Examiners' Report/
Lead Examiner Feedback

June 2015

NQF BTEC Level 1/Level 2 Firsts in Engineering

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

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Grade Boundaries

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 is conducted to ensure learners achieve the grade they deserve to achieve, irrespective of variation in the external assessment.

Variations in external assessments

Each test 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 for each test, because then it wouldn't take into account that a test might be slightly easier or more difficult than any other.

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 Pass	Level 2		
			Pass	Merit	Distinction
Boundary Mark	0	12	22	32	42

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 a range of marks for some questions. We hope this will help you to prepare your learners for future examination series.

General Comments on Exam

This was the fourth examination for this unit and there appears to be a gradual improvement of responses as the series continues and an increasing number of learners sitting this examination. Lower ability learners are still giving 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 a range of engineering scenarios, and it was pleasing to see learners using extended answers that focused on the vocational context. Learners would, however, continue to benefit from being taught examination skills and techniques as some continued to misread the questions and consequently they were not answered using an appropriate methodology. It was still 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 bend allowance charts and control charts.

It was pleasing to see that learners were completing the multiple choice questions correctly with a continued improvement on learners achieving Pass grades, at both Level 1 and Level 2.

Question 1

This question was aimed at a range of aspects relating to interpreting drawings and drawing information.

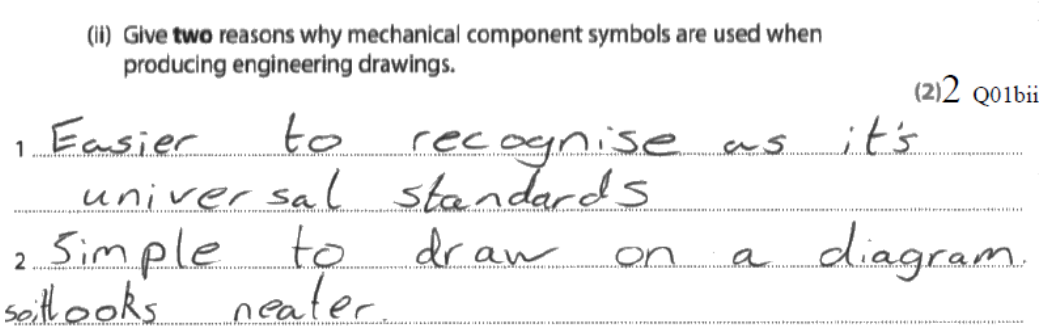
Targeted Specification Area: Learning Aim A.1

Q1(a): The majority of learners correctly identified the two types of working drawings as 'isometric' and 'general assembly'.

Q1(b)(i): Likewise, the majority of the learners were able to match the correct mechanical symbol with the correct name ('nut' and 'screw').

Q1(b)(ii): Many learners were able to score at least one mark here by giving a reason why mechanical components are used when producing engineering drawings. Typical correct responses related to components symbols being 'easy to understand', 'simple to draw' and 'universally recognised'. Incorrect responses included 'don't take up much space on the drawing' and 'the engineer will know where to put the component'.

2 mark example:



(ii) Give **two** reasons why mechanical component symbols are used when producing engineering drawings.

(2) 2 Q01bii

1 Easier to recognise as it's universal standards

2 Simple to draw on a diagram so it looks neater

Question 2

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

Targeted Specification Area: Learning Aim A.4

Q2(a): Most learners were able to identify the correct meaning of the safety sign as being 'switch off' or 'turn off here'; however, there were many incorrect responses for the sign, with numerous learners suggesting that this was an 'emergency stop' or just stating that it was a 'mandatory sign'.

Q2(b): The majority of learners were able to score reasonably well here as many were clearly able to state two safety actions that need to be followed when the symbol was displayed. Typical responses included specific types of PPE such as 'wearing goggles' and 'wearing gloves' or 'protective

clothing'. Learners who did not score well here often gave incorrect generic responses such as 'do not mess about with chemicals' and 'be careful'.

