



2017 NZFBI ASSOCIATE EXAMINATION

**Saturday 2 September
0900 to 1200 hours**

MODEL ANSWERS

EXAMINATION RULES AND INSTRUCTIONS TO CANDIDATES

1. Ten minutes will be allowed prior to the commencement of the examination for candidates to read the question paper, but they are not permitted to commence the examination until instructed.
2. Candidates are prohibited from introducing any books or papers of any kind into the examination room.
3. Candidates are not to communicate with, copy from each other, or communicate with anyone outside the examination room. Cellular phones are not permitted in the examination room.
4. Slide rules and silent non-programmable calculators may be used, subject to the scrutiny and satisfaction of the examination supervisor.
5. All written work must be completed in ink or good ball point pen, with drawings and/or diagrams in pencil. Drawing instruments may be used and are to be supplied by the candidate. Marks may be deducted for untidy work.
6. All answers are to be written in the combined question/answer books which will be handed in at the end of the examination. You can request additional paper from the examination supervisor if required.
7. Candidates should ensure that only their allocated examination number appears in the answer book. Do NOT write your name or brigade in the answer book or use them in the text of any of your answers – if required, use fictitious identification.
8. Candidates accept to abide by the rules of the New Zealand Fire Brigades Institute and accept the examination result as final. No correspondence will be entered into.
9. This examination contains three sections:
 - Section A - Multiple Choice
 - Section B - Long Answer (Compulsory)
 - Section C - Long Answer (Elective)

Candidates are to attempt all questions in Sections A and B, and may answer any three questions from the six questions in Section C.

10. Write the candidate number provided to you in the boxes below:

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SECTION A MULTIPLE CHOICE

30 MARKS

Answer all questions. Circle the letter beside the answer you think is correct.

1 mark each

- A1. Steel loses _____ % of its strength at 600°C.
- a) None
 - b) 30%
 - c) 66%
 - d) 50%
- A2. There are three properties of wood that influence its ability to ignite. Which property below is not one of them?
- a) Physical size
 - b) Load
 - c) Preservative treatment
 - d) Moisture content
- A3. The growth phase in a structure fire consists of five parts. What is not part of the growth phase?
- a) Heat starts to build up radiating towards the floor
 - b) There is little unburnt fuel left and gas temperatures decrease
 - c) A flashover occurs
 - d) Two zones are formed being the over-pressure zone and the under-pressure zone
- A4. Two-stroke petrol mix should be carried in what coloured container?
- a) Red
 - b) Blue
 - c) Yellow
 - d) Black
- A5. A backdraught occurring during a structure fire can be very dangerous. Which of the options below is not a sign of an impending backdraught?
- a) Sounds from inside the compartment seemed muffled
 - b) Dense grey-yellow smoke becomes darker as it exits the building
 - c) There is a sudden inrush of air when an opening is made
 - d) Tongues of flame are seen through the hot gas layer

- A6. Combustible metals are classified as what class of fire?
- a) Class A
 - b) Class C
 - c) **Class D**
 - d) Class K
- A7. When parking an appliance at a motor vehicle crash scene, it should be parked:
- a) **With the pump panel facing the incident**
 - b) With the appliance windscreen facing the incident scene
 - c) With the pump panel on the opposite side of the truck from the incident scene
 - d) Backed into the incident scene
- A8. At what pressure does the warning whistle operate on a breathing apparatus set?
- a) 45 Bar
 - b) 50 Bar
 - c) **55 Bar**
 - d) 60 Bar
- A9. What command/order is given to resume any activity that has been stopped?
- a) Carry on
 - b) **As you were**
 - c) Get to work
 - d) Fall in
- A10. Tilt slab is common in the construction of commercial buildings. What is the main hazard that they can pose for firefighters?
- a) **Either inward or outward collapse**
 - b) Height
 - c) Fire loading
 - d) High rack storage
- A11. Which word below does not form part of the phonetic alphabet?
- a) Lima
 - b) Papa
 - c) Alpha
 - d) **Indigo**

