

Examiners' Report

Summer 2010

Principal Learning

Engineering Level 1 Controlled Assessments

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Principal Learning Engineering

Level 1 Introduction

Learners could be entered for any of the seven Principal Learning units, at Level 1, in this series. These units were EG101 (Introducing the Engineering World), which is externally assessed by examination, EG102 (Practical Engineering and Communication Skills), EG103 (Introduction to Computer Aided Engineering), EG104 (Developing Routine Maintenance Skills), EG105 (Introduction to Engineering Materials), EG106 (Electronic Circuit Construction and Testing) and EG107 (Engineering the Future), all of which are internally assessed and moderated. Edexcel received a considerable number of entries for all seven units.

The specific reports for all units are under the appropriate heading, and broadly-speaking, learners performed well. General comments related to the external unit and the internal units are noted below.

Externally assessed unit - Learners performed well in this series, when compared to the January 2010 series; however, there were still clear patterns in achievement, especially when considering learners around the A/A* (at Level 1) boundary. Learners must have a basic knowledge of engineering sectors, job roles, materials, processes (and their possible applications) and environmental factors/energy use, in order to gain a high mark in this unit. Aspects of such knowledge are also fundamental to the Level 1 Principal Learning as a whole, and hence centres/consortia must ensure learners have assimilated this information very early in the course.

Internally assessed units - During this series, the centre/consortia marking for the internal units was generally in line with the national standard. It was clear that one person had completed the learner assessment (for a given centre/consortia/unit) in most cases, and hence internal standardisation was rarely an issue in this series; however, centres/consortia are advised that such a process will be very important when multiple assessors mark the same unit. 'Annexe E' in the Principal Learning specification gives guidance as to how this should be carried out.

In general, most aspects of administration for the internal units were good, with the correct samples being provided (including the work of those learners with the highest and lowest mark for each unit), although many centre/consortia packages were sent to the

moderators well after the submission deadline. Generally, a Candidate Record Sheet (CRS) was signed by each learner and the tutor, and centre/consortia marks were recorded correctly, on the CRS; however, candidate and centre/consortia numbers were often incorrect or missing, and centres/consortia are reminded that these are vital pieces of information if the moderation process is to operate smoothly. Further, most learner work was organised in such a manner that it was reasonably straightforward for the moderator to locate the evidence for each Learning Outcome; however, centres/consortia should: a) encourage learners to number each page in their work; and b) note these page numbers, for each Learning Outcome, on the CRS.

Centres/consortia should recognise that if learner evidence is provided in an organised fashion, by Learning Outcome, this greatly assists internal standardisation, as well as external moderation. Some centres/consortia sent a vast amount of unnecessary learner work to the moderator that was not associated with the summative assessment (i.e. delivery materials), and some did not provide an EDI print out of the centre/consortia marks for each learner. Centres/consortia are reminded that marks on the EDI print out (via Edexcel Online) should match those on the CRS. Many learners, from different centres, were taught as a single group, but still entered from their home centre; centres are advised that, in future series, it would be most appropriate to enter learners for each unit at the delivery centre, in order to minimise the moderation process.

In this series, learners were not given credit for implicit evidence. Learners must provide explicit evidence for each Learning Outcome, and hence centres/consortia should endeavour to assess each Learning Outcome in a similar manner. As a result, it would be advisable, and very helpful, for all assessors to annotate learner work to clearly identify where marks have been awarded, linked to the appropriate Marking Grid, with page numbers noted on the CRS. Centres/consortia are reminded that each unit specification has a section entitled 'Guidance for allocating marks', which should be referred to when designing/completing summative assessments. Further, centres/consortia may find it useful to 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 learners have the opportunity to address all of the assessment requirements, in each of the three Marking Bands, for each Learning Outcome. This will often involve the use of annotated photographs and learner observation records (the later completed by the teacher/tutor), especially for Marking Grid B and other practical evidence, which centres/consortia are actively encouraged to submit as assessment affirmation for the

learner in question. Centres/consortia should also be aware that, at this level, the use of templates is actively encouraged when the summative assessment approach is improved by their use - please see the comments regarding Learning Outcome 5 for EG102, and the comments in the Principal Moderator report for EG107. However, some centres/consortia relied on the use of the Edexcel Activity Sheets (from the Teacher Resource Disk) when asking learners to generate summative assessment evidence for several units; this is not recommended, as these documents are designed as delivery resources rather than assessment activities, and as a result restrict the level of attainment.

