

Examiners' Report/ Lead Examiner Feedback

January 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, Merit and Distinction. We hope this will help you to prepare your learners for future examination series.

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	Merit	Distinction
Boundary Mark	0	13	23	33	43

General Comments on Exam

This was the first 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.

On review of some of the examination papers it was also clear that learners were not always completing 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 drawing types.

Targeted Specification Area: Learning Aim A.1

Q1(a): The majority of learners correctly identified the type of drawing shown as being an exploded diagram.

Q1(b): Many learners were able to identify that the most appropriate application for a flow chart was 'showing the sequence of production' and the most appropriate application for a circuit diagram was 'checking the layout of electronic components'.

Targeted Specification Area: Learning Aim A.2

Q1(c)(i): Many learners had clearly been taught about the different linetypes found on engineering drawings as most were able to identify a centre line correctly.

Q1(c)(ii): Many learners were able to identify the symbol as being 'Diameter'. A number of learners incorrectly identified this symbol as 'Radius'.

Targeted Specification Area: Learning Aim A.2

Q1(d): The majority of learners were able to achieve at least one mark here with correct responses that focused on an orthographic projection being 'difficult to read' or a component being 'difficult to visualise' using this drawing technique. Some learners simply misread the question and gave advantages rather than disadvantages.

Level 2 Pass example:

(d) Give two disadvantages of an orthographic projection.	(2) 1 Q01d
1 They can sometimes be hard to understand.	

Targeted Specification Area: Learning Aim A.1

Q1(e): It was clear that learners who understood orthographic projections were able to access the mark for identifying the correct elevation.

Question 2


This question was aimed at (a) health and safety information and (b) sources relevant to a task.

Targeted Specification Area: Learning Aim A.4

Q2(a)(i): Many learners were able to clearly identify the sign as being 'explosive'.

Q2(a)(ii): The majority of learners were able to score reasonably well here as many were clearly familiar with the particular sign and able to offer correct responses related to wearing PPE, such as gloves and goggles, or handling with care. A number of learners simply stated 'keep out of reach of children', which was not appropriate in an engineering context.

Level 2 Pass example:



The background is orange.

State **two** safety actions that are necessary when this symbol is displayed.

(2) Q02aii

1. wear safety goggles

2. wear rubber gloves

Targeted Specification Area: Learning Aim A.3

Q2(b): The majority of learners were able to score well here and it was evident that they had seen material specifications sheets in one form or another. Most learners gave the correct responses of 'mechanical properties' and 'physical dimensions'.

Question 3

This question was aimed at testing knowledge of related documentation and interpreting drawing information.

Targeted Specification Area: Learning Aim B.2

Q3(a): This proved to be a question that generated a range of marks. Learners who had studied Gantt Charts were able to explain reasons for their use in this particular context with responses centred on 'clearly showing the schedule of production of the bicycle from start to finish so that deadlines can be met'. A number of learners simply described a Gantt Chart which was incorrect.

Level 2 Pass example:

(a) Explain **one** reason why Gantt charts would be used to organise the manufacture of a bicycle. (2) Q03a

It shows the activities that need to be done and the time they should be done for, this is helpful because you need to manage your time.

Level 2 Merit example:

(a) Explain **one** reason why Gantt charts would be used to organise the manufacture of a bicycle. (2) Q03a

So that they have an estimated time of when the project will be finished and ^{how long} ~~when~~ each step will take. They also show when each step should be done and what must be done before that step.

Q3(b): Some learners were able to score well here with disadvantages that focused on the complexity of the chart and the constant need to keep it up to date. This was sometimes supported with a recognition that engineers need to have a good understanding of such charts. Nonetheless, many learners had clearly not been taught this content and failed to gain any marks for this question.

Level 2 Pass example:

(b) Explain **two** disadvantages of using Gantt charts to organise the manufacture of a bicycle. (4) Q03b

1 A disadvantage could be that they are very difficult to understand for people that have not used them before.

Level 2 Merit example:

(b) Explain **two** disadvantages of using Gantt charts to organise the manufacture of a bicycle. (4) Q03b

1 ~~It might~~ It will take a while to create the gantt chart because there are alot of components

2 It ~~may~~ may not be easy for some people to understand

Targeted Specification Area: Learning Aim A.2

Q3(c): The majority of learners responded well to this question and it was pleasing to see that they could recognise the requirement to add both radii and the distance between the holes to arrive at a length of 42mm. There were, however, some highly inaccurate responses that had no relationship to the drawing as provided.