- A12. What is the most likely source of contamination from the equipment listed below at the scene of a fire?
- a) Helmet torches
 - b) Boots and gloves
 - c) Outside scene lighting
 - d) Staging area for spare BA cylinders
- A13. Where should a parts dump be located when completing a vehicle extrication?
- a) Beside the pump rescue tender
 - b) On the outer edge of the support area
 - c) Five metres away from the vehicles
 - d) On a salvage sheet beside the tool staging area
- A14. Which of the options below is not a principal of extinguishing a fire?
- a) Venting the fire
 - b) Smothering the fire
 - c) Starving the fire
 - d) Interrupting the chemical chain reaction
- A15. Which item of PPE listed below is not mandatory but often added following a risk assessment at a motor vehicle crash scene?
- a) Gloves
 - b) Safety glasses
 - c) Helmet
 - d) High visibility vest
- A16. When using a PPV fan, when must the ventilation point be created?
- a) Before the PPV fan is directed into the building
 - b) Immediately after the fan is directed into the building
 - c) As soon as possible after the fan is directed into the building
 - d) Once crews have entered the building and are attacking the fire
- A17. When completing the primary survey of a patient, what does the S stand for in the mnemonic DRSABCD?
- a) Safety
 - b) Stand back
 - c) Send for help
 - d) Severity of injuries

- A18. When should the first arriving officer of an appliance communicate his first SitRep?
- a) At the time of arrival
 - b) Five minutes after arrival
 - c) Once the initial scene survey is completed
 - d) Ten minutes after arrival
- A19. When working with an oxygen cylinder, you must take certain precautions. Which statement below is incorrect?
- a) Do not put any part of your body over the cylinder or valve
 - b) Lay cylinders on their sides when in use
 - c) Open the pressure-reducing valve quickly to ensure oxygen passes through the valve properly
 - d) Do not use oil or grease on or near cylinders, regulators or hoses
- A20. Which of these lines is not classed as a line carried on an appliance?
- a) General purpose
 - b) Towing line
 - c) Bucket line
 - d) Rescue line
- A21. When beginning the CPR procedure, how long to you “look, listen and feel” for a response from a patient?
- a) 2 seconds
 - b) 5 seconds
 - c) 10 seconds
 - d) 15 seconds
- A22. Who is the lead service agency at a motor vehicle crash scene?
- a) Ambulance
 - b) Fire
 - c) Police
 - d) Vehicle recovery agent
- A23. How much more water will a 70mm hose deliver over a 41mm hose?
- a) Two times
 - b) Three times
 - c) Four times
 - d) Five times

- A24. A status one patient is in what condition?
- a) Moderate
 - b) **Critical**
 - c) Dead
 - d) Minor
- A25. Who is responsible for wearing a seatbelt in a fire appliance?
- a) The officer in charge of the appliance
 - b) The driver
 - c) **The individual**
 - d) The officer in charge of the brigade
- A26. What item of equipment should be present when operating a portable pump?
- a) Foam branch
 - b) **Fire extinguisher**
 - c) Salvage sheet
 - d) Dividing breaching
- A27. The oxygen flow rate for a conscious patient wearing an acute (or simple) breathing mask is:
- a) 1 – 4 litres per minute
 - b) **6 – 8 litres per minute**
 - c) 10 – 12 litres per minute
 - d) 14 – 16 litres per minute
- A28. What type of portable pump primer is identified as a manual primer?
- a) Exhaust
 - b) Rotary
 - c) **Diaphragm**
 - d) All of the above
- A29. A stop message is used on the radio when:
- a) The fire is contained
 - b) **No further resources are required at the scene**
 - c) The last appliance is leaving the scene
 - d) The appliance has stopped at a running call incident

