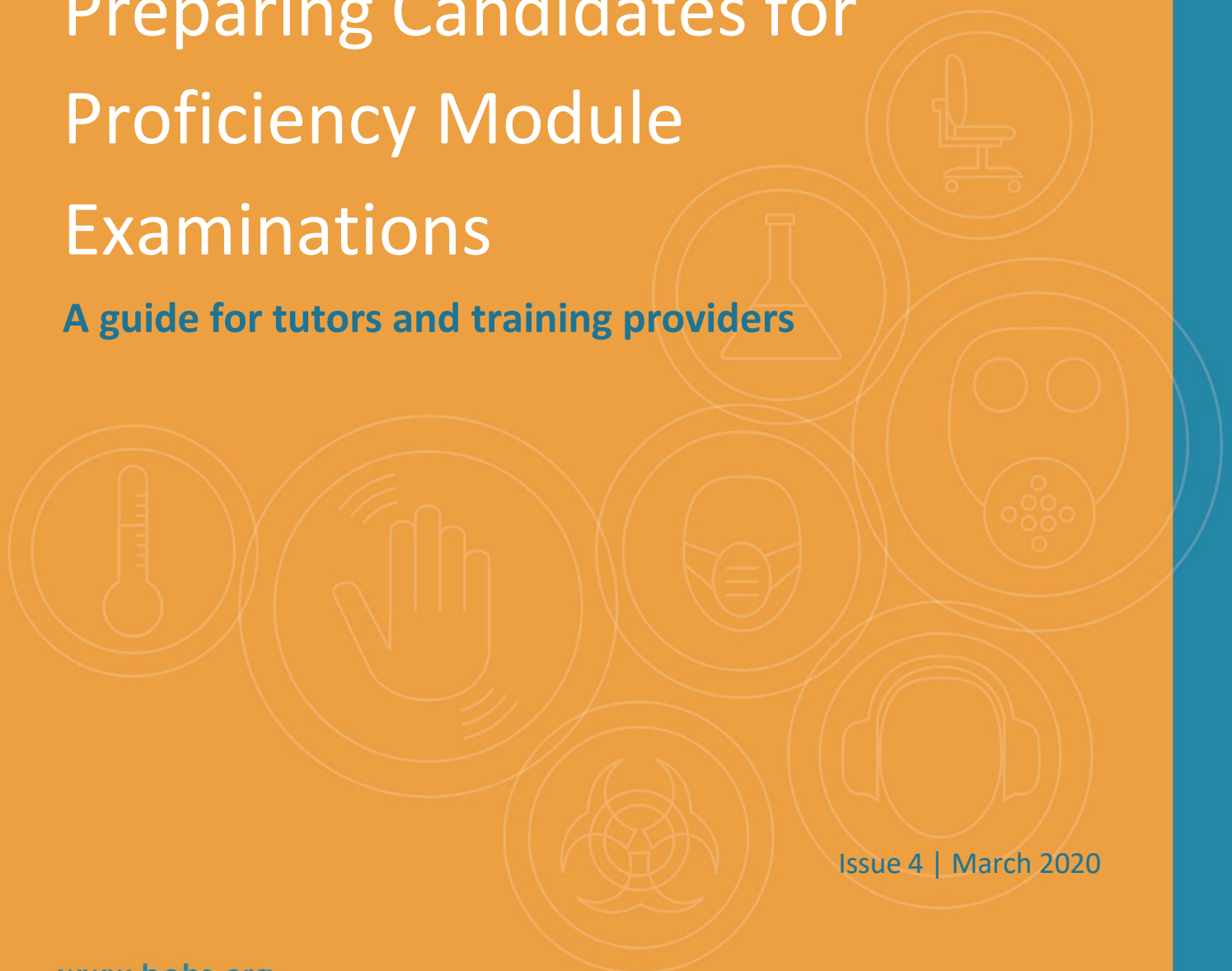


Preparing Candidates for Proficiency Module Examinations

A guide for tutors and training providers



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Introduction

This document outlines the recommendations of BOHS for good teaching and examination practice, to enable tutors get the best results out of all their candidates. This document consolidates the previous guidance documents for all Written Practical and Written Theory examinations and is designed to supplement (rather than replace) the 'Exam Guidance for Tutors', syllabi or Qualification Specifications available for each specific qualification on the BOHS website.

Preparing for the training course

Pre-requisites and facilities

All proficiency modules are designed as intensive courses and therefore require the undivided attention of tutors and candidates to achieve successful results. The teaching time quoted in the syllabi is only a guide and assumes the pre-course requirements for reading and knowledge are fully met. Where this is not the case, either for individuals or the whole class, tutors may need to devote additional time to these candidates over and above the stated teaching hours in the BOHS guidance.

