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

2024

Qualification Report

Contents

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

- 0171-515 Level 3 Land-Based Engineering – Theory exam (1)
  - March 2024 (Spring)
  - June 2024 (Summer)
- 0171-516 Level 3 Land-Based Engineering – Theory exam (1)
  - March 2024 (Spring)
  - June 2024 (Summer)

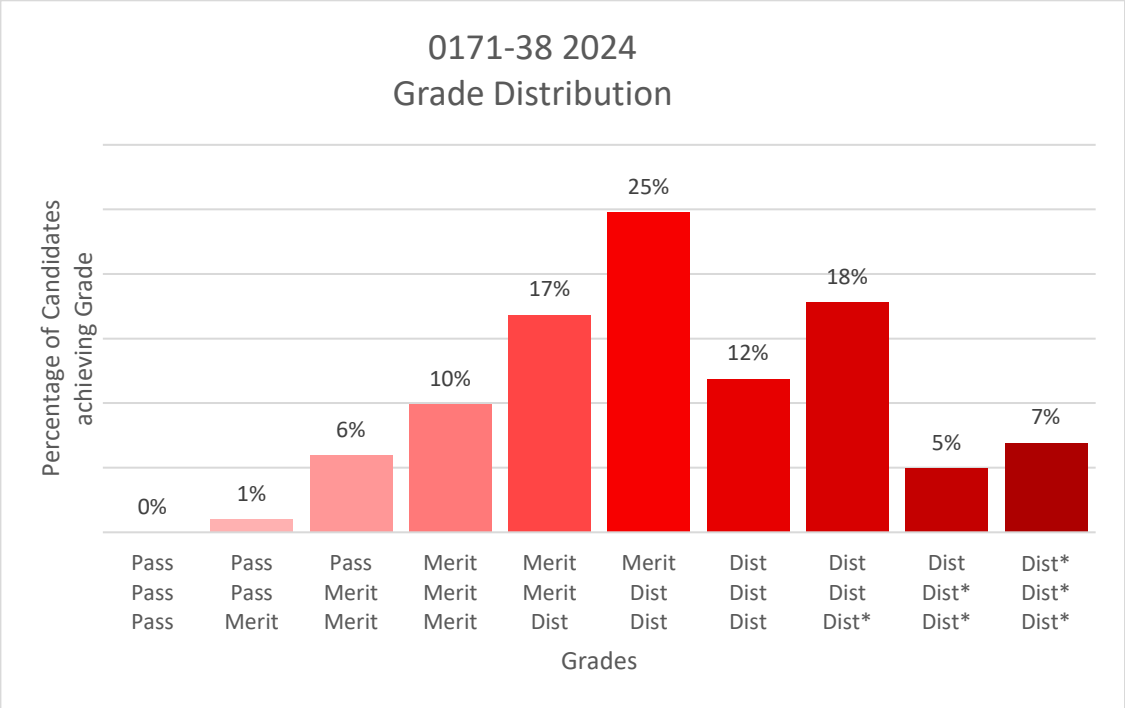
Year 2

- 0171-518 Level 3 Land-Based Engineering – Theory exam (2)
  - March 2024 (Spring)
  - June 2024 (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 12th August 2024.

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)

