

City & Guilds Level 2 Principal Learning in Engineering (2760-02) - Summer 2015

November 2015 Version 1.0

City & Guilds
Believe you can



www.cityandguilds.com

Contents

1	Introduction	4
	Employer engagement	4
	Assignment setting	4
	Providing evidence for moderation	4
	The use of marking grids provided by City & Guilds	5
	The submission of witness testimonies, consultation sheets and candidate reviews	5
	Additional note	6
2	Units	7
Unit 1	The engineered world (dated entry question paper)	8
Unit 2	Engineering design	12
Unit 3	Engineering applications of computers	13
Unit 4	Producing engineering solutions	14
Unit 5	Construct electronic and electrical systems	15
Unit 6	Manufacturing engineering	16
Unit 7	Maintenance	17
Unit 8	Innovation, enterprise and technological advance	18

1 Introduction

This document has been prepared by the Principal Moderator and Principal Examiner to be used as a tool to enhance teaching and assessment. It is advised that this document be referred to when preparing to teach each unit and then again when preparing for assessment.

Employer engagement

It is pleasing to see that employer engagement remains an important element of the successful delivery of the Principal Learning qualification. It should be incorporated in all assignment work if possible.

Assignment setting

Controlled assessments are fit for purpose. They concentrate on an appropriate engineering theme that meets well the unit's criteria, thus enabling candidates of all abilities to attain their full potential. Through moderation this year it is clear that centres have used common engineering tasks which have been used effectively for many units to develop candidates' understanding and progress across a range of units. However, it is advisable that when centres do modify or change assessment tasks that their allocated moderator should check and agree the suitability of the changes. Advice on assignment setting can be sought from the Moderator or Subject Manager at City & Guilds.

Providing evidence for moderation

Only original work should be submitted to the moderator. Centres should refer to the JCQ Instructions for Conducting Controlled Assessments.

When video evidence is submitted a transcript should also be present as this further authenticates the work. The transcript is an essential method of identifying candidates and checking how the assessment criteria were met.

If units of work have been combined this evidence must show in **each** unit.

Care should be taken to ensure that work shows the candidate name and number along with the centre number when being sent to either the moderator or City & Guilds. The assignment brief should be provided for selected all units for moderation.

Candidate Record Forms (CRF) should accompany all candidate evidence submitted. Important details should include signatures, marks and candidate enrolment numbers. It is also advisable that through future moderation that all centres include within their sample moderation controlled assessment briefs for both sampled and non-sampled units. Assessor's should also take care to ensure that the marks on CRFs should correspond to the marking grids and submission forms. Additionally, it is

important that centres ensure that CRF marks are correctly totalled for all candidates and that centre assessment sampled signatures include all assessors sample signatures.

It should be noted that the submission of work is often just a sample. However, a request for the work of the full cohort may be needed if problems arise during moderation. Therefore, all work should be ready and available during the moderation period (April / May).

Assessed work should be kept securely in the centre and available to the moderator throughout the whole moderation period. **This work should stay in the centre until 31 October of the submission year.** Marks should not be submitted if work is not assessed, standardised and ready for sampling.

The use of marking grids provided by City & Guilds

The assessment criteria provided in the specification require a candidate's assignment to be assessed using a 'best-fit' approach. This can be difficult when a candidate has performed well in one area and less well in several others, or vice versa. City & Guilds has created a set of marking grids which interpret the assessment criteria in such a way that candidates can be given marks in a more structured way.

Assessment grids assist the moderation process and allow for assessors to justify how marks have been awarded and it is recommended that this is done so that both internal and external moderation can take place effectively. When justification comments are not produced by the assessor, it can be difficult for the moderator to validate the marks awarded. Annotations on the candidates' work with unit criteria sign posting are often valuable to determine awarded marks. This is useful as comments can be too generic to obtain a description of why marks have been awarded. Advice from the moderator should be sought if in any doubt about this process.

The submission of witness testimonies, consultation sheets and candidate reviews

Each unit has an assessment guidance page which sets out the requirements of the task setting, duration and demand. Careful consideration of the 'forms of evidence' should be taken as some omissions (for example, student reviews of their practical work; witness testimonies) may delay appropriate awarding of grades. Additionally, photographic evidence for the 'practical outcomes' should always be included to ensure candidates work can be validated.

Centres can produce a range of diverse evidence such as witness testimonies to show how the candidates had responded to the criteria. It is recommended that witness testimonies are written by a specialist observer eg the assessor, since they have the expertise to make a judgment as to the sufficiency of the performance. Centres are recommended to avoid repeating the assessment criteria which can create an insufficient description of what was carried out.

