

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

2023

Qualification Report

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Introduction

This document has been prepared by the Chief Examiner and Principal Moderator; it is designed to be used as a feedback tool for centres in order to enhance teaching and preparation for assessment. It is advised that this document is referred to when planning delivery and when preparing candidates for City & Guilds Technical assessments.

This report provides general commentary on candidate performance in both the synoptic assignment and theory exam. It highlights common themes in relation to the technical aspects explored within the assessment, giving areas of strengths and weakness demonstrated by the cohort of candidates who sat assessments in the 2023 academic year. It will explain aspects which caused difficulty and potentially why the difficulties arose.

The document provides commentary on the following assessments:

Year 1

- 0171-015/515 Level 3 Land-Based Engineering – Theory exam (1)
 - March 2023 (Spring)
 - June 2023 (Summer)
- 0171-016/516 Level 3 Land-Based Engineering – Theory exam (1)
 - March 2023 (Spring)
 - June 2023 (Summer)

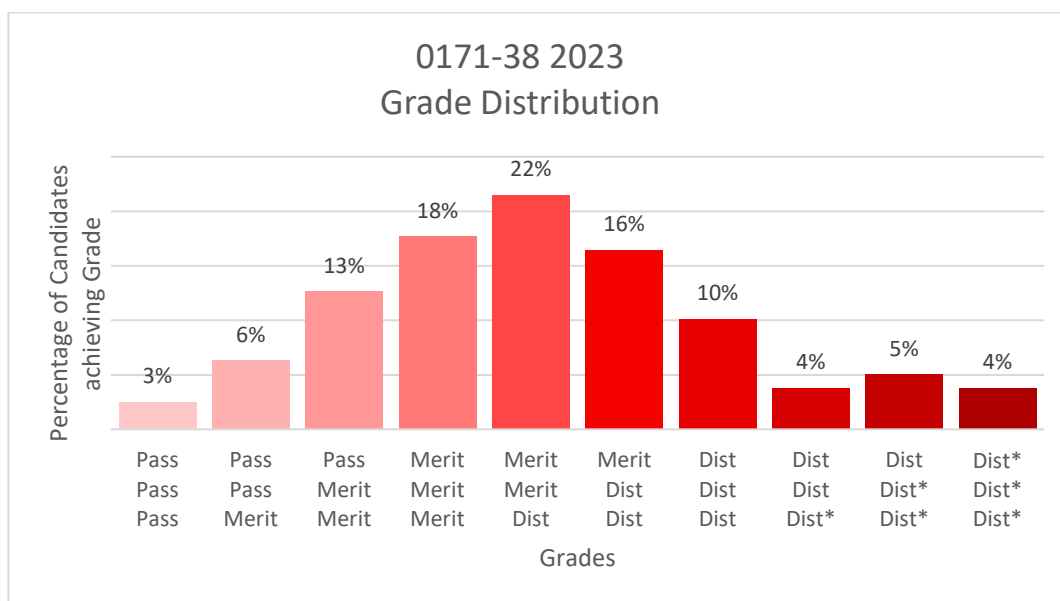
Year 2

- 0171-018/518 Level 3 Land-Based Engineering – Theory exam (2)
 - March 2023 (Spring)
 - June 2023 (Summer)
- 0171-017 Level 3 Land-Based Engineering – Synoptic Assignment

Qualification Grade Distribution

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

The grade distribution for this qualification is shown below:



This data is based on the distribution as of 14/08/2023.

Please note City & Guilds will only report qualification grades for candidates who have achieved all of the required assessment components, including Employer Involvement, optional units and any other centre assessed components as indicated within the Qualification Handbook. The grade distribution shown above could include performance from previous years.