Centres/consortia were given individual feedback by a moderator, via an E9, with comments noting possible areas where the summative assessment approach could be improved.

Level 1 Unit 2 Practical Engineering and Communication skills

During this series, the internal marking for this unit was generally in line with the national standard.

Learning Outcome 1 (Marking Grid B)

In this series, the majority of learners provided evidence of being able to identify and apply the requirements of working safely with colleagues in a familiar and unfamiliar context (to a lesser extent - see below), explaining why key aspects of relevant health and safety legislation are necessary. This Learning Outcome was approached in a different manner across centres/consortia; nonetheless, it was pleasing to note that the vast majority of assignment briefs allowed learners to access Mark Band 3. For example, a number of learners were required to complete a health and safety worksheet and were then observed carrying out tasks in the workshop; some were required to provide written responses in order to demonstrate that they understood the difference between their 'own responsibilities', and those of 'others', when considering health and safety legislation, in addition to identifying risks and citing some control measures; others were required to complete written and practical health and safety tests, where, for the later, the tutor wrote an observation record qualifying the ability of the learner to carry out a different types of engineering procedure safely etc.

In future series, centres/consortia may wish to combine aspects of the summative assessment for this Learning Outcome with LO.3 (see below), in order to further contextualise the assessment approach (i.e. learners could demonstrate they are working safely [LO.1] when dismantling an engineered product [LO.3]). In addition, it was noticeable that few learners provided, in an explicit manner, evidence that they could identify and apply the requirements of working safely with colleagues in an unfamiliar context; as a result, centres/consortia may wish to ask learners what they would do to ensure safe working if they were going to perform a given task for the first time, and this could be captured using a learner observation record.

Learning Outcome 2 (Marking Grid A)

In this series, the majority of learners were clearly able to describe two cutting processes, two forming processes and a joining process (for Mark Band 2). A smaller number of learners just identified the aforesaid processes (Mark Band 1) and fewer still compared the cutting and forming processes (Mark Band 3). However, a pleasing number attempted to relate each process to an industrial application.

Considering future series, it would be more appropriate for learners to state examples of cutting/forming/joining processes that are more akin to industrial manufacturing. Whilst 'sawing' is a cutting process, a better example would be to describe, for example, the use of a laser or water jet cutter. This comment is also applicable to the identification of a joining process, such as 'gluing', although this could still be used if the description was more elaborate. Some learners provided good sketches/imagery of the processes they identified/described and this is to be encouraged, as it provided a simple means of comparison. In some centres/consortia this Learning Outcome was evidenced by the use of a table, which required the learner to identify a specific process that may apply to a series a given tasks. This allowed the learner to show that they knew the difference between cutting, forming and joining processes, and this was followed by a series of short questions requiring the student to describe the various processes and then compare two of them. Centres/consortia should also note that good descriptions of, for example, numerous cutting processes, will still only generate the marks allocated to this particular piece of learner evidence. Learners need to provide evidence that they can identify/describe/compare cutting, forming and joining processes, not just one of the aforementioned.

Learning Outcome 3 (Marking Grid B)

In this series, the majority of learners provided evidence of being able to dismantle a product, clean and lay out the component parts and consequently reassemble the product. A smaller, but still sizeable, number of learners provided evidence of using documentation to select equipment when dismantling the product. A minority of learners identified parts needing replacement and fewer still compiled a report including parts for replacement and reasons for replacing them. Several learners wrote a report, but generally such reports were a retrospective narrative of the procedure carried out. Some centres/consortia made good use of annotated photographs and learner observation records covering the strip, clean, layout, check and rebuild of various engineering devices, and this is to be encouraged/commended for capturing evidence of the practical activities. This type of evidence was clear, comprehensive and easy to follow, and it provided a means of detailing the level of assistance provided to each learner, thereby justifying the allocation of marks. Such photographs would have also been appropriate as evidence for aspects of LO.1 (see above), if the learner followed the appropriate health and safety procedures/precautions.

