



Fire Services Examinations Board  
Qualifying Examination for Promotion to the Rank of  
Sub-Officer

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Paper 1: Operations

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**SUB1-1**

Wednesday 14 September 2005  
0920 hours – 1105 hours (1 hour 45 minutes)

Attempt ALL SIX questions.  
ALL questions carry equal marks.

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## SECTION A OPERATIONAL PROCEDURES AND INCIDENT COMMAND

Attempt BOTH questions

- 1 You are the initial Incident Commander of two pumps attending a developing fire involving large multi-storey occupied industrial premises in a town centre.
- (a) List the resources that you will need to consider in your assessment of needs in order to deal with the incident. **(10 marks)**
- and**
- (b) Identify the specific areas of resource control that the Incident Commander may delegate as sectors to appointed officers as the incident develops and more managers arrive. **(15 marks)**
- 2 Following a multi-pump fire that you initially attended as the Incident Commander, you decide to carry out a de-brief of the incident with your watch.
- Identify and briefly describe the different levels of de-brief on the performance of the individuals and crews on your watch that attended this incident.
- (25 marks)**

## SECTION B FIREFIGHTING AND RESCUE INCIDENTS

Attempt BOTH questions

- 3 As the officer-in-charge of an appliance responding to a road traffic accident on a busy three-lane dual carriageway, you will need to give careful consideration to the positioning of your appliance and the safety of your crew members.

When proceeding up the hill on which the incident has occurred, you note numerous vehicles on fire and discover at least one to have a dual-fuel system.

- (a) Identify, with reasons, the points that you will need to consider when deciding the positioning of your appliance at this incident. **(13 marks)**

**and**

- (b) In addition to wearing the appropriate personal protection equipment and coning-off, list other crew safety procedures that you would apply. **(12 marks)**

- 4 As the officer-in-charge of a predetermined attendance to an office building, on arrival, you discover that the basement of the building is involved in fire.

Describe the particular difficulties that can be encountered when dealing with fire in basements or underground buildings. **(25 marks)**

SECION C SCIENCE AND FIREFIGHTING

Attempt BOTH questions

5 Understanding the density of liquids and gases is an important consideration for firefighters when dealing with chemical incidents. In the role of Watch Manager, you have been tasked to deliver a lecture to your watch on the density of liquids and gases.

- (a) Explain how the density of a substance should be taken into account when considering an incident plan for burning liquids. (7 marks)

and

- (b) Consider two storage tanks standing on a flat horizontal surface and connected at the bottom by a horizontal pipe. Water is added until one tank is identified as being half full.

Explain with the aid of sketches:

- (i) the levels of water that will be present in each tank;  
(ii) if petrol was poured into one of the tanks, what would happen to these liquids now present, and why?; and  
(iii) when the petrol is poured into one of the tanks, how does this affect the comparative liquid levels of both tanks? (18 marks)

6 You attend an incident in an industrial premises which uses paraffin in baths. The heating in one of these baths is out of control and a situation now exists above the surface of the paraffin in which the evaporating fuel vapour is well mixed with air.

- (a) Define:  
(i) 'Flashpoint'; and  
(ii) 'Firepoint'. (8 marks)

and

- (b) As the heating of the paraffin continues beyond its normal working temperature in the bath, explain the effect this has on the vapour/air mixture in the presence of an ignition source as it continues through its:  
(i) 'Flashpoint'; and  
(ii) 'Firepoint'. (8 marks)

and

- (c) Describe the term 'Flash fire'. (9 marks)



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Paper 1: Operations

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**SUB1-2**

Wednesday 14 September 2005  
1345 hours – 1530 hours (1 hour 45 minutes)

Attempt ALL SIX questions.  
ALL questions carry equal marks.

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## SECTION A FIRE DEFENCE AND ALERTING SYSTEMS

Attempt ALL questions

- 1 In the role of Watch Manager, you are to provide an instructional talk to your watch on fire alarm systems in buildings.
- (a) Fire alarm systems, whether automatic or manual in operation, may be installed in buildings to satisfy one, or both, of two principal objectives. Identify these two principal objectives. (3 marks)
- and**
- (b) In relation to electrical fire alarm systems for buildings, describe the following categories of systems and the general objectives which they are installed to satisfy:
- (i) Category M systems;  
(ii) Category L systems; and  
(iii) Category P systems. (14 marks)
- and**
- (c) Identify and describe the four distinct means of automatic connection between a fire warning system and an Alarm Receiving Centre (ARC). (8 marks)
- 2 During a risk assessment visit to a business unit development, the owner informs you that he is prepared to consider installing sprinklers in each of the units as they become vacant and before new tenants move in. He informs you that he is not aware of the different types of sprinkler systems available or which would be the most appropriate for the various uses to which the units may be put and asks you for some information.
- Identify and describe the FOUR different types of sprinkler systems. (25 marks)
- 3 In the role of Watch Manager, you have arranged for your watch to visit a multi-storey complex in which wet rising mains have been installed to assist the Fire and Rescue Service in any necessary firefighting operation. Prior to the visit you decide to assess the knowledge of the watch members on their knowledge and understanding of wet riser firefighting mains.
- (a) Above what height in a building would a wet riser firefighting main be necessary, and why? (5 marks)
- and**
- (b) In what parts of the building is it to be expected that the outlets from the wet riser may be located? (6 marks)
- and**
- (c) Identify all the design features that can be expected in a wet rising firefighting main. (14 marks)

## SECTION B FIRE INVESTIGATION

### Attempt ALL questions

- 4 A fire has occurred at a large historical house. Although the fire has been relatively small the property loss is expected to be of high value.