Additional note

It is recommended that only evidence generated in the controlled time should be presented for moderation. Class notes, activities from employer visits, price lists, promotional leaflets from manufacturers and centre documents that have not been completed should not be included.

Formative assessments are not a requirement of this specification and although seen as good practice in some instances, proof of this is not needed. Where formative assessments are used, evidence of these does not need to be sent to the moderator.

To ensure fairness and equity to all, care should be taken to ensure that assignment timings are adhered to and that additional class work is not submitted as assessed material. A list of the controlled assessment timings are as follows:

- Unit 2 – 15 hours
- Unit 3 – 10 hours
- Unit 4 – 7 hours
- Unit 5 – 5 hours
- Unit 6 – 3 hours
- Unit 7 – 15 hours
- Unit 8 – 5 hours

2 Units

Summary of units

Unit	Title
1	The engineered world (dated entry question paper)
2	Engineering design
3	Engineering applications of computers
4	Producing engineering solutions
5	Construct electronic and electrical systems
6	Manufacturing engineering
7	Maintenance
8	Innovation, enterprise and technological advance

Introduction

This is the third year City & Guilds have offered Principal Learning. There are a range of resources available, including past papers, Principal Examiners and Principal Moderator reports.

A number of candidates did not attempt some of the questions. It is important to ensure candidates are prepared for the type and structure of questions used and are familiar with the variety of command verbs that may be used within a question paper.

It is worth noting that the sections on industry sectors, and their recognition, was much better answered by this year's cohort of learners. The Principal Examiner would like to complement the centres for heeding last year's advice given in his report.

Question 1

The following questions are about how you worked as part of a team.

State your role in the team.

Give the reason you were given that role.

A substantial majority of the candidates scored full marks here. Many of the cohort knew their role and what their input into the team was. Some answers lacked significant detail on their role for full marks.

Question 2

Successful team members provide support and feedback to others in the group.

Describe three ways of providing support and feedback to others.

Some detail was missing here – particularly on communication between group members. There were some candidates who showed a good understanding of team-work and its benefits.

Question 3

Name two materials, other than wood, used to make the hull of modern speed boats.

Aluminium was often offered as a suitable material by a large number of the candidates. However, aluminium and its alloys don't perform well in marine environments – a point worth bearing in mind for future cohorts of engineering students.

Question 4

This question was based on the construction of speed boat hulls.

One of the best answered of all questions on the entire paper. It is evident that methods of manufacture and processes are being well-taught and students appear to be linking methods and processes to other applications – a very encouraging development.

Question 5

Explain how the development in materials and construction have improved the performance of speed boats.

Many candidates managed to score some good marks here. Many mentioned engineering quantities such as speed, corrosion resistance, toughness, durability and aerodynamics. Good use of engineering terminology that must be emanating from good teaching – a positive outcome of this series.

Question 6

State three ways in which other boat users may benefit from technology developments in modern speed boats.

Some very uneven responses to this section. A more targeted exposure to the application of technology to the general public would help future engineering students to have a better appreciation of this area of the specification.

Question 7

This section refers to sectors that make up the engineering industry, career and training opportunities and employment legislation.

Name the engineering sector that each of the following photographs represents.

A pleasing improvement in the successful responses to this section as gauged against last year's cohort.

Question 8

Describe a product from the Sports Engineering / Waste Management and Water Resources sector of the engineering industry.

Some sound responses here showing good exposure to this area of the specification.

Question 9, part (a)

Describe a service from the Medical and Sports Technologies sector of the engineering industry.

A significant number of learners identified paramedics and the ambulance service as suitable services. These are **not** services provided via the engineering industry.

Question 9, part (b)

Describe a service from the Waste management and Water Resources sector of the engineering industry.

A well-answer section overall.

Question 10

There are three main groups of engineering jobs: professional, technical and operative.

State which group each of the following jobs belongs to.

A well-answered question – another encouraging feature of this examination. The vast majority of candidates registered a score indicating good teaching had taken place. Many of the learners understood the different groups to which a selection of workers were attached to.

Question 11

Give one example of a job title in the Vehicle systems and Transport infrastructure sector.

Identify the training required for this role.

Some uneven responses to this question. Strong answers linked the two parts of the question well. However, some candidates were unable link the job title and training requirements for the worker to be successful in specified role.

Question 12

Complete the following flow chart, which shows the career path to becoming a professional engineer.

A generally well-answer question. Some good responses and understanding were in evidence through the answers given.

Question 13

This question refers to the engineering professional bodies; who they are and how they support their members.