Targeted Specification Area: Learning Aim A.3

Q3(d)(i): Most learners were able to gain the mark for this question by correctly identifying the drill size as 5mm.

Q3(d)(ii): This proved to be a question that generated a range of marks. Some learners were able to state one reason for using a tapping drill reference chart with responses that centred on 'the screw/bolt not being the

correct fit'. Many learners simply mentioned that 'the chart shows accurate drill sizes' which was not a suitable response to the actual question.

Level 2 Pass example:

(ii) Give **two** reasons why it is important to use a tapping drill reference chart to find the correct drill size to tap a hole. (2) 2 Q03di

1. if you don't the tap won't fit the hole you've drilled.

2. the drill you are using to tap could get damaged in the hole

Question 4

This question returned to interpreting drawing information.


Targeted Specification Area: Learning Aim C.1

Q4(a): Again, this question generated a range of marks. The majority of learners were able to identify 'scale' and 'material' as the two missing labels on the drawing. Some learners answered with 'metal' which was accepted in this case as all the materials on the parts list were metal. A number of learners also used 'ratio' or 'proportion' which were acceptable responses for 'scale'.

Level 2 Pass example:

4 WC2 Engineering manufactures engineered components for the marine industry. Engineers at WC2 Engineering use a company-standardised layout for their working drawings. Here is an extract from a company-standardised layout.

14	Locking Sleeve	1	Aluminium
13	Support Bush	1	Aluminium
9	Support Bracket Stem	1	Low Carbon Steel
8	Angle Bracket	1	Low Carbon Steel
6	Connecting Link	1	Brass
5	Lens Case Crank	1	Aluminium
3	Support Bracket	1	Aluminium
2	Gearbox Crank	1	Aluminium
PART No.	DESCRIPTION	QTY	B

A 1:1	ALL DIMENSIONS IN mm GEN TOL = +/-0.5mm	PROJECTION 	DRAWN BY: PP DATE: 11/12/12	DRG NO. 3
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(a) What titles should be given to labels A and B in the company-standardised layout?

(2) Q04a

A Scale

B Name of material

Q4(b): The majority of learners found this question challenging. Correct responses focused on the inclusion of 'part numbers' and/or 'part descriptions'; however, very limited justification was provided for such responses. Some higher ability learners explained about the 'speed and ease of editing the template when producing other drawings'.

Level 2 Pass example:

(b) Explain **two** advantages for WC2 Engineering of using a company-standardised layout for their working drawings. (4) Q04b

1 They will always be the same, so if a branch have lost a drawing another branch may be able to copy the document and send it to the branch in need of it.

Level 2 Merit example:

(b) Explain **two** advantages for WC2 Engineering of using a company-standardised layout for their working drawings. (4) Q04b

1 It shows them the part number, Description of the part, the quantity and the material

2 It shows that the scale is 1:1, all dimensions, projection, who it was drawn by and the date it was completed

Question 5

This question was contextualised around a company that manufactures treadmills. This context gave learners an opportunity to apply their knowledge and understanding to a range of questions including simple mathematical calculations.

Targeted Specification Area: Learning Aim B.2

Q5(a)(i): It was clear that many centres had not taught Pareto to their learners as the 'principle' question was poorly answered. The principle is often known as the '80/20 rule' but many learners failed to achieve either mark for this question.

Q5(a)(ii): The above was also demonstrated in this question with many learners unable to identify the break point on the line at around the 80 mark. Many learners simply labelled the top of the highest bar or the top of the line graph.

Q5(a)(iii): Again, learners' lack of knowledge and understanding associated with Pareto continued on to this part of the question and many learners simply described what was seen on the graph. Learners who did score well were able to respond with answers such as 'the chart clearly shows the major defects allowing the company to focus on these issues'.

Level 2 Merit example:

(iii) Explain **one** advantage of using a Pareto chart to analyse treadmill defects. (2) Q5a(iii)

A Pareto chart clearly shows the type of defect and the frequency of it, this helps the manufacturer improve the treadmill as they can easily spot places that need to be improved on.

Level 2 Distinction example:

(iii) Explain **one** advantage of using a Pareto chart to analyse treadmill defects.

(2) Q5aiii

one advantage is that the company will be able to identify what the main cause of the problems are and what occurs more often so they will therefore be know what they should focus more on to change or repair

Targeted Specification Area: Learning Aim B.1

Q5(b)(i): This also proved to be a question that generated a range of marks. The majority of learners were able to obtain at least one mark here for displaying appropriate workings even if the final answer was incorrect. Some were able to go straight to the correct answer and received both marks for such a response.

