important to the design of the Olympic torch?
- How can information about humans be used to help design an effective torch?
- How can I design an Olympic torch that fulfils the design brief and will work well?

National Sports Museum exhibition focus

- The Olympic Torch display wall

AusVELS learning areas addressed

- Technologies – Design and Technologies
(currently take from the Australian Technologies Curriculum)
 - Technologies and Society
 - Technologies Contexts
- Materials Technologies
- Engineering Principles and Systems
 - Technologies processes and production skills
- Investigating, generating, evaluating
- Evaluating
- Mathematics (AusVELS)
 - Using units of measurement
 - Shape
 - Data representation and interpretation
- Health and Physical Education
(currently take from the Australian Technologies Curriculum)
 - Understanding movement

OVERVIEW

The purpose of this series of activities is to interest students in the design and development of the Olympic torch, and to become aware the many aspects a designer needs to consider to create a torch that is useable for all torch bearers, that works in a wide variety of environments, and is an effective symbol for the games they are designed for.

The unit contains a range of pre-visit activities that include discussions, research and practical exploration tasks to develop an understanding of the area prior to a museum visit. Students will be asked to consider the requirements of an Olympic torch, research existing torch designs, measure hands, simulate torch bearing situations and make simple ergonomic observations.

At the National Sport Museum, students review the torches on display, and develop ideas for torch decoration.

Post visit activities ask students to develop annotated design drawings of a torch design, and can be extended to allow students to create and evaluate their own 3D torch design mock-ups.

OUTLINE OF ACTIVITIES

Before the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time
Olympics - what and why?	Introduction to Olympic torch and relay	Video, discussion and research activity	Worksheet 1 - Research questions	Video, access to internet	Intro and discussion: 10 min Research: 30 min Report back: 10 mins Video and discuss'n: 10 min
Designing a 'good' Olympic torch	Considering the requirements of the torch and the role of the designer	Discussion, post-it note group work, reading comprehension		Post-it notes, markers, section of text	20-25 min
Designing for many hands	Exploring	Experiments and observational tasks	Worksheet 2	Measuring equipment, dowel, bean bags, newspaper, tape, timer, record sheets	Rotational activity: students do all tasks 1-1.5 hours Individual tasks: 25-30 mins approx each

During the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time
Olympic torches – then and now	Comparing the design of Olympic torches	Observation and written response to questions	Worksheet 3		Observation, discussion and written response 20-30 min
Torch design	Designing symbols and colours	Designing using a shape template	Worksheet 4	Drawing equipment, pencils, coloured paper, glue sticks	Drawing and colouring torch design ideas 15-20 mins

After the visit activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time
Your Olympic torch design	Experiencing the process of torch design	Design brief writing and design drawing	Worksheet 5	Drawing equipment	Design brief 1-1.5 hours

Extension activities

Activity title	Purpose/focus	Form of activity	Worksheets	Resources	Time
Torch making	Experiencing 3D construction of torch shape	Construction of a torch model		Modelling materials, cardboard, coloured paper, etc.	Completing a model based on design 1-2 hours
What do you think?	Evaluation of other students' work	Student description and peer review of designs and/or models	Worksheet 6		Group display and discussion/questions 30 mins
What did you learn?	Self evaluation	Answering questions about learning	Worksheet 7		Answering questions 20 mins

BEFORE THE VISIT

ACTIVITY 1: OLYMPIC TORCHES – WHAT AND WHY?**Introduction activity****Focus question: Why do we have an Olympic torch relay, and who is involved?****Activity stages**

1. View initial 30 seconds of the “Relive Sydney” video – showing the torch relay
<http://www.olympic.org/videos/re-live-sydney-2000>

Discuss the following questions as a class (or in small groups and report back):

- Why do you think Olympic torches exist – what are they for?
 - What is a torch relay? Why do they happen?
 - How far do you think they travel (Encourage students to guess – keep a record of their guesses)
 - How many people do you think carry a torch in a relay? (Again, encourage students to estimate)
 - Do all Olympic games have a torch relay? (Consider Summer, Winter, Paralympic Games. etc.)
 - How do you think torches should be designed so they work well?
2. **Worksheet 1** - Most of the questions about past relays will require further research – break students into small groups to research the torch relay of a specific Olympic event.

