Examiners' Report/
Lead Examiner Feedback

June 2016

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

Grade Boundaries

Introducing external assessment

The new suite of 'next generation' NQF BTECs now include an element of external assessment. The external assessments for NQF BTEC Construction are timetabled paper-based examinations.

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

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	Level 2 Merit	Level 2 Distinction
Boundary Mark	0	9	19	29	40

General Comments on Exam

This was the sixth examination for this unit and unfortunately there has been a decline in the quality of the responses compared to previous series of this examination. Lower ability learners are still giving inaccurate and/or simplistic responses to questions and therefore gaining limited marks. The more demanding questions provided learners with an opportunity to apply their knowledge in response to a range of engineering scenarios; however, most learners were not able to give 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 Centre's had not covered the Unit Content in its widest sense as many learners struggled to gain marks for areas related to 'geometric tolerances', 'fixed reference points' and 'schematic diagrams' when given an engineering context.

Many learners struggled to complete a number of the multiple choice questions correctly which was surprising as many aspects had been seen in previous series.

Question 1

This question was aimed at a range of information used when producing parts.

Targeted Specification Area: Learning Aim B.2

Q1(a): The majority of learners correctly identified at least one of the two characteristics of a production plan. Learners were more likely to get 'materials and components' correct rather than 'timings'.

Targeted Specification Area: Learning Aim A.4

Q1(b): The majority of the learners were able to match both mandatory signs to the correct names. Health and safety appears to be very accessible to all learners which is pleasing to see.

Targeted Specification Area: Learning Aim B.1

Q1(c): The majority of learners were also able to identify one type of production documentation relevant to producing parts as being 'quality control'.

Targeted Specification Area: Learning Aim A.3

Q1(d)(i): Learners struggled to identify the name given to the heading from the extract of a manufacturers data sheet for welding rods. Popular correct responses included 'rod thickness', 'rod diameter' and 'rod size'. There were a range of incorrect responses such as 'length' and 'measurements' but these were too generic to award a mark. Many learners gave responses associated with 'types of weld' which again was incorrect.

Q1(d)(ii): Learners again struggled to answer this question. Correct responses were seen that centred on 'checking the correct material is being used'. Many learners misread the question and simply stated what would be found on a materials specification and therefore could not gain a mark.

One mark response:

(ii) Give **one** reason for using material specifications when preparing to produce parts.

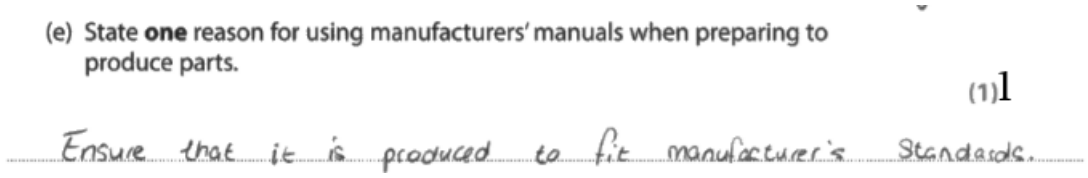
(1)

You know what material you need.

Targeted Specification Area: Learning Aim B.2

Q1(e): Again, learners struggled to answer this question. Correct responses talked about 'showing the correct assembly sequence' or 'parts are produced to standard'. Many learners misread the question and simply stated what would be found in a manufacturers' manual and therefore could not gain a mark.

One mark response:


(e) State **one** reason for using manufacturers' manuals when preparing to produce parts.

(1) 1

Ensure that it is produced to fit manufacturer's Standards.

Question 2

This question was aimed at a range of aspects associated with documentation when scheduling manufacturing.

Targeted Specification Area: Learning Aim B.2

Q2(a): The majority of learners correctly identified at least one of the two features of a schedule for manufacture. Learners were more likely to get 'milestones' correct rather than 'start date'.

Q2(b)(i) & (ii): Likewise, the majority of learners were able to identify the charts and graphical method as being a 'Gantt chart' and 'critical path analysis' respectively.

Targeted Specification Area: Learning Aim B.3

Q2(c): Surprisingly, many learners failed to identify the system used to locate and store the above documents as being 'ICT system'.

