

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

2022

**Qualification Report** 

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# **Foreword**

# **Results August 2022**

As you will likely be aware, Ofqual has announced that grading for General Qualifications this summer will be more generous than prior to the pandemic. This is partly due to managing the impact of disruption and learning loss on learner performance and also managing fairness between learners in different years who had different methods of determining their grades. Therefore, for A levels and GCSEs, grading will seek a midway position between 2019 and 2021, meaning, in general, results will be somewhat higher than prior to the pandemic. This year, 2022, is a transitional year and outcomes and standards will likely return to pre-pandemic levels in 2023.

Similarly, for Vocational and Technical Qualifications (VTQs), this summer will be a transitional year and Ofqual has now been clear that for VTQs "we should expect that this summer's results will look different, despite exams and assessments taking a big step towards normality." Ofqual has published a blog What's behind this summer's VTQ results

In acknowledgement of the disruption to learning and to support fairness for all learners certificating this summer (some of whom will be competing against learners taking General Qualifications for the same progression and higher education opportunities), we will be taking loss of learning into consideration, whilst still acknowledging the need to uphold the validity of the qualifications. On this basis, we have made the decision to apply a form of 'safety net' through some additional 'generosity' to both the theory examinations and synoptic assignments within our Technical Qualifications wherever appropriate, (noting that it may not be appropriate to apply where there is a clear impact on knowledge and skills to practice, particularly health and safety requirements or other relevant legislation). We are therefore also reviewing candidate work a few marks below (equivalent to 5% of maximum marks) the Pass and Distinction notional boundaries – the boundaries used during the awarding process as the best representation of maintaining the performance standard from 2019.

The reason for lowering boundaries, where appropriate, by 5% of the maximum marks available, is that it is broadly commensurate with the level of generosity learners are likely to see in General Qualifications at level 2 and level 3. Providing that senior examiners can support the quality of learners' work seen below the notional boundaries and agree it is sufficient to maintain the integrity, meaning and credibility of the qualifications, the grade boundaries will be lowered across the full set of grades – e.g Pass, Merit, Distinction and Distinction Star.

Given the circumstances, this is the best approach to take into account the disruption to teaching and learning across every learner in a fair and transparent way, and at the same time maintain the integrity and meaning of qualifications. This approach helps to level our Technical Qualifications awarding approach with that adopted for General Qualifications and other qualifications awarded in England and in the wider UK.

## Spring examination series 2022

Having taken this decision, we are also mindful of learners who have taken components in **Spring 2022** and believe they should also have access to the same level of generosity. For these learners, we wish to adopt a similar approach. Therefore, for learners taking Technical Qualification assessments in spring there will be similar generosity, through the addition of 5% of the maximum mark available for the assessment. It is a different mechanism to that we are using for the summer assessments but provides the same level of generosity to those learners taking assessments in the summer.

# 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 2022 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

- o 0171-015/515 Level 3 Land-Based Engineering Theory exam (1)
  - March 2022 (Spring)
  - June 2022 (Summer)
- 0171-016/516 Level 3 Land-Based Engineering Theory exam (1)
  - March 2022 (Spring)
  - June 2022 (Summer)

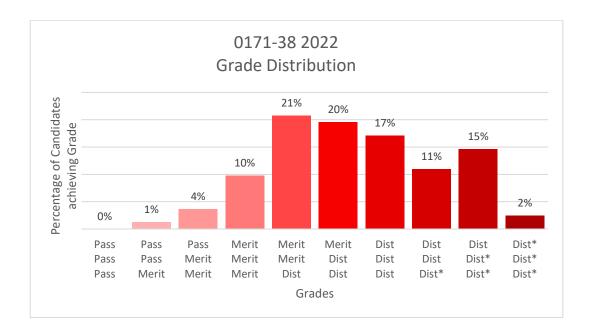
### Year 2

- o 0171-018/518 Level 3 Land-Based Engineering Theory exam (2)
  - March 2022 (Spring)
  - June 2022 (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 16/08/2022.

