

Examiners' Report January 2009

Principal Learning

Engineering

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Principal Learning Engineering Level 1

Learners could be entered for three of the principal learning units, at level one, in this series. These units were EG101 (Introducing the Engineering World), which is externally assessed by examination, EG103 (Introduction to Computer Aided Engineering) and EG106 (Electronic Circuit Construction and Testing), both of which are internally assessed and moderated.

The specific reports for both units that received entries are below, and in general, learners performed well.

The outcomes from the EG101 examination suggest that many learners seemed to have a limited knowledge of engineering materials and their possible applications. Further, and again considering the outcomes from this series, the same could be said for manufacturing processes. Such knowledge is fundamental to the level one principal learning, and hence centres should address this issue as a matter of urgency (although it is recognised that learners sat this examination very early during their course).

Considering this is a new specification, and for this series only, learners were given credit for implicit evidence they provided in their portfolios for EG106 (eg Learning Outcome 2, 'saving work' - see the Principal Moderator Report which follows). Learners should provide explicit evidence in future series, and hence centres should endeavour to assess each Learning Outcome in a similar manner. As a result, it would be helpful for assessors to annotate learner work to clearly identify where marks have been awarded, linked to the appropriate assessment grid. Centres are reminded that each unit specification has a section entitled 'Guidance for allocating marks', which should be referred to when completing summative assessments. Further, centres should refer to the Tutor Support Materials for this qualification when setting assignments that are to be internally assessed and externally moderated, in order to ensure that all the assessment requirements are met in full. This will often involve witness statements/learner observation records, completed by the teacher/tutor and submitted as assessment evidence for the candidate in question.

Principal Learning Engineering

Level 1 Unit 1 Introducing the Engineering World

Considering that this series was the first time this unit has been examined, the performance of learners was generally good. Centres are to be commended for their thorough preparation of learners in such a short period of time. However, from this series it is clear that certain topics need more attention. Specific issues, from this series, are highlighted below.

It was disappointing to see that some learners failed to respond to all questions. Centres should ensure that they encourage learners to attempt all questions.

Q1 to 8 - These questions were answered with a high degree of success.

Q9 - Many Learners seemed to find it difficult to correctly identify manufacturing processes.

Q13 - Considering the responses seen, the term 'fossil fuel' is not widely understood.

Q15 - Many learners were not able to identify an environmental benefit of using bio-fuels.

Q16 - General confusion was demonstrated in the interpretation of energy efficiency labelling.

Q17 (b) - Whilst learners scored well on other parts of this question, the purpose of an oil refinery was not widely recognised.

Q18 (c) - Responses suggested that many learners have a limited knowledge of engineering materials and their possible applications.

Q22 (b) - Many learners answered Q22 (a) correctly, but were unable to identify that 'on the job decisions' are made by team members [response A]. The most popular, but incorrect answer, was 'managing director' [response B].

Q23 (b) - Again, responses suggested that many learners have a limited knowledge of engineering materials and their possible applications. Many learners incorrectly identified Medium Density Fibreboard [response C] as the answer.

Q26 - Again, many learners seemed to find it difficult to correctly identify manufacturing processes.

Q27 - Learners may use MS PowerPoint presentation software on a regular basis whilst in centres; this may have led many of them to incorrectly identify this as a suitable medium for displaying initial thoughts and ideas in a problem solving meeting.

Principal Learning Engineering

Level 1 Unit 6 Electronic Circuit Construction and Testing

During this series, the internal marking for this unit was generally lenient, especially for Learning Outcome 4. Centres are reminded that the unit specification has a section entitled 'Guidance for allocating marks' which should be referred to when completing summative assessments.

Learning Outcome 1

In this series, the majority of learners correctly identified six components from standard symbols. Considering this is a new specification, and for this series only, learners were given credit for drawing the symbols for a further four physical components which were not always different from those identified in the first task above. In subsequent series, centres should ensure that the four further components are different to the original six. Further, learners gained higher marks if they identified the order code, cost and a key feature of five components from a component catalogue. Key features are identified in the 'What you need to cover' section of the unit specification (e.g. power rating, maximum current etc.), and all 3 details need to be evident, for each component, before a mark can be awarded.

Learning Outcome 2

In this series, the majority of learners were clearly able to sketch a circuit diagram, and reproduce it on a computer-based electronic circuit simulation package. The majority of learners included at least six components in this circuit, using standard symbols, as required. Very few learners provided evidence that they had saved their work; in future series, a computer file pathway should be provided by each candidate, for example, via a screen dump. Considering this is a new specification, and for this series only, a modified circuit diagram was taken as proof that the original circuit diagram was saved and subsequently retrieved.

Learning Outcome 3

In this series, team working was assessed appropriately, as meeting minutes were produced by the majority of learners and such minutes were evident in candidate folders. However, it was often difficult to ascertain the input of each learner to the team effort, and hence in future series a tutor observation record will be expected, detailing each learner's contribution and justifying the allocated marks. Further, it was clear that the majority of learners prototyped the circuit using a breadboard, and then produced the same circuit using strip board, in a safe manner (safety glasses, correct soldering technique etc). However, to access the higher marks for this Learning Outcome, learners should provide further images that show the quality of their work (for example, the positioning of components and the soldering of joints) and should construct the same circuit using a PCB given to them by the teacher/tutor. Alternatively, if images do not do justice to the standard of work produced, a tutor observation record will suffice in future series.