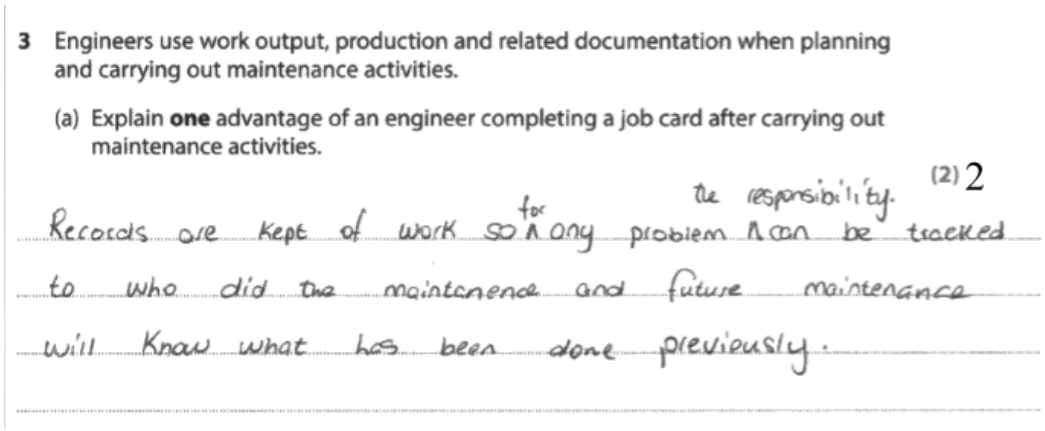
Question 3

This question was aimed at using work output and related production documentation.

Targeted Specification Area: Learning Aim B.1

Q3(a): Many learners were able to score one mark here by identifying an advantage of an engineer completing a job card after carrying out maintenance activities. Typical responses included 'allows the work of the engineer to be tracked' and 'shows how long it took an engineer to do an activity'. Some learners gave linked explanations that were awarded both marks.

Two mark response:



3 Engineers use work output, production and related documentation when planning and carrying out maintenance activities.

(a) Explain **one** advantage of an engineer completing a job card after carrying out maintenance activities.

(2) 2

Records are kept of work so for any problem can be tracked the responsibility. to who did the maintenence and future maintenance will know what has been done previously.

Q3(b): However, the majority of learners found this question quite challenging. Many learners were only able to identify one advantage of an aircraft maintenance engineer completing a test report after carrying out maintenance activities. Typical responses included 'provides an audit trail' or 'the engineer knows the plane is safe to fly'. Some learners produced linked explanations which allowed for further marks. Incorrect responses could also be seen here that focused on what could be found on a test report rather than the advantages of using one.

Two mark linked response:

(b) Explain **two** advantages of an aircraft maintenance engineer completing a test report after carrying out a maintenance procedure on an aircraft engine.

(4) 2

1 The test report will contain information ~~tha~~ about ~~the efficient~~ how well the Aircraft engine works and if it runs up to standard, therefore if anything goes wrong with the engine later on he has ~~an~~ evidence to show that it was not their fault.

Three mark response:

(b) Explain **two** advantages of an aircraft maintenance engineer completing a test report after carrying out a maintenance procedure on an aircraft engine.

(4) 3

1 Ensure that the maintenence has been carried out correctly, so that the engine is less likely to fail (important since it is vital and could cost lives).

2 Can identify any new or unresolved problems and ensure adequite testing was performed, so the ~~can~~ engine will be safe. since these problems can be resolved.

Targeted Specification Area: Learning Aim B.2

Q3(c): The majority of learners correctly identified at least one of the two types of working instructions. Learners were more likely to get 'operations sheets' correct rather than 'weld procedures specifications'.

Q3(d): The majority of learners found this question very challenging which was surprising as this part of the specification had been tested on many previous occasions. Many learners misread the question and gave general quality control techniques rather than reasons for using quality control information. For learners to achieve both marks here there needed to be two reasons given.

Two mark response:

(d) Give **two** reasons why an engineer would use quality control information and charts when planning maintenance activities.

(2) 2

1 Because it means they are able to see how urgently maintenance needs to be carried out

2 It allows them to decide whether maintenance is required on the machine or not.

Question 4

This question was contextualised around a company that builds one-off cars based on customers' needs. 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 B.3

Q4(a): This question proved quite challenging for some learners. Those that did score well were only able to give two advantages of using specific folding methods when handling drawings. Typical responses could be seen here such as 'prevents damage to drawings' or 'difficult to put in filing cabinets if not folded correctly'.