2 mark example:

(b) This is a common symbol used on chemical packaging.

The border is red.

State **two** safety actions that need to be followed when this symbol is displayed.

(2) 2 Q02b

1 Wear gloves to protect your hands

2 Wear goggles to protect your eyes.

Q2(c): The majority of learners did not score any marks here as they could not name two signs from the safe condition category found in the unit specification. Many learners gave mandatory sign names such as 'wear protective footwear' and 'wear eye protection'. It should be noted that safe condition signs have a green background colour and learners who did gain marks gave responses such as 'emergency exit' and 'first aid'.

Question 3

This question was aimed at testing knowledge of interpreting tasks and other information.

Targeted Specification Area: Learning Aim A.3

Q3(a): The majority of learners were able to gain the mark for this question and select the correct bend allowance from the chart as being '13.8mm'.

Q3(b): Likewise many learners were able to calculate the overall length of material required using the formula provided. It was very pleasing to see most learners using the space to provide calculations although a number of learners just gave the correct calculation (35.6mm) and were still able to access both marks. Learners did not score well if calculations were incorrect leading to an incorrect final answer; however, partial reward could be gained if learners had made a reasonable attempt to use the formula despite the final answer being incorrect.

1 mark example:

Length of material required to form a 90 degree bend in sheet steel =
E + 11.6mm + M

Where:
E = X - (R + T)
M = Y - (R + T)

Calculate the overall length of material required to form a 90 degree bend in sheet steel when T = 2mm, R = 6mm, X = 25mm, Y = 15mm and the bend allowance = 11.6mm.

(2) 1 Q03b

Space for calculations.

E = X - (R + T)
E = 25 - (2 + 6)
E = 17mm

M = Y - (R + T)
M = 15 - (6 + 2)
M = 7mm

Overall material length = ...

2 mark example:

Length of material required to form a 90 degree bend in sheet steel = E + 11.6mm + M

Where:
E = X - (R + T)
M = Y - (R + T)

Calculate the overall length of material required to form a 90 degree bend in sheet steel when T = 2mm, R = 6mm, X = 25mm, Y = 15mm and the bend allowance = 11.6mm.

(2) Q03b

Space for calculations.

E = 25 - (6+2)
E = 17

M = 15 - (6+2)
M = 7

17 + 11.6 + 7 = 35.6

35.6mm

Overall material length = 35.6mm

Targeted Specification Area: Learning Aim A.1

Q3(c): This question proved to be quite a challenge for all learners and consequently learners did not score very well here as they often gave responses that were already stated in the question stem which related to 'finding the correct bend allowance' or 'finding the correct length of material'. Also many learners gave incorrect simplistic responses such as 'easy to use' and 'saves the engineer time' with no justification.
A typical incorrect response is shown below:

(c) The engineering technicians need to design and make a new batch of filing cabinets. They use a bend allowance chart to find out the required bend allowance and the length of material needed to form a 90 degree bend.

Explain **two** other reasons why the technicians at HX6 Engineering would use a bend allowance chart when designing and making filing cabinets.

(4) 0 Q03c

1 So they can see what ~~#~~ type of material is needed

2 Also so they can see ~~#~~ what material would be strong enough but also flexiable enough to bend at 90 degrees.

Where learners did score some marks, there were normally clear references to improving bend consistency.

1 mark example:

Explain **two** other reasons why the technicians at HX6 Engineering would use a bend allowance chart when designing and making filing cabinets.

(4) 1 Q03c

1 To ensure that the filling cabinets are all built to the same specification

3 mark example: one low and one linked response

(c) The engineering technicians need to design and make a new batch of filing cabinets. They use a bend allowance chart to find out the required bend allowance and the length of material needed to form a 90 degree bend.

Explain **two** other reasons why the technicians at HX6 Engineering would use a bend allowance chart when designing and making filing cabinets.

(4) 3 Q03c

1 The bend allowance chart allows the technicians to easily carry out jobs more essicently because they can refer back to a pre-set accurate chart.