It is important that course and exam facilities are conducive for high levels of concentration for candidates, so distractions and external noise should be limited. It is also important that training providers and tutors emphasise to their clients and candidates the importance of prerequisite knowledge. They should also ensure that course conditions are suitable in order to enhance the learning experience and produce positive results.

In-house facilities and external training locations

In general, the results achieved from in-house courses are lower, so it is important for training providers and tutors to make appropriate amendments when needed. For example, candidates can often be distracted by the demands of their role and be required to react to everyday tasks and there can be a tendency to lose group continuity through the use of a canteen facility during breaks and intervals. Candidates are also likely to work to standard office hours and will not complete tutorials or homework. With this in mind, tutors and training providers should consider extending the amount of teaching hours to compensate for the shortfall in learning experience that may accrue in this kind of environment.

In any training venue that is not the candidate work place (e.g. hotels or training provider premises), tutors can offer additional teaching to assist weaker cohorts as and when required. For multi-day courses, the assigned homework should be relevant to the course content delivered on that day, and to be fully effective should be promptly reviewed by the tutor as an essential part of the course learning experience.

During the course

Group discussions

It is recommended that time allocated for breaks should be used for seeded discussions in order to reinforce teaching and learning from the tutor guided sessions. This seeded discussion should involve the practical application of knowledge from the preceding session.

Topics that should be discussed can include: Hazards and precautions in various scenarios that are required for sampling and inspections (P402, P404 and P405); Effect on static pressure readings under varying conditions for bag filters and cyclones (P601) and risk points in domestic water systems (P901).

Candidate examination scripts often record lower marks when this approach is not adopted. For example, when candidates are required to give advice to building occupiers or when they are asked to apply knowledge gained during the course to 'real-life' situations, inadequacies are reported.

Preparing candidates for examinations

All BOHS level 4 and level 5 Proficiency Modules are examined by short answer questions to measure the degree of candidate knowledge. These questions are designed to fit the teaching specification and require a brief answer (e.g. a short sentence or bullet points).

Examination conditions

For examinations, the room must be configured so that each candidate is able to work alone without observing or interfering with colleagues. A floor area of at least 1.5m² per candidate must be provided and the examination room must be at a comfortable temperature, adequately ventilated and free from distraction.

For open book examinations, candidates may have access to course notes, handouts or any associated course documentation. These are not allowed for closed book examinations. Candidates are not allowed to use laptop/palmtop computers, mobile phones, or any device which allows communication in any examination room.

Instructions to candidates

This information can be found on the front of each candidate examination booklet but tutors should make themselves aware of the instructions and explain them to candidates prior to the exam. Please refer to DA.65 Instructions for Conducting Written Examinations November 2019 – Issue 7.

Candidate exam briefing

During the exam techniques briefing, tutors are advised to inform candidates of the importance of reading through questions before answering them. Candidates are encouraged to identify questions of which they have considerable levels of knowledge and answer them first. For example, candidates who excel at calculations should locate those questions and complete them first, to ensure that a certain number of marks are gained (e.g. material and priority assessments in the written practical for asbestos modules and the ventilation calculations in P601 Written Practical).

Read the question first, and then answer the question

It is important that candidates read the question properly before answering. The candidate may have the knowledge to answer the question, but because they fail to acknowledge key words within the question they do not provide an answer that is sufficient, and therefore score fewer marks.

For example, (taken from an asbestos examination) when asked to describe the requirements of a particular stage of the four stage clearance procedure after remediation, some candidates often outline *all four* stages of this procedure, yet leave out important details of a particular stage, therefore losing marks.

In addition, candidates do not always recognize the difference between “how” and “why” in an exam question. For example, in response to the question “describe **how** to carry out a smoke test” answers often discuss **why** a smoke test needs to be carried out, or how an enclosure is built and its materials of construction. The candidate does not give any details of **how** to actually carry out the smoke test. This again does not score marks, as it is not answering the question.

Similarly, many candidates do not always understand the difference between **hazards** and **precautions**. For the question “what precautions would you need to take to take samples from this roof and flue?”, many answers include hazards such as “working at heights” without giving the precautions required for working at heights, which would not score any marks.



In the photograph above, the hazard is “working at heights”. The precaution might be “use a ladder with a second person footing” or “a scissor lift or cherry picker to gain safe access”.

Other examples where candidates commonly misinterpret the question include:

- Scenario questions where candidates are asked how they would take samples in a building where work operations are occurring 24/7 inside the building. Candidates often suggest internal sampling techniques, rather than picking up on the fact that is not safe to take samples in a building where work is occurring 24/7. Candidates should be thinking of external sampling techniques in their answer.
- Photograph scenario questions/document text extract questions, where candidates are asked to identify a number of issues or deficiencies **visible** within the photograph or the document (for example, a Plan of Work extract or a photo of an asbestos removal site). Candidates often suggest answers that aren't visible in the photo or document, rather than focusing on what is there. There are always more possible answers than marks to score for the question, and the asbestos product should always be clear in the photograph.

