Amateur radio syllabus - Foundation level

	Section 1 — Licensing conditions and station identification
	Nature of amateur radio, types of licence and call signs
1A1	Recall that the amateur licence is for self-training in radio communications and is of a non-commercial nature. Business use and commercial advertising is not permitted.
1A2	Recall the meaning of various types of Amateur Licence (Foundation, Intermediate, Full), and identify their Call signs, including Regional Secondary Locators and optional suffixes /A, /P, /M and /MM. Recall the meaning of 'Main Station Address', 'Alternative Address', 'Temporary Location' and 'Mobile'. Recall that the Foundation and Intermediate Licences do not permit operation of the Radio Equipment from a Vessel at Sea. Recall that airborne operation within the UK is not permitted at any Amateur Licence level. *Note: The optional club secondary locators are not examined.*
1A3	Recall the Foundation Licence does not permit the on air use of own design and modification of transmitting apparatus and that these privileges are available to holders of Intermediate and Full licences.
1A4	Recall that the Licensee must give immediate notice to Ofcom of any change to the Licensee's name, Main Station Address or mailing address. Recall that the licensee must confirm that the details shown on the licence remain valid at least once every five years. Recall that the licence can be revoked by Ofcom for breaches of licence conditions or for non-confirmation of licence details.

1A5	Recall the requirements for station identification.
	Note: For the purposes of the examination this includes identifying when there is a change of:
	• frequency
	• mode, including change of digital protocols
	  • FM (Frequency Modulation)
	  • AM (Amplitude Modulation)
	  • SSB (Single Sideband)
	  • CW (Continuous Wave - Morse Code)
	  • DATA (e.g. PSK, RTTY, WSPR, FT8)
	• supervisor
	• Regional Secondary Locator.

	Operators and supervision
1B1	Recall that only the licensee, or another UK licensed amateur operating under his or her supervision, may use the Radio Equipment. Recall that the call sign of the supervisor is used to identify the station and operation is in accordance with the supervisor's licence. Recall that in certain circumstances the licensee may allow the equipment to be used by a member of a User Service. Recall that only a Full Licensee, including a Full licensee operating under a Full (Club) licence, may supervise on air operation by a candidate on a Foundation Training Course. *Notes:* *The term 'Radio Equipment' (in initial capitals) is a defined licence term meaning the equipment used and identified by the operator's call sign. If a visiting amateur uses the radio equipment with his own call sign, it is his/her Radio Equipment.* *The Nature of the circumstances and identity of the User Services are not examinable.*
	Messages
1C1	Recall the requirement to send messages only to other amateurs. Recall that a 'Net' or 'Network' refers to a conversation with several amateurs with whom communication and identification has been established. Recall that transmitting for general reception, that is to anybody who may be listening, is not permitted other than for CQ calls.
1C2	Recall that secret codes are not permitted except under very specific circumstances. Understand that Morse code is not a secret code and that it is only secret codes which obscure the meaning of the Message that are prohibited.
	Apparatus, inspection and closedown
1D1	Recall the Licensee must carry out tests from time to time to ensure that the station is not causing Undue Interference to other radio users. Recall that a person authorised by Ofcom has the right to any or all of the following: • inspect, • require the modification of, • require the closedown of, • restrict the operation of the Radio Equipment.
1D2	Recall that to assist interference identification a person authorised by Ofcom may require the Licence holder to keep a log of all transmissions made over a specified period of time.
	CEPT and international
1F1	Recall that other Administrations (foreign countries) do not routinely recognise the Foundation Licence.