- A30. When a pump has been primed and water is entering the pump from an open water source, the compound gauge is giving a reading of 30kPa in the red (minus 30 kPa). What is this indicating?
- a) The pressure in the suction hose is 30kPa
 - b) The inlet valve is closed
 - c) Approximately three metres of lift from water level
 - d) Friction loss is 30kPa

Answer all questions in this section:

- Portable Pumps
- Radio Equipment and Procedures
- First Aid

Question 1 Portable Pumps

B1.1 List five safety precautions you should take when establishing a portable pump site. **5 marks**

- Clear space around the pump so that hot exhaust, sparks or hot engine cannot ignite vegetation
- Keep the pump level and on a firm surface
- Secure the pump to prevent it moving
- Be aware of fast flowing and deep water
- Ensure the pump operator is not breathing pump exhaust fumes
- Establish a safety zone
- Monitor quantity and quality of water and suction lift
- Be aware of hazards such as traffic, overhead wires or trees

B1.2 List five items of equipment you need when conducting operations with a portable pump.

5 marks

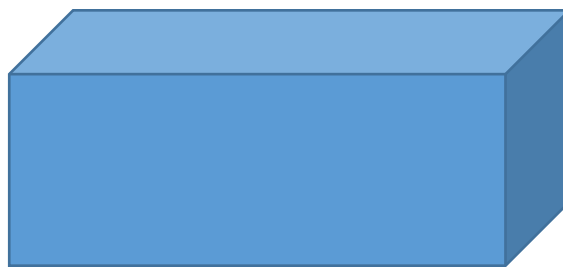
- Suction hose and foot valve
- Spare spark plug and spark plug spanner
- Delivery hose
- Ear muffs
- Shovel
- 41mm controlled dividing breech
- 41mm branch nozzle
- Portable radio
- Fuel can
- Hydro blender or class A foam concentrate
- Dry powder extinguisher
- Bucket strainer

B1.3 List five things you need to consider to ensure continuity of water supply when you are pumping from open water. **5 marks**

- Strainer is deep enough to avoid a vortex (3 x strainer diameter)
- Digging or damming stream
- Portable or improvised dam
- Blockage of suction
- Pumps as close as practicable to source
- Monitoring the water supply level

B1.4 Calculate the volume in litres of rectangular tank measuring 2.5m deep x 9m long x 4m wide.

2 marks



$$\begin{aligned}\text{Volume} &= \text{Length} \times \text{Width} \times \text{Depth} \times 1000 \\ &= 9 \times 4 \times 2.5 \times 1000 \\ &= 90 \times 1000 \\ &= 90,000 \text{ l}\end{aligned}$$

B1.5 Mud, silt, vegetation, stones, and rubbish in the water supply can block the suction hose strainer and reduce the volume that the portable pump can deliver. Detail three ways of ensuring that the intake of contaminants through the pump can be reduced. **3 marks**

- Use a suction tray to minimise the problem
- Attach a float to the strainer to keep it clear of the bottom
- Tie the suction hose to a ladder to keep it clear of the bottom

Question 2 Radio Equipment and Procedures

B2.1 List four things you must check as part of your regular maintenance checks of radio equipment.

4 marks

- Note any faults and action them as soon as possible
- Check the aerial to make sure it's connected properly and that it's not damaged (any damage to the aerial will reduce the receiving/transmission capabilities of the radio)
- Check and test the microphone/speaker to make sure it is connected properly and not damaged
- Check that the battery is fully charged and that you have spares

B2.2 There are two terms used to describe to the caller how well their transmission is heard. What are the two terms and give one example of a report you would transmit using these terms. **3 marks**

Strength:

- loud
- weak
- very weak
- fading

Readability:

- Clear
- Readable
- Unreadable
- Distorted
- With interference

B2.3 Describe the procedure to make an emergency call on the radio.

1 mark

- Say EMERGENCY, EMERGENCY, EMERGENCY.
- When a reply is received, the caller must give their:
 - Identity
 - Location
 - Nature of emergency

B2.4 Spell the word "radio" using the phonetic alphabet.