Use examination time effectively

Candidates have sometimes advised that they were unable to complete the written practical papers in the allocated timeframe. BOHS has identified several reasons for this when reviewing individual exam scripts:

- 1) Candidates writing too much. In attempt to ensure points are scored, candidates can often write down everything they have learned. Exam markers often find it difficult to identify point scoring comments and on occasions candidates do not answer the question at all, thus resulting in a loss of marks.
- 2) Candidates copying from the course manual. During the Written Practical exam, this approach is considered to be time consuming as candidates can waste valuable time searching for the relevant passage in their text book and miss out on valuable marks elsewhere.

To resolve these issues, candidates are asked to write relevant phrases and/or bullet points and not to waste time in writing complete sentences. Some candidates also lose time by writing in block capital letters. Tutors must emphasise to all candidates to read the question and then just answer it using short phrases or bullet points.

Marking and re-sits

Examination marking

The marks available are displayed next to every examination question. The space on the examination script for answers is variable, and is generally indicative of the length of answer that candidates are expected to write.

All short answer and essay examinations from BOHS use markers who are sufficiently experienced and qualified in the subject area and have had their examination marking skills verified.

The majority of candidates complete the written practical examination (P402, IP402, P404, IP404, P405, IP405, P601, P604 and IP601) with a pass rate of about 70%. Of those that run out of time to complete all questions in the paper, many candidates still score enough marks on the questions they have answered to pass the examination with the 60% pass mark requirement.

Any fail results close to the pass mark are automatically verified by a second qualified marker to ensure that there are no errors in the marking or the resulting pass/fail decision.

Enquiry about a result

Candidates who subsequently wish to question the examination decision can do so by filling in the DG.1 (12-03-2020)-Enquiry about an Exam Result-procedure – BOHS March 2020 form on the BOHS website and by paying an associated fee (which is refundable ONLY if the result decision is reversed). The examination script will be re-marked and re-checked by an independent subject specialist examiner. The candidate will also receive more detailed feedback and is advised to share this with their training provider before sitting a retake. However, BOHS recommended advising candidates that due to the earlier examination script verification and validation (checking for marginal results), changes to the result under appeal are rare.

Re-sit candidates

Some re-sit candidates do not achieve a pass mark on their re-sit. When their scripts are reviewed and compared, it is often found that they are making the same mistakes on both sittings.

In their results feedback, they are given a breakdown of marks scored which is split down by specification section. This should enable them to ascertain where they have lost marks, and they should focus on these areas in their revision before they re-sit the examination.

Tutors who provide help to re-sit candidates are advised to use this feedback data to help candidates revise on areas where knowledge is limited. For candidates of asbestos-related exams, common issues are found in the material and priority assessments and client advice sections of the written practical papers. In ventilation exams, candidates often struggle on the calculation questions where manipulation of the equations are required.

Common examples of where candidates lose marks in exams

‘Hedging bets’

Common errors where candidates often lose marks are when they are asked to identify different asbestos types. It is part of the marking protocol for the correct type of asbestos to be identified, and also correctly spelt to gain the full available marks.

A clear and unambiguous misspelling of the type will score some marks, but misspellings that are ambiguous will not score any marks at all (e.g. Chrystallite or Crocosite).

Some candidates will also put down all possible answers, in the hope that they will score marks (e.g. listing the three main types of asbestos when the question only asks them to identify one). This approach is known as ‘hedging bets’ and will not score marks.

Also, in response to a question with a photograph of an asbestos boiler flue through a roof (below) which asks which type of asbestos is likely to be present, some candidates answer “any”, which would again not score any marks. Answers should be specific.



Material assessments

P/IP402 and P/IP405 Written Practical examinations include questions asking candidates to evaluate the material assessment of a situation (as below), with an empty table that they are required to fill in with scores.

This should be completed using the table that is taken from HSG227 Appendix 2 that (as stated) is supplied as part of the answer script. It is worth reminding candidates that where the asbestos type is not specifically defined in the question, they should use 3 for the asbestos type value as per the HSE guidance.

However, material and priority assessments are subjective, and candidates may query whether they lose marks if their scores vary from the model answer. Tutors can reassure candidates that in material and priority assessment marking, there are spreads of marks on each section to allow for the variations in individual opinions.

The photograph shows a pub lounge. It is open for 14 hours per day, seven days per week. Carry out a material assessment on the coating on the ceiling. It has been confirmed that Chrysotile is present in the coating. (6 marks)



| | |
|-------------------|--|
| Product type | |
| Extent of damage | |
| Surface treatment | |
| Asbestos type | |
| Total | |

Priority assessments

For the priority assessment below, the priority assessment table should be filled in using the table taken from HSG227 Appendix 3 that is supplied as part of the answer script. Candidates need to be taught and given practice as how to conduct priority assessments where the average of each section is calculated, and then the score from each section is then added together to give the total priority assessment score. This total priority assessment score should then be combined with the material assessment score to give the total priority risk assessment score. Some candidates will have not have calculated averages before, so additional teaching time may be required to teach this.