Information can be found at:

- http://www.olympic.org/Documents/Olympic_Museum/Education/School%20Ressources/teaching_resources/ENG_The_Olympic_flame.pdf
 - http://olympic-museum.de/quickview/all_torches.htm
 - http://en.wikipedia.org/wiki/List_of_Olympic_torch_relays
3. Ask students to briefly report back to the class, or do a more formal presentation.
Display the photos students have found of torch bearers in the classroom
 4. After the students reporting session – class discussion/summary question:
 - Were the class’ estimates close to the actual information
 - So many different people have to carry the torch – why is this an important factor for the torch designer?
 5. Watch the video interview of Tim Collins – the designer of the 2005 Deaflympics torch.
Discuss the specific factors that he needed to consider when designing this torch.

ACTIVITY 1: OLYMPIC TORCHES – WHAT AND WHY?

Focus question: What factors are important to the design of the Olympic torch?

Materials:

- Paper
- Blotack
- Heading sheets – People, Function/how it works, Weather/environment, Appearance/symbolism, Sustainability,

When designers design a product for a specific task, they are given a list of requirements or criteria that need to be met. When designing the Olympic torch, this criteria list is developed and agreed upon by the host country's organising committee and the International Olympic Committee (IOC):

Class activity

In small groups, ask the students to brainstorm at least 4 requirements that the torch will need to satisfy to work well – e.g. “the torch needs to be easily carried”, or “The torch shouldn't go out, no matter where it is or whatever the weather conditions”. Ask the students to be very specific (instead of “the torch should look good” – they could suggest “the torch should use colours and shapes that work well together”, or “the shapes, colours and symbols on the torch should mean something significant”).

Place the headings on a wall and ask students to put their suggestions under the most appropriate heading. If there is a heading that doesn't have any suggestions, as a class, brainstorm additional criteria that cover this area.

Compare the students' list with the information provided in the “Bearing the flame: firing the spirit” article (p.2) about the requirements for the Sydney Olympic torch.

It (the Sydney Olympic torch) would need to look different, original and decidedly at home in the Australian environment. It would need to perform in any weather at reasonable cost and be reliable without fault. Not only would the Sydney Olympic torch need to meet these general criteria (as well as needing to be simple and logical enough to operate without a manual), it would also need to come up shining against an even more stringent set of requirements.

Among other criteria, the 2000 Olympic torch would need to be:

- *Less than 1.5kg in weight and easily carried;*
- *Easily reproduced (14,000 torches were required);*
- *Environmentally responsible in manufacture and operation;*
- *Able to burn for at least 30 minutes to cover each 20 minute run;*
- *Able to withstand 90kph winds, rain and snow;*
- *Free of polluting emissions or wastes;*
- *Easily held by torch bearers, from children to elderly people;*
- *Representative of the spirit of Sydney and the spirit of the Olympics.*

The torch would also need to withstand Australia's harsh and varied environment. From scorching desert heat to freezing mountain terrain, the Olympic torch had to stay alight in the face of every environmental and physical condition imaginable.

Extract from “Bearing the flame: firing the spirit”

http://olympic-museum.de/torches/olympic_torch.pdf

Original article published by the Powerhouse Museum, Sydney

* Add any new requirements to your list, under the appropriate headings.