2 The bend allowance chart allow the technicians to keep up consistancy when manufacturing large batches, because they wont make a mistake through bad calculations.

Question 4

This question was contextualised around a company that uses orthographic projection drawings when making customised components for the communications industry. This context gave learners an opportunity to apply their knowledge and understanding about this previously explored area of the unit content.

Targeted Specification Area: Learning Aim A.2

Q4(a)(i): Many learners were able to work out the correct overall length of swivel bracket by adding the existing 65mm length to the radius of 20mm to give an overall length of 85mm. Surprisingly, a significant number of learners did not achieve a mark for this question and responded with some unrealistic figures sometimes totaling to over 2000mm.

Q4(a)(ii): The majority of learners did not score any marks here as they could not identify the meaning of the abbreviation 'CBORE' as being 'counterbore'.

Targeted Specification Area: Learning Aim A.1

Q4(b): The majority of learners were able to score at least one mark here for demonstrating knowledge of why orthographic projections are used. Many learners gave correct responses such as 'shows all the dimensions of the product', 'shows hidden detail' and 'can be viewed from different angles'; however, there were no linked responses to award further marks. Also there was a typical incorrect response from learners 'easy to read/interpret' which orthographic projections are clearly not. Some learners were able to gain marks for linked responses centered around the use of different linetypes to represent different features of the part.

2 mark example: two low responses

(b) Explain **two** advantages to SW17 Systems of using orthographic projection drawings when making the swivel bracket component.

(4) 2 Q04b

1 Orthographic projection is good to use when making the swivel bracket because you can see where hidden details are

2 It is also good because it has dimensions on so the manufacturer knows what scale it should be made too

3 mark example: one low response and one linked response

(b) Explain **two** advantages to SW17 Systems of using orthographic projection drawings when making the swivel bracket component.

(4) 3 Q04b

1 As there are 3 drawings produced in orthographic projection, then all the detail of the component can be displayed from 3 diffrent angles- So no hidden detail is not displayed, in at least one Projection

2 All of the Measurements can be displayed on the drawings, therefore not missing any of information which the engineer will need to produce the component.

Q4(c): A significant number of learners were able to gain the mark for this question by correctly identifying 'third angle' as the type of orthographic projection drawing. It was surprising to see that many learners chose 'oblique' which is a type of pictorial drawing.

Question 5

This question was contextualised around a skilled engineer making one-off specialist brackets and using production plans when making these components. Again, 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. This is question that has appeared in a similar format and therefore learners should be getting both marks here. Learners often gave an incorrect response such as 'check', for the second heading, which has come straight from the production plan itself. If a mark was awarded it was usually for 'production' or 'operation' relating to the first heading.

Q5(b): This proved to be a challenging question for the majority of learners as they focused on why production plans are required rather than focussing on the necessity to write and keep new production plans for each specialist component therefore attracting no marks. Where learners did score it was usually in the form of brief responses as shown below. These often related to keeping a new production plan 'to allow the engineer to refer back to this if the component was ever required to be manufactured again'. It was clear that most learners have used or seen a production plan during their studies but had limited knowledge of why they are used in this situation.

1 mark example:

(b) The skilled engineer writes and keeps a new production plan for every specialist bracket that she designs and makes.

Explain **one** advantage to the skilled engineer of writing and keeping a new production plan when making each specialist bracket.

(2) 1 Q05b

It allows her to quickly ~~was~~ and safely carry out the task and by keeping the plan can be useful as is she is asked to make another specialist bracket.

2 mark example:

(b) The skilled engineer writes and keeps a new production plan for every specialist bracket that she designs and makes.

Explain **one** advantage to the skilled engineer of writing and keeping a new production plan when making each specialist bracket.

