

# Examiners' Report/ Lead Examiner Feedback

June 2014

NQF BTEC Level 1/Level 2 Firsts in  
Engineering

Unit 9: Interpreting and Using  
Engineering Information (21174E)

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## **Introduction**

This report has been written by the Lead Examiner for BTEC Engineering Unit 9 – Interpreting and Using Engineering Information. It is designed to help you understand how learners performed overall in the exam. For each question, there is a brief analysis of learner responses. You will also find some example learner responses at Level 2 Pass and Merit. We hope this will help you to prepare your learners for future examination series.

## **General Comments on Exam**

This was the second examination for this unit and, overall, the paper produced a reasonable range of responses. Lower ability learners often gave inaccurate and/or simplistic responses to questions and therefore gained limited marks. The more demanding questions provided learners with an opportunity to apply their knowledge in response to an engineering scenario, and it was pleasing to see some extended answers that focused on the vocational context. Learners would, however, benefit from being taught examination skills and techniques as often they did not read the questions properly and consequently they were not answered using an appropriate methodology. It was also evident that some centres had not covered the Unit Content in its widest sense as many learners struggled to gain marks for areas related to 'welding documentation' and surprisingly 'resistor colour code systems'. This was also the first series where a drawing insert was used in conjunction with Question 3. This proved quite challenging for some learners but those who were able to interpret this information scored reasonably well on all parts.

As with the previous series, it was also clear that learners were not always completing the multiple choice questions correctly. These are the questions that require the learner to put a cross in a box. Learners need to ensure that they are reasonably accurate when doing this and that they clearly mark lines through incorrect responses. Many learners used ticks which could affect the scoring. Centres need to ensure that learners are following the instructions as recorded on the examination paper.

## Question 1

This question was aimed at a range of aspects relating to interpreting health and safety information.

**Targeted Specification Area: Learning Aim A.4**

**Q1(a):** The majority of learners correctly identified the meaning of the safety sign as being flammable.

**Q1(b)(i):** Many learners were able to identify the correct colours used to display safe condition signs as being green and white.

**Q1(b)(ii):** Many learners were able to name two signs from the mandatory category. The most common responses related to 'eye protection' and 'ear protection'. Often responses were not in this exact format but suitable learner interpretation was accepted as shown below. Incorrect responses were also seen that are not specifically detailed in the Unit Content under Topic A.4, such as 'wear hard hat'; in addition, 'fire exit' was also seen on numerous occasions, which is from the safe condition category.

Level 2 Pass example:

(ii) Name **two** signs from the **mandatory** category. (2) 2 Q01bii

1 WEAR HEARING PROTECTION

2 WEAR SAFETY GLASSES

## Question 2

This question was aimed at (a) electronic symbols and abbreviations and (b) sources relevant to a task.

**Targeted Specification Area: Learning Aim A.2**

**Q2(a)(i):** Most learners were able to identify the correct symbol for the buzzer; however, there were many incorrect responses for the diode, with numerous learners suggesting that this was a transistor.

**Q2(a)(ii):** The majority of learners were able to score reasonably well here as many were clearly able to give simple reasons for the use of electronic symbols. Typical correct responses centred around the mark scheme responses of 'internationally recognised pictorial symbols' and 'easily identifiable components'. Learners who did not score well here often gave repetitive answers centred around 'ease of identification' and 'easy to understand'.

Level 2 Pass example:

(ii) Give **two** reasons why electronic symbols are used when drawing circuit diagrams. (2)2 Q02aii

- 1 The symbols are used universally therefore no confusion.
- 2 easier to draw symbols rather than trying to draw the component exactly how it looks.

**Targeted Specification Area: Learning Aim A.3**

**Q2(b)(i):** The majority of learners did not score any marks here as it appeared they had not been taught about resistor colour codes. Many responses were seen where learners had simply used the corresponding figures for each colour on the resistor and totalled them up to give an incorrect answer of 11. Where learners achieved a mark they provided responses of either 62k or 62000.

**Q2(b)(ii):** Likewise, the majority of learners did not score any marks here as it was clear that they had no knowledge of the tolerance band, which was needed in order to answer this question correctly. Typical incorrect responses included 'the resistors total value' and 'the amount of current/voltage a resistor can take'.

**Q2(b)(iii):** Again this proved to be a challenging question for learners and it appeared that many learners had not seen or used a colour wheel. Many learners simply stated reasons associated with 'speeding up the process' and 'finding the correct resistor' which formed part of the question itself and therefore could not be credited.

