

## **Principal Learning**

## **Engineering**

OCR Level 2 Principal Learning H810

## **OCR Report to Centres January 2014**

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

OCR will not enter into any discussion or correspondence in connection with this report.

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### OCR Level 2 Principal Learning in Engineering H810

#### OCR REPORT TO CENTRES

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## F548 The engineered world

A number of learners had clearly developed a sound understanding of the principles and techniques required for this novel type of assessment.

The following points need to be considered:

- In the information for presenters it clearly states that the digital video recorder in use must be able to store at least fifteen minutes of recording. The presenter must ensure that learners have access to all of the available time, even if the questions are repeated time and time again and appropriate prompts are given.
- When more than one presenter is being used to conduct the viva-voce, it is essential that internal standardisation takes place. We are not implying that presenters behaved contrary to the instructions, rather that the best practice shown could be shared internally.
- There were instances of background noise on some recordings which meant that it was difficult to hear what the learner was saying. It is strongly recommended that a trial recording is undertaken prior to the first viva-voce and it is checked for quality and any necessary action taken.
- In the notes for presenters it states "The profiles of the learner and presenter must be clearly visible on camera". In a number of cases this did not happen.
- The presenter may ask for further clarification if the learner's initial response to a question is ambiguous, incomplete or too inaccurate. However, in some cases the prompt included statements that gave the learner clues to enable them to answer a question correctly; this type of prompting is not permitted. The point is made again that it is important for presenters to watch other presenters so that consistency, reliability and validity is maintained.
- If a learner is answering a question but the focus is wrong, a presenter is allowed to restate the question to guide the learner back towards the focus of the question.
- The presenter must read out the exact question and not change any of the words or meanings because there must be consistency for every learner.
- For the viva-voce, learners may take into the preparation and examination rooms a work book that has been compiled for use during the viva-voce. The learner can refer to the work book but must not be allowed to read out pre-prepared material during the viva-voce. In a number of cases reading directly from notes did appear to take place.
- A number of learners spent a lot of time flicking through their workbook. It is suggested that a contents page with page numbers is placed at the front of their booklet to assist learners in finding information that they want in order to answer a question.
- Presenters are reminded that during the recording of the viva-voce they may go back over questions if there is time available.
- There is a maximum of fifteen minutes for the viva-voce. The presenter and/or invigilator are instructed to let the learner know when there are two minutes left. In a number of cases presenters did not follow this instruction.
- Correct labelling of files is crucial; each learners file must be named according to the following instructions:  
Centre number\_Candidate number\_Unit number\_Series.  
In addition, an indication of the contents of the CD/DVD must be written on the disc itself, self-adhesive notes are not sufficient for this purpose.
- Centres are reminded that compact discs or digitally submitted evidence will not be returned. A copy of the evidence must be made and stored under secure conditions as a backup copy of the evidence until the results are published.

Question one

- (a) *Please tell me about an engineering achievement you have researched.*  
(b) *Explain how people's lives have changed as a result of this engineering achievement.*

All learners correctly identified an engineering achievement that they had researched. A number of learners spent time giving times and dates of achievements which had no bearing on the answer to this part of the question. Learners included several correct, clear and logical examples of how people's lives have changed as a result of this engineering achievement. Very few responses included comments about human, social, economic and political changes in their lives.

Learners should be encouraged to select an engineering achievement that gives adequate scope for discussion in the viva-voce. Several inappropriate achievements were chosen which made answering the questions very difficult.

Question two

*Please tell me about any issues which had to be overcome during the development of the engineering achievement you have researched.*

The majority of learners could not talk in-depth about any issues which had to be overcome during the development of the engineering achievement they had chosen. The issues that could have been considered might involve human, social, economic and political ones. It is suggested that centre's read the unit specification assessment criteria 1.4. This states "Identify and assess the social, human, economic and political issues that drove the achievement".

To obtain high marks responses needed to include logical and relevant supporting evidence that demonstrated depth and breadth of knowledge regarding such issues.

It is suggested that the range of social, economic, political and human issues are considered when selecting engineering achievements and that learners are encouraged to study achievements where these issues can be demonstrated.