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**

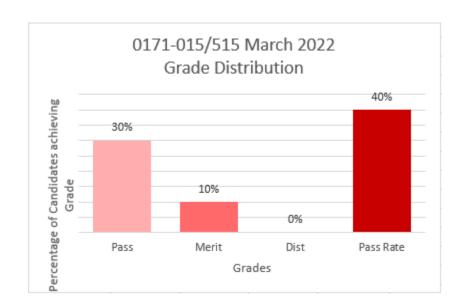
Assessment: 0171-015/515 Series: March 2022 (Spring)

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 generosity applied to the summer assessments will also retrospectively be applied to candidates who achieved their best result in spring. 5% of the base mark of the assessment will be added to their score rather than applied to boundaries.

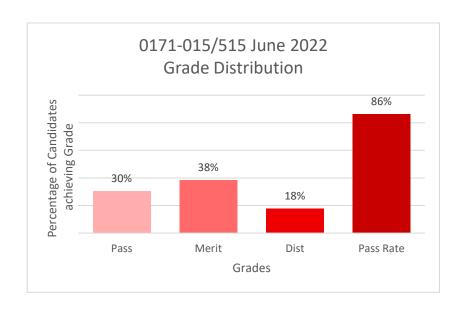
The graph below shows the approximate distributions of grades and pass rate for this assessment, it does not account for any marks that have been amended due to generosity:



Assessment: 0171-015/515 Series: June 2022 (Summer)

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	21
Merit mark	30
Distinction mark	39



# **Chief Examiner Commentary**

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

#### Series 1 - March 2022

The March 2022 examination paper covered a wide range of learning outcomes across the qualification specification, and it was comparable to previous series of the examination in terms of range, suitability and level.

Candidates' performance was lower than expected compared to previous series, with candidates demonstrating a lack of knowledge and depth of understanding across the paper.

Overall candidates in this series, were challenged with the maths and science-based questions eg compression ratio, mixing of units within a calculation, rounding up, relating to the phase of internal combustion engine operation and applying it to a firing order and cylinder configurations. A range of mathematical methods were demonstrated within answers by candidates but with limited accuracy.

Candidates performed better in topics related to the practical application of knowledge and practice of mechanical activities. Most candidates scored creditably for the questions relating to engine capacity, friction, averages and filters.

## **Extended Response Question (ERQ)**

The extended response question provided an opportunity for the candidates to demonstrate their knowledge and understanding of fault finding and give typical readings in a scenario relating to an agricultural tractor. Many candidates provided either a limited or very limited explanation of cylinder compression testing, often not including preparation and initial checks, and a lack of a recognised cylinder compression testing and recording procedure. Some candidates interpreted the question as testing injectors, fuel pressure, cooling system, taking readings while the engine is running and leak down testing. Most candidates did offer reasons for the engine fault description described in the question - most of which were logical and possible faults.

Centres are advised to help candidates develop their use and understanding of technical terminology and science-based concepts across the qualification. Candidates would benefit from practising examination techniques when preparing for future series to fully understand the requirements of the question before answering, particularly those that require candidates to demonstrate reasoning and justification 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 <u>Technicals in Agriculture and Land-based Engineering qualifications and training courses | City & Guilds (cityandguilds.com)</u>

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

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#### **Series 2 – June 2022**

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

Candidates' performance improved considerably compared to the previous series. The majority of candidates performed well in topics related to the practical application of knowledge, service and repair activities, for example, torque tolerances, stating some formula and engine components but their related in-depth knowledge to these and other activities demonstrated weaknesses in places.

Areas which proved more challenging for candidates included the maths and science-based questions, for example calculations, the conversion of units within a calculation, interpreting a graph, explaining key terms, causes of a symptom and types of systems. Some candidates used and applied alternative mathematical formula with success.

For the extended response question, candidates were provided with the opportunity to demonstrate their knowledge and understanding of testing and fault finding in a realistic scenario, the question in this series relating to an agricultural tractor. Although the responses were improved from the previous series, candidates often concentrated on discussing the testing procedure with limited possible faults or they discussed fault finding and limited testing procedure without including preparation and initial checks. The concentration on one area of the response impacted on performance and marks which were limited to the lower/middle mark ranges. Most candidates did offer reasons for the engine fault described in the question to a greater or lesser degree, and most answers were logical and possible faults.

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.