One mark response:

4 A specialist sports car manufacturer builds one-off cars based on customer needs. It stores the paper drawing for each car part in a filing cabinet in the main office. A range of drawing sizes are used.

(a) Give **two** advantages of using specific folding methods when handling drawings.

(2) 1

1 Folding so that the drawing number is clearly visible helps you ~~find~~ whatever drawing you need quicker.

Two mark response:

4 A specialist sports car manufacturer builds one-off cars based on customer needs. It stores the paper drawing for each car part in a filing cabinet in the main office. A range of drawing sizes are used.

(a) Give **two** advantages of using specific folding methods when handling drawings.

(2) 2

1 ~~to~~ ~~so~~ the drawing is not damaged

2 ~~so~~ the drawing will still be clear to see and fits in storage easier

Q4(b): This question proved to be quite accessible to most learners as this had been tested quite regularly in previous series. Those that scored well were able to identify two disadvantages of engineers handling a paper drawing in the context of the question. Typical responses could be seen here such as 'can become ripped or damaged' and 'drawings can be lost or misplaced'. A number of learners were able to produce linked responses such as 'drawings may become damaged in a workshop meaning drawings may need to be reproduced' or 'paper drawings can become lost meaning spare parts will take longer to produce'. There were again far too many incorrect responses that focused on the folding methods which were already discounted in the question stem.

Two mark linked response:

The paper drawings will be handled by engineers when building the cars and when manufacturing spare parts.

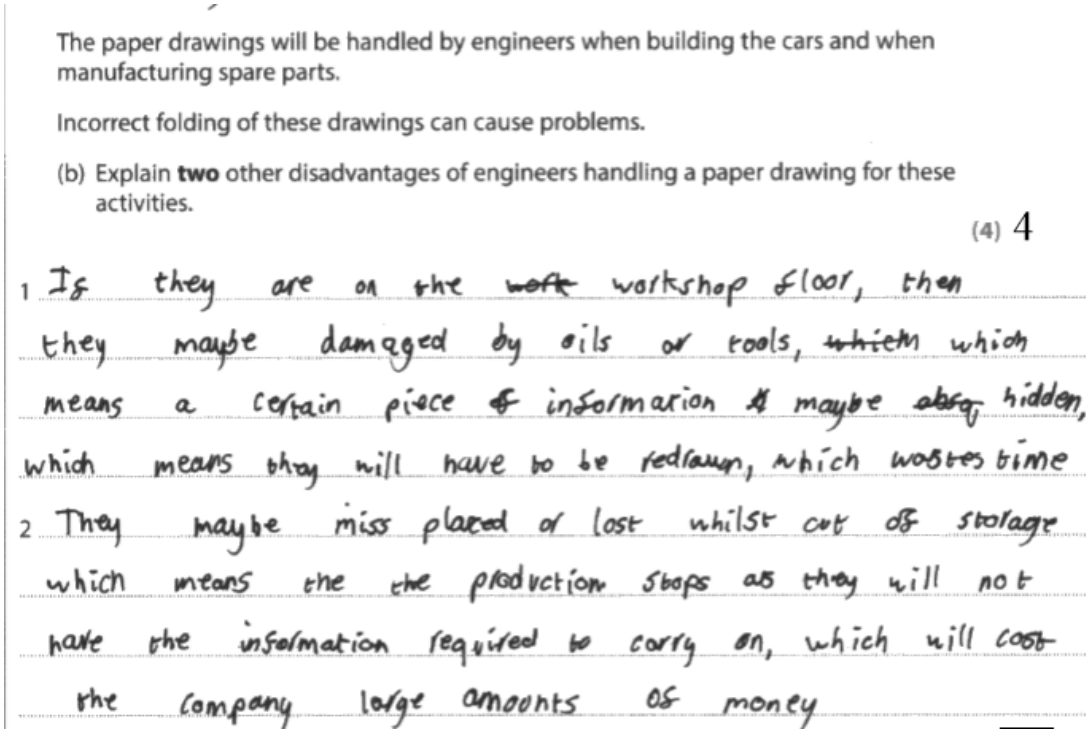
Incorrect folding of these drawings can cause problems.

(b) Explain **two** other disadvantages of engineers handling a paper drawing for these activities.

(4) 2

1 The drawing are likely to get dirty. This could lead to misinterpretation of the drawing and the products being made incorrectly

Four mark response:



The paper drawings will be handled by engineers when building the cars and when manufacturing spare parts.