In future series, centres/consortia should provide learners with a product that does require replacement parts. Further, centres/consortia may wish to provide learners with documentation (possibly in the form of a template) that includes an area for reflection/review after each stage of disassembly, with a further area for learners to note parts requiring replacement. The aforementioned could then be used as a basis for compiling a reflective report that includes parts for replacement and reasons for replacing them.

Learning Outcome 4 (Marking Grid A)

In this series, the majority of learners produced sketches of an engineered product in orthographic 3rd angle projection. Most learners also produced an isometric view of the same product, and both of these sketches were, in the main, correctly dimensioned. Most learners had clearly put a great deal of time and effort into their work for this Learning Outcome. However, very few learners produced a correct orthographic 1st angle projection, or an oblique view, and it was noticeable that centre lines and/or hatching were often missing from learner work, as was the use of common drawing conventions and layouts (e.g. a title block), despite centre/consortia assignment briefs/products that

required the production of such evidence. All of the aforementioned prevented many learners from accessing either Mark Band 2 or Mark Band 3.

Considering future series, sketches of a simple 3D engineered product, such as a milled bracket with an internal slot, would allow all the requirements of Mark Band 3 to be met, and as a result centres/consortia may wish to ask learners to produce less complex projections and views, to ensure that time is available to attempt all the elements within the Marking Grid for this Learning Outcome. Centres/consortia should also note that the product to be sketched should allow learners the opportunity to generate all 3 elevations (side, front and plan), when considering the orthographic projections.

Learning Outcome 5 (Marking Grid A)

In this series, most learners compiled a plan of operation to produce an engineered product. A small number of learners reviewed the success of the plan, and fewer still explained how changes to their plan would lead to improvements in planning or manufacture; as a result, this prevented many learners from accessing Mark Band 3. Many learners still provided their plan of operation as a written narrative, rather than using a table format, and this often meant key elements of the plan, such as materials or tools required, were missing. The majority of learners subsequently provided evidence of manufacturing the engineered product, through the use of annotated photographs and learner observation records. A notable number of learners had clearly written the plan retrospectively; centres/consortia are again advised that no credit can be awarded for this.

Considering future series, centres/consortia are advised to provide learners with a blank plan of operation table/template, with columns headed 'sequence of operations', 'materials', 'tools and equipment', 'health and safety' etc, perhaps with an area for reflection/review at the end of each row. In some centres/consortia, learners were required to complete a reflective production diary, including suggestions for improvements, as evidence of reviewing their plan (not their product), and this is considered to be good practice. A reflective diary is appropriate confirmation that the learner actually undertook the manufacture of an engineered product, if supplemented with a learner observation record and/or annotated photographs to capture the practical evidence of manufacture. Some centres/consortia used an external visit to support and consolidate learners' knowledge and understanding relating to this Learning Outcome;

this clearly helped learners when undertaking their summative assessments and is to be commended.

Level 1 Unit 3 Introduction to Computer Aided Engineering

During this series, the internal marking for this unit was generally in line with the national standard. Pleasingly, the majority of centres/consortia required learners to complete the summative assessment based on a simple engineered item, such as a cover plate, and this is good practice, as learners were able to access Mark Band 3 for all Learning Outcomes, despite the time constraint. Concentrating on a single, simple item, for all 3 Learning Outcomes, helps to contextualise the assessment and allows learners to concentrate on producing the necessary evidence as stated in the Marking Grid.

Learning Outcome 1 (Marking Grid A)

In this series, the majority of learners produced a dimensioned drawing of an engineered component in line with BS 8888 and a circuit diagram in line with BS 3939 complete with some annotation (for Mark Band 1). A significant number of learners provided evidence of preparing a template for these drawings, but many still failed to include important elements, such as a border or the truncated cone symbol. Most learners did not provide evidence that they had used separate layers for the dimensioning, annotation etc. It was clear that many learners had put a great deal of time and effort into their work for this Learning Outcome; however, learners were still sometimes required to produce drawings which were unrelated to the item to be manufactured for Learning Outcomes 2 and 3, and these drawings were quite complex at times, which was unnecessary (see below).