Question three

*Please tell me what you have found out about the merits or advantages of a registration scheme such as those for the gas, water or electricity trades.*

Learners struggled to respond effectively to this question. It is important that the difference between an engineering professional body and an engineering registration scheme is made clear to learners.

There was no mention in the responses seen of the UK Plumbing, Heating & Mechanical Engineering Services Registration Scheme or the Gas Safe Registration Scheme or the Electric Safe Registered Electrical Scheme.

It should be noted that an abundance of information is either available on the internet or directly from the organisations themselves.

Question four

*Describe education and training opportunities for a school leaver entering the engineering industry.*

A number of learners had limited knowledge of the training opportunities for a school leaver entering the engineering industry. The popular responses included going right into employment with an engineering company, entering an apprenticeship scheme, going to a Sixth Form college or a Further Education College. There are other opportunities, such as, Get Ready for Work Scheme, Kick Start Programmes, Youth Reach and an Army Preparation Course.

Question five

*Please explain, giving examples, how the engineering industry uses recyclable materials.*

A number of learners needed to listen to the question more carefully. For whatever reason the main emphasis of HOW the engineering industry uses recyclable materials was missed by many, who mentioned aluminium, glass and other materials but did not address how they were used in industry.

To obtain high marks learners needed to give a response which offered both breadth and depth and included logical and relevant supporting examples.

A number of learners considered how fossil fuels could be conserved by the use of solar, wind, tidal and nuclear options, which was not really appropriate for the question set.

*What can you tell Michelle about her responsibilities as a young person using chemicals and the responsibilities of her employer in this situation?*

Many responses included some or all of the following points:

Employers and employees have responsibilities to each other, they should also expect their rights to be upheld. These rights and responsibilities relate to areas such as Health and Safety, supervision and the provision of training.

The Health and Safety at Work Acts set out responsibilities and rights for both employees and employers. Employees are expected to carry out their work in a way that has regard to the safety of others.

Employers are expected to abide by a range of requirements governing such aspects as providing safe machinery and equipment, carrying out regular health and safety checks, ensuring the training of employees in health and safety issues, and carrying out a risk assessment to assess the dangers of particular work activities. There are also specific regulations about the way in which potentially harmful substances should be used and stored. There are a number of requirements about the minimum temperature at work, and other aspects of working conditions.

In this work place scenario, some learners proceeded to discuss everything they knew about work place rights and responsibilities and therefore gave a lot of irrelevant information. Answers should be closely linked to the scenario. For example, pay, holidays, paternity and maternity rights are not relevant to this scenario, but were quoted.

Presenters and learners are encouraged to look at the reference [www.direct.gov.uk](http://www.direct.gov.uk)

## F549 Engineering design

It was encouraging to see learners presenting their work in clearly defined chapters/sections relating to assessment criteria.

It is important that the model assignments chosen by learners allow them to both disassemble and compare strengths and weaknesses of the chosen product.

Some centres developed their own design brief which gave the centres and learners the ability to tailor schemes of work to their particular facilities, specialisms and abilities.

It was encouraging to see that learners are no longer choosing to design a new product but to improve the function of a chosen product. As the assessment criteria clearly states, learners should identify a possible improvement of the studied product.

Choosing the more functional aspects of a product allowed learners to investigate mechanisms, electrical/electronic circuits and/or structures. This gives learners access to a much wider range of possible communication and modelling techniques such as circuit diagrams, flow diagrams, overlays, 2D/3D mechanical models and structural diagrams/models.

### **Comments on Individual Questions:**

#### Assessment Criteria 1

It is beneficial if learners present their key criteria in sections i.e. needs of the user, needs of the manufacturer, fitness for purpose etc. It is important that learners disassemble their chosen product in real time and support this with photographic evidence. Learners need to describe in detail the manufacturing processes involved in making their chosen product; without this they cannot access the higher mark band.