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

# **Grade Boundaries**

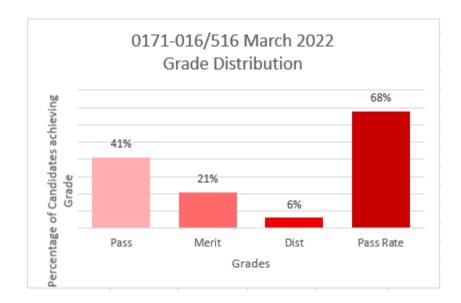
Assessment: 0171-016/516 Series: March 2022 (Spring)

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 generosity applied to the summer assessments will also retrospectively be applied to candidates who achieved their best result in spring. 5% of the base mark of the assessment will be added to their score rather than applied to boundaries.

The graph below shows the approximate distributions of grades and pass rate for this assessment, it does not account for any marks that have been amended due to generosity:



Assessment: 0171-016/516 Series: June 2022 (Summer)

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	21
Merit mark	29
Distinction mark	38

# **Chief Examiner Commentary**

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

#### Series 1 - March 2022

The March 2022 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. Overall candidates performed well on this paper, with higher achievement rates than in the previous March series.

Candidates performed well in areas which included basic electrical knowledge as well as standard identification of images. However, some candidates confused variable displacement pump term as opposed to gear type term. The topic of steering geometry showed a positive differentiation between the higher and lower scoring candidates. Overall candidates performed well on the straightforward land-based engineering knowledge questions.

Candidates did however struggle to expand on their electrical knowledge. Many candidates did not attempt to provide an answer in some areas, especially concerning electronic components. With candidates showing limited knowledge of battery chemical operation and how to apply the knowledge to practice. Candidates also showed inconsistent knowledge and understanding related to specific components of pneumatic braking systems.

## **Extended Response Question (ERQ)**

The extended response question (ERQ) highlighted the above strengths and weaknesses, with basic tests carried out gaining candidates marks but then limited technical understanding of the electronic and hydraulic systems being separated to produce a logical diagnostic plan. An example is using a diagnostic tool too early in the process before basic checks were investigated. Very few candidates provided any technical data or typical test figures, those that did achieved the higher band grades.

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.

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#### **Series 2 – June 2022**

The June 2022 examination paper covered a good range of learning outcomes across the qualification and was comparable to the previous series in terms of range, suitability and level. Overall candidates performed well on this paper, with higher achievement rates than in the March series.

Candidates performed well in areas which included basic electrical knowledge as well as standard identification of images. However, some candidates could not name mechanical steering boxes. The topic of steering geometry showed a positive differentiation between the higher and lower scoring candidates. Overall, candidates performed well on the straightforward land-based engineering knowledge questions.

Candidates did however struggle to expand on their electrical knowledge, with the electrical relationship most candidates could state a formula. Many candidates did not attempt to provide an answer in some areas, especially when answering questions concerning electronic components. Candidates showed inconsistent knowledge and understanding related to specific components of electronic signal in control systems. Limited knowledge of alternator components and how to apply the knowledge to explain operation was also evident.

More marks were achieved by the higher-level candidates by demonstrating their understanding of each part of the hydraulic circuit.

## **Extended Response Question (ERQ)**

The extended response question (ERQ) highlighted the above strengths and weaknesses. Candidates gained marks by carrying out basic tests, but there was limited technical understanding of the starter electrical system to produce a logical diagnostic plan. As an example, a diagnostic tool being used too early in the process before basic checks, such as visual investigations, were completed. Very few candidates provided answers that required any testing of the starter circuit with a multimeter and relevant technical data or typical test figures were often not supplied. Those candidates that were able to provide this information in responses achieved the higher band grades.

Very few candidates could give a test procedure for checking the battery condition.

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.

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# **Theory Exams – Year 2**

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

# **Grade Boundaries**

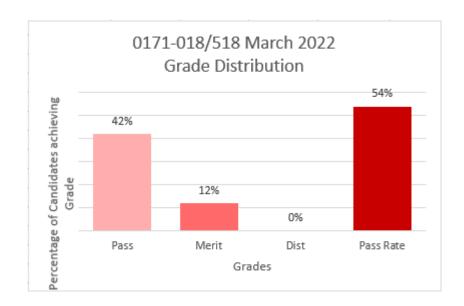
Assessment:0171-018/518 Series: March 2022 (Spring)

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 generosity applied to the summer assessments will also retrospectively be applied to candidates who achieved their best result in spring. 5% of the base mark of the assessment will be added to their score rather than applied to boundaries.