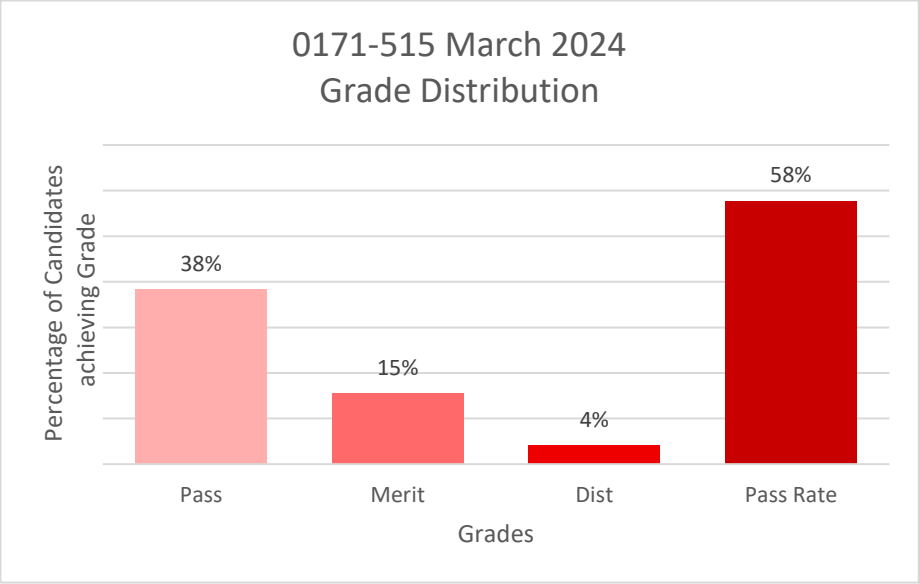
Grade Boundaries

Assessment: 0171-515
Series: March 2024 (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:

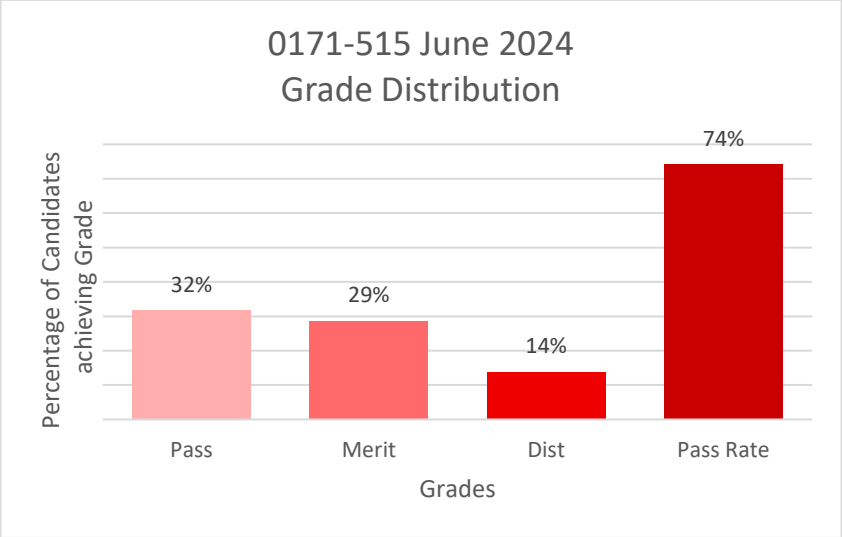


Assessment: 0171-515
Series: June 2024 (Summer)

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 distributions of grades and pass rate for this assessment using the above boundary marks:



Chief Examiner Commentary

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

Series 1 – March 2024

Overall, candidates' performance has improved compared to the previous series.

Many candidates performed well in topics related to the practical application of knowledge, service, and repair activities. Some candidates showed a deep understanding in places, but other candidates demonstrated limited knowledge.

Performance on recall questions (AO1) was mixed. Candidates struggled with questions relating to the definition of Hooke's Law, principles, and the formula for Pascal's Law. However, candidates performed well on questions relating to types of emissions system and cooling system component identification. There was some good performance seen in understanding questions (AO2) the most notable being a question relating to firing order grid, and the ERQ, but as with the recall questions there were some AO2 questions which performed less well eg questions on Newtons 1st law of motion, and the functions of a cooling system.

Areas of strength

- All calculation questions including calculation of area, Ohm's Law and mean calculations.
- Combustion strokes.
- Types of emissions control systems.
- The Extended Response Question (ERQ).

Areas that proved more challenging

- The principles-based questions, eg defining Hooke's Law, and stating the principles of Pascal's Law (including providing the formula for Pascal's Law).
- Candidates also lost marks by omitting the units from the calculation questions.

Areas of discrimination between candidates

- Stating formulas and units in calculation answers,
- Principals-based questions,
- Component identification,
- Function and relationship between power and torque.

The Extended Response Question

The ERQ gave candidates the opportunity to demonstrate their knowledge and understanding of engine servicing, the question in this series related to an agricultural tractor but is transferable to a multi cylindered CI power unit. Responses were improved from the previous series, and most candidates provided sufficient detail to score in the middle of band 2 (60% candidates achieved band 2 or above). Some candidates provided in-depth detail achieving marks in the upper band (13% achieved within band 3), a limited number of candidates struggled to provide basic details or did not answer the question.