2 marks

ROMEO ALPHA DELTA INDIA OSCAR

B2.5 What do the following K codes mean?

4 marks

- | | | |
|----|-------|----------------------------------|
| a. | K1 | Proceeding to incident |
| b. | K11-1 | Police required - Confidential |
| c. | K32 | Radio test – how do you receive? |

- d. K35 Verify address of incident
- e. K46-1 Stop Message: False alarm - Good intent
- f. K47 Stop Message: Unchanged from an earlier informative message
- g. K66 Arrival: Non-property fire
- h. K6 Available through pager notification

B2.6 What is the difference between a KE and K0? **2 marks**

K0 – Not available to attend incidents as part of a normal turnout sequence

KE – Unable to proceed when already associated to an event

B2.7 There are some commonly used words and phrases in standard radio procedures. For each word describe its meaning. **4 marks**

a. Acknowledge

Let me know you have received and understood the message

b. Out

My transmission is ended and I do not expect a reply

c. Over

My transmission is ended and I expect a reply

d. Say again

Repeat all or the following parts of your transmission

Question 3 First Aid

B3.1 To check for a person's level of responsiveness, AVPU is a simple reminder. List the four levels of responsiveness and briefly describe each of them. **4 marks**

- Alert: The patient is alert and responsive
- Voice: Even if drowsy, the patient can reply when you talk to them
- Pain: The patient is responsive to pain (hard pinch to earlobe or the trapezius muscle)
- Unresponsive: The patient is unresponsive to voice or pain

B3.2 You and your crew must perform CPR continuously once in attendance at a cardiac arrest. Name four situations when you can stop performing CPR. **4 marks**

- The patient recovers responsiveness and can breathe on their own
- You are placed at significant risk
- You cannot continue due to exhaustion
- An AED is attached and instructs you to stop
- You are advised to stop by the St John clinical advisor, or a paramedic or doctor

B3.3 Describe the procedure for clearing an airway obstruction (choking) in adults and children. **4 marks**

- Ask the patient if they are choking
- Try to position the person so they can support themselves on a table or desk
- Stand to the side of the patient and slightly bend the patient over
- Support the patient's chest with one hand and give five sharp blows between the shoulder blades with the palm of your hand.

B3.4 List four signs of inadequate breathing. **4 marks**

- Little or unusual chest movement
- Weak or abnormal sounds (wheezing, etc.)
- Occasional gasps
- Reduced responsiveness
- Rapid or slow breathing
- Unusual posture.

B3.5 Briefly describe a bag mask resuscitator and name a situation where the bag mask may need to be used. **2 marks**

A Bag Mask Resuscitator is a high-concentration, manually operated oxygen delivery device suited to patients who are not breathing adequately, or non-breathing patients who require resuscitation. It has a reservoir bag attached that increases the delivery of oxygen.

B3.6 Detail the procedure for inserting an Oropharyngeal airway (OPA) into a patient's mouth. **2 marks**

- Select an airway nearest to the length from the corner of the patient's mouth to the tip of their earlobe.
- Use the head-tilt chin-lift technique to open airway.

- Insert the airway with the curved part facing the roof of the mouth, passing the airway behind the tongue.
- Rotate 180° so that the curved part is sitting over the tongue.
- Check that the flange/bite block is sitting flush with the patient's lips or teeth.

Answer any three questions of the following six questions:

- Aerial Operations
- Urban Operations
- Firefighting Equipment
- Fire Science
- Community Education
- Dry Firefighting Techniques

If more than three questions are answered, the first three questions will be marked.

Question 1 Aerial Operations

C1.1 When setting up a site for helicopter operations what are five critical factors to consider?

