
Examiners' Report

NEBOSH INTERNATIONAL TECHNICAL CERTIFICATE IN OIL AND GAS OPERATIONAL SAFETY



UNIT IOG1: MANAGEMENT OF INTERNATIONAL OIL AND GAS OPERATIONAL SAFETY

SEPTEMBER 2019

CONTENTS

Introduction	2
General comments	3
Comments on individual questions	4
Examination technique	11
Command words	14

Introduction

NEBOSH (The National Examination Board in Occupational Safety and Health) was formed in 1979 as an independent examining board and awarding body with charitable status. We offer a comprehensive range of globally-recognised, vocationally-related qualifications designed to meet the health, safety, environmental and risk management needs of all places of work in both the private and public sectors.

Courses leading to NEBOSH qualifications attract around 50,000 learners annually and are offered by over 600 Learning Partners, with examinations taken in over 120 countries around the world. Our qualifications are recognised by the relevant professional membership bodies including the Institution of Occupational Safety and Health (IOSH) and the International Institute of Risk and Safety Management (IIRSM).

NEBOSH is an awarding body that applies best practice setting, assessment and marking and applies to Scottish Qualifications Authority (SQA) Accreditation regulatory requirements.

This report provides guidance for learners and Learning Partners for use in preparation for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content and the application of assessment criteria.

© NEBOSH 2019

Any enquiries about this report publication should be addressed to:

NEBOSH
Dominus Way
Meridian Business Park
Leicester
LE19 1QW

tel: 0116 263 4700
fax: 0116 282 4000
email: info@nebosh.org.uk

General comments

Many learners are well prepared for this unit assessment and provide comprehensive and relevant answers in response to the demands of the question paper. This includes the ability to demonstrate understanding of knowledge by applying it to workplace situations.

There are other learners, however, who appear to be unprepared for the unit assessment and who show both a lack of knowledge of the syllabus content and a lack of understanding of how key concepts should be applied to workplace situations.

This report has been prepared to provide feedback on the standard date IOG1 examination sat in September 2019.

Feedback is presented in these key areas: responses to questions, examination technique and command words and is designed to assist learners and Learning Partners prepare for future assessments in this unit.

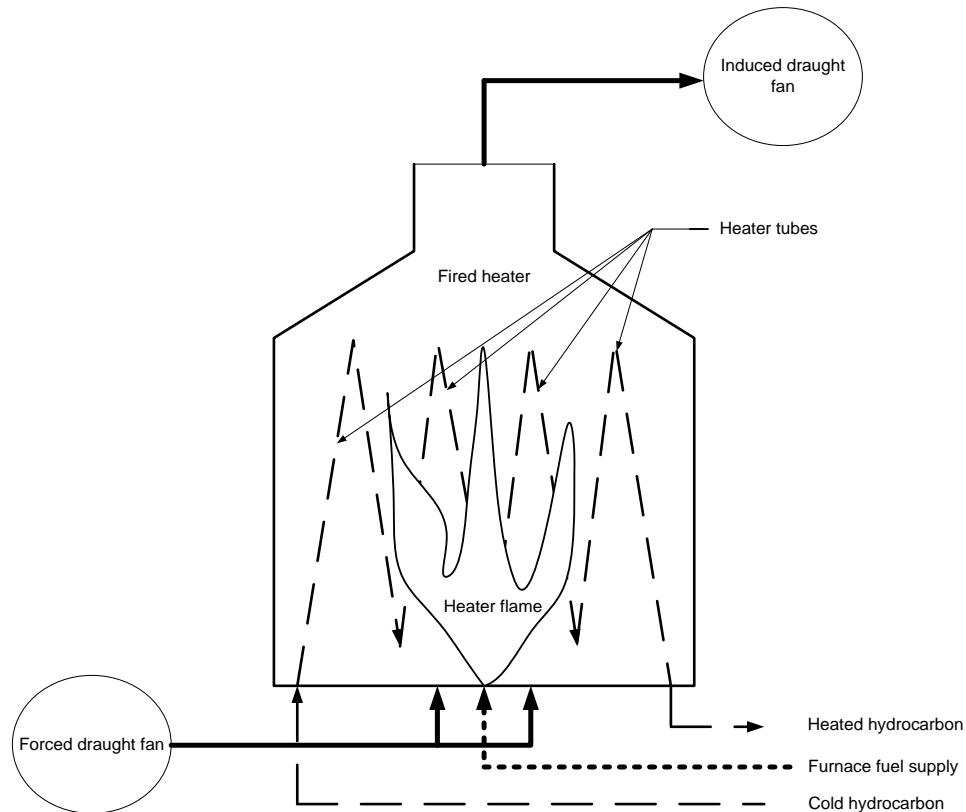
Learners and Learning Partners will also benefit from use of the 'Guide to the NEBOSH International Technical Certificate in Oil and Gas Operational Safety' which is available via the NEBOSH website. In particular, the guide sets out in detail the syllabus content for IOG1 and tutor reference documents for each Element.

Additional guidance on command words is provided in 'Guidance on command words used in learning outcomes and question papers' which is also available via the NEBOSH website.

Unit IOG1

Management of international oil and gas operational safety

Question 1 A fired heater is used to heat a hydrocarbon fluid. A forced draught fan supplies the air that is required for combustion and the induced draught fan extracts the combustion gases. The cold hydrocarbon flows through tubes in the heater and is heated indirectly by the ignited fuel.



With reference to the description and the diagram above:

- (a) **identify** possible causes of low hydrocarbon flow through the heater tubes; (2)
- (b) **outline** the significance of low hydrocarbon flow through the heater tubes; (2)
- (c)
 - (i) **identify** types of sensor that measure heater tube metal temperatures; (2)
 - (ii) **outline** reasons for controlling heater tube metal temperatures within the heater. (4)
- (d) **outline** controls that prevent heater tube failure; (6)
- (e) if the heater shuts down and the fire goes out, **outline** the specific operation that *must* be performed before fuel is re-introduced into the heater **AND identify TWO** risks if this operation does not take place. (4)

This question assessed learners' knowledge and understanding of learning outcome 3.6: Outline the hazards, risks and controls available for operating boilers and furnaces.

Although the written description and associated diagram were provided as signposts, some learners did not acknowledge this and provided responses that were unrelated.

For part (a) some learners correctly identified that low temperature causes low flow, although few linked low temperature with viscosity. Few learners identified internal tube fouling as a cause of low hydrocarbon flow.

In part (b) learners correctly outlined that low flow could result in tube failure, few specified that lower flow rate would affect the cooling effect of internal hydrocarbon flow within the tubes.

For part (c) (i) learners correctly identified thermocouples as a type of sensor, although few mentioned resistance thermometers.

In part (c) (ii) learners revealed limited knowledge of the reasons for tube metal temperature control. Correct answers included temperature control below the melting point of the tubes.

Learners displayed a better understanding of controls that prevent heater failure for part (d), including monitoring and inspection. Few learners responded correctly with automatic fired heater shutdown associated with low internal flow.

For part (e) learners understood the possible explosion risk, but few understood the necessity to purge the heater for a requisite time using the forced draught and induced draught fans.

Question 2

An investigation is to be carried out following an incident at an oil and gas installation. The area has been made safe and casualties have been treated.

- (a) **Outline** reasons for securing the scene of the incident. **(2)**
- (b) **Outline** how investigators should initially manage witnesses. **(2)**
*It is **not** necessary to outline issues associated with interview technique.*
- (c) *Other than* talking to witnesses, **identify** means of gathering information at the scene of the incident. **(4)**

This question assessed learners' knowledge and understanding of learning outcome 1.1: Explain the purpose of and procedures for investigating incidents and how the lessons learnt can be used to improve health and safety in the oil and gas industries.

In part (a) some learners mistakenly focused on the investigation itself instead of the initial security of the incident scene. Correct responses included prevention of unauthorised access.

Despite the specific italicised instruction in part (b) some learners still outlined specific interview techniques. A correct response would have been to carry out interviews as soon as possible after the incident.

In part (c) learners correctly identified photographs and drawings as a means of gathering information.

-
- Question 6**
- (a) **Outline** the concept of ‘as low as reasonably practicable’ (ALARP). (2)
 - (b) **Identify TWO** risk control barrier models extensively used in the oil and gas industry. (2)
 - (c) **Outline** the concept of risk control using barrier models. (4)
-

This question assessed learners’ knowledge and understanding of learning outcome 1.3: Outline the risk management techniques used in the oil and gas industries.

Some learners correctly weighed up risk vs sacrifice in part (a), although few outlined the use of judgement.

In part (b) many learners correctly identified Swiss cheese as a barrier control model used in the oil and gas industry.

With part (c) learners had difficulty in outlining the concept of identifying initiating events and subsequently introducing barriers. Although many learners identified and drew a Swiss cheese barrier model, few expanded on this with clarification that the slices of Swiss cheese were controls preventing a hazardous event.

-
- Question 7**
- (a) **Give** the meaning of the following terms:
 - (i) lower flammable limit (LFL); (2)
 - (ii) upper flammable limit (UFL). (2)
 - (b) Hot work permits involve the use of portable gas detectors to measure flammable gas concentrations.

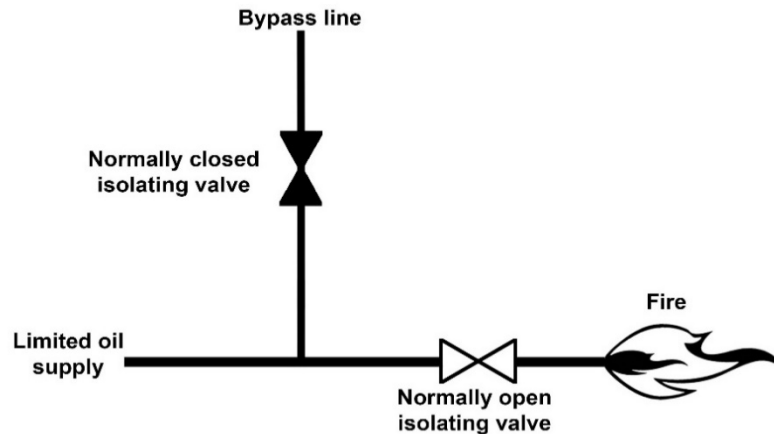
Outline when flammable gas concentrations should be measured for maintenance. (4)
-

This question assessed learners’ knowledge and understanding of learning outcomes 1.2: Explain the hazards inherent in oil and gas arising from the extraction, storage and processing of raw materials and products; and 2.5: Explain the importance of safe plant operation and maintenance of hydrocarbon containing equipment and processes.

In parts (a) (i) and (ii) learners correctly gave definitions of flammable substances in air where in (a) (i) lower flammable limit related to the lowest concentration and (a) (ii) above the upper flammable limit, mixtures are too rich to burn.

In part (b) learners correctly identified measuring flammable gas concentrations immediately before maintenance, although few specified ‘in the event of a gas detector failure’.

-
- Question 8**
- (a) **Identify** components of the fire triangle. (2)
 - (b) **Outline** the significance of the components of the fire triangle. (1)
 - (c) An oil pipeline with a normally open isolating valve is on fire. A bypass line with a normally closed isolating valve exists upstream of the fire.



With reference to the description and diagram above:

- (i) **outline** methods of removing fuel; (2)
- (ii) **identify** suitable types of portable extinguisher. (3)

This question assessed learners' knowledge and understanding of learning outcomes 3.5: Outline the fire hazards, risks and controls relating to hydrocarbons; and 4.1: Outline appropriate control measures to minimise the effects of fire and explosion in the oil and gas industries.

In part (a) learners demonstrated a good understanding of the components of the fire triangle including fuel.

For part (b) learners outlined the significance of the collective need for all the components for a fire to occur.

In part (c) (i) learners were able to determine how to remove the fuel in this scenario.

In part (c) (ii) learners correctly identified suitable extinguishers, but few specified wet chemical or ABF foam.

-
- Question 9**
- (a) **Outline** reasons for preventing corrosion. (4)
 - (b) **Identify** methods that can be used to prevent corrosion. (4)

This question assessed learners' knowledge and understanding of learning outcome 2.5: Explain the importance of safe plant operation and maintenance of hydrocarbon containing equipment and processes.

For part (a) some learners outlined reasons for preventing corrosion including legal requirements and preserving integrity.

In part (b) learners correctly outlined cathodic protection, but few mentioned the metal selected.

-
- Question 10**
- (a) **Give** the meaning of the term '*safe operating envelope*'. (2)
 - (b) **Identify** operating parameters that are part of a safe operating envelope at an oil and gas installation. (4)
 - (c) **Outline** the failure mode '*thermal shock*'. (2)
-

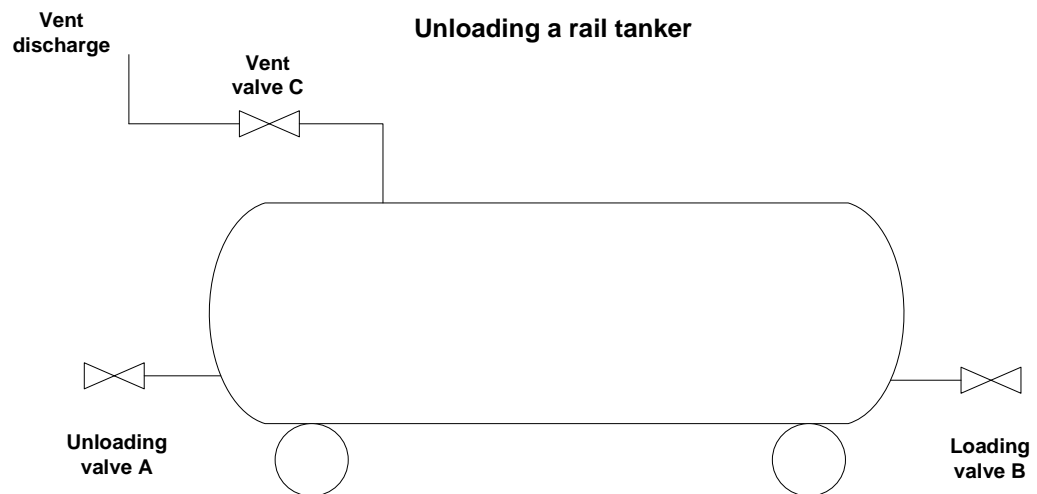
This question assessed learners' knowledge and understanding of learning outcome 3.1: Outline types of failure modes that may lead to loss of containment from hydrocarbons.

Some learners had difficulty in part (a) in giving the meaning of the term '*safe operating envelope*'. Correct answers included outlining upper and lower operating limits.

In part (b) many learners correctly identified operating parameters that form part of a safe operating envelope.

For part (c) some learners identified that temperature change was associated with thermal shock. However, it was necessary to outline that the temperature change was rapid to be awarded a mark.

Question 11 A rail tanker, containing hydrocarbon, is being unloaded as shown in the diagram below.



- (a) (i) **Identify** if valve A should be open or closed during unloading. (1)
- (ii) **Identify** if valve B should be open or closed during unloading. (1)
- (iii) **Identify** if valve C should be open or closed during unloading. (1)
- (b) **Outline** the significance of Vent valve C during unloading. (2)
- (c) **Outline** considerations for the location of any vent discharge when unloading a rail tanker. (3)

This question assessed learners' knowledge and understanding of learning outcomes 3.4: Outline the hazards, risks and controls available for the safe containment of hydrocarbons offshore and onshore; and 5.2: Identify the main hazards of and suitable controls for land transport in the oil and gas industries.

For part (a) most learners were able to identify which position the nominated valves should be in during unloading of the rail tanker.

In part (b) many learners had difficulty and were unable to outline the significance of preventing tanker implosion by opening vent valve C. Some learners incorrectly specified that it releases toxic gases and prevents explosion.

Some learners correctly outlined in part (c) that the vent should be high enough to safely disperse gases away from potential ignition sources.

Examination technique

The following issues are consistently identified as the main areas in need of improvement for learners taking Certificate level qualifications:

Learners misread/misinterpreted the question

Learners misreading or misinterpreting the question is by far the most common cause of learners not gaining the maximum marks available.

NEBOSH questions are systematically and carefully prepared and are subject to a number of checks and balances prior to being authorised for use in question papers. These checks include ensuring that questions set for the Certificate level qualifications relate directly to the learning outcomes contained within the associated syllabus guides. The learning outcomes require learners to be sufficiently prepared to provide the relevant depth of answer across a broad range of subject areas. For example, a learner could be asked about the causes of stress, or could be asked about the effects of stress. A question could require a response relating to the principles of fire initiation, or a question could require a response relating to the spread of fire. Therefore, a learner should focus not only on the general topic area (eg stress, fire) but also the specific aspect of that subject to which the question relates.

Learners must also pay attention to the command word. For example, a question could ask learners to '**identify** the hazards associated with demolition work', or a question from the same element could ask learners to '**outline** the control measures required during demolition work'. Learners appear to focus solely on the object of the question (demolition) and do not pay sufficient attention to the subject (hazards or control measures in the examples given) or the command word ('identify' or 'outline' in the examples given). There is often some confusion between hazard and risk. If a question requires an outline of hazards for a given situation, learners must be careful not to provide risks, or even in some circumstances precautions, as they will not be able to attract marks.

Examiners suggest that while many learners do begin their answer satisfactorily and perhaps gain one or two marks, they then lose sight of the question and include irrelevant information. Although further points included in an answer can relate to the general subject area, these points are not focused on the specific learning outcome and marks cannot be awarded. However, some learners appear to misread or misinterpret several questions. This situation is more likely due to learners preparing for the examination with a number of memorised answers obtained through rote-learning, that again can provide answers that are loosely associated with the subject matter but do not provide answers specific to the question. Such an approach is clearly evident to an Examiner and demonstrates little understanding of the subject matter and marks are not awarded.

Learners are advised to allow sufficient time to read and re-read the question in order to determine the key requirements prior to committing their answer to paper. Preparing a time plan before the examination will indicate how many minutes are available for each question and then part of this time allocation can be given to reading the question. Underlining or highlighting key words can assist in keeping focused on the salient points and simple mind maps or answer plans can also be useful. Maps and plans should be kept simple so as not to use up too much examination time.

Learners did not respond effectively to the command word

A key indicator a question will be the command word, which is always given in **bold** typeface. The command word will indicate the depth of answer that is expected by the learner and relates to the amount of detail that should be included in each point of the answer.

The learning outcomes in each element of all syllabus guides include the relevant command word that dictates the level of detail that should be covered in a course of study and the depth of answer that a learner would be expected to provide in an answer to an examination question.

Examiners report that learners continue to incorrectly observe the command words and therefore compromise their ability to gain the marks available. The majority of cases where command words are not observed relate to insufficient detail being given by a learner in their examination answer. A significant number of learners, irrespective of the command word given in the question, provide all answers in the form of a brief list of one or two words. This would normally not be sufficient to gain marks where the command word given was 'outline', 'explain' or 'describe', all of which require answers of more than one or two words.

Some learners do provide too much information, which would not be required where a command word limits the expected answer to 'give' or 'identify'. Learners would not be penalised for providing excessive detail but this would not be an efficient use of the time allocated.

Learning Partners should ensure that learning materials complement the command words in the syllabus guide and the NEBOSH guidance on command words and that sufficient time is given to advising learners on suitable examination technique during a course of study.

Learners unnecessarily wrote the question down

Developing a time plan is a key element in preparing for an examination. Advice included on Certificate question papers suggests that 30 minutes should be allocated for the answer to the long 20-mark question, and 90 minutes should be allocated to the answers for the remaining ten, 8-mark short questions. Therefore there are around 9 minutes available to answer an 8-mark question. This time will be required for reading the question properly at least twice, developing an answer plan, and then committing the answer to paper while regularly referring back to the question in order to maintain focus. Therefore any inefficient use of this time should be avoided.

The efficient use of this time is essential in order to ensure that all questions can be answered within the 2 hours available. Many learners feel it necessary to write out the question, in full, prior to providing their answer and although this practice will not lose marks it will lose valuable time. A significant number of learners do not answer all of the questions in the time permitted and do not complete the question paper, some of whom obviously run out of time.

Learners provided rote-learned responses that did not fit the question

It is clear that there are a significant number of learners who seem to recite answers in the examination that have been rote-learned in advance and do not answer the question.

While knowledge of material forms a part of the study for a Certificate-level qualification, a key aspect being assessed is a learner's **understanding** of the subject and reciting a pre-prepared and memorised answer will not show a learner's understanding. In fact, if a learner gives a memorised answer to a question that may look similar, but actually is asking for a different aspect of a topic in the syllabus, it shows a lack of understanding of the subject and will inevitably result in low marks being awarded for that answer.

Learners repeated the same points but in different ways / Learners provided the same answer to different questions

There are instances where learners repeat very similar points in their answers, sometimes a number of times. This is easily done in the stressful environment of the examination. However, once a point has been successfully made and a mark awarded for it, that mark cannot be awarded again for similar points made later in the answer.

Learners are advised to practise examination technique in their preparations to avoid this kind of pitfall. Writing an answer plan where points can be ticked off when made, or structuring an answer so that each point made is clearly shown, for example by underlining key points, can be of great use. This technique aids learners and makes it much clearer in the stress of the examination for learners to see which points have been made and reduce the chances of the same point being made several times.

Learners did not answer all of the questions

It has been noted that a number of learners do not attempt all of the questions and of course where a learner does not provide an answer to a question, no marks can be awarded. This seriously affects the potential marks available and the possibility of achieving a pass. Learning Partners must emphasise the importance of attempting all questions in order to maximise the opportunity to attract marks.

There can be several reasons for this issue: running out of the allocated time for the examination, not knowing the answer to the question, or forgetting to answer a question.

Questions can be answered in any order and answers can be written in any order in the answer book provided. Learners are advised to clearly keep track of questions they have attempted, such as marking them on the question paper that would minimise the risk of inadvertently missing a question to answer.

If the subject of the question is unfamiliar or the answer is not known, then it will be challenging to provide an answer. This can result from rote-learning and preparing for an examination with a number of memorised answers, or simply not being adequately prepared for the examination across the breadth of the syllabus. There is always the risk of a learner 'going blank' in an examination situation, in which case learners should be prepared with some techniques to help. Rather than trying to remember what was taught or what has been read, ask yourself 'what would I do, in this situation?'. Reference to personal application or experience is sometimes enough to stimulate an answer that otherwise may have been missed. Alternatively, learners can go back to first principles and break a question down into elements such as 'people', 'equipment', 'materials' and the 'working environment'. Approaching a question in small sections can minimise the risk of being overwhelmed by it as a whole.

Running out of time can be avoided by having an examination time plan and working to it. The question paper advises that you should spend 30 minutes on the long answer (question 1) and 90 minutes on the remaining ten short answer questions. This will provide around 9 minutes per short answer, follow the clock and when the time per question has expired, move on. Answering a question partly is better than not answering at all.

Learners did not allocate enough time to the question / Time management

In a number of cases question 1 is left until last or later in the question paper and does not appear to be answered completely. Other learners appear to rush the last one or two questions by providing very brief or bullet point answers, even when these questions require an outline. This indicates a lack of time management. It is advised that Learning Partners and learners spend time developing the skill of writing answers to questions bearing in mind the number of marks and time available. A 20-mark question requires significantly more detail than an 8-mark question.

Learners might benefit from writing abbreviations to save time and to recognise that there is no need to write out the question at the beginning of their answer. Standard abbreviations such as HSE, RIDDOR, COSHH, PPE and DSE are acceptable.

Learners' handwriting was illegible

Sometimes Examiners have difficulty in reading the handwriting of some learners. Although allowances are made for learners under the pressure of an examination, Learning Partners must remind learners that their writing needs to be legible or valuable marks may not be picked up during marking.

There is a minimum literacy requirement for learners on NEBOSH qualifications. As stated in the syllabus guides the standard of English required by learners studying for Certificate level must be such that they can both understand and articulate the concepts contained in the syllabus.

NEBOSH recommends to Learning Partners that learners taking this qualification should reach a minimum standard of English equivalent to an International English Language Testing System score of 6.0 or higher in IELTS tests in order to be accepted onto a Certificate level programme.

For further information please see the latest version of the IELTS Handbook or consult the IELTS website: <https://www.ielts.org/about-the-test/test-format>

Learners wishing to assess their own language expertise may consult the IELTS website for information on taking the test: <https://www.ielts.org>

Learning Partners are reminded that they must ensure that these standards are satisfied or additional tuition provided to ensure accessible and inclusive lifelong learning.

Command words

Please note that the examples used here are for the purpose of explanation only.

Outline

The command word 'outline' is by far the most challenging for learners. Referring to the NEBOSH guidance on command words available on the NEBOSH website, 'outline' means *"To indicate the principal features or different parts of"*.

Many learners do not give sufficient detail in order to warrant an 'outline' answer. The NEBOSH guidance on command word states that *"an exhaustive description is not required. What is sought is a brief summary of the major aspects of whatever is stated in the question"*.

If the use of the command word in everyday language or conversation is considered it may help the learner understand what is required. If asked to '**outline** the risks to an operator when manually closing a valve' an answer such as 'cuts, bruises, burns and strains' would be insufficient as this represents a listed answer. However, 'cuts from contact with sharp edges of the hand wheel, bruises from impact with adjacent plant items, burns from contact with adjacent uninsulated pipe work and strains from using excessive force' would be sufficient.

Explain

The command word 'explain' requires the learner to provide an understanding of the subject of the question and will usually be used in conjunction with 'why' or 'how'. Such as '**explain** how an interlocked guard operates' or '**explain** why a forklift truck may overturn'.

Some learners approach an 'explain' question the same as an 'outline' and provide a number of individual points rather than providing an explanation as to how something operates or why something occurs. While some learners do answer such questions sufficiently and satisfactorily, other learners have difficulty in explaining in a logical sequence and many repeat the same point.

Identify

'Identify' questions require the name or title of an item, such as, '**identify** the effects of electricity on the human body', or '**identify** the features of a vehicle route'. In most cases one or two words will be sufficient and further detail will not be required to gain the marks.

For example, if asked to '**identify** types of equipment found in an office' appropriate answers could be personal computer, printer, telephone, photocopier, etc. There would be no need to embellish those points with a description of the equipment or its function.

However, in contrast to 'outline' answers being too brief, many learners feel obliged to expand 'identify' answers into too much detail, with the possible perception that more words equals more marks. This is not the case and Learning Partners should use the NEBOSH guidance on command words within their examination preparation sessions in order to prepare learners for the command words that may arise.

Describe

The command word 'describe' clearly requires a description of something. The NEBOSH guidance on command words says that 'describe' requires a detailed written account of the distinctive features of a topic such that another person would be able to visualise what was being described.

If asked to describe the clock in the examination room, a person would have little difficulty in doing so and would most probably refer to its shape, its size, the colour of the clock and the style of numerals. Answers to such a question would almost certainly not result in general unconnected information about clocks, the history of clocks, or an explanation of why the clock is present in the room. Learners should consider the general use of the command word when providing examination answers.

Give

'Give' questions require a statement that is relevant to the subject asked for in the question but additional explanation is not required. Often, 'give' questions ask for the meaning of a particular term. While detailed explanation of the application of the term would not be required, a correct knowledge of the term itself is needed in order for the Examiner to award marks.

For additional guidance, please see NEBOSH's '*Guidance on command words used in learning outcomes and question papers*' document, which is available on our website: <https://www.nebosh.org.uk/i-am/a-learner/> - from this page the document can be found by clicking on the relevant Qualification link, then on the 'Resources' tab.