Following on from the previous question, the electrical cupboard is usually locked but is periodically accessed for ammeter reading. In line with HSE guidance, carry out a priority assessment for this situation writing your scores in the relevant boxes (7 marks)

| | |
|-----------------------------------|--|
| Normal occupant activity | |
| Likelihood of disturbance | |
| Location | |
| Accessibility | |
| Extent/amount | |
| Average | |
| Human exposure potential | |
| Number of occupants | |
| Frequency of use of area | |
| Average time in area | |
| Average | |
| Maintenance activity | |
| Type of maintenance activity | |
| Frequency of maintenance activity | |
| Average | |
| Total priority assessment | |
| Total material assessment | |
| Total priority risk assessment | |

This photograph shows a section of asbestos cement guttering and profiled sheeting on the roof of an old storage area which is used daily. The total material assessment score is 4 and the total priority risk assessment score is 8.

List FOUR management actions you would take for this situation. (4 marks)



Ventilation calculations

Many candidates lose marks in the ventilation examinations because they are unable to rearrange the equations into the desired format for the calculation they are required to do. Tutors are advised to provide calculation formulae in all possible formats in the course notes, perhaps in a tabular format so that candidates can apply the calculations in the right format.

$$Q = V \times A \quad V = Q/A \quad A = Q/V$$

Candidates also need to be reminded of the formulae for calculating the cross-sectional area of ducts:

$$A = \text{height} \times \text{width for rectangular ducts or inlets}$$

$$A = \pi r^2 \text{ or } A = \pi d^2/4 \text{ for circular ducts or inlets}$$

In addition, candidates should to be reminded that they need to calculate the percent deviation from the mean face velocity (especially for fume cupboards) and that if this value is in excess of 20%, the unit will not be suitable for use.

Advice to clients

In BOHS examinations, there are many questions that will ask the candidate to explain the advice they would give their clients in real-life situations. In many cases, the answers given by the candidates are not appropriate or relevant and often use incorrect phrasing.

For example, in asbestos examinations candidates use the phrase “encapsulate” where this would be totally impractical. For example, in the case of a broken asbestos gutter “immediate removal” would be a better answer.

In ventilation modules, candidates are often reluctant to recommend that a system should FAIL a thorough examination and test [TEXT] for a system where it is clearly inadequate for the task. For example, on a fume cupboard with a greater than 20% deviation in the face velocities.

Further guidance

If you would like any further guidance on delivering our qualifications, or would like clarification on this guidance document, please contact the Qualifications Team on 01332 298101 or email qualifications@bohs.org.

Appendix 1

Short Answer Questions (SAQs)

Example Questions with Marking Schedule

(SAQ Exam Tutor Guidance (190313) DA.54

Please note that these are examples only and they do not necessarily reflect the most up-to-date subject technical guidance. They are unlikely to appear in actual examinations. The number in parenthesis (eg. [2]) indicates the number of marks for that question/part of the question. The examples cover the range of Occupational Hygiene and Proficiency Modules currently available and are not presented in any particular order.

The appendix to this document contains many more example questions in the short answer series that may be used by tutors as overnight test questions during the course. This will allow students to gain more experience in addressing this style of question.

- 1) Explain why wetting with a water spray is not a suitable control method when removing sealed asbestos lagging.

Should use an injection system to ensure complete wetting throughout the whole lagging before removal [2] spray wetting only wets the exposed surface [2]

- 2) Give an example of a primary standard used for the calibration of sampling pump or working rotameter for flow rates in the field.

Soap Bubble meter [4] or Primary standard electronic flow calibrator [4] or electronic flow calibrator [2]. [Maximum 4]

- 3) What is the Walton and Beckett graticule used for when using phase contrast microscopy for the detection of asbestos?

Walton Beckett graticule is used for fibre counting microscope set up [3] to assess the size of fibres [1]

- 4) Which form of asbestos is more prevalent in Asbestos insulating board (AIB), used as ceiling tiles?

Amosite [4] correct answer given as one of two options [2] correct answer given as one of three options [1] correct answer given as one of more than three options [0]

- 5) According to HSE Guidance Note HSG247 how many air changes per hour should be provided by the negative air pressure unit on an asbestos enclosure?

8 [4]

- 6) As an analyst what action should be taken if an air test outside a stripping enclosure reaches an exposure level of 0.03 f/ml during work?