In future series, centres/consortia should ask learners to print out their template (and/or a screen shot) prior to any drawings being added to it. Similarly, screen shots and/or colour print outs, that show, for example, the dimensioning in a different colour, would be appropriate to provide explicit evidence of their use of layers. Further, some centres/consortia should ask learners to produce less complex drawings, to ensure that time is available to attempt all the elements within the Marking Grid for this Learning Outcome. It should be recognised that the summative assessment for this Learning Outcome is as much about the process of generating correct 2D CAD drawings as it is about the final outcome, and as a result, centres/consortia may also wish to provide learner observation records to capture this procedural evidence.

Learning Outcome 2 (Marking Grid A)

In this series, the majority of learners were able to provide evidence that they had used CAM software and cutting information to convert CAD drawing geometry into a machine tool cutter path (including tool set-up); further, the majority of learners were able to provide evidence that they had the ability to process the cutter path data into a coded CNC operating program (for Mark Band 1). It was pleasing to note that many centres/consortia then provided learners with the opportunity to identify and amend errors in program operation, through fault finding and rectification, often by amending the original item, although a much smaller number of learners provided evidence of rerunning the cutter path graphic simulation. Most learners used screen shots with some annotation to provide evidence for this Learning Outcome, and this is to be commended, as such evidence was clear and easy to follow.

Considering future series, centres/consortia may wish to provide a guide for learners to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another screen shot with simple annotation would suffice to provide evidence of using cutter path graphic simulation, yet this was seen infrequently. Further, centres/consortia could provide learners with a template or framework into which they could note details relating to the introduced error/s (i.e. a description of the problem). A further screen shot/s showing the cutter path graphic simulation being rerun, following amendments by the learner, with brief annotation noting how effective the changes were, would allow learners to access the top of Mark Band 3. Two to three pages of A4, with five to six screen shots covering all elements of the Marking Grid, including associated annotation/details, would suffice for this Learning Outcome. Learner observation records could also be used to support evidence of learners undertaking the necessary tasks to the required standard.

Learning Outcome 3 (Marking Grid A)

In this series, the majority of learners provided evidence of loading a CNC program into the controller, and of setting work datums and tool offset values. The majority of learners also provided evidence of safely executing the program to produce a first-off component. Very few learners provided evidence of using feed and speed override controls to gain optimum performance, or of editing the program to incorporate override values; however, a greater number of learners compiled a basic inspection report including reasons for non compliance and actions, which mainly resulted from

centres/consortia requiring learners to complete, review and reflect upon an inspection sheet that recorded the dimensional accuracy of the item in question. The majority of centres/consortia required learners to annotate images/photographs, or print screen shots, when providing some of the evidence for this Learning Outcome, which again is to be commended; such evidence was clear and easy to follow. Some learners provided a written narrative of how they worked safely; this is unnecessary, as annotated images, perhaps showing the learner wearing PPE or traversing the workpiece away from the tool in order to unload, would suffice.

Considering future series, centres/consortia may again wish to provide a guide for learners to ensure that each element of the Marking Grid for this Learning Outcome is covered. For example, another annotated photograph, providing evidence of learners experimenting with either physical or VDU-based feed and/or speed override controls, would have enabled many learners to gain access to the top of Mark Band 3, as opposed to Mark Band 2. Further, another screen shot with simple annotation would have sufficed to provide evidence of editing the CNC program to incorporate the optimum override values. Learner observation records could again be used to support evidence of learners undertaking the necessary tasks to the required standard; however, centres are advised that learner observation records alone are not sufficient evidence for this Learning Outcome.

Level 1 Unit 4 Developing Routine Maintenance Skills

During this series, the majority of internal marking for this unit was in line with national standards.

Learning Outcome 1 (Marking Grid A)

This Learning Outcome consists of 1.1 and 1.2, which includes maintenance procedures and documentation.