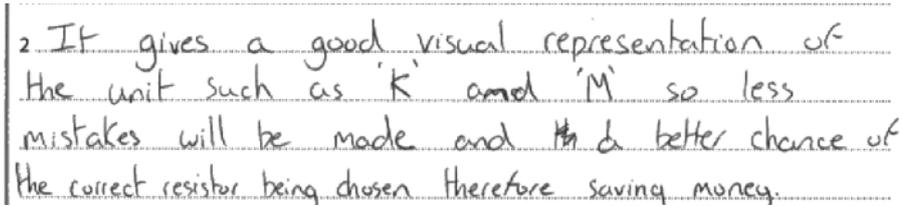
Level 2 Pass example: one low response.

An engineer is required to build a complicated circuit that uses numerous resistors with different values. The engineer's first task is to find the correct resistors, using the resistor colour wheel to speed up the process.

Explain **two** other reasons why the engineer would use a resistor colour wheel in this situation. (4)1 Q2biii

- 1 It reduces the chance of human error therefore it is more likely to be accurate.

Level 2 Merit example: 2 marks for a linked response.



2 It gives a good visual representation of the unit such as 'K' and 'M' so less mistakes will be made and a better chance of the correct resistor being chosen therefore saving money.

### Question 3

This question was aimed at testing knowledge of interpreting engineering drawings and drawing information. This question also saw the introduction of a drawing insert.

**Targeted Specification Area: Learning Aim A.2**

**Q3(a):** Many learners had clearly been taught about the different linetypes found on engineering drawings as most were able to identify an extension line correctly.

**Q3(b):** Likewise, many learners were able to work out the correct length of 50mm for the missing dimension on the drawing insert.

**Q3(c):** Many learners were able to identify the symbol as being 'Radius'. A number of learners incorrectly identified this symbol as 'Curved edge'.

**Targeted Specification Area: Learning Aim A.1**

**Q3(d):** This question proved to be quite a challenge for all learners and consequently learners did not score well here. Many of the responses were not related to the drawing itself but rather focused on the 'title block' with learners pointing out that there was no revision date present. Other incorrect responses saw learners stating that there was no 3D image available of the product or references were made to the missing dimension (E) which was answered in a previous question. Where learners did score some marks there were normally clear references to the incorrect linetype used for the hidden detail and no dimensional detail for the height of the hole.

Level 2 Pass example: two low responses

(d) Explain **two** errors on the mounting bracket drawing that will cause a problem when interpreting information. (4) 2 Q03d

- 1 In the bottom left drawing it shows no hidden ~~lines~~ <sup>details</sup> in one bit where the picture above shows hidden detail
- 2 It shows a hole with a diameter in one drawing but doesn't specify where it's placed.

Level 2 Merit example: one linked response

(d) Explain **two** errors on the mounting bracket drawing that will cause a problem when interpreting information. (4) 2 Q03d

- 1 On the plan view the left hole is shown using visible lines, however it is not and could lead to problems reading the drawing.

**Targeted Specification Area: Learning Aim A.2**

**Q3(e):** The majority of learners did not score any marks here as they could not interpret the correct section view. Many learners chose the section where the holes contained cross hatching, whereas the correct view was the one that contained cross hatching across the remainder of the product apart from the hole areas.

**Q3(f):** Again, the majority of learners did not score well here and this appeared to be an area of the specification that had not been covered in depth. There were many generic responses concerned with 'speed' and 'easy to understand'. Often, learners gave drawing advantages with no regard to the sectioning aspect of the question. Where learners did score, however, there were responses linked to 'all components in an assembly can be shown' but with very limited extension to award further marks.

Level 2 Pass examples:

(f) Explain **one** advantage of using sectioned drawings to enable the production of mechanical assemblies and components.

(2)1 Q03f

It allows us to easily see where a certain component should fit in when assembling

(f) Explain **one** advantage of using sectioned drawings to enable the production of mechanical assemblies and components.

(2)1 Q03f

By using a sectioned drawing it can show hidden detail that ~~to~~ may have been missed before.

Level 2 Merit example:

(f) Explain **one** advantage of using sectioned drawings to enable the production of mechanical assemblies and components.

(2)2 Q03f

They gave a visual representation of what the mechanical assembly/components would look like, this makes it easier to interpret and work upon.

#### Question 4

This question returned to interpreting drawing information (a) & (b) and using related documentation (c).

