

WorldSkills London 2011

Teaching Resource Pack

Unit 5: Engineering



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Unit 5: Engineering Session Overview

Background

WorldSkills London 2011 will be held at ExCeL London from 5-8 October 2011.

In this resource pack learners will:

- Understand the process of carrying out effective research.
- Understand the steps involved in producing a materials test plan
- Reflect on their learning

Starter Activity:

Working in pairs learners evaluate their understanding of the Learning Cycle by applying it to a given problem in engineering.

Learning Activity:

Working in small groups learners identify and record all the tasks, roles and responsibilities associated with testing materials.

Reflective Activity:

Learners are encouraged to reflect on their involvement in testing given engineering materials and the skills required. They are encouraged to think about setting and reviewing targets and any changes they would make to ensure they successfully complete all of the set activities.

Developmental Activity:

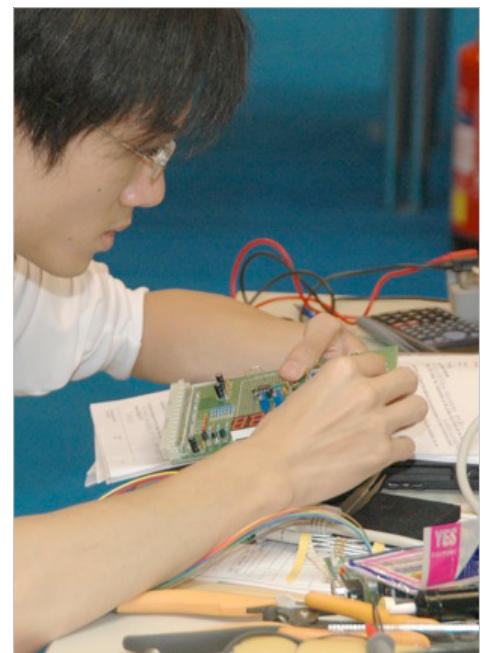
Learners review their role and their feelings and attitudes towards the task. They provide an appraisal of the development of their knowledge and skills.



Learner Checklist

Learners can:

- Apply the Learning Cycle and the associated learning processes to carrying out practical activities in the testing of materials.
- Reflect on the use of their skills and identify learning from the activities they have completed.





Unit 5: Engineering Session Planner

The following suggested plan is based around 4 x 60 minute practical activity sessions which could take place either within the classroom or similar environment such as WorldSkills London 2011 (www.worldskillslondon2011.com). The sessions focus on developing research and investigative skills of the learner by encouraging them to evaluate of the technical nature of roles within the engineering industry.

| Topic | Timing | Learning Outcomes | Teaching Activities | Learning Activities |
|--|--------|--|---|--|
| Session 1 Introduction to materials testing within engineering | 60mins | Learners understand the process of carrying out effective research and can identify, obtain and record sources of information appropriately. | Facilitation of a practical research linked to the testing of materials. | Research and gather information on the types of materials to be tested. |
| Session2 Producing a materials testing plan/schedule | 60mins | Learners can identify and produce a checklist of the skills and qualities required to complete a test plan. | Facilitation of a group discussion around the production of the test plan. | Production of a checklist identifying the key element of the test schedule. |
| Session3 Testing of materials samples | 60mins | Learners are able to carry out routine operations linked to the testing of materials. | Provide instruction in the testing of materials and the recording of results from the tests. | Carry out testing of given materials and accurately recording the results obtained. |
| Session 4 Reflecting on learning | 60mins | Learners are able to reflect on all aspects of the practical sessions and identify what they have learnt. | Facilitation of paired/ group activities around the Learning Cycle and reflecting on the learners experience of the practical activities. | Completion of set activities which encourage learners to reflect on their experiences and identify learning. |



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Unit 5: Engineering

Activity Brief:

In this section you will begin to research and investigate the practical and investigative nature of career and job roles in engineering.

You will be given a project brief (see below) and will be required to complete a series of tasks and activities.

Your tutor and/or advisors will be able to assist you.



Scenario

The WorldSkills London 2011 Competition which will be held at ExCeL London in October 2011, will award medals to those who win a particular skill competition. Working in conjunction with commercial sponsors and employers they wish to produce a set of medals to present to winners at the event.

You have been assigned as a Product Developer at WorldSkills London 2011 and it is the responsibility of you and your team to identify and recommend suitable materials for the production of the medals. As a first step you will test a variety of given materials and make recommendations as to their possible use in the design and production of the medals.

You will need to produce a plan and schedule for testing the materials and a means of recording your results.

The choice of material has a big effect on the properties of a product and how it is made. In this assignment you will test a number of different materials and identify how they could be used to produce the medals.

NOTE: In this assignment you will work under the supervision of your teacher or tutor who will be able to provide you with assistance as required.

Starter Activity:

Working in pairs briefly describe the materials you have been given in terms of their appearance, weight, feel and any other characteristics you think would best apply to the materials you are describing. Keep a written record of your descriptions in the form of a table.