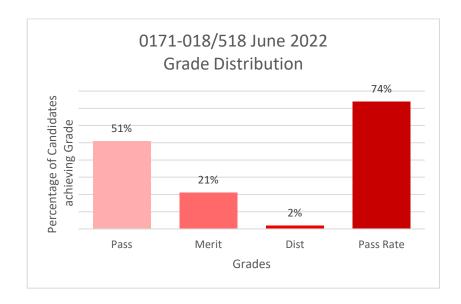
The graph below shows the approximate distributions of grades and pass rate for this assessment, it does not account for any marks that have been amended due to generosity:



Assessment: 0171-018/518 Series: June 2022 (Summer)

Below identifies the final grade boundaries for this assessment;

Total marks available	60
Pass mark	21
Merit mark	30
Distinction mark	39



# **Chief Examiner Commentary**

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

#### Series 1 - March 2022

The March 2022 examination paper covered several areas within the learning outcomes and was comparable to those sat in 2019 and 2020. Overall, candidates' performance was stronger in identifying components, indicating strong recall. However, the many of candidates' explanations lacked detail demonstrating the lack of both depth and breadth of knowledge and understanding.

In this paper, questions that required components or parts to be identified were answered well, most candidates used the correct terminology whether identifying wearing components or when describing the operation of a system. The higher scoring candidates were able to identify the impact of a stretched cable linking it to the possible effects on operation demonstrating knowledge and understanding when responding to explanation questions. The use of recognised terminology within the context of hydrostatic transmissions was evident in higher scoring candidates.

Many candidates demonstrated weaknesses in both knowledge and understanding when responding to questions related to hydrostatic transmission systems and hydro-mechanical transmission systems (CVT). There was consistent inaccurate use of terminology within answers. Within hydrostatic transmission systems, there was a lack of recognition of the varying layouts that are available and the advantages in performance that these different layouts can achieve. Candidates tended to respond by giving generic advantages of a hydrostatic system rather than specifics that were being asked for in a particular system. This was the case with high scoring candidates too. Very few learners were able to demonstrate an understanding of the operating principles of a hydro-mechanical transmission. Some candidates were able to use the correct terminology but few managed it in a logical manner that would offer a technically correct operating principle.

Another factor in the candidates' performance was the lack of detail when responding to an 'explain' question. Candidates tended to list one word responses rather than give a detailed 'cause and effect' scenario which would give access to a greater number of marks. To compound this, when asked for a number of responses candidates would often repeat the same response but in a different wording rather than giving an alternative response.

#### **Extended Response Question (ERQ)**

Overall, the cohort's performance, when responding to the ERQ, was an improvement from the previous series. Candidates were asked to fully assess and diagnose a fault on an electronically controlled, power shift transmission system. In the main, candidates were able to approach the task in a logical manner and demonstrated knowledge and understanding with the use of correct terminology within context. This was particularly evident when explaining the use of electronic service tools to scan for fault codes. Candidates across all scoring bands followed a consistent approach of talking to the operator, testing the machine themself, carrying out a risk assessment and completing the fault code scan and carrying out a calibration. Thereafter, higher scorers were able to use their deeper knowledge and understanding to complete a more comprehensive and logical approach to diagnosis following testing of electronic/electric faults, then moving to testing for hydraulic faults before finally resorting to full strip down to identify mechanical faults. Only a small number gave suggestions of possible faults or readings which may be recorded.

Candidates will benefit from practising exam questions linked to cause and effect, where they are asked to explain an advantage or disadvantage of a system for example. A fuller and more comprehensive understanding of modern but common transmissions systems and how the components within these systems operate and interact with each other would also benefit candidates in the future. Candidates would also benefit from reading the question carefully and taking note of the number of marks awarded. A question looking for three advantages to be

explained and carrying 6 marks will be looking for the advantage to be stated and an explanation for why it is an advantage.

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

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#### **Series 2 – June 2022**

As with previous series, there was a spread of results across the June 2022 cohort with candidates performing well in the majority of the questions. However, candidates' performance was at a lower level for questions relating to limited slip diffs, epicyclic units and hydrostatic systems. These questions looked at areas which are within the handbook but may have not been covered in as much detail as other fundamental systems.

In general, all candidates regularly accessed marks when required to identify traditional engineering components and assemblies, such as bearings and differentials. Candidates across the board also demonstrated good knowledge of specific gear types and the operation of power shift transmission systems. Understanding was also shown with the majority of candidates accessing marks around the causes of bearing failure linked to specific symptoms. Candidates, in the main, responded to 'explain' questions with greater depth by providing responses that included a cause and effect on a more regular basis compared to the previous series.

Questions which looked at more complex components did differentiate considerably. The majority of candidates were unable to access marks when looking at questions relating to limited slip differentials and the working principles of an epicyclic reduction unit. As with other series, candidates struggled to demonstrate sufficient knowledge and understanding of hydrostatic transmission systems (HSTs) and the components used within these systems. Broadly, candidates were unable to explain the function of a key components within a HST or explain the working principles of common components used with an HST. Candidates did not make use of the question wording which stipulated that the image provided was indeed a particular type of motor, with many instead describing the operation of a pump.

The extended response question looked at the process for inspecting and preparing a used mower conditioner for resale. All candidates accessed marks, with a key theme of gear box and drive shaft inspections. Overall, the majority of candidates used recognised terminology and structured their process with a good degree of logic. However, a number of candidates did use some diagnostic techniques which would be more appropriate for an overhaul or rebuild rather than an inspection. Candidates generally included the risk assessment process and made mention of safe working processes, however such responses were not as evident as in past series. Candidates also did not identify the need to remove tension from belts in order to check bearings and the requirement that all safety decals were in a fit for purpose condition. In comparison to previous series, the ERQ was not answered with the same level of depth and breadth. High scoring candidates, in the main, were able to provide a logical flow to the inspection and demonstrated a deeper knowledge and understanding by explaining what results they would expect of a faulty component.

Candidates were well prepared for this exam with many providing responses which demonstrated both depth and breadth of knowledge in some of the areas covered within the paper. However, many candidates lacked the basic knowledge of fundamental components used with drivelines and hydrostatic transmission systems. Candidates would benefit from more focus on these areas to increase their recognition of the common parts and the understanding of the function and working principles of the systems components.

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)

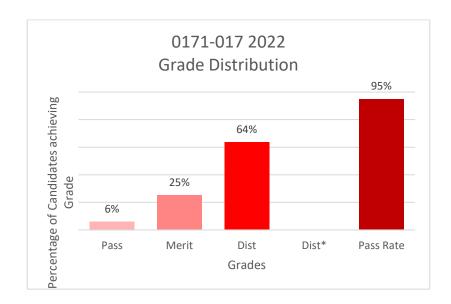
# **Grade Boundaries**

Below identifies the final grade boundaries for this assessment:

Assessment: 0171-017

Series: 2022

Total marks available	60
Pass mark	21
Merit mark	30
Distinction mark	39



# **Principal Moderator Commentary**

Candidates' synoptic assignments this year were comparable to the work submitted in previous series. On the whole, 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.

When it came to measuring tolerances on the gearbox, there seemed to be differences in what was measured and the accuracy of the measurements. For example, some candidates did not measure the backlash or preload on the bearings. Other candidates, when using the DTI, did not place it perpendicular to the movement being measured

The approach to the small engine task was also varied: some candidates fully dismantled the engines, whilst others did not remove the crankshaft and avoided having to re-time the engine. This was clearly influenced by teaching staff as the approach tended to be by centre.

For task 1, candidates were asked to dismantle, assess and reassemble a small four stroke engine to manufacturers' specifications. In some centres, candidates did not fully dismantle the engines. This negated the need to retime the engine which meant that the candidate lost the opportunity of picking up more marks for AO2 & AO3. Candidates at some centres would also have benefitted from a greater amount of literature relating to the engines as a point of reference for torque settings and clearances.

For task 2, candidates had to dismantle and assess an angle drive gearbox. There was a variation of gearboxes across centres but, as with task 1, there was often a lack of technical literature for candidates to refer to.

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.