Stop the job [2] get people in the vicinity to leave the area [1] visually inspect the tent/enclosure and investigate source [1] inform the Client [1] [Maximum 4]

- 7) What is mesothelioma?

Cancer/tumour [2] of the mesothelium [2] the lining of the pleura or peritoneum [2] (linings of the main body cavities) [Maximum 4]

- 8) The effects of asbestos and tobacco smoke are said to be synergistic. What does this mean?

Working together [2] to more greatly elevate the risk of disease [1] (lung cancer) than the two agents would pose individually [1]

- 9) Describe a technique that can be used to visualise dust or aerosol particulate material in the air.

Use of a dust lamp or equivalent bright beam of light shone through the area where it is thought a particle cloud may be present [2]. The particles present diffract the incident light [1] and an observer looking up the beam to the source of the illumination (at an angle of about 5 – 15°) can see the dust particles [2]. [Maximum 4]

- 10) What is the reduction in inward flow velocity at one duct diameter from a non-flanged captor hood, compared with the face velocity?

The velocity at one duct diameter in front of the hood will be less than 10% of that achieved at the face [4] or 10 to 15% [2]. [Maximum 4]

- 11) What happens to the air flow in a duct when the direction of rotation of a centrifugal fan is reversed?

It will be in the same direction [2] but the characteristics will change [2] flow reduced [1]. [Maximum 4]

12) What are the main reasons for installing an air cleaner in a local exhaust ventilation system?

Compliance with environmental legislation [2] preventing contaminated air re-entering the workplace [2] economic considerations such as the recovery of expensive material [1]. [Maximum 4]

13) Why should weather caps and cowls be avoided on external discharges of LEV systems?

They create a large resistance to airflow [1] reducing the efficiency of the system [1] and prevent contaminants being dispersed [2]

14) What equipment/instruments can be used to assess the performance and face velocity of a small ventilated booth?

Smoke generator [2] smoke tubes [2] anemometer (Vane or Thermal) [2]. [Maximum 4]

15) What is the most suitable filter type for sampling airborne oil mist?

Small pore size PVC, MCE or PTFE membrane filters [4] or glass fibre filter [4]

16) Using the OSHA model, what is the adjustment to the long-term exposure limit for workers who routinely work 12 hour shifts?

Exposure limit value X 8/12 [4]

17) Using the data below calculate the average dust concentration over the period of sampling.

Amount of dust collected = 0.73mg

Sampling pump flow rate = 2.1 litres per minute

Sampling time = 7 hours and 10 minutes.

Calculation: 430 mins @2.1 litres/min = 903 litres or 0.90 m³

0.73/0.90 = 0.81 mg/m³

0.81 mg/m³ [4] correct answer with no units [3] incorrect answer but correct method [up to 2]

- 18) Calculate the 8-hour time-weighted average exposure to xylene vapour of a worker who spends 45 minutes each day at an operation where the concentration is 232 ppm, 4.5 hours on an operation where the concentration is 47 ppm, and 5.25 hours on an operation where the concentration is 5 ppm.

[Calculation: $[232 \times 0.75] + [47 \times 4.5] + [5.25 \times 5]/8 = 51.5 \text{ ppm}$]

44.9 ppm [4] correct answer with no units [3] incorrect answer but correct method [up to 2]

- 19) Why are blank control samples and filters from air sampling dust placed in clean labelled tins or Petri dishes and left with the lids slightly ajar in the balance room overnight before being weighed?

Filter papers absorb moisture [2] therefore it is necessary to ensure that samples and controls are all at equilibrium with the humidity of the room [2]

- 20) At a work activity where there are currently no control measures in use, an employee's exposure to an asthmagen [an agent that can cause occupational asthma] with an occupational exposure limit of 5 g/m^3 is measured at $4 \text{ } \mu\text{g/m}^3$. Does anything need to be done and if so, why and what?

Yes [1] asthmagens do not have a no effect level [2] so exposure needs to be reduced initially by RPE [1] followed by engineering controls if possible [1] [Maximum 4]

- 21) In a small workshop the background noise level in the area is 81 dBA. A new pump with a declared operating noise level of 76 dBA is to be introduced. What is the expected overall noise level in the workshop when the pump is operating?

For 81 and 76, the difference is 5, the difference of 5 leads to 1.0 addition to the higher level. Therefore $81+1.0 = 82 \text{ dBA}$ [4] Incorrect answer correct method [up to 2]

- 22) The noise levels from three separate machines in an area are 79, 82 and 85 dBA. What is the expected overall noise level when all three machines are running together?

Adding the noise levels in pairs – $79 + 82$ gives a total of 84dBA, $84+85$ gives a total of 87.5dBA. Correct answer [4] incorrect answer correct method [up to 2]

- 23) Why is the A weighting network normally used when assessing risks from exposure to noise?