Learning Outcomes

In this activity you will produce:

- A schedule of testing for a given set of material samples.
- Details of the results of your tests on the given set of materials samples.
- An information chart detailing how one of the materials chosen could be formed and used to produce a competition medal.

Using the Learning Cycle

In this activity you will be applying the Learning Cycle to the given problem. Below is a brief description of the different stages as discussed in **Unit 4**.

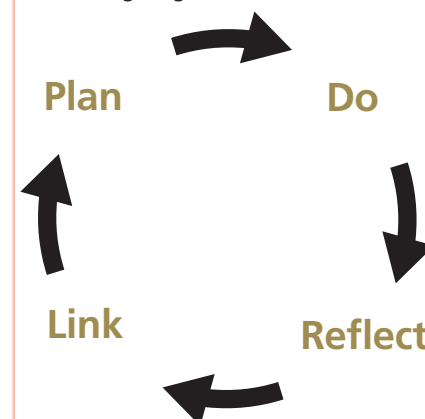
Reflecting on learning for work:

Doing: This involves carrying out and being aware of all the activities you are involved in during a project or task.

Reflecting: This involves looking back and summarising what you have done or what has taken place in the project or assignment.

Linking: This stage involves making links and connections with previous knowledge and/or skills and identifying possible solutions.

Planning: This will involve you identifying what you have learnt in order to make improvements, which involves reviewing and deciding the next steps, structuring what you do in a new way and setting targets.





Unit 5: Engineering

Learning Activity 1

In the following tasks you are going to use your descriptions to identify the properties of each of the materials. In addition you will test the mechanical and physical properties of the materials and make an initial choice of your preferred material for producing the medals before you carry out tests.

Task 1:

[Note: This task will take approximately 1-2 hours to complete]

By consulting with your teacher and your partner complete the following tasks:

Produce a plan for the testing of the materials you have been given. Your plan should include details of how you will test the mechanical and physical properties of the given materials.



Copy and complete the table below.

| Material Sample Number | Type of Material (e.g. ferrous or non-ferrous metal, polymer, ceramic, non metal) | How will material be tested and what equipment will you use? | Why will you test the material in this way |
|------------------------|---|--|--|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Task 2:

[Note: This task will take approximately 2-3 hours to complete]

Test the materials in your test plan. Record the test results clearly in a table. Note down any changes you needed to make to the testing or your test plan.

Task 3:

[Note: This task will take approximately 1-2 hours to complete]

For the materials you have tested complete the following table ensuring that your information is as accurate as possible.

| Material Sample Number | Type of Material (e.g. ferrous or non-ferrous metal, polymer, ceramic, non metal) | How will material be tested and what equipment will you use? | Why will you test the material in this way |
|------------------------|---|--|--|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |

Thought Box:

What do we mean by the statements 'mechanical' and 'physical' properties of a material?

You will need to consult sources of information from books and/or the internet. Make a brief record of your findings. Your teacher/tutor will also discuss these terms during the session.

Thought Box:

What are the potential health and safety issues associated with the testing of the given materials?

Working in pairs/small groups identify and produce a list of any personal and protective clothing and/or equipment required and any safety measures you need to follow.

Thought Box:

Having completed the testing of all of the materials, which material would you recommend for use in producing the WorldSkills London 2011 Competition medals? Why?



Unit 5: Engineering

Reflective Activity

This activity will focus on your experience of carrying out research. It will help you analyse what went well with your research and areas you feel could have been developed further. Use the space below to record your thoughts on the planning and completing of the practical tasks set.

| | |
|--|--|
| Name: | |
| Class / Year: | |
| Course/Subject: | |
| What research did I carry out and what information did I consider to be important? | |
| What were the three main things I learned from taking part in this activity? | |
| What did I previously think was true, but now know to be incorrect/ wrong now that I have completed the activities? | |
| What did we not cover that I expected we should? | |
| What was new or surprising to me in completing these practical activities? | |
| What have I changed my mind about, as a result of working as part of a team? | |
| One thing I learned carrying out research I may be able to use in the future is... | |
| I am still unsure about... | |
| Issues that interested me a lot, and that I would like to study in more detail | |
| What I most liked about this activity was... | |
| What I most disliked about this activity was... | |
| Other interesting facts I learned in completing my tasks as part of the project..... | |



Unit 5: Engineering

Developmental Activity

This activity will focus on getting you to review particular aspects of your role and your feelings and attitudes. You may find this section challenging!

DO ASK FOR HELP FROM YOUR TEACHER OR TUTOR IF REQUIRED!

| | |
|--|--|
| What key ideas have I covered by completing the given tasks? | |
| What have I achieved in completing these tasks? | |
| What am I still unsure of after completing my tasks? | |
| What do I need to do to address the things I am unsure of? | |
| What do my partners in my team think of my role and contribution to the team? | |
| If I was to be involved in a similar task what would I do differently? | |

For more information about our Education Experience Programme and how you can get involved please contact:

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