

Level 3 Advanced Technical Extended Diploma in Agriculture (720) (Farm mechanisation) (0171- 008/0171-508)

Part of 0171-32

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Guide to the examination

Who is this document for?

This document has been produced for centres who offer **City & Guilds Level 3 Advanced Technical Extended Diploma in Agriculture (720) (Farm mechanisation)**. It gives all of the essential details of the qualification's external assessment (exam) arrangements and has been produced to support the preparation of candidates to take the exam/s.

The document comprises four sections:

1. **Details of the exam.** This section gives details of the structure, length and timing of the exam.
2. **Content assessed by the exam.** This section gives a summary of the content that will be covered in each exam and information of how marks are allocated to the content.
3. **Guidance.** This section gives guidance on the language of the exam, the types of questions included and examples of these, and links to further resources to support teaching and exam preparation.
4. **Further information.** This section lists other sources of information about this qualification and City & Guilds Technical Qualifications.

1. Details of the exam

External assessment

City & Guilds Technical qualifications have been developed to meet national policy changes designed to raise the rigour and robustness of vocational qualifications. These changes are being made to ensure our qualifications can meet the needs of employers and Higher Education. One of these changes is for the qualifications to have an increased emphasis on external assessment. This is why you will see an external exam in each of our Technical qualifications.

An external assessment is an assessment that is set and/or marked by the awarding organisation (ie externally). All City and Guilds Technical qualifications include an externally set and marked exam. This must be taken at the same time by all candidates who are registered on a particular qualification. We produce an exam timetable each year. This specifies the date and time of the exam so you can plan your delivery, revision and room bookings/PC allocation in plenty of time.

The purpose of this exam is to provide assurance that all candidates achieving the qualification have gained sufficient knowledge and understanding from their programme of study and that they can independently recall and draw their knowledge and understanding together in an integrated way. Whilst this may not be new to you, it is essential that your learners are well prepared and that they have time to revise, reflect and prepare for these exams. We have produced a Teaching, Learning, and Assessment guide that is you should refer to alongside the present document ([Teaching, Learning and Assessment Guide](#)). If a learner does not pass the exam at their first attempt, there is only one opportunity to resit the exam, so preparation is essential.

Exam requirements of this qualification

- **Level 3 Agriculture** – Theory exam (2) (2 hours).

The exam is graded and a candidate must achieve at least a Pass grade in order to be awarded the qualification. (In addition to the exam, a synoptic assignment must also be completed and passed). You can find full details of the synoptic assignment in the *Qualification Handbook* and the *Synoptic Assessment Guide* – please see the link to the qualification page at the end of this document.

When does the exam take place?

The exam is offered on two fixed dates in March or June. The exact dates will be published at the start of the academic year in the *Assessments and Exam Timetable* <http://www.cityandguilds.com/delivering-our-qualifications/exams-and-admin>.

At the start of the programme of study, in order to effectively plan teaching and exam preparation, centres should know when the exam will be taking place and allocate teaching time accordingly. Section 2 of this document gives a summary of the content that needs to be covered in order to prepare learners for the exam and full details of this are given in the *Qualification Handbook*. learners for the exam and full details of this are given in the *Qualification Handbook*.

Form of exam

The exam for this qualification can be taken either on paper (0171-508) or online (0171-008).

Can candidates resit the exam?

Candidates may resit the exam once only. If a candidate fails the exam both on the first attempt and when resitting it, that candidate has failed the qualification and cannot achieve it in that academic year.

How the exam is structured

Each exam has a total of 60 marks available and is made up of:

- Approximately 10-12 short answer questions;
- 1 extended response question.

Multiple choice and short answer questions are used to confirm **breadth of knowledge and understanding**.

The extended response question is to allow candidates to demonstrate **higher level and integrated understanding** through written discussion, analysis and evaluation. This question also ensures the exam can differentiate between those learners who are 'just able' and those who are higher achieving.

More details about and examples of question types are given in Section 3 of this document.

Assessment Objectives

The exams are based on the following set of assessment objectives (AOs). These are designed to allow the candidate's responses to be assessed across the following three categories of performance:

- **Recollection** of knowledge.
- **Understanding** of concepts, theories and processes.
- **Integrated application** of knowledge and understanding.