(2) 2 Q05b

Writing a new production plan each time is good because if she ever needs to make one shes already created again she can easily find it and knows how to do it without wasting time

Question 6

This question was contextualised around a company that manufactures and assembles washing machines. Again, this context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

Targeted Specification Area: Learning Aim B.2

Q6(a)(i): The majority of learners struggled with this question which was again surprising as this is clearly signposted under Topic B.2 of the unit content. Learners failed to identify another type of working instruction and often gave responses associated with control charts. Typical incorrect responses such as 'Gantt Charts', and 'Pareto Charts' were often seen along with references to different types of 'manuals' which was already mentioned in the question stem. Typical correct responses from some learners included 'job cards', 'operation sheets' and 'engineering drawings'.

Q6(a)(ii): The majority of learners were able to score at least one mark here for a reason why technicians use manufacturer's manuals when assembling washing machines. Typical correct responses focused on 'parts being fitted correctly' and 'being provided with a full list of parts'.

2 mark example:

(ii) Give **two** reasons why the technicians at CF82 Engineering would use a manufacturer's manual when assembling washing machines.

(2) 2 Q06ai

1 Using the manual it show them what parts they should have to assemble the washing machine

2 to ensure they are all made correctly each and every washing machine

Q6(b): This proved to be a challenging question for the majority of learners as they could not identify advantages of using control charts when manufacturing washing machines. Many incorrect generic responses were seen here with relation to 'saving time' and/or 'saving money' with no linked explanation. Learners at the distinction level would be expected to achieve at least 3 marks for this question as there should be evidence that they were able to explain two advantages of using control charts when manufacturing washing machines using typical responses such as 'can be used to predict when faults may occur allowing for the appropriate preventative action to be taken' and 'gives a visual indication of quality so issues can be easily identified'.

2 mark example: two low responses

(b) CF82 Engineering uses control charts when manufacturing washing machines.

Explain **two** advantages to CF82 Engineering of using control charts when manufacturing washing machines.

(4) 2 Q06b

1 To ensure quality control. So every machine is treated the same way.

2 If a mistake is made, you can trace back your steps of manufacture and find the error. Look to the control chart to find out what should be done to control the problem.

2 mark example: one linked response

(b) CF82 Engineering uses control charts when manufacturing washing machines.

Explain **two** advantages to CF82 Engineering of using control charts when manufacturing washing machines.

(4) 2 Q06b

1 For quality control, this ensures that the washing machines are being made to a good standard of quality, charts will help record and address any manufacturing defects.

4 mark example: two linked responses

(b) CF82 Engineering uses control charts when manufacturing washing machines.

Explain **two** advantages to CF82 Engineering of using control charts when manufacturing washing machines.

(4) 4 Q06b

1 One advantage is that CF82 Engineering can control the quality of their washing machines over time. This means that CF82 Engineering can predict the quality of the washing machines over a certain period of time.

2 Another advantage is that CF82 Engineering would only produce few defective components (those who went above UCL). This means that CF82 Engineering can understand from the control chart when defefaulty parts are made, so they can stop the process. By looking at the control chart, the compay understands how well they aream done.

Question 7

This question was again contextualised around a company manufacturing engineering components and its paper based system of organising engineering drawings along with quality control issues. Again, this context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

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

Q7(a): The majority of learners were able to score at least one mark here. Typical responses such as 'to stop products being made incorrectly' or 'to stop engineers from using drawings are that are inaccurate' were evident from learners. Incorrect responses focused on having to replace drawings and the associated cost and time of this.

2 mark example:

7 (a) State **two** reasons why engineers should report errors on engineering drawings.

(2) 2 Q07a

1 If other engineers wer to use the drawing for manufacture it would be made wrong.

2 If an incorrect component is made it could slow production of the product.

Q7(b): The majority of learners scored at least two marks here with typical responses centred around 'drawings becoming lost' or 'filing cabinets required for storage' but could not offer any further explanation to warrant the extension marks on this question. It was again clear that learners covered paper-based systems 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. There were four marks available here and some learners misread the question and gave incorrect responses that focused on the speed at which paper based drawings can be produced compared to ICT based drawings.