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)

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

Series 2 – June 2024

Overall, the candidates' performance has improved compared to June 2023. Mathematical and science-based questions as well as explanation and reasoning-based question responses have improved.

Areas that still prove more challenging for candidates included the maths and science-based questions for example calculations, rounding up, stating units and explanation-based questions.

Areas of strength

- Stating metric units eg Torque, noise and speed
- Calculating the mean average
- Laws of friction

Areas that proved more challenging

- Ohms law and its application
- Disadvantages of a liquid cooling system
- Metric unit of measure for speed

Areas of discrimination between candidates

- Calculating the volume of a cylinder
- Causes of excessive engine oil consumption
- Functions of a common rail fuel injection system
- The Extended Response Question.

Extended Response Question

Candidates were provided with the opportunity to demonstrate their knowledge and understanding of mechanical fuel system diagnostics in a realistic scenario, the majority of candidates achieved marks within Band 2 (67%) with a limited number of candidates achieving marks within Band 3 (8%).

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.

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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)

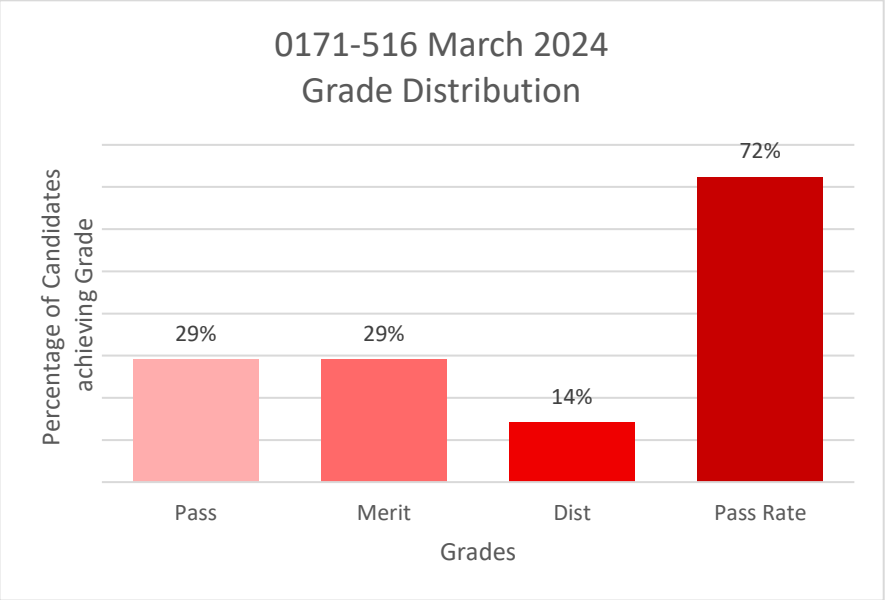
Grade Boundaries

Assessment: 0171-516
Series: March 2024 (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:

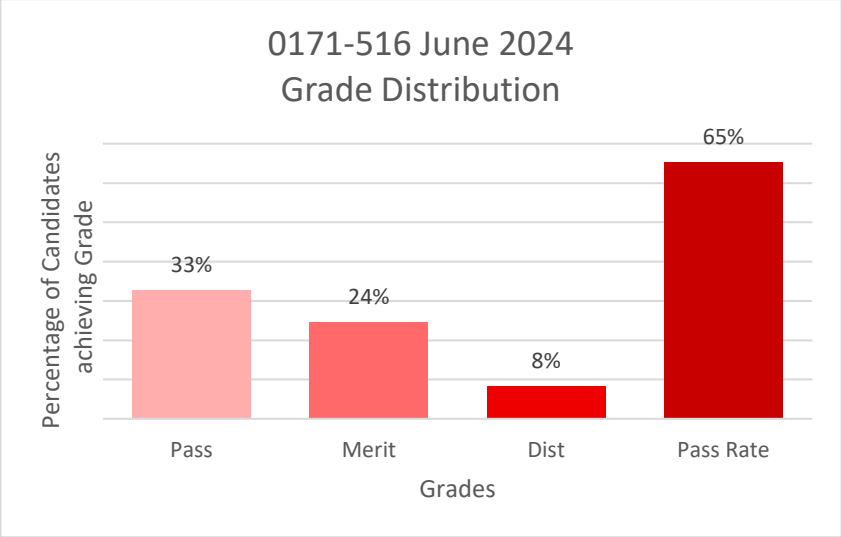


Assessment: 0171-516
Series: June 2024 (Summer)