In full, the assessment objectives covered by the exam for this qualification are:

Assessment objective	Mark allocation (approx %)
<i>The candidate..</i>	
AO1 Recalls knowledge from across the breadth of the qualification	38%
AO2 Demonstrates understanding of concepts, theories and processes from a range of learning outcomes.	42%
AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes.	20%

Booking and taking the exam

All assessments for City & Guilds Technical Exams must be booked through Walled Garden. There is a deadline for booking exams, synoptic assessments and any other centre marked assessments, please refer to the time line to check these dates.

The exam must be taken under the supervision of an invigilator who is responsible for ensuring that it is conducted under controlled conditions. Full details of the conditions under which the exam must be taken can be found in the Joint Council for Qualifications (JCQ) document, [Instructions for Conducting Examinations \(ICE\)](#).

Special consideration

Candidates who are unable to sit the exam owing to temporary injury, illness or other indisposition at the scheduled time may qualify for special consideration. This is a post-examination adjustment that can, in certain circumstances, be made to a candidate's final grade. The Joint Council for Qualifications' guide to the special consideration process can be found at www.jcq.org.uk.

To make a request for special consideration, please contact: policy@cityandguilds.com

Access arrangements

Access arrangements are arrangements that allow candidates with particular requirements, disabilities or temporary illness to take assessments, where appropriate, using their normal way of working. The Joint Council for Qualifications document, *Access Arrangements and Reasonable Adjustments* gives full details and can be downloaded [here](#).

For further information and to apply for access arrangements please see:

[Access arrangements - When and how applications need to be made to City & Guilds](#)
[Applying for access arrangements on the Walled Garden](#)

2. Content assessed by the exam

Farm mechanisation (720)

The exam assesses:

- **Unit 310: Land Based Power Units**
- **Unit 326: Spreader And Sprayers**
- **Unit 335: All-Terrain Vehicles and Rough Terrain Telescopic Forklifts**

Each exam assesses a sample of the content of these units. This means that a single exam will **not** cover 100% of the unit content. The full range of content will be assessed over a number of examination series. Details of the coverage of a particular exam paper will **not** be released in advance of the exam itself. Centres should **not** make assumptions about what will be assessed by a particular exam based on what has been covered on previous occasions. In order to be fully prepared for the exam, learners **must** be ready to answer questions on **any** of the content outlined below.

The table below provides an overview of how the qualification's Learning Outcomes are covered by each exam and the number of **marks** available per Learning Outcome (ie **not** the number of *questions* per Learning Outcome). In preparing candidates for the exam, we recommend that centres take note of the number of marks allocated to Learning Outcomes and to assign teaching and preparation time accordingly.

In preparing candidates for the exam, centres should refer to the Qualification Handbook which gives full details of each Learning Outcome.

The following is a summary of only that qualification content which is assessed by the exam and **not** a summary of the full content of the qualification.

Unit	Learning outcome	Topics	Number of marks
310 Landbased Power units	LO1 Know the function of key components found	1.1 Purpose and function of key components 1.2 Operator adjustments 1.3 Control systems	16
	LO2 Know operating principles of land-based machines and power units	2.1 Power unit 2.2 Transmission system 2.3 Electrical and hydraulic systems	

	LO3 Understand the applications of land-based machines and power units	3.1 Risk assessment 3.2 Routine maintenance 3.3 Recording documents	
	LO4 Understand the applications of land-based machines and power units	4.1 Characteristics of power units, transmissions and hydraulic systems 4.2 Operating settings 4.3 Alternative designs	
326 Spreaders and Sprayers	LO1 Know machinery used for the application of pesticides and fertilisers to agricultural crops	1.1 The operation of spraying machinery 1.2 The operation of spreading machiner	16
	LO2 Prepare, operate and maintain spraying and spreading machinery	2.1 Machinery preparation 2.2 Machinery operation 2.3 Machinery maintenance	
	LO3 Know factors affecting efficiency and accuracy of pesticide and fertiliser placement	3.1 Variables affecting the efficiency and accuracy of pesticide and fertiliser placement 3.2 Impacts of changing variables on efficiency and accuracy of pesticide and fertiliser placement	
	LO4 Understand the impact of developments in application technology on operator safety and environmental protection standards	4.1 Impacts of developments in application technology on operator safety 4.2 Impacts of developments in application technology on environmental protection standards 4.3 Legislation relevant to the application of pesticides and fertilisers	
	LO1 Know the function of key components found within All-	1.1 Purpose of key components used in ATVs	16