The A weighting is a frequency filter [2] that has a similar response to the frequency response of the human ear [3] [Maximum 4]

- 24) The sound level of one machine is 89 dBA. A second, identical machine is added next to it. The resulting sound level when both machines are running is:

92 dBA {2 sources +3} [4]

- 25) What is the main reason for substituting toluene di isocyanate (TDI) with methylene di isocyanate (MDI)?

MDI has a much lower vapour pressure at room temperature [4] and therefore releases less vapour than TDI [4] [Maximum 4]

- 26) What is the most common toxic pyrolysis product of chlorinated hydrocarbons?

Phosgene [4] correct answer given as one of two options [2] correct answer given as one of three options [1] correct answer given as one of more than three options [0]

- 27) What is the critical health effect which forms the basis for setting the Exposure Limits for n-hexane?

Peripheral neuropathy [4]

- 28) Define the two types of vibration exposure of concern in occupational ergonomics, and give an example of a likely cause of each type.

Hand transmitted vibration [1] – through use in hand held power-tools [1]

Whole body / shaking / jolting the whole body through a supporting surface [1] - through driving machinery [1] particularly over rough ground [1] [Maximum 4]

- 29) List four protective functions provided by the skin.

Protects tissues underneath from physical [1] chemical [1] and biological damage [1] as well as from extremes of temperature [1] and loss of water [1] [Maximum 4]

30) List the four minimum ergonomic requirements for a typical office VDU workstation.

Screen – adjustable [1] for position, brightness and colour [1] [Maximum 1]

Seat – stable [1] and adjustable [1] [Maximum 1]

Keyboard – suited to the operator [1], adjustable [1] [Maximum 1]

**Work surface – sufficient space [1] allows personal variation in equipment location [1]
[Maximum 1]**

[Maximum 4]

31) When making an environmental assessment of an indoor workplace, which two measurements are required to calculate the WBGT index of that workplace?

Natural or un-aspirated wet bulb [2] and globe temperature [2]

32) What is a typical clo value range for polar clothing?

3-4 [4] anything from 2-6 [2]

33) Which occupational skin disease is the most common in industrial workers?

Contact dermatitis [4]

34) What is the recommended work/rest regime for heavy work at 30°C WBGT?

25% work/75% rest per hour [4]

35) What are heat cramps caused by?

Loss of body salt in sweat [4]

Appendix 2

(SAQ Exam Tutor Guidance (190313) DA.54

The lists below are examples of questions which course providers may wish to use during their course as examples of the many types of questions that the candidates will face in the actual examination.

We have not provided example answers to these questions so that these or similar questions may be used in the actual examination papers.

1.0 Asbestos

1. How long before carrying out the work must a company being employed to strip sprayed asbestos from a workplace inform the enforcing authority of the proposed activity?
2. To comply with the Control of Asbestos Regulations 2012 how often should respirators used in asbestos stripping be **thoroughly** examined and tested?
3. According to HSE Guidance Note HSG 248 before clearance air sampling takes place in an enclosure what should be done to the negative pressure unit?
4. How frequently should a negative pressure unit be **thoroughly** examined and tested?
5. As a building manager, the analyst covering a removal job advises you that the method statement is significantly different from the work actually carried out. What action would you expect the analyst to take?
6. When removing asbestos what personal protection would you expect to be wearing?
7. At the start of an asbestos removal job as a Supervisory License Holder what would you want to be done first?
8. What could be used to provide a primary calibration for a working rotameter?
9. When carrying out sampling to assess the adequacy of respiratory protection inside an asbestos stripping enclosure, according to HSG 248, where should the sampling head be located?

10. Apart from the pre-filter, why should the negative pressure unit should be located outside an asbestos stripping enclosure?
11. When conducting an asbestos clearance inspection in a boiler house, traces of asbestos debris are discovered around bolt heads on valve flanges. What would be the most appropriate action?
12. Visual inspection of an enclosure revealed that asbestos removal work has been completed but with no dust or debris remaining. However, the clean end of the three stage airlock has some dust on the floor. What action should the analyst from the asbestos testing laboratory take?
13. What standard would be applied to respiratory protection equipment used by an analyst entering an enclosure for monitoring as stage 3 of the four stage clearance procedure?
14. As an analyst carrying out four stage clearance you find that the enclosure has been sprayed down with a PVA material. What would you do?
15. According to HSE guidance what factors need to be taken into consideration in calculating a material assessment?
16. Whilst carrying out a survey you need to take samples from a tar and felt roof. What sampling frequency would you observe?
17. What is the typical concentration of asbestos fibre found in textured coatings?
18. Define/explain the purpose of a Management Asbestos survey?
19. Which is the preferred method for taking a sample from asbestos cement roofing sheet?
20. Additional sampling during a Management survey establishes that a wall board panel does **not** in fact contain asbestos. Give the most likely potential reason for the original error.
21. What is the purpose of the material assessment algorithm as defined by HSG 264?