As the officer-in-charge, your initial investigation suggests that it may have begun as a smouldering fire in an old settee caused by a discarded cigarette end.

(a) Explain:

- (i) the general limitations of this as a possibility; and
  - (ii) the most favourable conditions for this to have been the possible cause.
- (10 marks)**

**and**

- (b) Following further enquiries at the scene of the fire you suspect that its cause may not be accidental.

Having reached this conclusion, identify the consequent actions expected from:

- (i) yourself;
  - (ii) the fire and rescue service; and
  - (iii) the police.
- (15 marks)**

- 5 You have been asked to represent your Station Manager at a meeting with a group of insurance specialists who wish to discuss the financial implications of arson (fire raising) incidents.

Identify the situations when fraud could be the motive for arson. **(25 marks)**

- 6 As the officer-in-charge seeking to establish the cause of a fire in office premises that was discovered shortly after all staff had left at the end of the day, you must speak to as many people as possible who might be able to provide useful information.

When questioning individuals, what information would you seek to obtain from:

- (a) the witness who spotted the fire and made the call to the fire and rescue service? **(13 marks)**

**and**

- (b) the employees? **(12 marks)**

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Paper 3: Human Resource Management

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**SUB1-3**

Wednesday 14 September 2005  
1615 hours – 1800 hours (1 hour 45 minutes)

Attempt ALL SIX questions.  
ALL questions carry equal marks.

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## SECTION A EMPLOYMENT

Attempt BOTH questions

1 In the role of Watch Manager, you are explaining to your watch the effects that absence through sickness of employees has on the effectiveness of the fire and rescue service and the actions expected of employees should they become ill.

(a) What are the consequences to the brigade of high rates of sickness absence?  
(10 marks)

and

(b) Explain the obligations that employees will need to fulfil when first being unable to attend for work due to sickness up until their return to work to ensure their entitlement to sick pay.  
(15 marks)

2 In the role of Watch Manager, you have identified poor performance by a firefighter which is attributable to a lack of capability.

(a) List the four areas that would provide the reasons to deal with poor performance as a lack of capability rather than wilful conduct or attitude.  
(8 marks)

and

(b) When it has been recognised that an unacceptable level of performance at work is evident, explain:

(i) your primary objective;

(ii) the possible effects on others should you ignore the firefighter's lack of competence; and

(iii) the stage at which dismissal for lack of capability is likely to be the outcome.  
(17 marks)

## SECTION B TRAINING AND DEVELOPMENT

Attempt BOTH questions

3 In the role of Watch Manager, you are responsible for assessing the performance of the personnel on your watch.

(a) Explain:

- (i) the reasons for assessments of performance in the workplace;
- (ii) the purpose of assessments of performance in the workplace; and
- (iii) the objectives of properly conducted assessments of performance in the workplace.

(10 marks)

and

(b) Although the assessment of personnel is an ongoing process, identify when, within a fire station, performance reviews should be organised. (6 marks)

and

(c) Explain, in detail, one of the reviews identified in your answer provided in (b) above. (9 marks)

4 You have been tasked by your Station Manager to organise a scenario based training event involving the rescue of live casualties.

Explain fully:

(a) the considerations that should be applied to the use of live casualties prior to the training event. (13 marks)

and

(b) the potential benefits of using live casualties. (12 marks)

## SECTION C HEALTH, SAFETY AND WELFARE

Attempt BOTH questions

- 5 The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR) require the Health and Safety Executive to be notified of certain events. In the role of Watch Manager, you need to be aware of what needs to be reported.

Identify the four specified categories of circumstances associated with accident or injury that require such notification, and give two examples for each category.

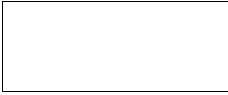
**(25 marks)**

- 6 In the absence of the Station Manager and in the role of Watch Manager, you will have the responsibility for the workplace and must have an awareness of the requirements of the Workplace (Health, Safety and Welfare) Regulations 1992.

Describe the duties placed on employers by these Regulations for 'Health' with regard to:

- (i) ventilation;
- (ii) temperature;
- (iii) suitable and sufficient lighting;
- (iv) cleanliness; and
- (v) workstations and seating.