Incorrect folding of these drawings can cause problems.

(b) Explain **two** other disadvantages of engineers handling a paper drawing for these activities.

(4) 4

1 If they are on the ~~work~~ workshop floor, then they maybe damaged by oils or tools, ~~which~~ which means a certain piece of information it maybe ~~also~~ hidden, which means they will have to be redrawn, which wastes time

2 They maybe miss placed or lost whilst out of storage which means the the production stops as they will not have the information required to carry on, which will cost the company large amounts of money

Question 5

This question was contextualised around engineers using drawings when designing components and assemblies. Again, this context gave learners an opportunity to apply their knowledge and understanding to these questions.

Targeted Specification Area: Learning Aim A.2

Q5(a)(i): This proved to be a very challenging question as learners were unable to name two mechanical component symbols. Those learners who scored marks here gave responses such as ‘bolt’ and ‘screw’. Many learners gave electronic component symbols such as ‘LED’ and ‘battery’ which was incorrect. Some learners gave responses associated with different drawing methods such as ‘isometric’ and ‘oblique’, again both incorrect responses.

Q5(a)(ii): However, it was surprising to see that many learners failed to identify the circuit symbol as a ‘variable resistor’. Many learners gave a response of ‘resistor’ but it needed to be more specific to award a mark.

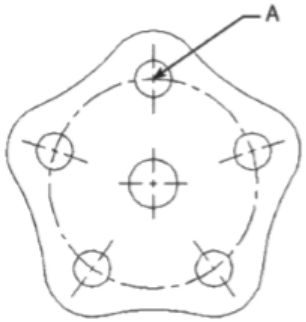
Q5(a)(iii): Again, this question proved to be quite challenging for most learners. Fixed reference points had not been tested before but there is clear reference to these within the specification. Those that had been taught this were able to gain a mark with a typical response such as ‘all dimensions will be from one point’. Two gain both marks here; learners would need to develop a linked response such as ‘all the dimensions will be from one point preventing incremental tolerance errors’. Unfortunately, it was very clear that many learners had not been taught this part of the specification and

gave responses that talked about the ability to align products to this or simply left a blank space.

One mark response:

(iii) The image shows an incomplete drawing of part of a clutch housing, which is to be connected to a gearbox housing.

The designer is considering using point A as a fixed reference point when adding dimensions.



Explain **one** reason for using a fixed reference point when dimensioning the clutch housing.

(2)1

Reduces innacuracy due to eliminating cumulative error.

Q5(b)(i): Most learners were able to achieve at least one mark here for identifying one of the tolerances. More often than not, learners were able to identify the upper tolerance as being 25.4mm. The lower tolerance (24.6mm) was often incorrect with learners adding a zero after the decimal point and producing an incorrect figure of 24.96mm. This was really surprising as this is another area of the specification that has been tested and was previously quite successful.

Q5(b)(ii) Again, geometric tolerances proved to be a very challenging question. The learner had clearly not been taught this aspect of the specification and this was often left blank. Where some learners did score was for a response centred on the accurate positioning of the holes. For learners to achieve both marks for this question there needs to be a linked response such as ‘a geometric tolerance allows features to be specified with reference to a fixed datum’.

One mark response:

(ii) The designer is thinking of adding a geometric tolerance to the drawing.

Explain **one** reason for using a geometric tolerance on this drawing.

(2) 1

Geometrical tolerances help with accuracy of the geometry (shape) of the object, therefore using geometrical tolerances, such as circularity, can help ensure that the shape of the object is as accurate as it can be.

Question 6

This question was contextualised around a company that manufactures hydraulic pumps for the agricultural industry. Again, this context gave learners an opportunity to apply their knowledge and understanding to a range of questions.