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| <b>Targeted Specification Area: Learning Aim A.2</b> |
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**Q4(a):** Learners struggled with the questions associated with welding as this was the first time that it had been introduced in this unit. There are clearly links to this topic within the Unit Content and centres needs to address this for future series. Consequently, the majority of learners did not score well on this question and were unable to identify the two vertical parallel lines representing a square butt/groove on a welding drawing.

**Q4(b):** Likewise the majority of learners were unable to recognise the weld symbol for 'backing run'. The majority of incorrect responses were given as 'spot weld' or 'curved weld'.

**Targeted Specification Area: Learning Aim B.2**

**Q4(c):** Learners did not score well on this question as many of the responses focused around safety issues when welding the support structures for overhead electric cables rather than an advantage of using a weld procedure specification in this situation. Learners who scored some marks here tended to respond with answers associated with improved weld quality and welders being able to follow the correct procedures for each process.

Level 2 Merit example:

(c) Explain **one** advantage of using weld procedure specifications when welding support structures for overhead electric cables.

(2) Q04c

IF you correctly follow the procedure then the electric cables shouldn't be a danger because the correct weld should be in place

**Question 5**

This question was contextualised around a company that manufactures support bushes for the marine industry. This context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

**Targeted Specification Area: Learning Aim B.2**

**Q5(a):** The majority of learners were able to score at least one mark here. Health and safety information is something that appears to be covered quite well in centres as it is fundamental to all engineering processes. Typical correct responses focused on the need to wear protective clothing such as 'safety goggles' and 'overalls'. The more able learners explored the 'securing of the support bush in the chuck' when turning and 'ensuring guards were in place'. Some learners gave responses that had no link to health and safety when turning such as 'materials requirements' or 'tooling requirements'.

**Q5(b):** The majority of learners were able to score at least one mark here by simply stating a type of related documentation for scheduling from the Unit Content, the most common response being 'Gantt Chart'. The more able learners sometimes gave a linked response describing the Gantt Chart. Many incorrect responses were also evident as learners attempted to answer this question by selecting documentation stated in other areas of the examination paper, such as 'job cards' and 'production plans'.

Level 2 Pass example:

(b) Describe **one** type of related documentation that could be used to schedule the manufacture of a large batch of support bushes.

(2) 2 Q05b

A Gantt chart could be used to plan and allocate time need to complete the manufacturing process.

**Q5(c):** This proved to be a challenging question for the majority of learners. Where learners did score it was usually in the form of brief responses as shown below. The more able learners were expected to produce linked responses such as 'plans contain tools and equipment information not specified on the drawing allowing the engineer to prepare these before manufacture' or 'plans will show timings of operations to enable scheduling of the manufacture of support bushes'. It was clear that most learners have used or seen production plans during their studies but had limited knowledge of why they are required in addition to drawings.

Level 2 Merit example:

(c) Two engineers at ABC Precision Engineering made prototype support bushes using a drawing. Both prototypes were accepted as fit for purpose. Although the prototypes were accurate, a production plan must be created before batch production can begin.

Apart from health and safety requirements, explain **two** reasons why the production plan is required in addition to the drawing.

(4) 2 Q05c

1. Because without a production plan people ~~can~~ <sup>wouldn't</sup> be able to know how to assemble it.
2. You wouldn't know how many people were required to <sup>manufacture</sup> ~~make~~ one and what tools were needed.

## Question 6

This question was again contextualised around a company manufacturing components and sub-assemblies and its documentation control.

The majority of learners sitting the examination paper completed the final questions. This was pleasing as it is good examination technique for learners to at least attempt all questions.

**Targeted Specification Area: Learning Aim B.3**

**Q6(a):** Most learners attempted this question but with limited success. It was evident that documentation control had been covered in some centres as responses focused on the mark scheme answers related to 'files can easily be organised' and 'the system is straightforward to understand'. Nonetheless, many learners responded with 'preventing damage to drawings' which is not a reason for having a specific documentation control system.

Level 2 Pass example:

6 XYZ Engineering manufactures a variety of components and sub-assemblies for several different customers. It uses a range of drawings and production documentation to support its manufacturing operations.

(a) Give **two** reasons why XYZ Engineering has a specific documentation control system for its engineering drawings. (2) 2 Q06E

1 All drawings <sup>dimensions</sup> <sub>and text</sub> should be to a standard so that they can be universally read and understood

2 They should have drawing numbers so they can be located easily and information/title blocks should be in the same location so that staff can quickly find information needed.