335 All-Terrain Vehicles and Rough Terrain Telescopic Forklifts	Terrain Vehicles and Rough Terrain Telescopic Forklifts	1.2 Purpose of key components used in RTFLs 1.3 Operator adjustments and inputs on key components used in ATVs 1.4 Operator adjustments and inputs on key components used in RTFLs	
	LO2 Understand the operating principles and applications of All-Terrain Vehicles and Rough Terrain Telescopic Forklifts	2.1 Operating principles and features of different power units 2.2 Operating principles and features of transmission systems 2.3 Operating principles of engineering	
	LO3 Prepare and operate All-Terrain Vehicles and Rough Terrain Telescopic Forklifts with associated attachments	3.1 Preparation of ATVs 3.2 Preparation of RTFL 3.3 Operation of ATVs 3.4 Operation of RTFL	
	LO4 Maintain and service All-Terrain Vehicles and Rough Terrain Telescopic Forklifts	4.1 Routine maintenance on ATVs 4.2 Routine maintenance on RTFLs	
		Total marks for sections:	48 marks
		Integration across units*:	12 marks
		Total marks for exam:	60 Marks

* *Integration across units.* These marks relate to Assessment Objective 4). These marks are awarded to differentiate between levels of performance by candidates taking the exam. The marks are given for how well a candidate has applied their knowledge, understanding and skills from across the units that make up the qualification in an integrated way to meet the requirements of the exam questions.

3. Guidance

Vocabulary of the exam: use of 'command' verbs

The exam questions are written using 'command' verbs. These are used to communicate to the candidate the type of answer required. Candidates should be familiarised with these as part of their exam preparation.

The following guidance has been produced on the main command verbs used in City & Guilds Technicals exams.

A more detailed version of this table, which also includes the command verbs used in the assignments is published in *City & Guilds Technical Qualifications Teaching, Learning and Assessment* guide.

Command verb	Explanation and guidance
Analyse	Study or examine a complex issue, subject, event, etc in detail to explain and interpret, elements, causes, characteristics etc
Calculate	Work out the answer to a problem using mathematical operations
Compare (...and contrast) (or describe the similarities/differences)	Consider and describe the similarities (and differences) between two or more features, systems, ideas, etc
Define	Give the meaning of, technical vocabulary, terms, etc.
Describe	Give a detailed written account of a system, feature, etc (..the effect of...on...) the impact, change that has resulted from a cause, event, etc (..the process..) give the steps, stages, etc
Differentiate between	Establish and relate the characteristic differences between two or more things, concepts, etc
Discuss	Talk/write about a topic in detail, considering the different issues, ideas, opinions related to it
Distinguish between	Recognise and describe the characteristic differences between two things, or make one thing seem different from another
Evaluate	Analyse and describe the success, quality, benefits, value, etc (of an end product, outcome, etc)
Explain	Make (a situation, idea, process, etc) clear or easier to understand by giving details, (..how..) Give the stages or steps, etc in a process, including relationships, connections, etc between these and causes and effects.

Give example(s) illustrate/	Use examples or images to support, clarify or demonstrate, an explanation, argument, theory, etc
Give a rationale	Provide a reason/reasons/basis for actions, decisions, beliefs, etc
Identify	Recognise a feature, usually from a document, image, etc and state what it is
Justify	Give reasons for, make a case for, account for, etc decisions, actions, conclusions, etc, in order to demonstrate why they suitable for or correct or meet the particular circumstances, context
Label	Add names or descriptions, indicating their positions, on an image, drawing, diagram, etc
List	Give as many answers, examples, etc as the question indicates (candidates are not required to write in full sentences)
Name	Give the (technical) name of something
Propose	Present a plan, strategy, etc (for consideration, discussion, acceptance, action, etc).
Select	choose the best, most suitable, etc, by making careful decisions
State	Give the answer, clearly and definitely
Summarise	Give a brief statement of the main points (of something)

Question types

The following explains, and gives examples of, types of questions used in City & Guilds Technical exams. In preparing candidates to take the exam, it is recommended that you familiarise them with the requirements of each question type so that they can be effective and make best use of the time available when sitting the exam.