In this series, most learners were able to describe three different types of maintenance procedures, where each could be used and how they are carried out. They were also able to give examples of maintenance documentation and what this documentation covers. Not all learners were able to state why different types of maintenance procedures are needed, and how to use maintenance documentation when planning and carrying out

identified maintenance tasks. It was pleasing to note that almost all centres/consortia used a practical approach with this Learning Outcome, and learner evidence was sound as a result.

The vast majority of centres/consortia provided learners with the opportunity to access Mark Band 3, but are reminded that at Level 1 learners require clear and unambiguous guidance in order to understand the requirements when submitting evidence for this Learning Outcome. An example of this was noted during external moderation, where clearly defined tasks were provided for the servicing of a bicycle. Very good use was made of the workshop manual as a source of documentation, and hence the learner outcomes were excellent.

Learning Outcome 3 (Marking Grid A)

In this series, LO.3 provided some challenge for learners, when considering the causes of failure of a product or a piece of equipment.

The majority of learners were able to devise a simple plan to see if the product (or piece of equipment or system) might fail in service. They were also able to demonstrate the ability to use simple tools and equipment. Not all learners recorded key measurements as part of this process. They also had difficulty in reviewing the plan in relation to its effectiveness, and struggled to make improvements to it.

This situation could be improved if centres/consortia gave more thought to the task setting and subsequent guidance given to learners, as this would allow access to Mark Band 3. Centres/consortia should consider allowing learners to discuss the possible reasons of failure, such as age, wear, corrosion, operating environment, lubrication failure and inherent design faults.

Learning Outcome 2 (Marking Grid B)

This Learning Outcome centres around two key requirements: a) that learners are able to use tools safely; and b) that learners can carry out a routine maintenance task.

All centres/consortia used a practical setting to allow learners to provide evidence for this Learning Outcome. However, the use of annotated photographs and learner observation records, which would have served to assist in the external moderation process, was not consistent across the centres/consortia.

Centres/consortia should also consider how they can evidence guidance, limited guidance and independence, which is a key indicator for access to each of the Mark Bands for this Learning Outcome. This could easily be referenced using a learner observation record, and this was provided by a good number of centres/consortia.

Level 1 Unit 5 Introduction to Engineering Materials

During this series, the internal marking for this unit was broadly in line with the national standard, for the majority of centres/consortia, although in some cases this was achieved by being lenient with some of the Learning Outcomes, and generous with others. In some cases, evidence was presented for a particular Learning Outcome and credit was not given in the subsequent assessment. Care should be taken when assessing work that all learner evidence is given appropriate credit, and that a mark is awarded where a candidate provides some work for any Learning Outcome. It was encouraging that the majority of centre/consortia assignment briefs were designed to allow access to all of the Mark Bands.

Learning Outcome 1 (Marking Grid A)

In general, learners provided good evidence in stating and defining material properties, and then giving appropriate applications of the material. In this series, there was an increase in the number of learners who achieved marks from MB3, due to their consideration of how materials and their properties are linked to applications.

Learning Outcome 2 (Marking Grid A, including 2.1, 2.2, 2.3 and 2.4)

Most learners produced some appropriate evidence for these Learning Outcomes; however, the quality and content of the work was very varied. Learners tended to achieve the requirements for Mark Bands 1 and 2, with far fewer attaining credit from Mark Band 3. Centres/consortia are reminded that in order to achieve MB3, learners are required to justify the use of a particular forming process for a material, and to link the application of the material to the properties of the material and the forming process. In this series, there was an increased use of tables to provide evidence for each of these Learning Outcomes, and learners who used them generally performed well.

There are still some common errors evident from both learners and centres/consortia; for example, many are still missing the requirement for an elastomer in Learning Outcome

2.3. Similarly, for thermosetting plastics in Learning Outcome 2.4, three different processes should be considered in addition to three different materials. It is not appropriate to state 'laying up' for each.

Learning Outcome 3.1 (Marking Grid A)

Some learners presented evidence for this Learning Outcome and were not awarded any credit, especially from Mark Band 1. In future series, learners would benefit from being provided with appropriate documentation to work from, which must include appropriate abbreviations; suitable examples include materials requisitions, drawings, parts lists and technical specifications.