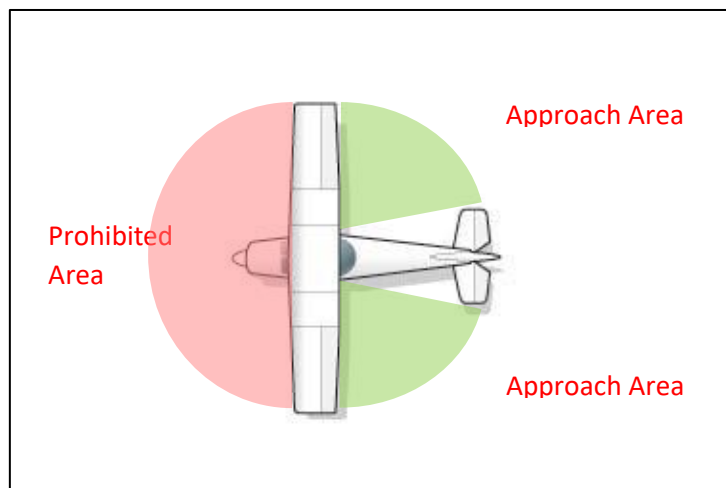
5 marks

- Airstrip orientation
- Airstrip surface
- Airstrip length
- Airstrip altitude
- Turning circle

C1.2 On the diagram below identify:

- The preferred and prohibited approach zone by using arrows or shading the areas and label each; and
- Name and identify at least two fixed wing aircraft components that are hazardous to personnel.

4 marks



- Props
- Doors
- Rudder
- Elevators
- Ailerons
- Slats
- Spoilers

C1.3 Identify and describe five factors to consider in site selection for an area to carry out helicopter operations.

5 marks

- Wider tolerance of airstrip direction in various wind conditions during take-off and landing
- Less need for extensive flat and close grazed areas. Muddy areas are undesirable but limited amounts can be workable. Limited ground corrugation is okay.
- Length of site for operations is less critical than for fixed wing aircraft
- Little extra space is required to turn helicopters before subsequent take-offs

- Better suited to lower altitudes:
 - 5000 ft = payload reduced
 - 9000 ft= limited ability to operate

C1.4 Under Civil Aviation rule 91.211 a passenger briefing must be undertaken prior to any take-off.

a. Who should give the briefing? **1 marks**

The briefing must be given by the pilot -in-command, a member of the crew, a person nominated by the operator, or by a recorded presentation

b. What are five key points that must be covered in a briefing? **5 marks**

- Locations and means for opening passenger entry doors / emergency exits
- Requirements of stowing luggage and passenger amenities
- The location of survival / flotation / emergency / oxygen equipment for passenger use
- The procedures in the case of an emergency landing
- The use of portable electronic devices

Question 2 Urban Operations

C2.1 Before donning a BA face mask, what two actions must you complete first? **2 marks**

- Reset first breath mechanism
- Turn on cylinder

C2.2 When doing a low-pressure test, how long do you hold your breath and what do you look for? **2 marks**

Two seconds. The needle should not move in the gauge

C2.3 What are the first two things you do in case of sudden air loss while wearing BA? **2 marks**

- Check cylinder valve is turned on
- Operate the supplementary supply valve

C2.4 In the entrapment procedure, how do you attract attention to your situation? **2 marks**

The wearer activates the PASS alarm. If this cannot be activated, the clapping of hands or tapping noises on an object can be used to guide the rescuers towards the wearer.

C2.5 List any two examples of harmful substances that can make an irrespirable atmosphere. **2 marks**

- Toxic gases
- Dust
- Fumes
- Smoke
- Vapours
- Any irrespirable atmosphere

C2.6 What are two important pieces of information recorded on a BA Tally at the time of deployment? **2 marks**

- Wearers name
- Cylinder air pressure

C2.7 When carrying out decontamination, outer clothing and equipment must be washed with a minimum flow rate. What is the required flow rate during the decontamination and for how long is this flow required to be maintained? **2 marks**

- 20 litres per second
- Two minutes

C2.8 What is meant by hypoxia? **2 marks**

Hypoxia is the condition that occurs when the brain and other vital organs are deprived of oxygen

C2.9 What actions MUST you take if a BA team fails to return by the time due out?