- An effective candidate will gauge the type and length of response required from the question and the number of marks available (which is given for each question on the exam paper).
- Short answer questions may not require candidates to write in complete sentences. Extended response questions will require a more developed response.
- Candidates should read the exam paper before attempting to answer the questions and should allocate time proportionate to the number of marks available for each question or section.

Question type:

Short answer questions (restricted response)

These are questions which require candidates to give a brief and concise written response. The number of marks available will correspond to the

Example question:

State **two** advantages of continuously variable transmission (CVT) over mechanical transmission when used on a tractor. (2 marks)

Answer:

number of pieces of information/examples and the length of response required by the question.

1 mark for each advantage stated, up to 2 marks

- Allows the forward speed of the tractor to be adjusted independently of the engine speed
- Smoother operation
- No need to change gear
- Reduced forward-reverse shuttle times
- Any other relevant answer

Structured Response Questions

These are questions that have more than one part (eg a), b), etc.). The overall question is made up of linked, short answer questions which move the candidate through the topic in a structured way. For example, the question will usually start with a 'recall'/'state'/'describe' question followed by an 'explain' to draw out understanding of the topic. They usually have a shared introductory 'stem', and the number of marks may increase through the question.

a) What would be the effect of a thermostat on a liquid cooling system, being stuck in the closed position? (1 mark)

b) Explain the reason for using a pressurised radiator cap in a liquid cooling system. (2 marks)

Answer:

a) 1 mark for: The engine would overheat

b) Up to 2 marks for the reason

It increases the boiling point of the water (1) allowing the engine to run at a higher temperature (1) or prevents water loss from evaporation (1)

Accept any other suitable answer

Extended response questions

Extended response questions are those that require the candidate to write a longer written response using sentences and paragraphs. These usually require candidates to discuss, explain, etc. a topic in some detail. The question is often based on a short case study, scenario or other prompt. The level of detail should be gauged from the question and the number of marks available.

You are about to hitch and set up a mounted sprayer for the first time. The tractor will be driven to a field but there are no public roads involved.

Discuss the checks and procedures that need to be followed, to ensure safe hitching and setting up for accurate operation before going to the field. (12 marks)

Indicative content

Hitching

- Carry out a risk assessment or follow any risk assessment already produced for the task
- Wear correct PPE - overalls, gloves and steel toe cap boots
- Get training on the new machine if necessary (all operators must have a FEPA certificate of competence)

- Check Power take off is the correct length before fitting
- When hitching, make sure no one stands or reaches between the tractor and machine
- Check tractor is matched to machine, power, weight, lifting capacity, correct number of spool valves, correct PTO shaft fitted
- Check all guards are in place on tractor and machine
- Turn off engine before connecting PTO shaft.

Setting up

- Use operator's manual to help set up the machine correctly
- Check hydraulics are in position control
- Set maximum height to prevent sprayer from hitting cab
- Tighten check chains/bars to prevent sideways movement
- Check tyre pressures are correct on tractor
- Add front end weights to tractor if necessary
- Set sprayer level using top link and levelling box
- Check free movement of machine
- Read pesticide label for correct dilution rate and spray quality
- Check correct size nozzles are fitted and not worn or blocked
- Calibrate machine to give correct output for a given speed
- Ensure any dilute pesticide is collected and disposed of safely
- Fit carbon filter to tractor if available
- Check boom moves freely up and down

Band 1 (1-4 marks)

Limited discussion of the checks and procedures that need to be followed. There will be limited examples of hitching on and setting up to ensure safe and accurate operation. Answer may be disorganised and ambiguous. Little or no use of specialist terms.

Example answer

You need to check the tyre pressures, oil and water on the tractor and then drive it up to the machine. Hook it onto the three-point linkage and attach the PTO which is what makes the machine work. Make sure the tractor is switched off when out working with the PTO shaft and when you are spraying you must use the right PPE. All of the instructions for mixing the chemical are on the spray leaflet.

Once it is mounted on the tractor you should double check the tyre pressures are ok for when it is filled up with water. It might need further weights on the front as well. The next stage is to calibrate the sprayer and check the nozzles are working OK. Once you are happy with setting up you drive to the spray safe and put the chemical in and then drive to the field. Make sure the booms are at the correct height.