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

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

Series 1 – March 2024

Candidates' performance on this paper is broadly comparable to March 2023.

Areas of strength

- Component operation.
- Knowledge of braking systems and electronics.
- Hydraulic system faults.

Areas which proved more challenging

- Explanations of the working principles of a vehicle alternator.
- Questions relating to electronic components (including higher performing candidates).
- Electrical power and hydraulic calculation questions (including transposition of a formula).
- Exam technique - some candidates did not read questions carefully/ answer the question being asked eg in the question related to vehicle management and telematics, many responses referenced general machine operation. Also, the question that related to the function of differing types of vehicle electrical components; many candidates responded with no comprehension of the operation.

Areas with differentiation

- Steering wear in relation to effect on geometry showed a positive differentiation between the high and low scoring candidates.
- The Extended Response Question showed a range of performances, showing an appropriate level of discrimination between candidates.

The Extended Response Question

This question focussed on diagnostic assessments, typical readings and related faults for a land-based vehicle's electronic throttle to engine control. Candidates performed well in this question, with 98% of candidates achieving some marks (87% of which achieved band 2 or above, with 42% scoring within band 3 which is an improvement from March 2023). Few candidates understood the advantages of using an oscilloscope to read signals from the throttle device.

A proportion of candidates planned their answers well showing some improvement in the exam technique. This was especially evident in some questions requiring candidates to show depth of understanding. However, this area still requires further work, many candidates failed to provide the required answers due to not reading the questions.

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)

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

Series 2 – June 2024

Overall, candidates' performance on the paper was comparable with previous series.
The examination paper covered a good range of learning outcomes across the qualification and was similar to the comparable previous series in terms of range, suitability and level.

Areas of strength

- Component operation
- Hydraulic systems
- Electronics (for higher performing candidates)

Areas which proved more challenging

- Identifying the components of a manual steering system
- Identifying electrical components
- Electronic wave forms

Areas with differentiation

- Steering components and wear - geometry
- Hydraulic pump operation
- Extended response question

Identifying the components of a manual steering system caused some confusion for candidates as most answered with power-operated (hydrostatic) terms and this led to lower marks being accessed.

Several candidates did not attempt to provide an answer for some questions, especially in relation to electronic wave forms. This area seems to have been challenging for most candidates including those higher performing who mostly scored lower marks. Candidates did not recognise the wave form for a speed sensor, although this is one of the most common speed output wave patterns used on land-based vehicles.

The Extended Response Question
The extended response question provided an opportunity for candidates to demonstrate their knowledge and understanding of diagnostic assessments, typical readings and related faults for a land-based vehicle's electrical charging and starting systems. It showed a range of performance, as expected for this type of question, showing an appropriate level of discrimination between candidates (88% of candidates achieved marks in band 2 or above, with 29% scoring within band 3). Few candidates understood the relationship between dimming lights and alternator functions.

Centres are advised to help candidates develop their use and understanding of technical terminology across the qualification. Candidates would 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)

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)

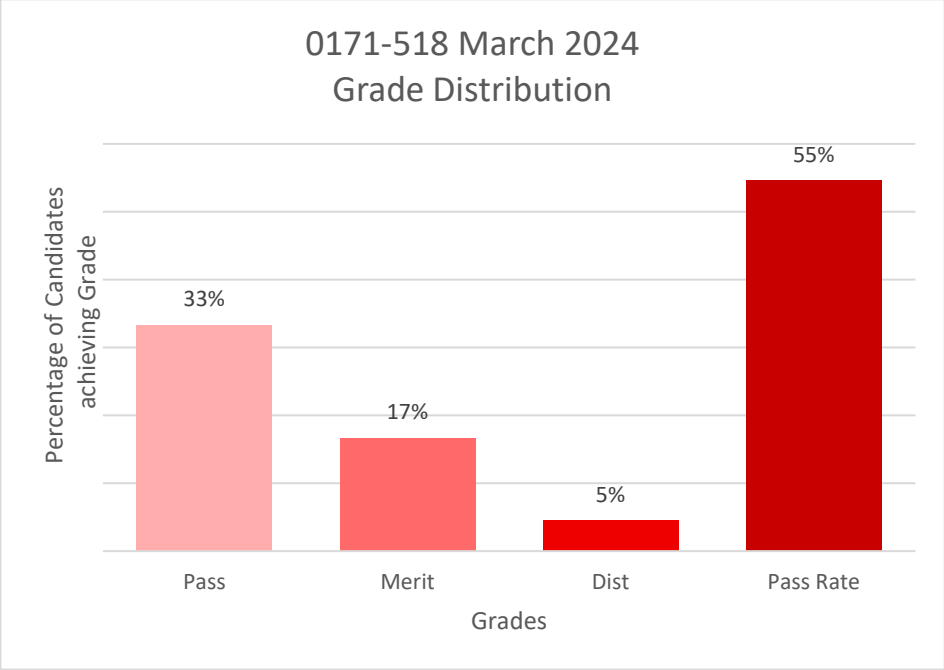
Grade Boundaries

Assessment:0171-518
Series: March 2024 (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:

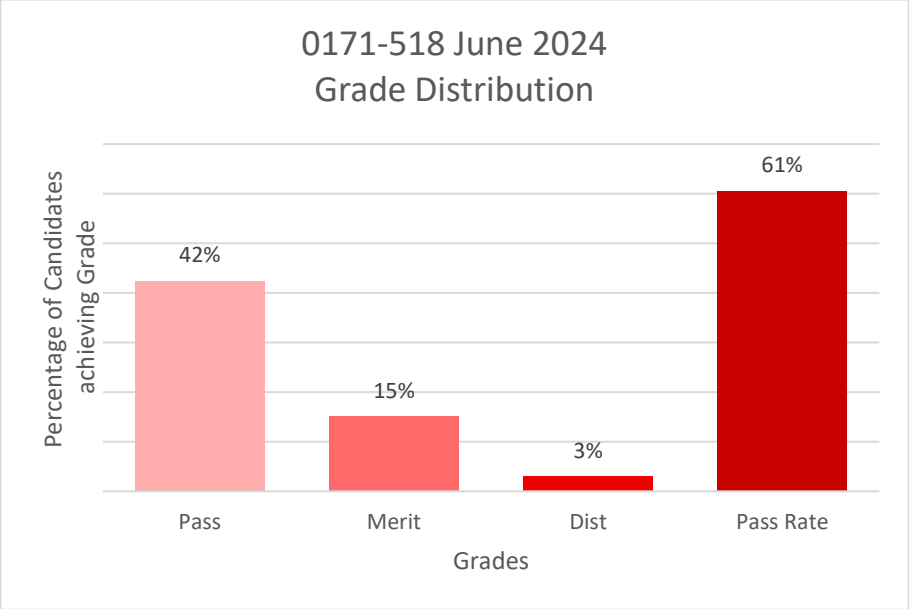


Assessment: 0171-518
Series: June 2024 (Summer)

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

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

Series 1 – March 2024

In general, all candidates performed similarly to previous series by responding well to explain questions (AO2), providing a good degree of depth. Candidates performed well in unit 358 *Repair land-based mechanical power transmission systems*. However, candidates struggled with questions on unit 359 *Understand land-based synchromesh transmissions and clutches*.

Overall, most candidates used recognised terminology and structured their process with a good degree of logic. Although, a number did use some diagnostic techniques which would be more suitable to a powershift or mechanical transmission.

Candidates generally included the risk assessment process and made mention to safe working processes; however, this was not as regular as in past series. Candidates were unable to identify the need to remove stored energy from the system.