**(25 marks)**



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Paper 4: Business Administration – Key Skills

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**SUB1-4**

Wednesday 14 September 2005  
1150 hours – 1300 hours (1 hour 10 minutes)

Attempt BOTH questions.  
ALL questions carry equal marks.

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**Attempt BOTH questions**

1 You have been requested to undertake certain work to support reports that are to be submitted to the fire authority.

- (a) A policy of achieving at least one smoke alarm in 95% of the homes in the brigade area is being proposed. In order to do this it is planned to fit, free of charge to the householders, one smoke alarm in those homes that do not already have one. The project is scheduled to take place over four years and an equal number will be fitted each year.

The following information is available:

Number of households in the brigade area = 532,000

% of households already in possession of a smoke alarm = 83%

Cost of alarms = £7.30 each.

Calculate:

- (i) the total number of smoke alarms still needed to satisfy this policy;  
(ii) the total cost of these additional smoke alarms; and  
(iii) the financial provision each year to complete the project.

**(8 marks)**

*(All formulae and working out to be shown).*

**and**

*Continues...*

### Question 1 Cont'd

- (b) In the year 2003, a retained station attended 600 calls. Because of the station's commitment to community safety activity, calls in the retained station area fell by 13% in 2004.

On average, 1 Watch Manager, 1 Crew Manager and 4 Firefighters turned out and 2 Firefighters received only attendance payments.

Given the following simplified pay rates, how much will the authority have saved as a result of the reduction in calls?

	Turn out	Attendance
Watch Manager	£18.47	£9.29
Crew Manager	£16.27	£8.49
Firefighter	£13.98	£7.56

(8 marks)

*(All formulae and working out to be shown).*

and

- (c) The savings on another station were £10,000. The authority has agreed to share this money between the personnel on that station on the following basis:

The Watch Manager will receive 2 times the amount to be allocated to a Firefighter.

Each Crew Manager will receive 1½ times the amount to be allocated to a Firefighter.

The personnel on this station are:

1 Watch Manager;  
2 Crew Managers; and  
8 Firefighters.

In monetary terms, how much will:

- (i) the Watch Manager receive;  
(ii) each Crew Manager receive; and  
(iii) each Firefighter receive?

(9 marks)

*(All formulae and working out to be shown).*

2 By using the data shown below, relating to an area's calls in 1998/99 compared to 1997/98, provide the following information.

(a) In what hour did the greatest number of incidents occur in:

(i) 1998/99; and

(ii) 1997/98?

(2 marks)

and

(b) What is the average number of special service calls occurring per hour?

(to the nearest whole number)

(3 marks)

and

(c) Draw a frequency chart and from that determine the mode for the number of over border calls occurring per hour.

(5 marks)

and

(d) By what percentage have total calls fallen from 1997/98 to 1998/99 (to 2 decimal places)?

(5 marks)

and

(e) Draw a bar chart to show the 1998/99 hourly distribution of chimney fires.

(10 marks)

(All formulae and working out to be shown).

INCIDENTS BY TIME OF CALL 1998/1999										
Time	Fires	Misc Fires	Chimney Fires	False Alarms			Special Service	Over Border	Total 1998/1999	Total 1997/1998
				Malicious	Good Intent	Apparatus				
0001-0100	77	29	4	27	16	58	39	0	250	246
0101-0200	56	13	2	13	6	47	21	1	159	205
0201-0300	54	16	2	12	2	49	17	1	153	157
0301-0400	47	17	0	7	8	53	22	0	154	115
0401-0500	44	13	0	4	5	46	18	1	131	113
0501-0600	26	6	0	1	4	45	11	1	94	125
0601-0700	23	4	0	0	8	56	14	0	105	117
0701-0800	37	4	2	2	11	73	29	1	159	207
0801-0900	38	3	3	5	10	117	39	2	217	225
0901-1000	48	12	4	13	22	155	43	1	298	307
1001-1100	65	7	3	19	16	172	62	1	345	339
1101-1200	58	18	9	22	13	153	70	2	345	368
1201-1300	84	23	14	27	20	121	51	0	340	379
1301-1400	78	47	13	29	20	144	65	0	396	403
1401-1500	70	46	8	30	26	142	65	1	388	399
1501-1600	79	57	13	42	28	144	56	1	420	450
1601-1700	92	62	12	55	31	127	57	4	440	455
1701-1800	106	89	21	56	31	127	72	1	503	552
1801-1900	125	126	27	68	23	123	67	4	563	567
1901-2000	106	153	34	53	33	101	56	3	539	553
2001-2100	105	138	32	49	34	77	45	0	480	535
2101-2200	107	97	21	37	25	88	37	2	414	475
2201-2300	114	62	22	23	20	80	31	1	353	329
2301-2400	97	42	6	24	8	78	25	3	283	290
<b>TOTALS</b>	<b>1736</b>	<b>1084</b>	<b>252</b>	<b>618</b>	<b>420</b>	<b>2376</b>	<b>1012</b>	<b>31</b>	<b>7529</b>	<b>7911</b>