This is repeated until the field is finished. The sprayer should be washed out afterwards

Band 2 (5-8 marks)

Adequate discussion of the checks and procedures that need to be followed. There will be adequate examples of hitching on and setting up to ensure safe and accurate operation. There will be some use of specialist terms, although they may not always be used appropriately. The information is presented mostly in a structured format.

Example answer

The operator should make sure they have read and understood the relevant Risk Assessment. If not available, then the operator should write out a Risk assessment before carrying out the activity. Once they are sure they know what they are doing the tractor should have the oil, water, tyre pressures and weights checked so that it does not tip over backwards and can carry the weight. All guards should be in place.

Drive the tractor up to the sprayer and reverse up in line with the sprayer. Stop just short of the machine and get out. Check that the machine is safely mounted on a stand and will not fall on you or the tractor when you get closer. Check the tractor is lined up ok, that the check chains on lift arms are loosened off so arms fit around lower

mounting pins. Also check that ground is clear of obstructions, level and firm so that you do not trip, and the tractor does not go out of line as you drive closer.

The operator will need a FEPA Certificate so that the manager and everyone else knows he/she can do the job properly. Reverse the tractor up to the implement until the lower link arms are in line with the mounting pins. From the cab raise arms until left link arm is lined up and then adjust the right arm to match. Switch off and unmount. Connect the three-point linkage (left, right and top) followed by PTO shaft. Once the machine is mounted on the tractor tighten check chains, adjust link arms (levelling box) and top link to ensure machine is level and that there is free movement of the implement up and down. The correct height for the crop should be set on the tractor hydraulics.

The operator should make sure they have the correct PPE on and then they can calibrate the machine by measuring the water and speed. Once that is set the sprayer can be filled up and spray added at the correct dilution rate according to the leaflet.

When spraying is finished the sprayer should be washed out and any unused chemical disposed of properly. The sprayer can then be put away.

Band 3 (9-12 marks)

Detailed discussion of the checks and procedures that need to be followed. There will be detailed examples of hitching on and setting up to ensure safe and accurate operation. Specialist terms will be used correctly and appropriately. Information will be presented in a structured format and logical order.

Example answer

The operator should make sure they have read and understood the relevant Risk Assessment which should be available. If not available, then the operator has the responsibility to conduct a Risk assessment before carrying out the activity. In any event and to be safe it is wise to stop and consider what is about to be carried out to make sure it is done safely. Key points are ensuring the

tractor is turned off whenever you are out of the cab and that you have the key with you. If you have anyone to help you, make sure the tractor engine is turned off when they approach the machine to connect or work on any part. Make sure any assistant does not stand between the tractor and the implement whilst you are operating the tractor. You should be wearing appropriate clothing for spraying and working with the machine so overalls and steel toe capped boots for general maintenance plus PPE for spraying operations.

The operator should also have received appropriate training and for spraying should hold a current and correct Certificate of Competence (FEPA PA1 and PA2 in this case). Additionally, the operator should ensure they are familiar with the equipment they are using. As it is a first-time operation with that machine the farm should have provided familiarisation or an opportunity to go on a training course for that machine with the manufacture or they could have received training at College. This is essential, so the operator has the correct match of equipment with correct front weights, tractor lifting capacity, sufficient spool valves to operate the machine, correct tyre pressures, and carbon filter in cab. Operators manual should be consulted as necessary. Additionally, the pesticides label should be available and would need to be read for later on.

After completing the pre-start checks (oil, water, tyre pressures, wheel nuts and weights) drive the tractor up to the sprayer and reverse up in line with the sprayer. Stop just short of the machine and get out. Check that the machine is safely mounted on a stand and will not fall on you or the tractor when you get closer. Check the tractor is lined up ok, that the hydraulics are in 'position' control, check chains on lift arms are loosened off so arms fit around lower mounting pins. Also check that ground is clear of obstructions, level and firm so that you do not trip, and the tractor does not go out of line as you drive closer.