Learning Outcome 4

In this series, the majority of learners tested the operation of a given electronic circuit, using an electronic circuit simulation package. However, the evidence provided by the majority of learners suggested that only four output signals were tested; the marking grid for this Learning Outcome clearly states that six different input and output signals should be tested. Considering this is a new specification, and for this series only, any written evidence provided by learners that mentioned testing with an oscilloscope, and the connection of oscilloscope probes to a transistor, was taken as proof of the setting up and use of physical test equipment. In future series, a tutor observation record and/or annotated photographs will be required, to capture both the setting-up and use of the test equipment, and consequently to allocate marks.

Principal Learning Engineering

Level 2 Unit 2 Investigating Engineering Design

Learning outcome 1

Generally, good use was made of sketches and digital images so that all learners were able to achieve scores in mark band 1. Tutor witness testimonies were not always presented and it was agreed by the moderating panel that, for this series only, written evidence and sketches are sufficient proof for achieving mark band 1. The main weakness in learner responses was the non-presentation of the detailed written evidence needed to achieve the higher mark bands. This would appear to have been caused by centres not providing learners with properly constructed assignment briefs.

Most aspects of centre administration were applied correctly and learner work was provided in the form of a portfolio. This was usually well presented in a logical order and was easy to follow. However, centre assessors must ensure the use of current versions of the unit assessment grids to ensure correct assessment.

It would be of benefit for centres to provide an assignment Brief. This would allow for clear instructions to learners, as tasks could be used to break up the unit requirements into manageable parts. Centres should consider using the Tutor Support Material currently available.

For future series, centres need to give more guidance to learners about what evidence is required to access the higher mark bands, particularly with respect to evaluating range of performance and fitness for purpose. It will also benefit learners if they concentrate on investigating just a single product or system (as indicated in the specification) rather than several products. With the inclusion of properly annotated photographs and witness testimonies this will allow a more thorough coverage to be carried out.

Learners generally did well in identifying a product and describing its construction and function, but failed to show evidence of “dismantling and reassembling” the chosen product, as stated in the current unit specification.

There was a more mixed response to mark band 2 and 3 with few learners gaining available marks. Centres should ensure that learners do not over rely on unedited research material (text and photos) taken from the web. This did not allow learners to fully explore the features of their chosen product. If learners had disassembled and reassembled their product, an opportunity for “live” photos and witness testimony/observation record would have arisen as evidence.

Learning outcome 2.1

Learners were able to identify physical constraints from their given design briefs but, without the aid of assignment briefs containing clear tasks and guidance referenced to the marking grid, they were not able to easily access mark bands 2 and 3. On the whole learners appear to have been well supported - presumably through discussion with the tutor.

Learning outcome 2.2

Evidence presented for mark bands 1 and 2 was generally robust but weak when specifying economic and manufacturing considerations. Most of the learners seemed to have a limited understanding of manufacturing processes, and those that did tended to focus on activities in a centre workshop environment rather than in an engineering business.

Learning outcome 3

Some good design ideas were presented which were well supported by written commentary thus enabling mark bands 2 and 3 to be accessed by higher ability learners. The main problem was that most learners did not pick up on the importance of referencing back to the requirements of the PDS when justifying their choice for a final design solution.

Learning outcome 4

Learners produced final design solutions across the range of ability and presented them using sketches, drawings and PowerPoint. Where tutor witness testimonies were not presented it was agreed by the moderating panel that, for this series only, written evidence and sketches would be accepted as sufficient proof for achieving mark bands 2 and 3. Learners missed out on marks because none of the designs presented lent themselves to having mathematical and scientific calculations carried out on them.

General comment

Some learners presented Gantt charts to show their progress but it seems likely that these were drawn up 'after the event' because there was no indication of them being used effectively, for example by showing modifications when targets were not met. Those that presented log books did so in the style of a simple diary, making it difficult for the assessor/moderator to give full credit for the developmental and thought processes followed through by the learner.

In future, when centres are designing the unit assignment brief they would benefit by referring to the published Tutor Support Material as this gives them clear guidance on how to present tasks so that the learner is able to focus on what evidence should be presented, particularly with reference to gaining scores in mark bands 2 and 3.

The degree of support given to learners does not appear to be uniform and some have been allowed too free a hand so making it harder for them to meet the requirements of the assessment grid. A reminder to centres about fully understanding what is written in the unit delivery, assessment and allocation of marks guidance will benefit learners in the future.

Some aspects of centre administration were not properly addressed. Centres must ensure that an Edexcel pro-forma cover sheet is attached to each learner's portfolio of evidence, this makes it easier to confirm assessed and moderated marks. The latest issue of the unit specification did not appear to have been used by one centre. Fortunately this did not seem to have disadvantaged the learners because it only related to a small part of LO.1. In some places annotation of learner work was not clear, making it difficult for the moderator to see exactly where marks had been awarded by the assessor

Many of the issues identified in this report are to be expected with a new qualification delivered by centres many of whom will be new to working with Edexcel unit specifications. If they seek and implement the required level of guidance and support there is no reason why any of the problems should not be satisfactorily resolved and learners achieve higher grades in future sessions.

