

# IFE Level 4 Certificate in Fire Safety and Fire Science

## Unit 6 – Fire Investigation

### Examiner Report – March 2016

#### Introduction

19% of candidates achieved a Pass.

As in previous years, a major issue for most candidates was the lack of underpinning scientific and technical understanding. Many responses lacked depth with candidates often providing only basic (and often irrelevant) information in their answers.

Candidates generally performed best on questions 2 and 7. Responses to question 7 were generally very poor.

#### Question 1

*Paper is a common fuel often encountered in compartment fires. Describe in detail the properties of paper and explain how paper behaves when involved in combustion. (20 marks)*

#### **Examiner Feedback**

Most of the candidates that attempted this question demonstrated some basic knowledge in relation to the properties of paper. Many candidates appreciated that there were different considerations relevant to whether single sheets of papers or stacked paper were involved.

The question asked candidates to “explain” how paper behaves when involved in combustion but few candidates demonstrated in-depth understanding of the effect of heat on paper. This lack of depth in responses limited the amount of marks that candidates could attain.

#### Question 2

*You are called to investigate a fire involving an energised two gang extension lead with two electric heaters plugged into it. The extension lead is supplied by a ring main fitted with a 32A miniature circuit breaker. The nominal voltage is 230V AC. Information suggests that one heater has a 3kW element and the other has a 1kW element.*

- a) Assuming that the information is correct, calculate the current draw if both the heaters are in use (correct to 2 decimal places). (4 marks)*
- b) Calculate what the expected resistance should be for each element (correct to 2 decimal places). (4 marks)*
- c) Discuss the possibility of this fire being of electrical origin and give your reasoning. (12 marks)*

#### **Examiner Feedback**

This question was generally answered well. Many candidates clearly understood the relevant power, voltage, resistance and current considerations and calculations that needed to be applied and attained good marks for their responses to part a) and b).

Part c) was generally answered less well as candidates often failed to explore key issues that could have led to the fire.

### **Question 3**

*A lot of evidence can be obtained from glass fragments recovered from a fire scene. Describe the information that can be recovered from examining the glass at a fire scene and explain how glass can be fractured. (20 marks)*

#### **Examiner Feedback**

This question was a popular choice for candidates. Although many candidates demonstrated some basic knowledge of the information that can be gained from glass at a fire scene, few candidates demonstrated in-depth understanding of the way that glass can be fractured. Good marks were achieved by those that included explanations of impact fractures, thermal fractures and pressure wave fractures in their responses.

### **Question 4**

- a) Explain, in detail, heat release rate. (10 marks)*
- b) The location of a fire within a compartment plays a key role in the development of the fire plume. Describe the effect that the wall factor has on plume development. (10 marks)*

#### **Examiner Feedback**

Many candidates appeared to lack understanding in relation to “heat release rate” and there were many poor responses to part a) of this question. Some candidates omitted this section of the question completely.

Part b) was often answered very well with many candidates gaining high marks for this element of the question.

### **Question 5**

- a) Define the term ‘fire’. (2 marks)*
- b) Explain the different types of flame structures produced during combustion. (8 marks)*
- c) Describe five differences between flaming combustion and smouldering/glowing combustion. (10 marks)*

#### **Examiner Feedback**

This question, which tested understanding of fire science, was often poorly answered. Understanding of fire and combustion is fundamental to fire investigation but few candidates achieved high marks for their response to this question.

### **Question 6**

*A compartment fire in a room with a normal fuel load goes through fairly predictable stages of development in its lifetime. With the aid of a simple diagram, describe in detail each of these stages. (20 marks)*

#### **Examiner Feedback**

There were some good responses to this question which assessed understanding that is fundamental to fire investigation. However, there were also many poor responses with some candidates unable to describe the stages ie: beginning/incipient stage, growth/free burning stage, fire growth to flashover, post-flashover stage and decay stage.

### **Question 7**

*As the effects of the nature of fuels and the conditions in a wildland fire are fairly predictable, there are a number of reliable indicators that can be used to determine the direction of fire spread past a given point. Describe these indicators. (20 marks)*

#### **Examiner Feedback**

There were many poor responses to this question with few candidates demonstrating understanding of the indicators. An example of the type of indicator that was expected was the fact that charring of a fencepost or tree trunk will be deeper on the side facing the incoming fire.

Some candidates focused on the ways in which fires start and develop rather than focusing on the requirements of the question which related to indicators that can be used to “determine the direction of fire spread past a given point”.

### **Question 8**

*Fire behaviour ‘indicators’ are the visible, and usually measurable, changes to the surfaces and materials within a fire scene produced by heat, smoke or flames.*

- a) Explain what ‘ghost marks’ are and how they are produced. (10 marks)*
- b) Describe the process that results in ‘annealed furniture springs’ and explain how annealed furniture springs can assist the fire investigator. (10 marks)*

#### **Examiner Feedback**

Candidates that opted to answer this question generally provided a better response to part b) than to part a).

In response to part a), many candidates confused “ghost marks” with smoke, silhouettes and/or protection marks. Most candidates demonstrated understanding of the process that produce “annealed furniture springs” and were able to achieve marks on this section of the question.