Learning Outcome 3.2 (Marking Grid B)

The evidence provided for Learning Outcome 3.2, in this series, was minimal. It is suggested that learner observation records and annotated photographs are used for future submissions, in order to support the marks which are awarded for this Learning Outcome.

Learning Outcome 3.3 (Marking Grid A)

In this series, the learner evidence which was presented for this Learning Outcome was not always explicit. In many cases, where learners had been awarded marks from MB3, there was little evidence of the selection of tests by learners, which is required for this Mark Band. However, it was clear from the sample that tests had been carried out on a range of materials by the vast majority of learners.

In future series, it would be good practice to explicitly name the tests, and the materials being tested, and to include this information in a written report. The use of results tables should also be encouraged within reports.

Level 1 Unit 6 Electronic Circuit Construction and Testing

During this series, the majority of internal marking for this unit was in line with national standards.

Learning Outcome 1 (Marking Grid A)

In this series, most learners were able to identify six components from a given circuit diagram, and a further four other components. Centres/consortia should note that the further four symbols should be identified from a selection of physical components. Most learners were able to research key features of components, but the various examples of what a key feature was varied across the centres/consortia. Tolerances, working voltages, power ratings, maximum current and temperature ranges are typical key features that could be cited.

In summary, most learners were able to access MB3. This Learning Outcome was tackled well, yielding some high marks.

Learning Outcome 2 (Marking Grid A)

In this series, almost all learners were able to sketch an electronic circuit diagram, including six symbols. Some sketches were neater than others. Mark Band 2 calls for learners to reproduce the sketch using a computer software package. This did not pose too many problems for the vast majority of learners. The issue that arose during the moderation process was the lack of evidence provided to enable confirmation that the drawing had been saved. This was also the case for Mark Band 3. It was difficult to confirm retrieval of the saved file, modification, and resave. Centres/consortia are advised to state file pathways, and provide associated screen shots. In summary, most learners were able to access MB3.

Learning Outcome 3 (Marking Grid A)

In this series, this Learning Outcome proved the most challenging. Evidence to justify planning, or working within a team, was not consistent across the centres/consortia. At Level 1, learners require more detailed guidance and direction from tutors that will enable them to fully understand the requirements of this Learning Outcome. A detailed set of meeting minutes could highlight what planning was discussed, and the contribution made by each member of the team. This was attempted by some centres/consortia.

It was clear that learners had built the circuit, in its various forms, as most centres/consortia provided photographs; however, some of these showed far more detail than others.

It is imperative in future series that centres/consortia provide clear evidence of the learner working safely. Again, suitable annotated photographs would suffice. A learner observation record could also be provided. In summary, almost all learners accessed Mark Band 2, and some were able to access Mark Band 3.

Learning Outcome 4 (Marking Grid B)

In this series, most learners were able to use a software simulation package to undertake basic tests. The requirement to undertake six measurements did challenge some learners. Centres/consortia are advised that the six measurements do not all have to be waveform outputs. Voltage tests will also suffice.

Evidence of setting up physical test equipment was limited. Some centres did provide learner observation records, but the comments were a little brief. The use of annotated photographs is recommended.

Some learners provided very basic statements about the advantages/disadvantages of using physical test equipment. In general, the requirement to compare results and advantages/disadvantages of computer based tests, versus physical tests, was not answered well.

In summary, most learners accessed Mark Band 2; very few accessed Mark Band 3.

Level 1 Unit 7 Engineering the Future

In the majority of cases, the internal marking for this unit was in line with the national standard in this series. The assignments seen during the moderation period were designed to allow learner access to the whole range of marks. The use of structured assessment materials is appropriate at Level 1, and if such materials allow access to all of the Mark Bands, their use is encouraged.

Learning Outcome 1 (Marking Grid A)

Most learners provided evidence of considering three new/smart materials, by identifying them and then describing their properties and specific engineering applications.