Theory Exams – Year 1

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

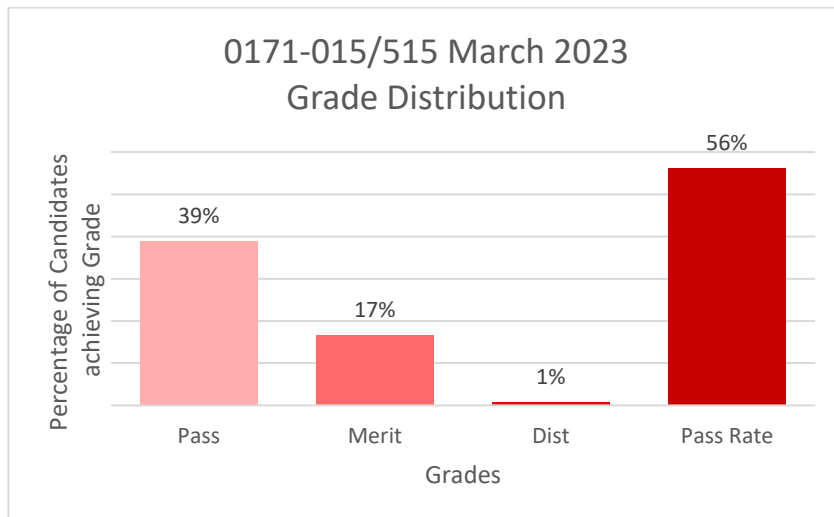
Grade Boundaries

Assessment: 0171-015/515
Series: March 2023 (Spring)

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	60
Pass mark	24
Merit mark	33
Distinction mark	42

The graph below shows the approximate distribution of grades and pass rates for this assessment:

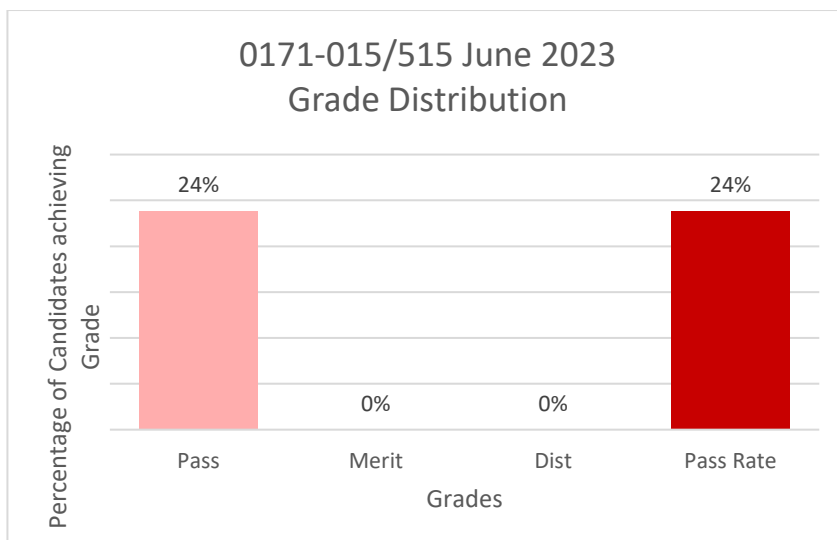


Assessment: 0171-015/515
Series: June 2023 (Summer)

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	60
Pass mark	22
Merit mark	31
Distinction mark	40

The graph below shows the approximate distributions of grades and pass rate for this assessment using the above boundary marks:



Chief Examiner Commentary

0171-015/515 Level 3 Land-Based Engineering - Theory exam (1)

Series 1 – March 2023

The examination paper covered a wide range of learning outcomes from across the assessed units of the qualification, including service engineering calculations, fundamental and current technologies. The paper was comparable to previous series of the examination in terms of range, suitability and level. Compared to the March 2022 series, there was an improvement in performance from both the lower achieving and mid-achieving candidates. Responses indicated stronger performance in areas requiring practical application of knowledge and in some specific mathematical topics.

A particular area of strength was evident when calculating a percentage. Most candidates were able to interpret a range of data and provide evidence of all stages of the calculation. For other calculation questions, some candidates used and applied alternative mathematical methods with success. Good knowledge and understanding was also demonstrated when summarising engine operating principles, with a range of marks achieved across the different ability levels.

Whilst candidates performed well in percentage calculations, the remaining maths and science-based questions proved more challenging. Some candidates missed the opportunity to access marks on two parts of a question relating to gear ratios, with some providing no answers and some being unable to demonstrate recall of the correct formula. Responses relating to methods of heat transfer also demonstrated weaknesses in knowledge and understanding, with most candidates unable to determine the temperature difference for the calculation part of the question. Finally, candidates were challenged when asked to give examples of forces acting on internal engine components.