2 marks

- Notify Incident Commander, OIC and BASO if established
- Dispatch a rescue team
- Assemble further rescue teams
- Request medical assistance

C2.10 When using a PPV fan, who must the PPV fan operator inform in the event of a fan failure?

2 marks

- The internal fire-fighting crew(s)
- Incident commander

Question 3 Firefighting Equipment

C3.1 Name four types of firefighting hoses commonly used on fire appliances in New Zealand.

4 marks

- Hose Reel Tubing
- Lay flat
- Water Jacket
- Hard suction

Various iterations of hose diameter i.e. 25mm, 41mm, 45mm, 70mm, 90mm can expand the choices above.

C3.2 What are four of the triggers for a standard test procedure for in-service hose?

4 marks

- On all hose supplied uncoupled and then coupled by FENZ staff
- After use at incidents
- After repair
- Annually (45mm, 70mm, 90mm lay flat hose)
- Biannually (25mm, 41mm lay flat hose)

C3.3 Name three types of BA cylinders currently in use with Fire and Emergency New Zealand.

3 marks

- Steel
- FRP – Fibre Reinforced Plastic
- Composite (Alloy)

C3.4 How often are the following breathing apparatus cylinders hydrostatically tested?

2 marks

- Steel **Five yearly**
- Composite **Two yearly**

C3.5 Name three pieces of equipment used for gaining access to a locked building with a roller door and a locked internal door.

3 marks

- Halligan
- Crowbar
- Pry bar
- Axe
- Sledgehammer
- Cut off saw
- Disc
- Cutter
- Bolt cutters
- Partner saw
- Rabbit tool

C3.6 When using a PPV fan, who must the PPV fan operator inform in the event of a fan failure?

2 marks

- The internal fire-fighting crew(s)
- Incident commander

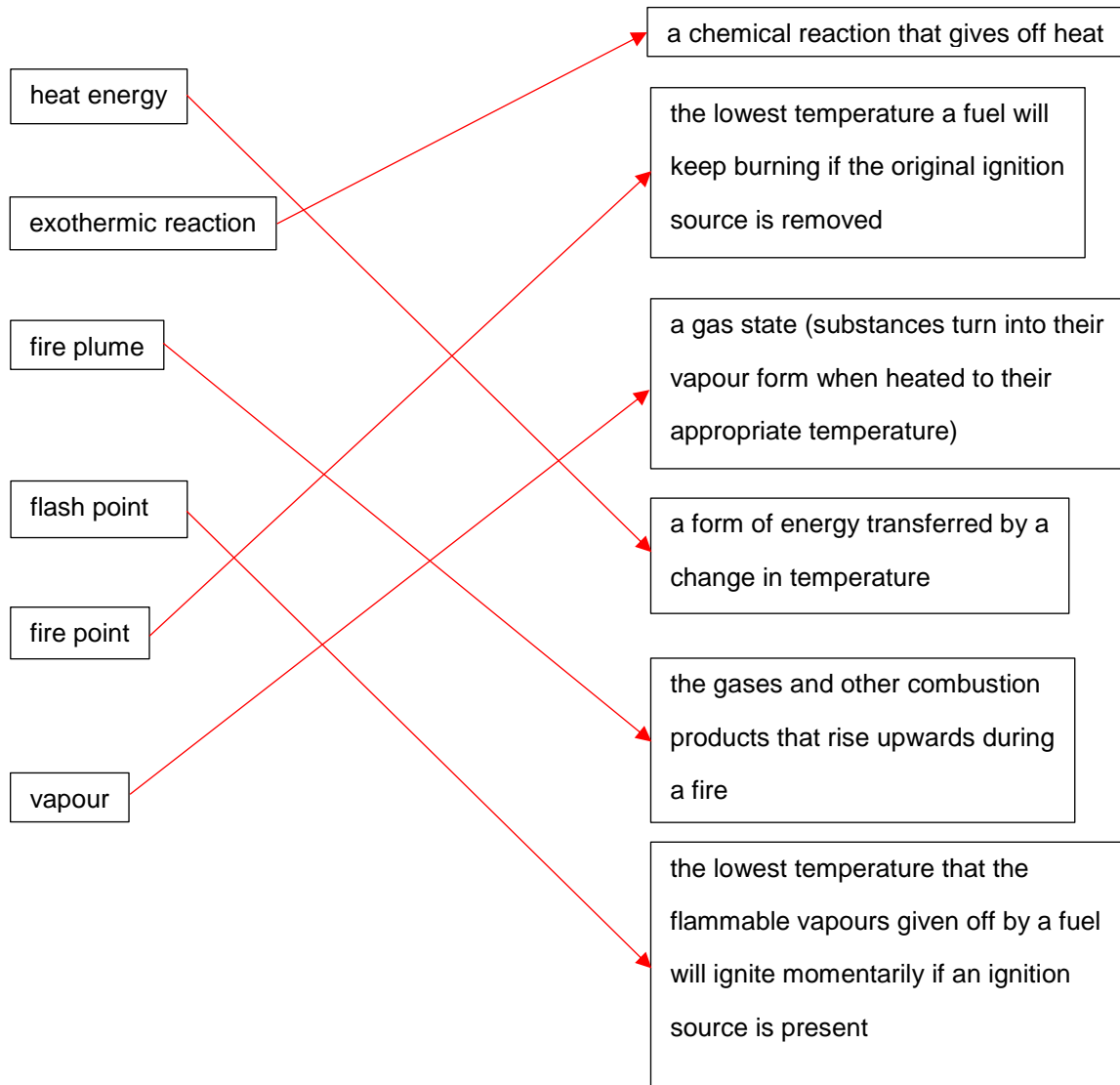
C3.7 What are the types of fire extinguishers are generally found on fire appliances?