Principal Learning Engineering

Level 2 Unit 8 Exploring Engineering Innovation, Enterprise and Technological Advancements

General Comments:

Overall, the paper produced a good range of responses. Lower ability learners often gave generic responses to questions, such as 'recycle/use less/get a loan' that gained limited marks. Some learners based their responses on an incorrect context or misread the question and therefore did not gain marks. The more demanding questions at the ends of the paper were difficult for many learners and consequently many gave inappropriate responses.

Most learners would benefit from being taught examination skills and techniques as often they did not read the questions properly and questions were not answered using the 'state, describe, explain' method.

Question 1 is aimed at (a) identifying types of intellectual property, (b) reading, understanding and researching the pre-release, (c) understanding why a given intellectual property is used, (d) the benefits gained from registering a given intellectual property.

Part (a): the majority of learners correctly associated the different types of intellectual property with their descriptors.

Part (b): most learners correctly identified which intellectual property should be chosen based on information in the pre-release.

Part (c): those that had studied the pre-release material were able to offer detailed responses. The pre-release mentioned 'novel idea', 'substantial and new idea'; many responses were about the benefits.

Part (d): received good responses from many learners with most picking up some marks.

Question 2 is aimed at (a) testing the market place pre-production, (b) testing the product, fit-for-purpose, (c) raising finance.

Part (a): most learners were able to name an example of at least one market research technique.

Part (b): a very significant percentage of learners could not adequately describe industrial testing techniques. Tests such as soak, duration, reliability and pressure featured little in the answers. Most learners however, did have understanding of testing with customers.

Part (c) was answered well with most learners scoring high, answers like 'Dragons Den' gained no marks unless clarified as venture capitalists.

Question 3 is aimed at testing knowledge of materials and their properties. The questions were set in the context of the pre-release, referring to the torch casing, reflector and switch. Judgment was made on the appropriateness of the material for mass production and its matched properties

For part (a) (i) and (ii) most learners stated a suitable material and matched its properties. However, some Learners gave generic responses such as 'plastic' when a specific material was required.

Part (b) (i) and (ii): a reasonable proportion of Learners read the question as 'switch' and not 'switch contact' and answered accordingly. The question was looking for switch contact material such as copper with a property of 'good conductor'.

Part (c) (i) and (ii): produced good answers with most learners stating an appropriate material and a correct property.

Question 4 is aimed at testing the learners understanding of mass production techniques and the manufacturing process.

Centres are reminded that the paper is ramped in difficulty and the latter questions in each section are aimed at the more able Learners. The question required an ability to provide specific responses, by drawing upon specialist knowledge. Learners who provided answers that related to a mass production process scored well. However many Learners suffered from a lack of exposure to 'real life' production engineering. Responses such as "vacuum forming" and "melting down tin cans" to make the torch casings featured regularly. Learners' descriptions of the process were weak and sometimes inappropriate. Drawings failed to show understanding of a mass production technique. There were a numbers of learners who did not give notes and/or sketches and therefore were unable to gain full marks. The correct detail is clearly outlined in the specification and centres should refer to it.

Question 5 is aimed at (a) the advantages of the technology, (b) an explanation of the technologies impact in the home or work place.

Part (a) was generally well answered with most Learners attracting some marks; very high and low responses were limited in number. Some responses were generic and limited to a narrow range of advantages.

Part (b) had a similar result with many Learners attaining mid-range marks, explanations were generally limited.

Question 6 is aimed at (a) transport and raw material, (b) manufacturing techniques and process, (c) waste disposal, (d) packaging and documentation and finally distribution.

The majority of learners sitting the examination paper attempted the final questions. This is pleasing as it is good exam technique for learners to attempt all questions. Many responses were too generic for a higher ramped question, learners often replied to the question 'explain the impact of....' with answers such as "too much energy used" and to 'explain reduction of....' with answers like "use less".

Statistics

Level 1 Unit 1 Introducing The Engineering World

Grade	Max. Mark	A*	A	B
Boundary mark	45	38	28	18

Level 1 Unit 6 Electronic Circuit Construction and Testing

Grade	Max. Mark	A*	A	B
Boundary mark	60	54	39	24

Level 2 Unit 2 Investigating Engineering Design

Grade	Max. Mark	A*	A	B	C
Boundary mark	60	54	43	33	23

Level 2 Unit 8 Exploring Engineering Innovation, Enterprise and Technological Advancements

Grade	Max. Mark	A*	A	B	C
Boundary mark	60	53	44	35	26

Notes

Centres are reminded that this is the first examination for this new specification and that coursework boundaries may change in the following series

Maximum Mark: the mark corresponding to the sum total of the marks shown on the mark scheme or mark grids .

Boundary mark: the minimum mark required by a candidate to qualify for a given grade.

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