2 mark example:

(b) SN10 Engineering manufactures engineering components for a range of customers. It uses a paper-based system to organise engineering drawings. One disadvantage of this system is that, over several years, many of the paper-based engineering drawings that SN10 Engineering uses have become damaged.

Explain **two** other disadvantages to SN10 Engineering of continuing to use a paper-based system to organise engineering drawings.

(4) 2 Q07b

1 The library that contains the drawings is taking up space, because they've used a paper for several years they take up a lot of storage space for the drawings.

2 Some drawings could easily get lost. Someone may put the drawing in the wrong place or it falls somewhere and is then lost so no-one finds it.

3 mark example:

(b) SN10 Engineering manufactures engineering components for a range of customers. It uses a paper-based system to organise engineering drawings. One disadvantage of this system is that, over several years, many of the paper-based engineering drawings that SN10 Engineering uses have become damaged.

Explain **two** other disadvantages to SN10 Engineering of continuing to use a paper-based system to organise engineering drawings.

(4) 3 Q07b

1 Another disadvantage is that paper based documents can become lost and is there are not spares then the company will have to stall production to produce a document costing them money.

2 Another disadvantage is compared to a computer based system is that is a components dimensions on a drawing need to be changed it will take a long time to produce then re-circulate the documentation and if old drawings stay in circulation they could be confused with there new drawings meaning components could be produced with errors.

Targeted Specification Area: Learning Aim B.1

Q7(c): It was pleasing to see that the majority of learners attempted this question with a significant improvement on the success rate. There were simplistic implications mentioned with regard to 'no way of monitoring quality control procedures' or 'customers not knowing if quality checks had taken place'. This led onto issues with defective products being manufactured and the reputation of the company. The learner at this grade boundary showed limited knowledge of not using quality control documentation.

The more able learners were expected to achieve higher marks by providing a range of implications associated with not using quality control documentation. Learners would show a good or developed understanding of this topic with a range of points described but not always balanced. Learners would consider that using quality control documentation would provide a framework or structure to ensure that checks were carried out leading to auditable trails for customers and enhancing the company's reputation ultimately leading to repeat sales. Also the points made will be

relevant to the situation in the question. It was also pleasing to see that a number of learners had completed some kind of drafting during the exam prior to writing this final question as there were bullet pointed notes written above the final response which shows good planning; however, centres need to be aware that the majority credit is given for the extended writing response (please refer to the mark bands at the bottom of the Q7c mark scheme).

2 mark example:

(c) SN10 Engineering carries out quality control checks but does not generate quality control documentation.

Discuss the impact for SN10 Engineering of not generating quality control documentation.

(8) 2 Q07c

Not documenting quality contol checks will prevent the company from identifying previous faults which in turn could prevent the company from seeing ~~that~~ what faults are occuring over a history on a manufacturing.

Having documents would allow the company to build a history of quality control allowing them to refer back to in order to check if they are improving there manufacturing process which in turn can save money

6 mark example:

(c) SN10 Engineering carries out quality control checks but does not generate quality control documentation.

Discuss the impact for SN10 Engineering of not generating quality control documentation.

(8) 6 Q07c

By not having a quality contrd documentation then more fault products could get through to delivery to the customer which could damage the reputation of the company as bad news ~~fasts~~ travels fast. Furthermore more and more complaints would be made more often as there's no quality control documentations to deal ~~with~~ with the problems. There would be no checks being made during manufacture of the product as the quality control systems wouldn't be in place. The company would lose out on money trying to fix lots of problems with the manufacturing stage. Customers would have a lot of trouble trying to give feedback as there wouldn't be any systems in place to do so. allow them to give feedback. In addition to that any checks done may not be recorded so checks might be done twice or even three times before someone realises it been done. By not having quality control documentation they some checks may be done multiple times while others may not be done at all. Also quality contol documentation can keep track of all ever checks done so any checks not done can be tracked back to the day and who was meant to do it at that time and why didn't they. (Total for Question 7 = 14 marks)

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