Responses relating to the function and operation of systems were mixed, as candidates were unable to demonstrate breadth and depth of knowledge and understanding across all areas. This was particularly evident in questions divided into multiple parts, where candidates responded well to some parts but showed weakness in others, such as oil specifications and the function of exhaust gas recirculation valve.

The extended response question provided an opportunity for candidates to demonstrate their knowledge and understanding of testing and fault finding in a realistic scenario relating to a land-based liquid-cooled engine. Many candidates discussed basic diagnostic procedures or concentrated on one area, such as header tanks or coolant hoses. This limited depth in diagnostic testing impacted performance, limiting achievement to the lower/middle mark ranges. Those candidates who encompassed diagnostics for the whole system using a logical approach were able to access marks in the higher mark range.

Centres are advised to help candidates develop their use and understanding of fundamental principles, technical terminology and mathematical and science-based concepts across the qualification. Practising examination techniques when preparing for future series would be particularly beneficial to fully understand the requirements of the question before answering.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/qualifications/0171-015/515-land-based-engineering)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

Series 2 – June 2023

The examination paper covered a wide range of learning outcomes across the assessed units of the qualification including current technologies and it is comparable to previous series of examinations in terms of range, suitability, knowledge, understanding and level.

43.6% (38 candidates) were resitting the examination after failing in March 2023.

Candidates' performance declined compared to the previous series. Overall, the responses indicate a reduction of candidates' ability to demonstrate knowledge and understanding of the topics covered.

Areas which proved more challenging for candidates included the maths and science-based questions, for example calculations, the conversion of units within a calculation and explaining key terms.

Areas of discrimination between candidates' responses included stating the formula for power, compression pressure's, comparing the function of a pressure relief and bypass valve.

For the extended response question (ERQ), candidates were provided with the opportunity to demonstrate their knowledge and understanding of component measuring in a realistic scenario. Overall responses concentrated on engine servicing and not measuring engine component wear which impacted on the marks achieved which were limited to the lower/middle mark ranges.

Centres are advised to help candidates develop their use and understanding of fundamental principles, technical terminology and science-based concepts across the qualification. Practice in examination techniques would be particularly beneficial when preparing candidates for this exam. Candidates should fully understand the requirements of the question prior to answering, particularly for those questions that require reasoning, explanation and justification.

Past papers and marking schemes are available on the City and Guilds website which should be used for exam practice.

City & Guilds also offers a technical exam guide to support the work on the exam technique.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/Technical-Engineering-qualifications-and-training-courses)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

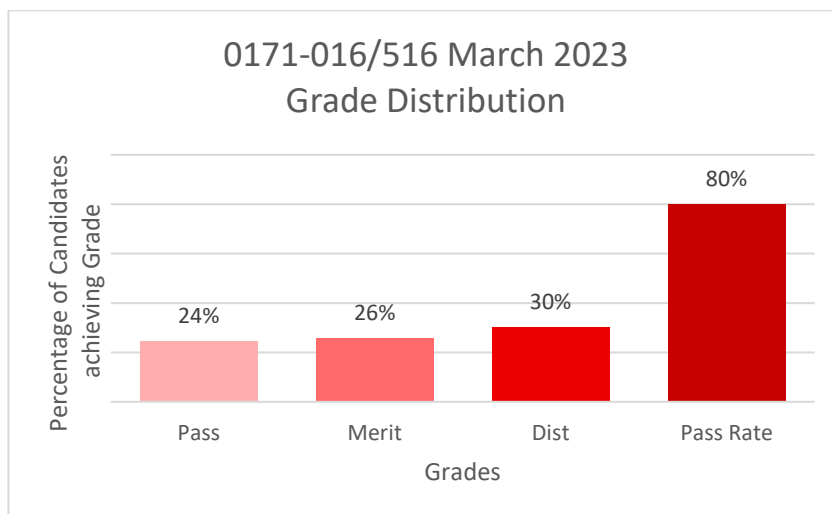
Grade Boundaries

Assessment: 0171-016/516
Series: March 2023 (Spring)

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	60
Pass mark	24
Merit mark	32
Distinction mark	41

The graph below shows the approximate distribution of grades and pass rates for this assessment:

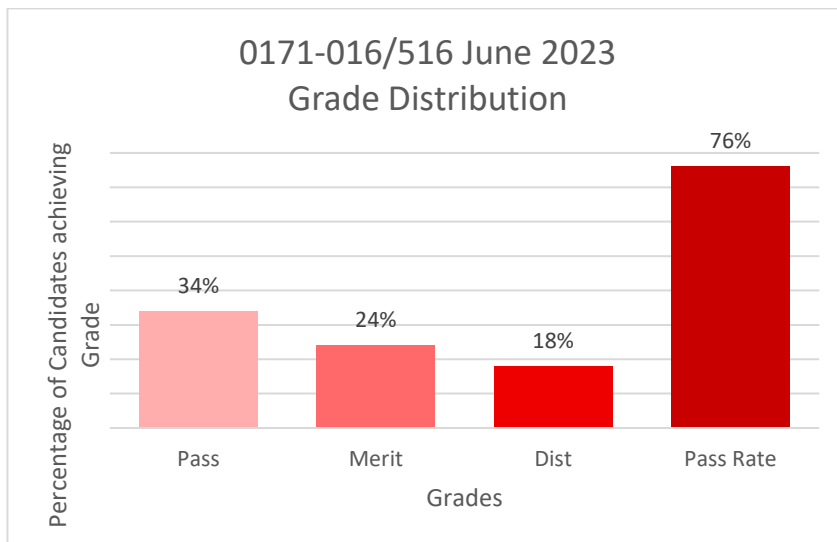


Assessment: 0171-016/516
Series: June 2023 (Summer)

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	24
Merit mark	32
Distinction mark	41

The graph below shows the approximate distributions of grades and pass rate for this assessment using the above boundary marks:



Chief Examiner Commentary

0171-016/516 Level 3 Land-Based Engineering - Theory exam (1)

Series 1 – March 2023

Overall, candidates' performance on the March 2023 paper demonstrated an improvement compared to previous series. Responses showed strong levels of recall, particularly in areas of hydraulics, and indicated that candidates were better prepared to provide more in-depth answers. However, as has been the case in all previous series, most candidates were unable to expand on their knowledge and understanding of electrics.

Most candidates showed a good level of recall throughout the paper, with particular strengths evident in areas such as braking systems. Candidates also demonstrated a strong understanding of hydraulics, accessing marks by giving a good level of detail in their answers. One further area which attracted good responses was in the extended response question.

Candidates demonstrated weaknesses in their electrical knowledge. When required to carry out an electrical calculation, most candidates stated the incorrect formula and responses showed a lack of understanding of the electrical diagram provided. Many candidates were unable to access marks in some areas as they did not attempt to provide answers, especially when responding to questions concerning electronic terminology and components. Candidates showed inconsistent knowledge of abbreviations relating to specific components of electronic systems. Applied knowledge of alternator components and their internal operation was also limited.

The extended response question required candidates to discuss the processes for diagnosing a fault on a four-wheel drive axle and to recommend repair procedures. There was an improvement in performance compared to previous years, with most candidates providing a logical process of diagnostics and repair to achieve middle band marks. Candidates who achieved higher marks provided a larger range of solutions and evidenced a greater depth of reasoning and logic for the recommendations made. Candidates who achieved marks in the lower mark band outlined very basic processes that lacked technical detail and understanding of the system components. These responses were often given as a narrative list of checks that should be carried out, and inspection of components and relevant repair procedures were not discussed.

Centres are advised to help candidates develop their knowledge and understanding of electrics, with particular focus on electronic terminology, principles and components. Candidates will also benefit from further practice in exam techniques to ensure that they read and fully understand what the question is asking before attempting to answer. As part of this, it would be beneficial to become more familiar with the command verbs and to understand the differences in how to respond to 'describe' and 'explain' questions.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/Technical-Engineering-qualifications-and-training-courses)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

Series 2 – June 2023

Overall, candidates' performance on the June 2023 paper demonstrated an improvement compared to the previous summer series. Responses showed strong levels of recall, particularly in areas of hydraulics, and indicated that candidates were better prepared to provide more in-depth answers. However, as has been the case in all previous series, most candidates were unable to expand on their knowledge and understanding of electrics.