Slowly reverse the tractor up to the implement until the lower link arms are in line with the mounting pins. From the cab raise arms until left

link arm is lined up and then adjust the right arm to match. Switch off and unmount. Connect the three-point linkage (left, right and top) and make sure the clips are placed to lock arms onto machine. Before attaching the PTO shaft make sure you have the correct shaft with the adequate overlap when the machine is fully raised and does not bottom out when lowered. PTO Guard is essential. If not present, do not use the machine. Clip safety chains (anti spin) of PTO shaft to link arms.

Once the machine is mounted on the tractor tighten check chains, adjust link arms (levelling box) and top link to ensure machine is level and that there is free movement of the implement up and down to ensure it does not collide with the cab. Booms should have free movement and should be set at the correct height on the hydraulics' position control to suit the crop and nozzles being used. Height adjustment may have to be finalised once in the field with the crop before spraying as each field can be different.

Using the correct PPE for the spray being used and before putting chemical into the sprayer the correct nozzles should be fitted tested (measure the amount of water coming out over a set time at PTO revs) and calibrated for a given speed to ensure they are not blocked or worn (look at pattern) using plain water only over a safe area. Once satisfied then the pesticide should be added to the correct dilution rate in the designated area by the 'Spray Safe' and spraying can commence. Note that any unused dilute pesticide should be collected and disposed of safely.

Examination technique

Candidates with a good understanding of the subject being assessed can often lose marks in exams because they lack experience or confidence in exams or awareness of how to maximise the time available to get the most out of the exam. Here is some suggested guidance for areas that could be covered in advance to help learners improve exam performance.

Before the exam

Although candidates cannot plan the answers they will give in advance, exams for Technical qualifications do follow a common structure and format. In advance of taking the exam, candidates should:

- be familiar with the structure of the exam (ie number and type of questions).
- be aware of the amount of time they have in total to complete the exam.
- have a plan, based on the exam start and finish time for how long to spend on each question/section of the exam.
- be aware of how many marks are available for each question, how much they should expect to write for each question and allow most time for those questions which have the most marks available.

At the start of the exam session

At the start of the exam, candidates:

- should carefully read through the instructions before answering any questions.
- may find it helpful, where possible, to mark or highlight key information such as command words and number of marks available on the question paper.
- identify questions which require an extended written answer and those questions where all or part of the question may be answered by giving bullets, lists etc rather than full sentences.

Answering the questions

Candidates do not have to answer exam questions in any particular order. They may find it helpful to consider, for example:

- tackling first those questions which they find easiest. This should help them get into the 'flow' of the exam and help confidence by building up marks quickly and at the start of the exam.
- tackling the extended answer question at an early stage of the exam to make sure they spend sufficient time on it and do not run out of time at the end of the exam.

Candidates should avoid wasting time by repeating the question either in full or in part in their answer.

Candidates should **always** attempt every question, even questions where they may be less confident about the answer they are giving. Candidates should be discouraged however, from spending too long on any answer they are less sure about and providing answers that are longer and give more detail than should be necessary in the hope of picking up marks. This may mean they have less time to answer questions that they are better prepared to answer.

Extended answer questions

Before writing out in full their answer to extended questions, candidates may find it helpful to identify the key requirements of the question and jot down a brief plan or outline of how they will answer it. This will help clarify their thinking and make sure that they don't get 'bogged down' or provide too much detail for one part of the question at the expense of others.

Towards the end of the exam

Candidates should always set aside time at the end of the exam to read back through and review what they have written in order to make sure this is legible, makes sense and answers the question in full.

If a candidate finds they are running out of time to finish an answer towards the end of the exam, they should attempt to complete the answer in abbreviated or note form. Provided the content is clear and relevant, examiners will consider such answers and award marks where merited.

Further guidance on preparing candidates to take the exam is given in the City & Guilds publication, [Technical Qualifications, Teaching, Learning and Assessment](#) which can be downloaded free of charge from City & Guilds website.

4. Further information

For further information to support delivery and exam preparation for this qualification, centres should see:

City & Guilds

Qualification homepage: <http://www.cityandguilds.com/qualifications-and-apprenticeships/land-based-services/agriculture/0171-technical-in-agriculture-and-landbased-engineering#tab=information> which includes:

- Qualification handbook
- Synoptic Assignment
- Sample assessments

Technical Qualifications, Resources and Support: cityandguilds.com/techbac/technical-qualifications/resources-and-support

Joint Council for Qualifications

Instructions for Conducting Examinations: www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations