City & Guilds
A City & Guilds Group Business

1145-21 Level 2 Certificate in Engineering

(Manufacturing Technologies)

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.

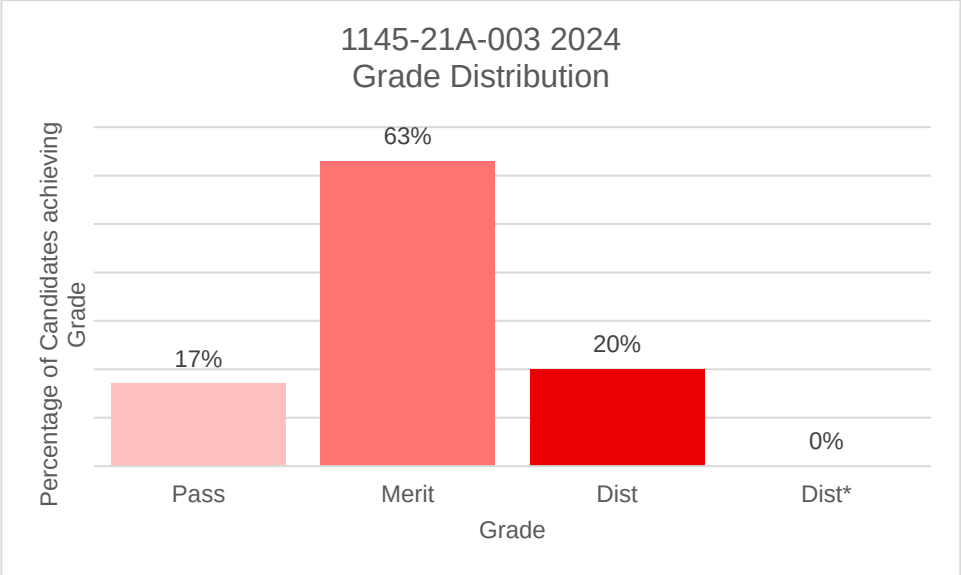
This report provides general commentary on candidate performance in both the synoptic assignment and theory exam. It highlights common themes in relation to the technical aspects explored within the assessment, giving areas of strengths and weakness demonstrated by the cohort of candidates who sat assessments in the 2024 academic year. It will explain aspects which caused difficulty and potentially why the difficulties arose.

The document provides commentary on the following assessments:

- 1145-520 - Level 2 Technical Certificate in Engineering (360) - Theory exam
    - March 2024 (Spring)
    - June 2024 (Summer)
- 1145-027 - Level 2 Technical Certificate in Engineering (Manufacturing Technologies) – Synoptic Assignment

Qualification Grade Distribution

The approximate grade distribution for this qualification is shown below:



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 Exam

Grade Boundaries

Assessment: **1145-520 Level 2 Engineering – Theory exam**
Series: **March 2024**

Below identifies the final grade boundaries for this assessment, as agreed by the awarding panel:
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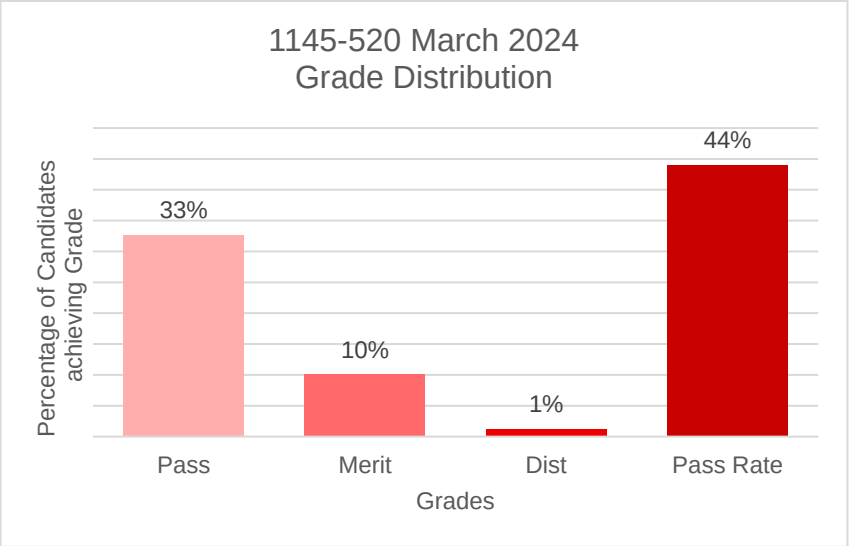
Total marks available	60
Pass mark	22
Merit mark	31
Distinction mark	41

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

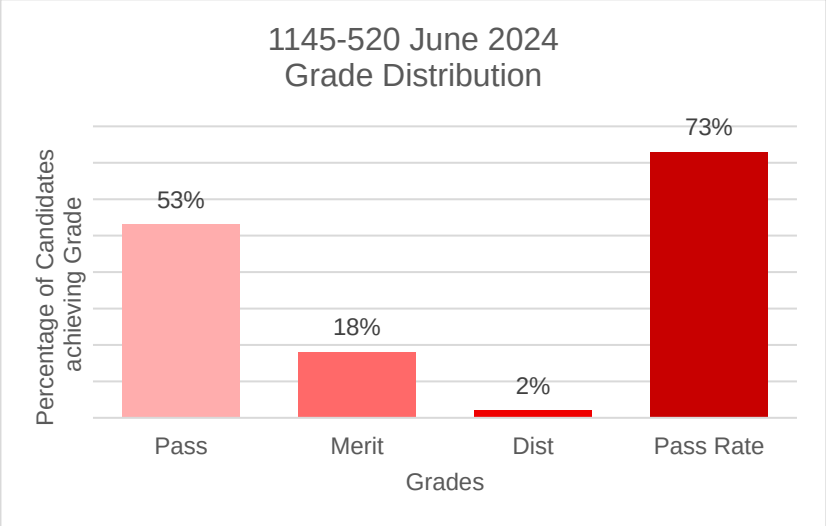


Assessment: **1145-520 Level 2 Engineering – Theory exam**
Series: **June 2024**

Below identifies the final grade boundaries for this assessment.

Total marks available	60
Pass mark	22
Merit mark	31
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

Assessment component: 1145-520 Level 2 Engineering – Theory exam

Series 1 – March 2024

The paper as a whole and the individual questions met the requirements of the specification and were pitched appropriately for this level. The paper was comparable with the previous series in terms of the number of questions assessing knowledge recall (AO1), understanding (AO2) and extended responses. There was a mixed response to this paper with some clear areas of strength shown and some clear areas of weakness present. Most questions assessing basic knowledge recall were answered well. Responses to questions assessing understanding were more varied, with limitations in breadth and depth shown.

With Principles in Engineering (Unit 203), candidates showed competence in applying mathematical principles to engineering contexts, especially in performing calculations accurately. The ability to suggest materials and outline manufacturing processes for practical scenarios indicates a strong understanding of materials science and the ability to apply theoretical knowledge practically. Weaknesses were identified in some areas; there was a general misunderstanding of thermodynamics concepts, including specific heat and methods of heat transfer. Responses to material testing and the effects of annealing on metals were weak, with a notable gap in understanding the causes of oxidation. In addition, confusion in basic calculations regarding gear ratios and efficiency suggests areas that need further exploration and practice.

When focusing on Developing Engineering Workshop Practice (Unit 204), candidates demonstrated understanding of practical applications for tools (e.g. punch, chisels). However, significant confusion about the responsibilities under the Electricity at Work Regulations 1989 shows a need for improved instruction in regulatory knowledge. In addition, it was noted that candidates often confused response types between explaining control measures and providing examples. The understanding of infrared thermometer applications was also weak, suggesting a specific area for enhanced practical training or demonstration.

In regard to Working in Engineering Businesses (Unit 205), responses to written communication forms in a business context were mostly well-answered, indicating a strength in recognising and utilising formal communication methods. It is noted that candidates struggled with identifying GDT and electrical symbols, foundational knowledge areas in engineering drawing and electrical engineering. There was a mixed understanding of commercial aspects of engineering, with some candidates failing to grasp broader business contexts. Many candidates were unable to recall specific business improvement methodologies, pointing to a need for better integration of these concepts into the curriculum.

Performance on extended response questions (ERQs) highlighted mixed results. While ERQs were answered well in some cases, showing a good level of understanding and the ability to articulate comprehensive responses, a significant portion of the cohort showed confusion between the correct terminology and therefore demonstrated a lack of depth in their analysis. Confusion between terms like "shareholders" and "stakeholders" and general misunderstandings in responses indicate gaps in business knowledge and the ability to integrate engineering practice with business concepts. This suggests that while ERQs are effective in differentiating candidates based on their analytical and synthesis skills, there remains a gap in candidates' preparedness to answer these types of questions. Improving instruction on how to approach ERQs, coupled with reinforcing the interconnectedness of engineering with business and societal contexts, could enhance future performance in this critical area of assessment.

Series 2 – June 2024

The June 2024 examination for the Level 2 Technical Certificate in Engineering exhibited a commendable level of understanding and application among candidates across a diverse range of engineering principles and practices. The assessment covered fundamental topics including safety signage, risk assessment, equipment applications, material selection, mathematical calculations, and business improvement strategies.

Topics answered well:
Candidates demonstrated commendable strengths across various domains in the June 2024 examination for the Level 2 Technical Certificate in Engineering. Particularly noteworthy was their proficient understanding and application of safety signage and risk assessment principles, as evidenced by clear and accurate identifications of shapes and meanings. Mathematical proficiency was evident throughout the exam, with candidates adeptly tackling calculations involving force, energy, power, and mechanical advantage. Responses to questions on equipment applications and engineering principles were generally precise and well-supported, showcasing a solid grasp of foundational concepts. Furthermore, candidates excelled in explaining business improvement strategies such as Kaizen and Lean Manufacturing, highlighting their ability to articulate how these approaches enhance engineering company performance through detailed examples and insights.

Topics not answered well:
A recurring issue was incomplete or insufficient working shown in mathematical calculations, which impacted the clarity and completeness of responses. Some candidates also struggled with providing thorough explanations in questions requiring deeper understanding, such as characteristics of non-metallic materials and specific engineering processes. There were instances where candidates provided correct answers but failed to demonstrate a clear understanding of underlying principles or failed to link their answers back to practical applications effectively. In some cases, responses lacked specificity or clarity, particularly in questions requiring detailed explanations or descriptions of engineering concepts. Additionally, a few candidates exhibited difficulties in structuring their answers coherently, which occasionally hindered the clarity and organization of their responses.

Extended Response Questions:
The Extended Response Questions (ERQs) highlighted significant strengths. Candidates demonstrated strong analytical and application skills across various scenarios, such as suggesting suitable materials for specific engineering parts and justifying their choices based on material properties and manufacturing processes. Additionally, responses to questions discussing different business improvement approaches showed a thorough understanding of methodologies like Kaizen and Lean manufacturing, with clear explanations on how these strategies can enhance efficiency, quality, and overall company performance. These questions effectively tested candidates' ability to apply theoretical knowledge to practical engineering contexts and evaluate their impact on business operations.

Concluding statement:
In summary, the June 2024 examination for the 1145-520 Level 2 Engineering – Theory exam appropriately assessed candidates' understanding and application of key engineering principles. While there were notable strengths in areas such as safety signage, risk assessment, mathematical calculations, and business improvement strategies, challenges remain in deeper conceptual understanding, practical application, and clarity in extended responses. The mixed performance across different units highlights the need for targeted improvements, as highlighted above. Increased focus on linking theoretical knowledge to practical applications and refining answer structures could lead to stronger overall outcomes in future assessments.

Centres are reminded of the City & Guilds Technicals 'Exam Guides' available here
Technicals in Engineering qualifications and training courses | City & Guilds (cityandguilds.com)

Synoptic Assignment

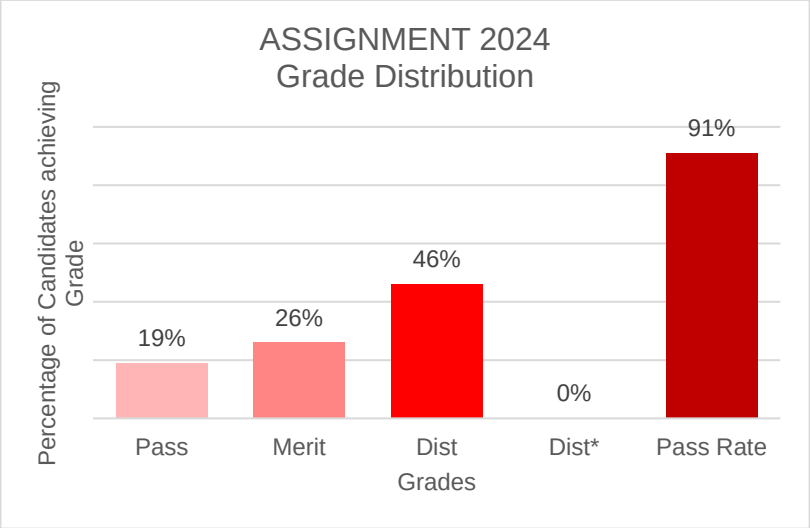
Grade Boundaries

Assessment: 1145-027
Series: 2024

Below identifies the final grade boundaries for this assessment:

Total marks available	60
Pass mark	23
Merit mark	32
Distinction mark	42

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



Principal Moderator Commentary

Assessment component: 1145-027 Level 2 Engineering – Synoptic assignment

The assignment was similar in level to the previous series. Evidence provided by candidates supported this view, which was sufficient, valid, and of appropriate quality for marking.

The assignment involved the manufacture of a machinist's hammer using manual and computer-controlled machines. This was carried out as a series of structured tasks, specified in the assignment brief. The assessment objectives assessed by this assignment were AO1 (Recall of knowledge), AO2 (understanding), AO3 (practical skills), AO4 (bringing it together) and AO5 (attending to detail / perfecting). In general, this assignment was completed well by candidates.

AO1 (recall of knowledge): In general, technical terms were used in bills of material, production plans, risk assessments, and evaluations of the manufacturing process. In most cases, candidates displayed good knowledge recall, accurately naming tools and processes.

AO2 (understanding): The evidence was generally good, especially when candidates justified work practices and safety requirements. Most candidates provided risk assessments and production plans that implied practical application of understanding; best practice was demonstrated in some cases by providing rationales for the processes selected. Several candidates missed the opportunity to demonstrate a clear grasp of the sequence of activities being carried out by fully annotating and explaining their CNC machining programmes.

AO3 (practical skill): Observations were usually supported by photographs and relevant commentary on the practical observation form, which often showed manufacturing processes in progress. Photographs of individual components and the final assembly, accompanied by manufacturing details, were observed as best practice.

AO4 (bringing it all together): This was generally evident in the production planning, justifications of processes, and component evaluations.

AO5 (attending to detail): In most cases, this was appropriately evidenced. For the majority of candidates, the main dimensions were documented on the test record sheets. The best practice identified was the inclusion of both test record sheets with objective dimensional measurements as well as subjective evaluations of the machinist's hammer components and the final assembly carried out by the candidate as part of the final test. Generally, the tutor assessed the practical work with subjective comments on the practical observation form.

The markers clearly considered all AOs while awarding marks, which is commendable. It would be helpful for moderation if centres made or added comments that illustrated where assessment criteria were specifically addressed.