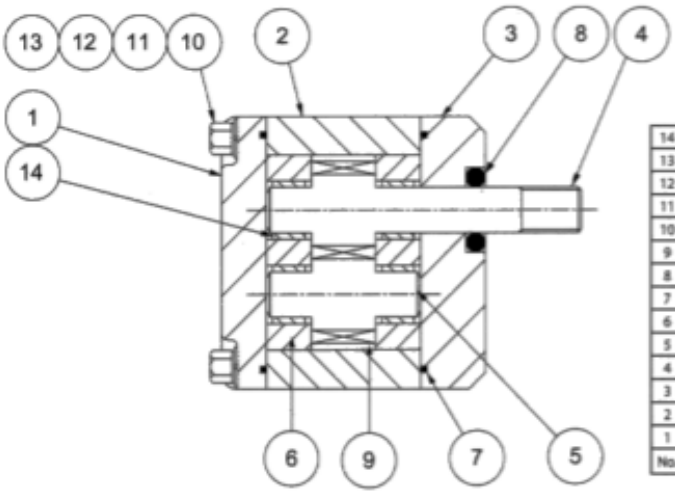
Targeted Specification Area: Learning Aim A.1

Q6(a): This proved to be another challenging question for the majority of learners as they could not explain the advantages of using notes on an assembly drawing when manufacturing the hydraulic pumps. Far too many learners focused on elements of the parts lists and gave typical incorrect responses such as 'it shows you the part number' or 'it tells you the name of each part'. Those that did score well were only able to identify advantages. Typical responses could be seen here such as 'it shows the sequence of assembly' or 'it provides additional information'. A minority of learners were able to produce linked responses such as 'it shows the sequence of assembly ensuring that parts are correctly fitted together' or 'provides additional information so there is less chance of making errors during manufacture'.

Two mark linked response:

1 Notes are read by engineers which can give critical information about that part or procedure. This will mean the accuracy of manufacturing the pump is greater as well as safety depending on the note contents.

Three mark response:



Notes

A.

B.

C.

D.

No.	Part	Quantity
14	Bush	4
13	Thread locking compound	0.5cc
12	Flat washer	4
11	Spring washer	4
10	Screw	4
9	Grease	2cc
8	Shaft seal	1
7	Seal	2
6	Bearing	2
5	Driven gear	1
4	Drive gear	1
3	Front cover	1
2	Body	1
1	Cover	1

(a) Assembly drawings are used by engineers on the production line to build these pumps. As well as using balloon referencing and parts lists on these drawings, notes are also added.

Explain **two** advantages to Pardpumps of using notes on the assembly drawing when manufacturing the pump.

(4) 3

1 Adding notes such as how much adhesive should be put on a component to assemble it to other components can be useful in making sure not too little is applied that it doesn't stay together and not to much is applied to avoid wasting it.

2 Adding notes on components that need to be heat treatment, indicating what heat treatment should be used allows the manufacturers to get a better idea of how to treat the components meaning they are less likely to do it wrong.

Q6(b): The majority of learners again struggled with this question but this is clearly signposted under Topic A.1 of the unit content. Typical correct responses related to 'the customer knowing what the pump would look like' or 'time consuming to produce a drawing for every customer', but these were only achieving marks at band level 1. Many learners found it difficult to discuss the implications of producing schematic drawings let alone in the situation provided. Many learners focused on the 'each customer' talking about how long it would take to produce drawings for each customer which is this question was acceptable. Many responses simply gave descriptions of a range of drawing techniques which were clearly incorrect. For learners to achieve marks there needed to be responses that had considered a range of points that was balanced and showed a clear relevance to the situation in the question. There could have been both positive and negative impacts of schematic diagrams. There were far too many blank responses this year.

Mark band 1 response:

(b) Pardpumps is considering producing a schematic diagram of the specialist pump it designs for each customer.

Discuss the implications of producing a schematic diagram in this situation.

(8) 2

each costomer should know all information of the specialist Pump when sold. A schematic diagram would be a good idea to show the ~~the~~ costomers correct and easy ~~to understand~~ information. All of the information from the Specialist pump will ~~be~~ be prosseed and then put on a schematic diagram to insure the costimer knows all critical information. when, or a probem accurs with the pump they can go back to the schematic diagram and see ir they can see the issue before its repaird.

Mark band 2 response:

(b) Pardpumps is considering producing a schematic diagram of the specialist pump it designs for each customer.

Discuss the implications of producing a schematic diagram in this situation.

(8) 5

A schematic diagram explains how a system works. If a schematic diagram of this specialist pump were to be made, you would have to explain exactly how all the components work, their job, and how they influence on each other to make the system work.

The schematic diagram should include annotations, parts list and exploded drawings.

This schematic diagram could then be used in conjunction with the assembly drawing. It would enable the customer to know exactly how the system of the pump works.

In this drawing, they would need to explain how the drive gear and driven gear work together.

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