Most candidates showed a good level of recall throughout the paper, with particular strengths evident in areas such as braking systems. Candidates also demonstrated a strong understanding of hydraulics, accessing marks by giving a good level of detail in their answers. One further area which attracted good responses was in the extended response question.

Candidates demonstrated weaknesses in their electrical knowledge. When required to explain operation of a circuit and discuss readings their responses showed a lack of understanding of the electrical diagram provided. Many candidates were unable to access marks in some areas as they did not attempt to provide answers, especially when responding to questions concerning electronic terminology and components. Candidates showed a lack of knowledge of images of specific components of electronic systems. Applied knowledge of electronic transmission management operation was also limited.

The extended response question (ERQ) required candidates to discuss the processes for diagnostic assessment of a vehicle with two interrelated faults. There was an improvement in performance compared to previous series, with most candidates providing a process of diagnostics and repair to achieve middle band marks but not necessarily in a logical order. Candidates who achieved higher marks provided a larger range of solutions and evidenced a greater depth of reasoning and logic for the recommendations made including technical information and typical figures. Candidates who achieved marks in the lower mark band outlined very basic processes that lacked technical detail and understanding of the system components. These responses were often given as a narrative list of checks that should be carried out, and inspection of components and relevant repair procedures were not discussed.

Centres are advised to help candidates develop their use and understanding of technical terminology across the qualification. Candidates would further benefit from practising examination techniques when preparing for this exam to fully understand the requirements of the question before attempting to answer, particularly those that require candidates to demonstrate reasoning in support of statements.

Past papers and marking schemes are available on the City and Guilds website which should be used for exam practice.

City & Guilds also offers a technical exam guide to support the work on the exam technique.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/qualifications/level-3/technical-qualifications)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

Theory Exams – Year 2

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

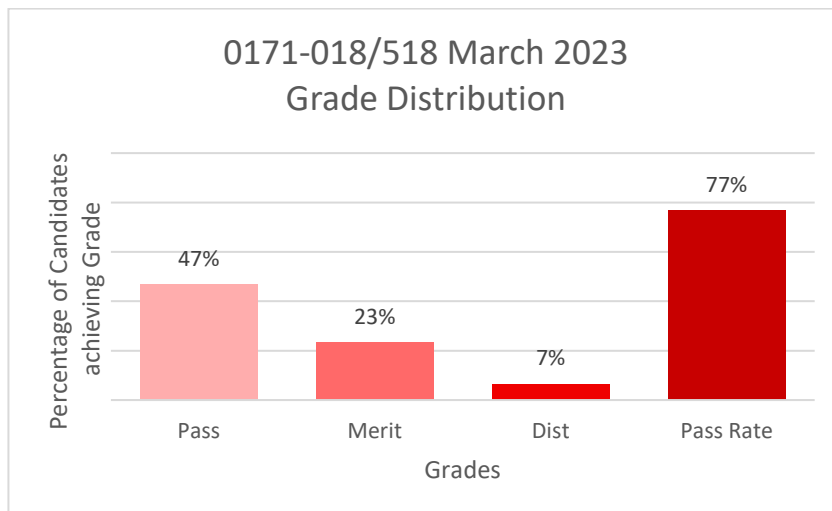
Grade Boundaries

Assessment:0171-018/518
Series: March 2023 (Spring)

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:

Total marks available	60
Pass mark	24
Merit mark	33
Distinction mark	42

The graph below shows the approximate distribution of grades and pass rates for this assessment:

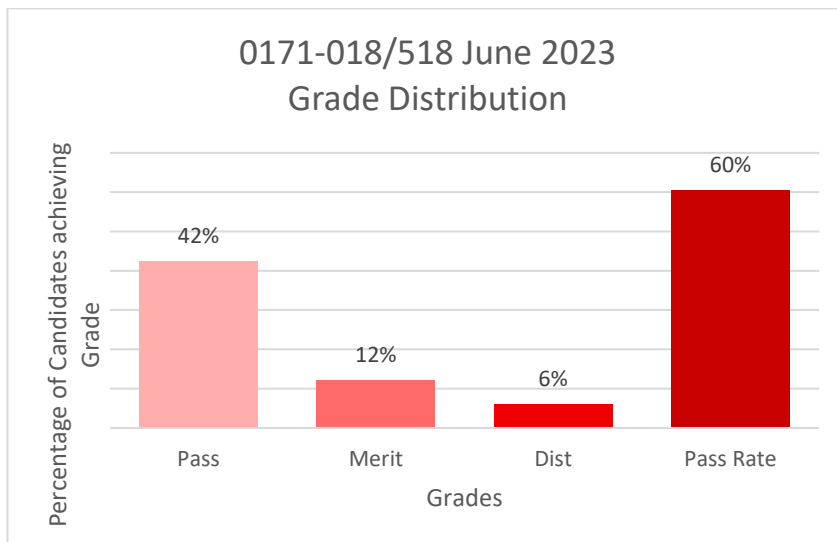


Assessment: 0171-018/518
Series: June 2023 (Summer)

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	24
Merit mark	33
Distinction mark	42

The graph below shows the approximate distributions of grades and pass rate for this assessment using the above boundary marks:



Chief Examiner Commentary

0171-018/518 Level 3 Land-Based Engineering - Theory exam (2)

Series 1 – March 2023

The March 2023 examination paper covered a number of topics within the designated learning outcomes and was comparable to previous papers sat in 2020 and 2022. Overall, candidates' performance improved compared to previous series. This upward trend was mainly driven by stronger responses to 'explain' questions, as the majority of candidates were able to demonstrate greater depth by following the expected 'cause and effect' answer format.

In this paper, candidates responded well when identifying parts or components in mechanical and power shift transmission systems. The use of correct terminology demonstrated strong recall and a depth of understanding when explaining causes of faults. Higher scoring candidates were able to show a greater breadth of knowledge and understanding across the paper and access marks with more descriptive and accurate responses.

Most candidates demonstrated weakness in the identification of components within an axial piston, variable displacement pump. There was a consistent theme of inaccuracy, and most candidates were unable to identify core components such as swash plate, pistons and cylinder/barrel. When testing a hydrostatic transmission, there was also a lack of knowledge and understanding as to why a technician would want to measure and record both pressure and flow to successfully diagnose wear within the pumping unit. Very few learners were able to demonstrate knowledge and understanding of the flow of power through a differential when a vehicle is turning sharply. Most candidates described the function of the differential and detailed elements of its working principle, rather than following the flow of power from component to component.

The cohort responded well to the extended response question (ERQ), showing improvement from previous series. Candidates were asked to fully assess and diagnose a fault related to the constant engagement of an electronically controlled four-wheel drive hydraulic clutch. Candidates demonstrated a competent approach which followed a logical plan. In the main, responses mentioned discussions with the operator, pre-stat checks followed by a risk assessment, before testing the machine themselves. Several made use of a scanning tool to identify fault codes and the process of clearing codes before retesting. Candidates who performed well tested individual systems (electric/electronic, hydraulic and mechanical). This was mostly carried out in the order of simple tests before moving on to the more complex tests. Lower achieving candidates lacked the depth of knowledge to suggest possible faults and consistently missed key steps in the process. Only a small number of candidates suggested possible readings from measuring equipment, such as digital multimeters or hydraulic pressure gauges.

Candidates will benefit from greater exposure to more complex transmission systems to build their depth and breadth of knowledge and understanding. Along with this, an opportunity to diagnose faults on these systems would enhance their ability to apply this knowledge into the testing and inspecting procedures that are commonly completed on these transmission systems. Candidates would also benefit from greater familiarity with the command verbs used in questions and an understanding of what is expected in response to these will allow for greater access to marks across the paper as a whole.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/qualifications/0171-018/518-land-based-engineering-qualifications-and-training-courses)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

Series 2 – June 2023

Overall candidates' performance was slightly below that of previous series. Candidates performed well when looking at advantages of CVTs and factors which would influence the selection of gears within an electronically controlled power shift gear box.

Candidates demonstrated weakness in the identification of components within a simple Synchroniser and with calculations.

Candidates continued the trend of answering 'Explain' questions in the manner of cause and effect which allowed them to access the full range of marks available when explaining possible causes of a sticking clutch and the advantages of a gear drive over a belt drive system.

Candidates understanding of the operating principles of a planetary reduction unit, commonly found on the rear axle of a tractor, lacked depth with many failing to recognise that the ring gear would be held stationary. This lack of depth of knowledge was again evidenced with the low level of marks achieved when identifying clutches used on PTO shafts.