**Targeted Specification Area: Learning Aim B.1/B.2**

**Q6(b):** The majority of learners did not score well on this question. It was again clear that learners had seen or used a job card at some point during their studies but there was a lack of understanding of the ways this information could be used in the context of the question. Where learners did score marks it was again for either two brief responses or a single linked response. The more able learners were expected to provide a second linked response in addition to the one provided below such as 'the job card acts as a central point of reference allowing engineers to follow information related to the task.'

Level 2 Merit example: two marks for a linked response

2 It shows the Job number, Registration Number and dates so it can provide an audit trail if anything goes wrong and needs to be traced back.

**Q6(c):** It was pleasing to see that the majority of learners attempted this question although with limited success. The lower ability learners gave simplistic implications with regard to 'expected delivery times' and 'prioritising of orders', often in the form of a list with only one viewpoint considered.

The more able learners were expected to achieve higher marks by providing a balanced range of implications associated with sharing different documentation, with points made relevant to the situation in the question. Some answers were well thought out and it was pleasing to see some learners suggesting both pros and cons in their final response; nonetheless, most answers lacked the depth required for the higher marks.

Level 2 Pass example:

- (c) XYZ Engineering buys mouldings from a supplier when producing sub-assemblies for specialist car body shells. Several orders were delivered late and some mouldings were inaccurate. XYZ Engineering is considering sharing its schedule for manufacture information with the supplier.

Discuss the impact for XYZ Engineering of sharing its schedule for manufacture information with the mouldings supplier.

(8) 2 Q06c

The impact for XYZ Engineering on sharing its ~~the~~ schedule would be big because if they give them the information for the date to be finished, the moulding company would be able to create the moulds for a certain date so that XYZ Engineering ~~is~~ M.T.T.F Graph (Mean time to fail) would be less big drops more gradually and also they will be able to finish jobs a bit quicker so that the customers are happier. They can also send them the drawings ~~on~~ of the mould so they can get the dimension right.

Level 2 Merit example:

- (c) XYZ Engineering buys mouldings from a supplier when producing sub-assemblies for specialist car body shells. Several orders were delivered late and some mouldings were inaccurate. XYZ Engineering is considering sharing its schedule for manufacture information with the supplier.

Discuss the impact for XYZ Engineering of sharing its schedule for manufacture information with the mouldings supplier.

(8) 4 Q06c

By sharing its manufacture schedule with suppliers, the supplier will have a better understanding of when XYZ Electricals will need to restock. This will give ~~them~~ the supplier a warning of when XYZ Electricals will order. This will also reduce the chances of a late order and ~~increase~~ improve the interaction between XYZ Electricals and the supplier.

By XYZ Electricals sharing the manufacture schedule with the supplier, it will give a ~~clear~~ <sup>better</sup> indication of how the moulding will need to be formed and will produce more accurate moulds and again leading to better interaction between XYZ Electricals and the supplier as the communication is improved.

## Grade Boundaries

### External assessment

The suite of 'next generation' NOF BTECs include an element of external assessment. This external assessment may be through a timetabled paper-based examination, an onscreen, on demand test or a set-task conducted under controlled conditions.

### What is a grade boundary?

A grade boundary is where we 'set' the level of achievement required to obtain a certain grade for the externally assessed unit. We set grade boundaries for each grade (Distinction, Merit, Pass and Level 1 fallback).

### Setting grade boundaries

When we set grade boundaries, we look at the performance of every learner who took the assessment. When we can see the full picture of performance, our experts are then able to decide where best to place the grade boundaries - this means that they decide what the lowest possible mark should be for a particular grade.

When our experts set the grade boundaries, they make sure that learners receive grades which reflect their ability. Awarding grade boundaries ensures that a learner who receives a 'Distinction' grade next year, will have similar ability to a learner who has received an 'Distinction' grade this year. Awarding grade boundaries is conducted to make sure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

### Variations in externally assessed question papers

Each exam we set asks different questions and may assess different parts of the unit content outlined in the specification. It would be unfair to learners if we set the same grade boundaries year on year because then it wouldn't take into account that a paper may be slightly easier or more difficult than the year before.

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

| Grade            | Unclassified | Level 1<br>Pass | Level 2 |       |             |
|------------------|--------------|-----------------|---------|-------|-------------|
|                  |              |                 | Pass    | Merit | Distinction |
| Boundary<br>Mark | 0            | 12              | 22      | 32    | 42          |

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