Areas of strength

- Identifying bearings.
- Explaining of wear of gear drive train systems.
- Responding to potential symptoms of overload on a belt drive system.
- AO2 questions a 'cause and effect' type response was common in most responses demonstrating that candidates were well prepared for this type of question.

Areas which proved more challenging

- Synchromesh gear transmissions – candidates showed little understanding of these systems and their operating principles.
- Four-wheel drive systems – candidates demonstrated minimal depth of knowledge and understanding. Broadly, candidates were able to identify that wear would take place, however they were unable to explain why this wear would occur and how operating with two-wheel drive on the road would prevent this.
- The control of electro-hydraulic clutches was an area where breadth of knowledge was lacking with many candidates only able to access one or two marks when identifying the inputs which would be needed to control the clutch.

Areas with differentiation

- Misalignment in a gear train system. Overall candidates demonstrated a breadth of understanding by accessing marks consistently when responding to potential symptoms of overload on a belt drive system.
- Candidates found questions that looked at specific components of systems, such as synchromesh transmissions systems, powershift transmission systems or hydrostatic transmission systems challenging whether this was identifying them from a schematic or in a pictorial form. Higher scoring candidates accessed marks consistently throughout the paper, however low scoring candidates missed out on identifying marks on a regular basis.

The Extended Response Question

The ERQ required candidates to diagnose a fault within a hydrostatic transmission system fitted to a material handler. Candidates performed well in this question, with 98.5% of candidates gaining some marks (90% of which achieved band 2 or above). Candidates covered relevant areas such as oil changes, filters, and pressure testing. The vast majority of answers included using an electronic diagnostic device and described the process accurately. Some of the higher scoring candidates suggested typical readings and plausible faults, whilst mentioning key hydrostatic transmission system components.

All documents are available to download from Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds (cityandguilds.com)

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

Series 2 – June 2024

Overall, the candidates' performance was consistent with past series. As with past series candidates performed strongly in the units which looked at more basic forms of transmission and then found advanced transmissions more challenging.

Candidates performed well in the extended response question demonstrating a good level of applied knowledge and understanding.

Unit 358: Repair land-based mechanical power transmission systems
Candidates were able to access marks across all questions in this area demonstrating a good depth and breadth of knowledge and understanding of this area.

Unit 359: Repair land-based synchromesh transmissions and clutches.
Candidates accessed marks in most of the questions in this area, there were some gaps in knowledge when identifying clutch components and methods of engagement.

Unit 360: Repair land-based powershift transmissions
Although candidates did access marks in this area, there was a lack of depth of understanding when looking at operational advantages and the process of calibration.

Unit 361: Repair land-based hydrostatic or hydro-mechanical (CVT) transmissions
Overall candidates found this area more of a challenge. Technical terminology seemed to confuse candidates and they were unable to demonstrate applied knowledge and understanding when looking at specific components and control systems of CVTs.

Extended Response Question (ERQ)
Overall candidates responded well and applied a good degree of logic when completing the diagnostic assessment of a four-wheel drive system. Many mentioned the need to risk assess and speak to the customer. They were able to break the diagnostic requirement into the three basic systems of electric/electronic, hydraulic and mechanical, and suggested appropriate tests for each system. The use of terminology was impressive, although at times slightly out of context. Some candidates suggested appropriate readings from tests and possible faults.

General comments
Candidates attempted to answer the 'explain' questions with more accuracy and extended their statements to include a cause-and-effect type response, however, this is still an area for centres to focus on when looking at exam technique.

Centres should ensure candidates are familiar with the terminology that is used within the qualification handbook when discussing powershift, hydrostatic and CVT transmissions. Candidates did have a good understanding of the benefits of these transmissions, however, many struggled to explain the function of key components or processes within each system.

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.