Another variable set of responses to this section regarding the engineering professional bodies. The responses illustrated a lack of knowledge about the various engineering institutions (IMechE., IoP., IET., etc).

Question 14

State two things that employers are required to do by law to protect their workers in a dusty environment.

There were some very well-measured and constructed responses to this area of the specification. The learners appear to have a sound grasp of health and safety in the engineering industries.

Question 15

Employees have rights and responsibilities when they are at work.

State one right to personal protection and one responsibility when working in dusty conditions.

A very encouraging set of responses to this question. A significant proportion of this cohort answered with clarity and confidence that displayed good knowledge of this area.

The small cohort of candidates attempting this unit limits the conclusions that may be drawn from the data.

Candidates' work contained a range of design concepts ranging from a desk lamp to a pedal cycle holder for a global positioning unit (GPS).

The centre that required candidates to design a desk lamp provided useful teacher annotations to highlight critical stages of candidates' design concepts, which was particularly helpful to confirm the standards of work and assist the moderation process.

Candidates produced a range of drawings outlining their design against the product specification and presented final design solutions to current engineering drawing conventions. Higher scoring candidates included a **written evaluation** of the effectiveness of the design solution.

The administration of the moderation ran smoothly for examiners and candidates. Centres conducted, marked and forwarded assessment tasks well before the set May 31st deadline to support external moderation and this assisted the moderation progress.

It is clear that the centres have prepared the candidates appropriately to meet the challenges of the unit specification and supported the candidates to achieve a level appropriate to their abilities.

It greatly helps the external moderation process when the centres include **assessment grids** that show how the marks have been awarded during centre moderation and is recommended as good practice for future assessments.

Unit 3

Engineering applications of computers

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

Successful candidates produced a presentation which recorded the processes used and the testing, results and decisions made by candidates. Marks were awarded for a written summary of the use of computers in engineering contexts.

It is clear that centres have prepared the candidates well to meet the challenges of the unit specification and supported the candidates to achieve at a level appropriate to their abilities. Support for centre moderated awards can be with witness testimonies from the centres – as explained in the guidance notes.

Internal marking is helped where centres **directly reference** the award of marks against the assessment criteria. This is recommended as good practice. The external moderation process is also facilitated when centres include assessment grids that indicate how the marks have been awarded during centre moderation.

Unit 4

Producing engineering solutions

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

Controlled assessment tasks include the production of a dry cell AA battery tester and for one centre a desk lamp. This served as a good example where a single project, with good planning, can be used to provide valuable evidence across multiple units. All centres directed candidates to include in their submission a production plan, indicating time allocation, identifying materials, components and equipment. The majority of candidates responded well to their set tasks and provided responses and reasons for their selection.

Centres prepared their candidates satisfactorily and the vast majority responded produced work of a good standard that met the requirements outlined in the specifications. Most marking is referenced to the assessment grid and supports external moderation. Assessment evidence included a range of photographic evidence to support marks awarded, which rightly include a range of **candidate comments** to confirm the specific progress and achievements of individual candidates.

Consistency of centre based content and reliability of the moderation process has been greatly helped by the dedicated teams in the centres. The administration of the moderation ran smoothly for examiners and candidates.

It is clear that the centres have prepared the candidates to a high standard to meet the challenges of this unit specification and supported the candidates to achieve their full potential.

Unit 5

Construct electronic and electrical systems

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

It is clear that the centres have prepared the candidates well to meet the challenges of the unit specification and they have supported the candidates to achieve at a level appropriate to their abilities.

Candidates are required to plan for the construction of an electronic circuit and provide an appropriate circuit diagram, along with an explanation of circuit and component functions. This includes for higher scoring candidates mathematical calculations of component values to ensure the correct functioning of their electronic circuit.

Moderated assessment tasks are designed well to ensure candidates of all learners achieve their full potential. This year there were a good range of qualitative evidence to support the awarding of high marks for the planning, construction and testing of electronic circuits. However, it is advisable that assessments should **include records of testing and fault-finding**, that include aspects of health and safety to maximise the attainment of marks across all band criteria.

The moderation process was greatly helped by those centres that indicated how they have awarded marks with reference to the assessment grid.

Unit 6

Manufacturing engineering

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

It is clear that the centres have prepared the candidates adequately to meet the challenges of the unit specification and supported the candidates to achieve at a level appropriate to their abilities.

The specification for this unit requires that the candidate produces a production plan identifying manufacturing processes, equipment, materials, components, which they then manufacture, whilst applying high levels health and safety management and control measures.

