

IFE Level 3 Diploma in Fire Safety and Fire Science

Unit 7 – Fire Investigation

Examiner Report – March 2018

Introduction

49% of candidates achieved a pass for this examination.

Candidates performed particularly well on question 5 and well on question 8. Candidates performed least well on questions 2 and 3.

A common failure in responses was the lack of precision when providing definitions and scientific explanations.

Question 1

a) *Define the term “combustion”. (5 marks)*

b) *Explain the combustion process in terms of the fire tetrahedron. (15 marks)*

Examiner Feedback

Few candidates were able to define the term “combustion” correctly. Candidates should be aware that combustion is a chemical reaction usually including oxygen and usually accompanied by the generation of heat (exothermic) and light in the form of flame.

Most candidates correctly explained the combustion process in terms of the fire tetrahedron. However, few candidates understood the concept of chain reaction and how free radicals sustain combustion.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 4, pages 20-23.*

Question 2

a) *Define the term “limits of flammability” (also known as “flammable range”). (5 marks)*

b) *Describe how dusts or finely divided solids undergo combustion and describe the characteristics of a dust explosion. (15 marks)*

Examiner Feedback

Most candidates were able to provide sufficient information in response to part a) to attain at least some of the marks available.

Part b) was often answered poorly as few candidates demonstrated the depth of understanding required. Some candidates provided only very brief responses. Many identified only that flammability increases with finer particle size because smaller particles absorb more heat. Few candidates considered the characteristics of a dust explosion. Candidates should be aware that dust explosions usually come in two phases (ie pilot and secondary) with the pilot explosion disturbing additional dust particles which causes one or a series of secondary explosions.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 6, pages 26 – 27 and 50 – 51.*

Question 3

There are many reasons why electrical equipment, wiring and appliances might cause a fire to ignite.

- a) Explain the term “resistive heating” and describe the circumstances in which it will occur. (10 marks)*
- b) Describe how electrical cable reels may be the source of a fire. (10 marks)*

Examiner Feedback

This question was a popular option for candidates but few candidates were able to attain high marks. Explanations were often inadequate with candidates failing to demonstrate the depth of scientific understanding required at this level.

Responses to part a) were often poor. Candidates generally performed better on part b) than on part a).

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 9, pages 83 – 89.*

Question 4

- a) Describe the properties that make flammable/ignitable liquids efficient first fuels (i.e. the fuel first ignited). (5 marks)*
- b) Describe the patterns left in a fire scene that could indicate the presence or use of a flammable liquid/ignitable liquid and identify other materials or conditions that may cause similar patterns. (8 marks)*
- c) Describe the common methods of detecting flammable/ignitable liquids and comment on how arson can be proved. (7 marks)*

Examiner Feedback

There were some good responses to this question. However, some candidates failed to address all aspects of the questions and this limited the marks that could be attained.

Most candidates presented good responses to parts a) and c) although some candidates omitted to comment on how arson can be proved when responding to part c).

Part b) was less well answered as candidates did not provide sufficient detail on the patterns that indicated the presence of flammable liquids at a fire scene. Even where candidates did identify common patterns, these were rarely described fully and many candidates failed to identify other materials or conditions that could cause similar patterns. Candidates should be aware that other circumstances that could cause similar effects include ventilation effects, intense radiated heating of synthetic carpets, duvets, cushions and molten flows of polypropylene boxes and furniture etc.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 11, pages 111 – 113 along with chapter 15 pages 153 – 158.*

Question 5

a) *Define the terms and give the SI units of measurements for:*

- i) *voltage (3 marks)*
- ii) *current (3 marks)*
- iii) *resistance (3 marks)*
- iv) *power (3 marks)*

b) *Give the equations for and explain the relationship between:*

- i) *Ohms Law (2 marks)*
- ii) *Power Formula (2 marks)*

c) *A current of 8 amps flows through an appliance with a maximum resistance of 28.75 ohms. Calculate the power of the appliance. (4 marks)*

Examiner Feedback

This question was a popular choice for candidates and many of those that attempted the question secured high marks. A number of candidates attained all 20 of the marks available for this question.

In responding to part b), some candidates failed to demonstrate understanding of the relationship between Ohms Law and the Power Formula.

In responding to part c), some candidates omitted to show their methods and working out. Candidates should be aware that marks for the method used can be obtained even where the final answer is incorrect; as a result, candidates should ensure that they show all stages in calculations. Some candidates omitted to include SI units in their final answer and this meant that they could not obtain the marks available for showing correct units.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 8, pages 72 – 73.*

Question 6

- a) *Explain the importance of preparing for a fire investigation. (3 marks)*
- b) *Describe the necessary considerations and arrangements that ensure a methodical and effective investigation can be undertaken. (17 marks)*

Examiner Feedback

This question was a popular choice for candidates and many candidates were able to secure full marks.

Most candidates provided a good response to part a) and many secured full marks for this.

Part b) was also answered well. Candidates that performed well did so by explaining their thought processes in relation to preparing for a fire investigation along with the methodical reasoning behind the scientific method. Some candidates presented only brief lists of points and failed to explain the considerations that lay behind the actions – these candidates were unable to attain many, if any, marks.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 1.*

Question 7

Describe the methods, indicators and factors to consider when determining the origin, cause and development of fire within a compartment or structure. (20 marks)

Examiner Feedback

This question provided candidates with the opportunity to demonstrate their understanding of the methods, indicators and factors that they would consider when determining the origin, cause and development of fire within a compartment or structure. Good candidates were able to explore a wide range of methods and factors such as room dimensions, building construction, human indications, presence of incendiary devices, examination of electrical and gas supplies, fuel loads, ventilation effects, effects of fire-fighting and fixed installations etc.

There were 20 marks available for the question but some candidates gave either limited or repetitive responses and therefore attained only a few of the marks available.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 11, pages 102 - 103.*

Question 8

- a) *Describe the considerations and best practice to be taken into account when taking photographs or video footage during the course of a fire scene investigation. (14 marks)*
- b) *Describe two methods other than video or photographs that may be used for recording a fire scene and describe one advantage for each. (6 marks)*

Examiner Feedback

This question was the least popular option for candidates. However, candidates that completed the question often attained high marks.

Good responses were received to part a) which covered both best practice for taking effective images and the legal principles that govern the production of images as evidence in court.

Part b) was often answered well with candidates able to refer to methods such as contemporaneous notes, sketches, voice recordings and annotated maps and plans supplied from occupiers.

For further information on this subject, candidates are advised to refer to the following IFE publication: *A Guide to Fire Investigation, Chapter 16 page 159 – 160.*