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Synoptic Assignments

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

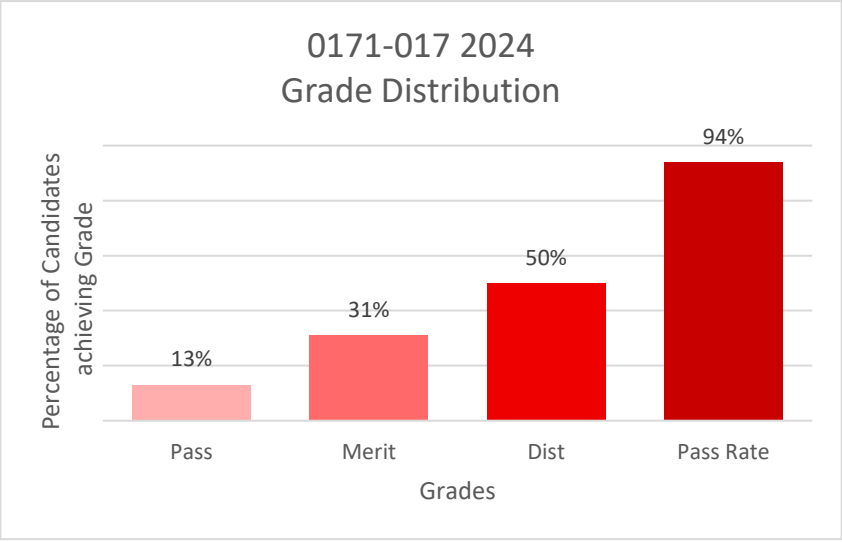
Grade Boundaries

Below identifies the final grade boundaries for this assessment:

Assessment: 0171-017
Series: 2024

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 in 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.

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.

The synoptic involved the candidates completing two tasks. The first task related to dismantling an engine and identifying faults. The second task related to faults in a hydraulic system. Candidates in general were able to complete the tasks to a level that reflected their ability.

Areas of strength

- Use of tools (Tasks 1a and 2a)
- Dismantling and reassembling the tractor engine

Areas which proved more challenging

- Fault diagnosis – level of detail when reporting causes of faults

Areas of differentiation between candidates

- Inspecting components for signs of wear or failure (Task 1a)
- Hydraulic test results

Both tasks were equally well completed by centres, however, there was a large difference in the amount of evidence submitted by centres, particularly around results recorded when checking the hydraulic system. The impact was some candidates from some centres provided far less evidence of the findings of the tests resulting in less evidence for moderating. This puts more emphasis on the assessor's comments as opposed to the candidate's evidence for review.

Best practice

Most centres provided tutor written feedback of practical performance which was detailed and clearly showed the quality of the candidate's performance across all AO's within the practical tasks. This written evidence, via the Practical Observation (PO) form, is the **key** evidence required for moderation of the practical tasks in the synoptic assessment. Some centres produced PO forms that were limited in detail and/or were providing feedback on understanding/skills in incorrect boxes on the PO form. Some centres did not always link the tutor feedback to the bandings in the assessment objective marking grid or provide detail on areas for improvement within each assessment objective. Focusing on the quality and clarity of the tutor written feedback is essential moving forward.

There were a number of occurrences where the overall marks on the Candidate Record Form (CRF) had been added up incorrectly. There were also occasions where candidate evidence was missing from the moderation portal or signatures were missing from candidate declaration forms, and a smaller number of occurrences where declaration forms were not uploaded to the moderation portal. Care should be taken to ensure these administrative aspects are correct when marking and uploading to the moderation portal.

Where there is more than one marker within the qualification, centres should ensure that the evidence that is uploaded for each candidate is in the same detail and is consistent across the cohort. A small number of centres uploaded tutor written evidence on the POF and CRF that varied in detail across assessors. A consistent standardised approach between markers will enable the moderation process to be undertaken without hindrance.

Where tutor and candidate evidence is uploaded in a handwritten format, care should be taken to ensure all evidence is fully legible and that both sides of the paper/evidence are scanned. It is best practice to word process evidence.

Overall, the majority of centres produced high quality evidence which aided the moderation process. Best practice is seen with the inclusion of the following evidence for each candidate as **one** document.

- Signed and dated declaration of authenticity.
- Detailed CRF (one completed for the entire assessment). AO3 written feedback on the CRF which summarises the quality of the practical performance.
- Detailed POF's or centre produced equivalent which focuses on the quality of candidate performance across the different AO's. These can be separate for different tasks or brought together on one form.
- Candidate written work. Tutor annotations on written work are beneficial for moderation purposes.