22. According to HSG 264 when is information required for a risk assessment to be collected?
23. What is the initial starting point in a priority assessment algorithm for a survey of Asbestos containing materials in premises?
24. What action should be taken where there is evidence in the form of particulate on the floor beneath sprayed asbestos on steel work at high level?
25. What action should be carried out by a building manager where an electrician is required to access the void above a suspended ceiling of asbestos tiles in good condition for 15 minutes?
26. What are the options that could be taken during a management asbestos survey, where an asbestos label is found attached to a piece of wooden plywood boarding in an office?
27. Which asbestos material could legitimately be found used in buildings constructed between 1996 and 1998?
28. When carrying out a refurbishment and demolition survey in accordance with HSG264. If no access is available into a room or area what should the surveyor report?
29. What asbestos fibre type would be determined, if it is observed as showing a faint yellow-brown pleochroism, straight extinction, 2nd order interference colours, length slow sign of elongation and dispersion staining colours in RI liquid of 1.67?
30. What is the most likely treatment that Crocidolite has received if it is exhibiting positive (length slow) elongation?

2.0 Legionella

1. How do people catch Legionnaires' disease?
2. Give two examples of how the disease may be medically confirmed.
3. Why might Legionella tend to proliferate in the base of a hot water storage vessel?
4. Why are mains fed electric showers generally considered to be a lower risk than mixer showers?
5. It is recommended that multiple cold water tanks are connected in series. What are the possible consequences of operating multiple tanks that are connected in parallel?
6. Which would be of more concern: water at 28°C in a clean tank, or water at 18°C in a rusty tank? Justify your answer
7. Is Legionnaires' disease notifiable in England and Wales? Is there any required reporting?
8. How quickly must changes to the details required by the Notification of Cooling Towers and Evaporative Condensers Regulations be reported?
9. What is the principal function of a granular filter such as a sand filter in a cooling tower or evaporative condenser system?
10. Give two advantages of disinfecting a cooling tower system at a low chlorine concentration for a longer period, rather than at a high concentration for a shorter period.

3.0 Ergonomics

1. What is the definition of the term 'anthropometry' and what is its purpose?
2. Name the main factors that contribute to the gender differences in strength?
3. Describe the main methods by which work tasks can be redesigned to enhance a human's endurance in carrying out these tasks?
4. Describe the criteria that can be used to ensure information presented to a person is compatible with their perceptual abilities.
5. What is the purpose, advantages and disadvantages of the technique of timeline analysis?
6. Give an example of an "engineering control" and how it can be used to reduce risk?
7. Why should an analyst NOT assess manual handling risk by carrying out the manual handling work themselves?
8. What ergonomic factors should be considered in defining the intended size of a workspace?
9. What issues should be considered in the safe design of walkways and stairs?
10. What design features of a workstation need to be considered in accommodating the user?

4.0 Control

1. Describe a technique to visualize dust or aerosol particulate material in the air?
2. List the main elements of the hierarchy of control and the order of preference for the different measures.
3. In a non-flanged captor hood, what is the approximate inward flow velocity reduction with distance?
4. When a Centrifugal fan has its direction of rotation reversed, what happens to the air flow in the duct?
5. What are the main reasons for installing an air cleaner in a local exhaust ventilation system?
6. List four methods that can be used to evaluate the efficiency of local exhaust ventilation systems
7. For what reasons should weather caps and cowls be avoided on external discharges?
8. What equipment/instruments should be used to assess the performance and face velocity of a small ventilated booth?
9. The potential for exposure to airborne contaminants for maintenance personnel is typically greater than for non-maintenance personnel because:
10. What is the effect of fitting a flange to an extract duct?

5.0 Measurement of Hazardous Substances

1. What is the most suitable medium for sampling airborne oil mist?
2. Employees who routinely work 10-hour shifts are exposed to a substance, which has a long-term exposure limit. What multiplier of measured exposures should be adopted for comparison with the 8-hour long-term exposure limit?
3. From which welding process will the fumes produced contain the greatest percentage of hexavalent chromium? (Cr V1)
4. A sampling pump was run at 2.2 litres per minute for 5 hours 45 minutes. The amount of respirable dust collected was 0.42 mg. What is the average airborne dust concentration over the sampling period?
5. Why does cadmium oxide fume have a very low short-term exposure limit?
6. Following an air sampling survey for trichloroethylene (occupational exposure limit 100 ppm 8-hour time-weighted average) as part of a routine annual air monitoring programme, eight out of ten results are less than 50 ppm, one is 70 ppm and one is 115 ppm. What conclusions can be drawn and why?
7. Calculate the 8-hour time-weighted average exposure to xylene vapour of a worker who spends 30 minutes each day at an operation where the concentration is 200 ppm, 5 hours at 50 ppm, and 5 hours at 10 ppm.
8. Why are blank control samples and filters from air sampling dust placed in clean labelled tins or Petri dishes and left with the lids slightly ajar in the balance room overnight before being weighed?
9. At a work activity where there are currently no control measures in use, an employee's exposure to an asthmagen with an occupational exposure limit of $5 \mu\text{g}/\text{m}^3$ is measured at $4 \mu\text{g}/\text{m}^3$. Does anything need to be done and if so what?
10. The exposure of a worker to respirable dust was measured during a series of operations. What is the time-weighted average dust exposure during the course of the day?