2 marks

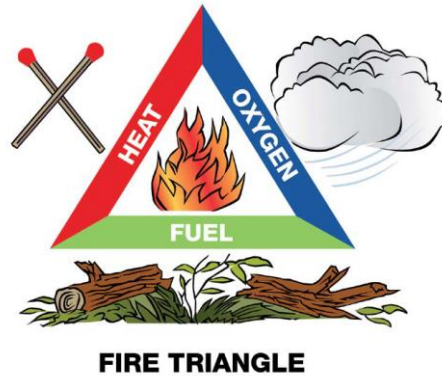
- Carbon dioxide
- Dry powder

Question 4 Fire Science

C4.1 Connect each box with an arrow which outlines the definition on the opposite side. **6 marks**



C4.2 To extinguish a fire, we need to remove one or more “sides of the fire triangle”. Draw a diagram of the fire triangle and state an example of how each can be removed to extinguish a fire. **6 marks**



- Fuel – for example to remove the fuel
- Heat – for example using water to cool
- Oxygen – for example using a foam blanket to smother

C4.3 Explain briefly how a fire in a structure grows and develops within a compartment using the “Four Phases of Fire” principle. **8 marks**

- Incipient Stage - Fuel, oxygen and heat occurs starting ignition.
- Growth Stage - Hot gases rise causing fire plume, moving laterally along the ceiling, builds in and begins to move down. Heat radiating towards the floor. Temperature increases causing pyrolysis and then flashover.
- Fully developed / Steady state – Everything in the room is burning and can depend on the amount of oxygen entering the room (known as ventilated controlled fire)
- Decay - Most of the fuel has been used, the temperature decreases and the fire starts to die down

Question 5 Community Education

C5.1 What are four aspects of the role of a Fire Risk Management Officer? **4 marks**

- a) Provide advice on and conduct fire investigations
- b) Provide technical advice on building safety and inspections
- c) Provide technical fire safety advice to Chief Fire Officers, to ensure the Fire Service's statutory obligations (and our focus on the incidence and consequence of fire) are met
- d) Provide high quality fire safety advice to all community sectors

C5.2 There are eight "at risk" groups that Fire and Emergency New Zealand focuses on to provide fire safety resources to enhance community education. Name five of the groups. **5 marks**

- a) Children
- b) Older adults, specifically isolated, hard to reach elderly
- c) Lower socio-economic groups
- d) Māori and Pacific Island peoples
- e) Disabled persons and those with special needs
- f) Rental property owners
- g) Rural property owners
- h) Commercial / industrial / retail property owners.