Typically, these materials tended to consist of shape memory alloys, phosphorescent pigments, polymorph and thermochromic inks. There was an increase in the number of

alloy materials being described, such as titanium alloys. For this Learning Outcome, some centres/consortia provided learners with very structured assignments which enabled them to access MB3.

Learning Outcome 1.2 (Marking Grid A)

Most learners gave three new engineering technologies with some description of their use in everyday life. Typical technologies included hybrid vehicles, induction motors, remotely operated vehicles and mobile communication devices.

In some instances, centre/consortia again provided learners with assignments which were very structured, in order to allow access to MB3. Where this was the case, learners were able to relate the technologies to their impact on society and the environment. Learners from centres/consortia that followed a less structured approach tended to submit evidence which was limited to MB2. There is still scope for improvement when considering the design of the assignment brief for this Learning Outcome, as in many centres/consortia the assignment fails to address the 'social impact' aspect of this Learning Outcome.

Learning Outcome 2 (Marking Grid A)

In this series, most learners were able to demonstrate an understanding of a range of recycling processes, with glass jars, aluminium cans and similar products being considered. In many cases, this was accompanied by a good description of the recycling process required for the product/s. Some learners referred to materials rather than products, and were rewarded appropriately.

Learner evidence for the recycling processes varied in format, from written reports through to presentations and leaflets. Using the later methods is to be encouraged, as they are more likely to engage learners and encourage them to improve their attainment. Learners were less successful in their descriptions of the methods of disposal of non-recyclable products. In many cases, the responses for this aspect of the Learning Outcome were limited to MB1.

Learners tended to consider recycling rather superficially, and did not consider the bigger picture of the long term benefits to the environment and to society in general. It is suggested that in order to improve attainment for this Learning Outcome, centres/consortia should encourage learners to include more detailed explanations as to why some materials can be recycled and some cannot.

Learning Outcome 3 (Marking Grid A)

In this series, most learners were able to identify two sources of renewable energy, with hydroelectric, solar, tidal and wind power being popular choices. Some learners referred to biomass and geothermal sources; these were less frequent, but still appropriate. Most learners were able to provide a description of how electricity can be generated from the sources which they identified, with a significant number of learners providing very detailed work. An increased number of learners were able to provide some consideration of the positive and negative environmental impacts of the sources of energy which they had described.

However, learner evidence associated with the consideration of energy storage methods was still limited. Those learners who did well were able to provide good descriptions of the potential use of batteries and flywheels as storage methods, whilst others linked the use of reservoirs to store water to their earlier work about hydroelectric power. When taken in this context, the use of reservoirs as a storage method for energy is appropriate.

Statistics

Level 1 Unit 2 Practical Engineering and Communication Skills

	Max. Mark	A*	A	B	U
Raw boundary mark	60	51	37	24	0
Points Score	8	6	4	2	0

Level 1 Unit 3 Introduction to Computer Aided Engineering

	Max. Mark	A*	A	B	U
Raw boundary mark	60	52	37	23	0
Points Score	4	3	2	1	0

Level 1 Unit 4 Developing Routine Maintenance Skills

	Max. Mark	A*	A	B	U
Raw boundary mark	60	52	38	25	0
Points Score	4	3	2	1	0

Level 1 Unit 5 Introduction to Engineering Materials

	Max. Mark	A*	A	B	U
Raw boundary mark	60	52	38	24	0
Points Score	4	3	2	1	0

Level 1 Unit 6 Electronic Circuit Construction and Testing

	Max. Mark	A*	A	B	U
Raw boundary mark	60	54	39	24	0
Points Score	4	3	2	1	0

Level 1 Unit 7 Engineering the Future

	Max. Mark	A*	A	B	U
Raw boundary mark	60	53	38	24	0
Points Score	4	3	2	1	0

Notes

Maximum Mark (raw): the mark corresponding to the sum total of the marks shown on the Mark Scheme or Marking Grids.

Raw boundary mark: the minimum mark required by a learner to qualify for a given grade.

Please note: *Principal Learning qualifications are new qualifications, and grade boundaries for Controlled Assessment units should not be considered as stable. These grade boundaries may differ from series to series.*

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