| Operation | Duration | Result |
|-----------|---------------|------------------------------|
| 1 | 1 hr 15 mins | $0.20 \text{ mg}/\text{m}^3$ |
| 2 | 3 hours | $0.04 \text{ mg}/\text{m}^3$ |
| 3 | 2 hrs 45 mins | $0.05 \text{ mg}/\text{m}^3$ |
| 4 | 30 mins | $0.30 \text{ mg}/\text{m}^3$ |
| 5 | 30 mins | $0.65 \text{ mg}/\text{m}^3$ |

11. Workers are engaged in paint spraying using polyurethane paint containing Isocyanate (a respiratory sensitiser). A high degree of control, including respiratory protection is in place. What additional testing should be carried out to provide evidence of the continuing effectiveness of control measures?
12. What air sampling strategy should be adopted for the evaluation of exposure to Cadmium Oxide fume (WEL 0.05 mg/m³ 8-hr TWA, 0.05mg/m³ 15-min STEL)?
13. What is the main purpose of fixed location static samplers?
14. When sampling for airborne asbestos fibres, what filter should be used for the standard method of microscopic evaluation?
15. Automatic continuous monitoring of sulphur dioxide gas is best carried out using which technique?
16. List two methods for detection used in Gas liquid chromatography.
17. Which external quality control scheme is concerned with asbestos fibre counting?
18. For a substance hazardous to health with a 'Sk' notation in HSE Guidance Note EH40 'Workplace Exposure Limits', what would be the route of entry into the body?
19. What biological index is used normally used for the biological monitoring of exposure to inorganic mercury?
20. Several dust filters are weighed before and after air sampling. Along with these filters, three 'blank' filters are also weighed. What is the weight of dust on sample filter 1, corrected for the average weight change of the blanks?

| Filter | Weight before (mg) | Weight after (mg) |
|-----------------|--------------------|-------------------|
| Sample filter 1 | 26.137 | 27.087 |
| Blank filter 1 | 25.136 | 25.143 |
| Blank filter 2 | 26.584 | 26.595 |
| Blank filter 3 | 26.254 | 26.257 |

6.0 Noise

1. Five sound sources generate the following noise levels in dB(A) at a listener's ear: 92, 88, 86, 93, 81 dB(A). What is the total noise level (to the nearest dB(A)) when they all occur at the same time?
2. If a frequency analyzer used for measuring vibration has been set up so that 1 g (9.81m/s^2) is equivalent to 0dB, what does a value of 20dB higher relate to?
3. A person is exposed to 75 dB(A) for 3 hours, 84 dB(A) for 2 hours, 90 dB(A) for 1 hour and 93 dB(A) for 2 hours. This is equivalent (approximately) to an exposure for 8 hours of:
4. A centrifugal fan has 40 blades, and rotates at 1500 rpm. Which predominant frequency would be expected to be found in the noise produced?
5. What is the most accurate and easy way to assess a complicated noise exposure that consists of a series of different noise sources experienced over a period of time?
6. When constructing a noise enclosure for a plastics grinding machine what are the preferred materials for the enclosure panels?
7. In the course of an environmental noise investigation in accordance with BS4142 a dominant noise source operates for 15 minutes per hour during the daytime only. If the $L_{aeqTm} = 56$ dB(A), what is the daytime specific noise level?
8. What is the physical principle on which the accelerometer depends for the measurement of vibration?
9. In what units should the magnitude of vibration for assessment of hand held tool be expressed as?
10. What is the main benefit of wearing anti-vibration gloves?

7.0 Thermal Environment

1. In a room admitting sunlight through a window, what is the air temperature determined by?
2. The uptake of oxygen at 1 litre per minute is equivalent to approximately what level of metabolic rate (in watts)?
3. When assessing heat stress using the Wet Bulb Globe Temperature Index, apart from natural wet bulb, globe and dry bulb temperatures, what other parameters are considered when assessing work/rest regimes?
4. What two relationships are described on a psychrometric chart?

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Information in this guide is correct at the time of issue but may be subject to change.

BOHS

5/6 Melbourne Business Court
Millennium Way
Pride Park
Derby
DE24 8LZ

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No. 1150455