The production of manufactured components, as the assessment criteria details, awards the majority of marks for this unit. As such, centres are advised that the **inclusion of evidence to support manufacturing processes** is highly recommended to award marks and support the moderation process. For example, this may include **written testimonials** or Assessor Record Sheets to confirm the achievement of manufacturing processes against task specifications and tolerances.

Centres that encouraged candidates to record how production was divided in teams and provide written descriptions of the challenges the team faced and how they overcame these, were able to evidence and achieve the higher scoring mark band criteria. The use of people resources and the possible use of automated processes was also included by the more successful candidates.

Unit 7

Maintenance

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

It is particularly pleasing to note that this unit involved a range of engineering companies that greatly enriched and supported the vocational learning of candidates. This ranged from a large national Oil Pump manufacturer to a large Thermodynamic Boiler and Piping company.

Candidates that achieved higher marks were guided by centres to include in their submissions a **maintenance schedule** for one system or an item of equipment and evidence of the identification of faults through the process of a maintenance service schedule.

Higher scoring candidates demonstrated a thorough knowledge of service procedures for their task and completed their **maintenance record sheets** fully and accurately. The centres that made use of **external engineering employers** to service hydraulic oil pumps and thermodynamic system is an example of best practice, where learning is related to real work scenarios.

The centres that encouraged candidates to include an evaluation of the overall effectiveness of the maintenance service, along with the precautions and procedures specified, was particularly pleasing as it replicates closely the expectations of industry for maintenance inspections and servicing.

Completed maintenance service schedules, evidenced well and supported the awarding of individual candidate marks and provides additional evidence to support and provide confidence of awarded marks through external moderation.

Unit 8

Innovation, enterprise and technological advance

The small cohort of candidates attempting this unit limits the conclusions that may be drawn.

Assessment tasks clearly enthused the vast majority of candidates, which is evident through the diverse, detailed and comprehensive work they produced. This task enabled candidates of all abilities to achieve at a level appropriate to their abilities.

Higher scoring candidates produced very detailed reports describing the influences of innovation, enterprise and technological advance on a selected product that included a research plan, research findings and an **evaluation** of the impact and effectiveness of the innovation on mobile phone technologies.

It is pleasing to see the range of high quality work produced by the more successful candidates and in particular the development of design ideas, which are augmented through to a wide range of final design project presentations.

The moderation process supports the range of awarded marks. However, it is advisable that the award of marks are indicated by teachers against assessment criteria bands to support future external moderation, as is the case for all internally assessed units.

Useful contacts

UK learners General qualification information	T: +44 (0)844 543 0033 E: learnersupport@cityandguilds.com
International learners General qualification information	T: +44 (0)844 543 0033 F: +44 (0)20 7294 2413 E: intcg@cityandguilds.com
Centres Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com
Single subject qualifications Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 F: +44 (0)20 7294 2404 (BB forms) E: singlesubjects@cityandguilds.com
International awards Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: intops@cityandguilds.com
Walled Garden Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413 E: walledgarden@cityandguilds.com
Employer Employer solutions, Mapping, Accreditation, Development Skills, Consultancy	T: +44 (0)121 503 8993 E: business@cityandguilds.com
Publications Logbooks, Centre documents, Forms, Free literature	T: +44 (0)844 543 0000 F: +44 (0)20 7294 2413

Every effort has been made to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement and the right is reserved to change products and services from time to time. City & Guilds cannot accept liability for loss or damage arising from the use of information in this publication.

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email:
feedbackandcomplaints@cityandguilds.com

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. We offer over 500 qualifications across 28 industries through 8500 centres worldwide and award around two million certificates every year. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Licence to Practice (land-based qualifications), the Centre for Skills Development (CSD works to improve the policy and practice of vocational education and training worldwide) and Learning Assistant (an online e-portfolio).

Copyright

The content of this document is, unless otherwise indicated, © The City and Guilds of London Institute and may not be copied, reproduced or distributed without prior written consent. However, approved City & Guilds centres and candidates studying for City & Guilds qualifications may photocopy this document free of charge and/or include a PDF version of it on centre intranets on the following conditions:

- centre staff may copy the material only for the purpose of teaching candidates working towards a City & Guilds qualification, or for internal administration purposes
- candidates may copy the material only for their own use when working towards a City & Guilds qualification

The *Standard Copying Conditions* (see the City & Guilds website) also apply.

Please note: National Occupational Standards are not © The City and Guilds of London Institute. Please check the conditions upon which they may be copied with the relevant Sector Skills Council.

Published by City & Guilds, a registered charity established to promote education and training

City & Guilds

1 Giltspur Street

London EC1A 9DD

T +44 (0)844 543 0000

F +44 (0)20 7294 2413

www.cityandguilds.com