Design features of the Sydney Olympic torch

Did you know that:

- The shapes of the top profile of the torch and the texture of the white layer were designed to reflect the Sydney Opera House
- The shape of the torch recalls the shape of a boomerang
- The torch flame worked underwater – but a different flame mechanism was used for a special underwater torch

Class display – display a large photo of the Sydney Olympic's torch with this information attached

“For the 2000 Summer Olympic Games in Australia, the Olympic Torch Relay went underwater for the first time. Torchbearers carried the Olympic Flame past the Great Barrier Reef. Powered by a chemical formula that produced enough oxygen and nitrogen to maintain the flame, the torch was carried by marine biologist Wendy Craig Duncan and remained submerged a full three minutes.”

From: <http://news.discovery.com/history/us-history/olympic-torch-120511.htm>

Image: Getty Images



ACTIVITY 3: DESIGNING FOR MANY HANDS

Focus question: How can information about humans be used to help design an effective torch?

This activity focusses on designing a torch that is appropriate and comfortable for human use, and in simple terms explains the concepts of ergonomics and anthropometric data. Students carry out measuring activities, and make observations about what dimensions would be appropriate for torch design.

Materials

- Worksheet 2
- rulers
- 25mm wooden dowel (broom handle width, can be purchased at a hardware store) – 500 mm long
- newspaper
- 1 kg weight – you could use a bag of rice (in tough packaging), bean bags, etc.
- elastic bands or tape (for holding newspaper and/or weights in place)
- timers (a watch, clock, phone would do)

As a result of the last activity, students should realise that many different people handle and use the Olympic torch. Point out the photos that students have found. Discuss:

- the diversity of these people, noticing that they have different hand size, differing strength, etc.
- why is it important for designers to consider the people using the torch when it is being designed?
- how can designers create a torch that will be easily used by all people?

Worksheet activity 2

Introduce the concepts of Ergonomics – understanding what the human body is like and how it works, so that product can suit the body. Designers use knowledge of ergonomics and anthropometric data to help them make decisions about size, shape and how things work.

3 specific ergonomic aspects relevant to the torch design have been identified and simple activities have been given that help students to explore and measure these areas:

- hand measurements
- grip size
- weight balance

Organisation:

These simple measuring and testing tasks should be carried out in small groups (3-4 students).

Teacher choice to either ask all groups to complete all activities (this can be done as a round robin activity), or each group can complete just one activity then report their findings back to the rest of the class.

Task 1 - measuring hands

Students measure the hands of 10 people, and graph their results

Task 2 - grip/handle width

Students trial 3 different grip widths to decide which is more comfortable

(It is recommended that the teacher also completes this activity, so students can compare results with different sized hands)

Task 3 - weight distribution

Students change the location of weights on a mock torch stem to decide which position is easier to carry

Reporting back - at the end of these activities, groups can report their findings.

Discuss:

- Why is this information useful?
- How might this affect the torch designer's choices in the area of size and shape?
- What other research could be carried out?

DURING THE VISIT

During the visit to the National Sports Museum

The National Sports Museum has a display wall of the Summer Olympic Torches from the Berlin Games 1936 to the London Games in 2012. Spend some time with students looking at and discussing the different torch designs.

ACTIVITY 4: OLYMPIC TORCHES – THEN AND NOW!

Worksheet activity 3

Students complete a question sheet that asks them to identify and respond to different aspects of torch design, looking at:

- what is on display, the shape and size of torches, and how comfortable they might be to carry

Then choose to answer a question on

- An interesting shape
- The materials used
- Symbolism/special design features

Design a torch

Worksheet activity 4

Students use the template to develop creative ideas for torch designs – focussing on the decorative features and symbol design.

Materials and equipment needed:

- Torch template
- Coloured pencils, markers
- Scissors (if template is not shaped)
- Metallic paper (cut into small sections)
- Glue sticks

AFTER THE VISIT

ACTIVITY 5: YOUR OLYMPIC TORCH DESIGN

Focus question: What design ideas can I develop that fulfil the design brief and work well?

Worksheet activity 5

Students work as individual designers, or in design teams to write a design brief for an Olympic torch, and consider the main requirements of the situation.

They then develop and draw a design for an Olympic torch, and write comments explaining their ideas.