Strengths and weaknesses comparison of similar products was not evident in much of the work and where it was, more detail and products for comparison was needed. Presenting analysis of strengths and weaknesses of a product and comparison to a range of similar products in the form of a chart is often effective. Areas such as aesthetics, ergonomics, safety, materials, fitness for purpose, sustainability etc. should be considered. Meaningful and objective conclusions must be drawn from this comparison if the higher mark band is to be accessed.

#### Assessment Criteria 2

To access the higher mark band learners must show a detailed understanding of the implications of the standards relevant to their selected product. It would be useful if the chosen product was disassembled into its component form and standards and legislation addressed to all of these. From this understanding learners should draw conclusions as to the implications for their chosen product.

This could include reference to the risk from burning, earthing, toxic materials and pinch points.

### Assessment Criteria 3

It was encouraging to see design briefs clearly identifying an improvement in detail. Design briefs should relate to an improvement which candidates have identified through their disassembly of the product.

Specifications needed detailed and reasoned justification to access the higher mark band.

Many specifications were too generic and lacked meaningful justification.

It would be useful if specifications were presented in areas such as those given in assessment criteria 1.

### Assessment Criteria 4

To access the higher level mark band learners should independently select the most appropriate communication techniques for all aspects of their work. This could take the form of word processing to sketching, a chart of techniques giving uses and advantages and a range of CAD drawings.

Many learners showed a limited ability in basic traditional drawing skills.

A wide range of presentation styles and techniques should include sketching, orthographic projections, isometric projections, exploded views, circuit diagrams, CAD and 2D/3D modelling. Modelling would be a good way of demonstrating structural issues and mechanisms.

In many cases drawings lacked clarity and accuracy which is essential for learners to gain the higher band marks.

Detailed annotation alluding to the specification was not evident in some of the work.

### Assessment Criteria 5

Tests should be done in real time with photographic evidence supporting this. Questionnaires and subjective surveys do not give learners the opportunity to do scientific tests and mathematical analysis. This denies them access to the higher level mark band. Learners could use some of the tests outlined in Unit F545 Introduction to Engineering materials. Few learners produced clear, meaningful conclusions from their test results.

## F554 Maintenance

Most learners entered for this module chose to use the Model Assignment based on the maintenance of cycles.

The choice of a cycle gave the learners access to a product that they were familiar with. It also allowed the tasks to be undertaken in the centre workshop.

Learners must undertake their maintenance tasks independently.

Centres are reminded that they can use more than one product for their candidates to maintain, which could be useful where centres / consortiums have wide ability ranges.

For example some learners could maintain a child's single speed cycle and some could maintain a sophisticated mountain bike with multiple gears and suspension.

In some cases the nature of failure and failure trends was very centre-led which did not allow learners to work independently and therefore gain access to the higher mark band.

### Assessment Criteria 1

To gain marks in the higher band learners must independently select information from manufacturers and prioritise what is needed.

Learners must undertake complex routine maintenance procedures such as on bearings, cranks and gear systems to gain marks in the higher band.

There should be evidence of learners using tools and equipment safely; the most effective way of achieving this is with annotated real-time photographic evidence rather than a written statement.

It is important that learners do not complete this task as part of a team. It must be undertaken independently.

Some learners chose to produce a maintenance manual and others a flow diagram as evidence of how they devised procedures for an engineered product. These proved very effective methods of demonstrating this requirement.

Many learners did not address the requirement to modify and re-test where necessary.

### Assessment Criteria 2

For those that chose the model assignment focussed on cycles it was challenging for learners to choose a different product from the same company to study. Some used data generated by the centre to achieve this and this is an acceptable approach.

Most learners were able to give detailed information on the nature and cause of failure.

However, to gain marks in the higher band they also need to consider the implications and impact of this on both user and manufacturer.

### Assessment Criteria 3

Some centres found it difficult to access suitable data for their learners to use when analysing failure trends. To overcome this problem centres devised their own statistics and data for learners to use, which is acceptable.

Some learners chose to present their findings as a simple statement. Some used graphs and charts and this proved a very effective method of presenting this information.

Only a few learners went on to include a planned maintenance schedule in their report for the associated engineered product or system.

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