The extended response question (ERQ) was not answered as well as it has been in previous series. The breadth and depth of knowledge demonstrated was lower and there was a lack of logic applied when carrying out testing. Some candidates did identify the role a dynamometer would play in the process. Although some candidates did relate relevant readings and possible faults, this was not common.

Candidates would benefit from greater practice of calculations within an applied setting. Centres should continue to highlight the expected responses to explain questions (cause and effect) as this has seen a dramatic improvement over the last 2 series. Candidates should ensure they are reading over both the question and their responses before submitting the paper.

Past papers and marking schemes are available on the City and Guilds website which should be used for exam practice.

City & Guilds also offers a technical exam guide to support the work on the exam technique.

All documents are available to download from [Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds \(cityandguilds.com\)](https://www.cityandguilds.com/Technical-Engineering-qualifications-and-training-courses)

Past papers and marking schemes: Documents – Level 3 – Assessment materials – Past Papers tabs

Exam guide: Documents – Level 3 – Assessment materials

Synoptic Assignments

0171-38 Level 3 Advanced Technical Extended Diploma in Land-Based Engineering (1080)

Grade Boundaries

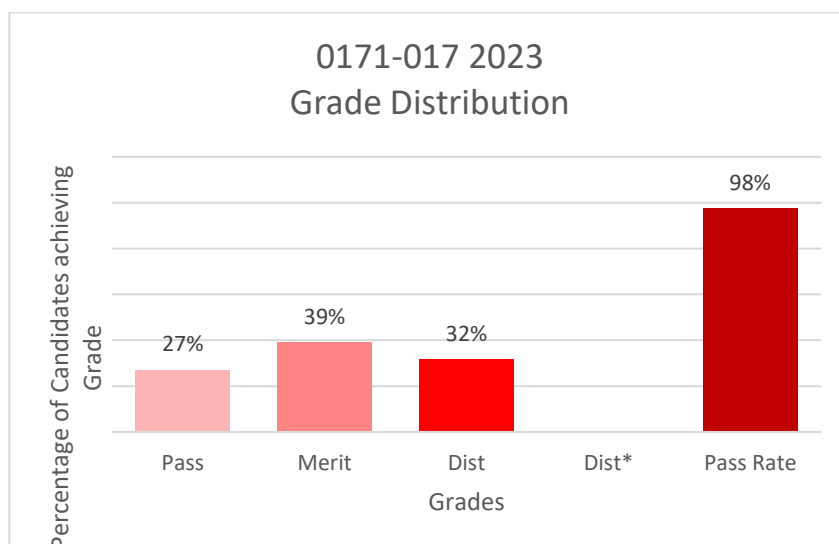
Below identifies the final grade boundaries for this assessment:

Assessment: 0171-017

Series: 2023

Total marks available	60
Pass mark	24
Merit mark	33
Distinction mark	43

The graph below shows the approximate distributions of grades and pass rate for this assessment using the above boundary marks:



Principal Moderator Commentary

Candidates' synoptic assignments this year were comparable to the work submitted previous series. Overall, candidates were well prepared for the synoptic assignment, and the standard of work reflected this. Candidates were aware of what was required to complete each task to industry standard.

As would be expected, there was some variation in the standard of candidates' practical work and a greater variation in the level of knowledge and understanding. Candidates generally completed the practical tasks well and, in most cases, selected the correct tools and used them well. Candidates also worked in a safe, logical way.

For Task 1, candidates were asked to dismantle, diagnose, and reassemble a multi cylinder diesel tractor engine to manufacturers specifications and clearances. The approach taken varied where some candidates fully dismantled the engines, whilst others removed the bare minimum of components.

For Task 2, candidates were asked to fabricate a bracket to mount a flashing beacon onto a trailer according to specifications. There was a large variation in the quality of work completed. A number of candidates struggled to accurately mark out the work whilst others failed to use the correct drill size prior to tapping the threaded holes.

Centres are asked to be mindful of the final submission date. Centres are reminded that candidates' synoptic assignments may be uploaded in advance of this deadline as soon as work is completed. This would support the moderation process to ensure that any errors are promptly flagged up and that centres have the opportunity to correct errors well in advance of the final submission dates.