Encourage students to use colour and line clearly to communicate their ideas, and ask questions about the size and shape of their designs, and any special features to prompt them to comment on these aspects of their drawings. Some students may want to consider where the flame will be placed and how it might work.

EXTENSION ACTIVITIES

Making a torch mock up

Students can make a full sized mock-up of their torch design, using cardboard and recycled materials, metallic and coloured paper, drawn and/or printed images, etc.

Worksheet activity 6 - Peer evaluation

Display the torch mock-ups next to their design. Students can provide descriptive information about their designs, identifying its key design features. Provide a comment sheet for other students to write brief, constructive comments about other students' designs. Students only need to write one comment on each sheet. If necessary, ask students to write 2 positive comments before every 'improvement' comment, and explain that every sheet needs a positive comment.

Worksheet activity 7 - Self evaluation

Students use guided questions to evaluate what they have learnt – photocopy the worksheet at 141% (A3 size)

CURRICULUM LINKS

Indicators of student achievement and assessment strategies

The activities in these materials address the following AusVELS and Australian Curriculum learning areas:

Design and Technologies (Years 5-6) - Australian Technologies Curriculum

- Technologies and society - students investigate how designers (people in design and technologies occupations) address competing considerations in the design of a product
 - by considering how designers approach the task of designing an Olympic torch, and discussing what is important in its design
- D&T processes and production skills - students critique needs and opportunities for designing
 - by identifying the reasons for and purpose of Olympic torches, and considering the specific needs of the torch user, measuring, trialling and testing)
- D&T processes and production skills - students generate, develop and communicate design ideas
 - by developing and drawing ideas for a torch (may complete a full-sized mock-up)
- D&T processes and production skills - students negotiate criteria for success when making designed solutions individually and collaboratively
 - by identifying the key criteria/requirements for an effective torch design and using them for developing and evaluating their Olympic torch designs

Mathematics (Years 5-6) - AusVELS

- Shape - students connect three dimensional objects with their nets and other two dimensional representations, construct simple prisms
 - By transforming a drawing into a 3D object (when making their torch mock-up) - likely to be an elongated cone section, cylinder or prism
- Using units of measurement - students solve problems involving the appropriate comparison of lengths
 - By measuring and comparing hand sizes to consider what impact this has on torch design
- Data representation and interpretation - students construct displays appropriate for data type, and describe and interpret different data sets in context
 - By developing a graph or chart to represent their task findings, and discussing their results

Health and Physical Education - Australian Curriculum

- Understanding movement - students manipulate and modifyobjects to perform movement sequences
 - By understanding how the body works to perform a task (carrying a torch), and how the modification of the torch design can assist in the task's performance

- Understanding movement – students examine how involvement in physical activities creates community connections and intercultural awareness
 - By considering how the Olympic torch relay builds connections and awareness

Creative and critical thinking – Australian Curriculum

- Inquiring – identifying, exploring and organising information and ideas
 - investigate complex issues related to torch use
 - critically analyse information and evidence according to criteria such as validity and relevance
- Generate ideas, possibilities and actions
 - generate alternatives and innovative solutions for torch designs
 - predict possibilities, and identify and test consequences when seeking solutions and putting ideas into action
- Reflecting on thinking and processes
 - evaluate and justify the reasons behind choosing a particular problem-solving strategy
 - explain intentions and justify ideas, methods and courses of action, and account for expected and unexpected outcomes against criteria they have identified

Strategies for assessment

- Monitoring levels of engagement in class discussion and group work
- Observing individual contributions to group work
- If students are asked to formally present research and/or findings of group work, develop a marking guide/rubric for assessing content and presentation
- Monitoring the use of appropriate and technical design language when students are developing and explaining their ideas
- Assessing the accuracy of measuring, carrying out trials and reporting group findings
- Assessing students' understanding of design concepts through their ability to develop appropriate designs and explain their design decisions through written and verbal comments
- Peer assessment of design ideas and product mock-up
- Students' self evaluation of learning

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