C5.3 Briefly summarise the Fire and Awareness Intervention Programme (FAIP) and state the age range of the target audience. **2 marks**

Consequence based programme to reduce fire lighting incidents in young fire lighters from ages 3-17 years old.

C5.4 Detail one of the ways to make a FAIP referral to Fire and Emergency New Zealand staff. **1 mark**

Referrals can be made by email to faip@fire.org.nz or by calling 0800FIREINFO or take the information and contact details and pass on to someone who knows.

C5.5 Detail the objectives of the "Get Firewise" programme. Include the process of teaching, the school years involved, and at least one key message. **5 marks**

Get FireWise is a programme designed to teach fire safety behaviour that could save a child's life in an emergency:

- a) It is a structured, sequential program that can be taught by teachers in every school within New Zealand
- b) A crucial aspect of the program is a presentation by a Firefighter to the class.
- c) The programme teaches the following lifesaving phrases:
 - a. 'Get Down, Get Low, Get Out Fast'
 - b. 'Shout FIRE, FIRE, FIRE'
 - c. 'Go to the safe meeting place'.
- d) The following resources are provided to aid in the Get FireWise programme:
 - a. Firefighter's Get FireWise kit for use with Years 1–2 and Years 7–8 presentations
 - b. Components have also been developed for Kōhanga Reo, and Kura Kaupapa students

C5.6 Below are some of Fire and Emergency New Zealand's fire safety messages. Fill in the missing words:

3 marks

- Swept chimneys are safe chimneys
- Don't drink and fry.
- Have no doubt of two ways out. Make sure you have an escape plan.
- Fire is fast. Get out, stay out.
- Put ashes in a metal bucket to cool. They can start a fire for up to five days.

Question 6 Dry Firefighting Techniques

C6.1 List five hand tools that can be used for fighting vegetation fires and describe what they are used for. **5 marks**

- Shovel
- Fire rake
- McLeod tool
- Pulaski
- Mattock
- Axe
- Slasher
- Beater

C6.2 Explain the following fireline construction techniques using hand tools: **5 marks**

a. Use of natural barriers

Rivers and barren areas, and constructed fire barriers, like roads, railway lines and cleared firebreaks help contain the fire.

b. Avoidance of heavy fuels

Creating a line through heavy fuels requires extra work due to the nature of the vegetation and required dimensions of an effective fire line.

c. Width of the fireline

To increase the width of the fire line in grass fuels, an option is to dig and roll the turf to the side away from the fire on the protected side.

d. Height of overhanging vegetation

Cutting down overhanging material can help prevent material from moving downhill.

e. Trenching on slopes

Trenching involves chopping and digging into a slope to form a trough and enhancing the barrier by piling the soil dug up along the downhill side of the trench.

C6.3 Explain how hot spots are identified. **2 marks**

Use of a thermovision scanner operated by trained personnel to help locate hot spots and to detect deep-seated hot spots not apparent at the surface.

Doubtful hot spots can be checked for warmth with the back of a hand (cold-trailing).

C6.4 Explain how the following actions assist with mop-up:

8 marks

a. Extinguishing

Ensuring that the fire line cannot expand or spread beyond the perimeter.

b. Isolating

Removing or protecting hazardous fuel to ensure the fire cannot be sustained.

c. Containing

Allowing fuels that are not completely burned to burn themselves out.

d. Seeking assistance

Staying within calling distance of other crew members in case assistance is required.