Level 2 Pass example:

$$MTTF = \frac{\text{Total number of minutes}}{\text{Total number of failures}}$$

- (i) Use the control chart to calculate the **Mean Time to Failure** in minutes for the belt drive.

Write your answer on the line below.

(2) 2 Q05bi

$$7833 + 8368 + 8120 = 24,321$$

$$\frac{24,321}{3} = \underline{\underline{8107m}}$$

8,107 minutes

Q5(b)(ii): Another question that generated a range of marks. The lower ability learners were able to access a mark here with responses focused on 'estimating the time of failure'. Higher order responses extended the aforementioned with a justification such as 'allowing maintenance to be scheduled prior to failure'. Again, a number of learners simply described what they could see in the graph which was not a benefit of using this information.

Level 2 Pass example:

(ii) Explain **one** benefit of using MTF information when planning maintenance activities for the treadmill. (2) Q05bii

you can use it to help you predict when the treadmill will fail next, and therefore help you to ~~the~~ fix the problem.

(Total for Question 5 = 9 marks) **4**

Level 2 Merit example:

(ii) Explain **one** benefit of using MTF information when planning maintenance activities for the treadmill. (2) Q05bii

you could use the MTF to schedule regular services at the relevant times so that it doesn't stay broken for long

Question 6

This question was again contextualised and centred on related documentation and the care and control of drawings.

The majority of learners sitting the examination paper attempted 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.2/B.3

Q6(a): Most learners attempted this question but with limited success. It was evident that quality control documentation had been taught in some centres as responses focused on 'traceability issues if parts are defective'. Nonetheless, many learners simply misread the question and gave answers associated with general quality control processes rather than documentation.

Level 2 Merit example:

- 6 XYZ Electricals manufactures flat screen monitors for a range of customers, and complaints about them have risen in the last year.
- (a) To deal with this, XYZ Electricals has introduced a range of quality control documentation. One advantage of introducing quality control documentation is that it will reduce the number of customer complaints.
- Explain **two** other advantages for XYZ Electricals of introducing quality control documentation during the production of flat screen monitors.

(4) 2 Q06a

- 1 Can trace who made a faulty product and why so they don't do it again.
- 2 Ensures all resources used to manufacture the product are at a suitable standard so they don't fail. This way the company won't lose money buying inadequate materials.

Q6(b): The majority of learners scored some marks here and it was clear that they had been taught the advantages and disadvantages of using ICT based systems. Several learners gave coherent advantages associated with the 'ease of access to information' and 'less storage space required'. This was sometimes balanced against disadvantages associated with 'system failures and the loss of drawings' and 'cost implications in terms of software and training'. 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:

(b) The design department at XYZ Electricals has a paper-based system of document control for their engineering drawings. They are considering switching to an ICT-based system.

Discuss the possible impact on XYZ Electricals of changing to an ICT-based system of document control for their engineering drawings.

(8B) Q06b

If all the component drawings are being kept on computers it would mean that drawings must be printed off whenever they are needed. A ~~main~~ disadvantage to this would be that the computer system could crash meaning no drawings are able to be printed. It would also mean that ~~if~~ if drawings that need to be updated they ~~can~~ would have to be done manually. This is time-consuming. An advantage to this would be that ~~the~~ drawing will be easier to find and the process of finding drawings are more ~~of~~ efficient.

Level 2 Distinction example:

(b) The design department at XYZ Electricals has a paper-based system of document control for their engineering drawings. They are considering switching to an ICT-based system.

Discuss the possible impact on XYZ Electricals of changing to an ICT-based system of document control for their engineering drawings.

(8) Q06b

If ~~the~~ XYZ Electricals switch to an ICT based system for document control, they may have to scan in or create new versions of the drawing using a CAD system. This may mean hiring a specially trained person or train the employees to use CAD. Both of these can cost a lot of time ^{and money}. Also by creating new ones may mean that any graffiti from an engineer may be removed and therefore problems could later occur when creating a product or repairing one etc. However, if XYZ did change to an ICT system, it could have a good impact. It would mean that any drawings could be backed up in the office and in a different secure location not in the same building. So if any natural disasters or fires occurred, they could print another copy off. It would also make documents easier to access and cheaper as they could store them on an intranet ^{instead} of a ~~library~~ library and then employees could access them from anywhere. This would save money, paper and ink as they would only print them if they need them.

(Total for Question 6 = 12 marks) **7**

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