	Licence schedule
1G1	Identify relevant information in Schedule 1 to the Foundation licence. *A copy of the relevant part of Schedule 1 will be available during the examination.*
1G2	Recall the • purpose of basic EMF restrictions; • equipment to which the EMF restrictions apply; • transmit power level at which the EMF restrictions apply; • persons to which the EMF restrictions apply; • need to keep a written record of assessments carried out. *Note:* *1. See also 8D1.* *2. The record includes a justification of why no further action is required if that is the case (e.g., power levels are below the threshold).*
	Section 2 — Technical aspects
	Fundamental theory
2A1	Understand that the flow of electrons is an electric current. Recall that a conductor allows electrons to flow easily and that an insulator does not. Recall that metals such as copper and brass are good conductors, as is carbon. Plastics, rubber, glass and ceramics are regarded as insulators. Recall that current can flow across wet insulators. Recall that the unit of electric current is the Ampere (Amp). Recall that the unit of electrical potential is the Volt.
2A2	Recall that a circuit is needed to allow current to flow, and that circuit will include a source of electrical energy. Recall that current in all parts of a series circuit has the same value. Recall that the potential differences across items in parallel are the same.
	Power
2B1	Recall that power is measured in Watts (W). Recall that a current through a resistor results in conversion of electrical energy to heat energy in the resistor. Understand that Power (Watts) in a circuit is the product of the Potential Difference (Voltage) and the Current (Amps) i.e. $P=V\times I$ Calculate the unknown quantity given the numerical value of the other two.

	Resistance
2C1	Understand that resistance is the property of a material that opposes the flow of electricity. Recall that the unit of resistance is the Ohm (Ω). Recall that the current (I) through a resistor (R) is proportional to the voltage (V) across that resistor. Use Ohm's law to calculate the value of any one of the three quantities (voltage V, current, I and resistance R) given the other two. Understand that where a supply feeds more than one component or device the total current is the sum of the currents in the individual items when connected in parallel.
2C2	Understand that the sum of the voltages across a number of resistors in series equals the supply voltage.
2C4	Recall that polarity must be correct for electronic circuits to function correctly, or damage may be caused.
	AC theory
2E1	Understand what is meant by Direct Current (DC) and Alternating Current (AC).
2E2	Identify the sine wave as a graphical representation of the rise and fall of an alternating current or voltage over time. Recall the frequency of the mains supply – 50Hz. Recall the range of frequencies for normal hearing – 20Hz -15kHz. Recall the range of frequencies for audio communication – 300Hz - 3kHz. Recall that radio frequencies can range from below 30kHz to beyond 3000MHz. Recall the frequency bands for HF, VHF and UHF radio signals. Understand the meaning of the abbreviations RF and AF.
2E7	Understand the relationship between frequency (f) and wavelength (λ). Recall the units for frequency (Hz) and wavelength (m). *Both the f λ graph and the velocity of radio waves will be given in the Reference Booklet.*
	Digital signals
2F1	Recall that analogue signals are constantly changing in amplitude, frequency or both. Recall that digital signals are a stream of finite values at a specific sampling interval. Recall that digital signals can be processed by a computing device with suitable software.

2F2	Recall that an Analogue to Digital Convertor (ADC) is a device used to sample an analogue signal and produce a digital representation of it. Recall the meaning of the term ADC. Recall that a computing device is required to process digital signals. Recall that a Digital to Analogue Convertor (DAC) is a device used to represent a digital signal in analogue format. Recall the meaning of the term DAC.
	Cells and power supplies
2J1	Understand that a battery is a combination of cells (usually in series). Recall that a battery provides electrical energy from stored chemical energy and has a Potential Difference across its terminals. Recall that any unwanted battery must be properly disposed of. Understand that a rechargeable (secondary) battery has a reversible chemical process.
	Section 3 — Transmitters and receivers
	Transmitter concepts
3A1	Recall that the function of a radio transmitter is to send information from one place to another using electromagnetic radiation/wireless technology. Recall that the process of adding information to a radio frequency carrier is known as modulation.
3A2	Recall that the audio (or data) signal is modulated on to the radio frequency carrier in the modulation stage of the transmitter. Recall that modulation is achieved by varying the amplitude or frequency of the carrier, resulting in AM or FM modulation modes. Recall that information can be carried by AM, SSB or FM. Recall that data may be transmitted by modulating the carrier using suitable audio tones, commonly two or more, generated by an audio interface such as a computer sound card.
3A3	Recall that when radio frequencies are modulated (mixed) with an audio frequency the new frequencies that are generated are called sidebands. Recall that amplitude modulated signals contain two sidebands and the carrier. Recall that a SSB modulated signal contains only one sideband.
3A4	Identify diagrams representing audio, an RF carrier, amplitude modulated, frequency modulated and CW radio signals. Understand the terms carrier, audio waveform and modulated waveform. *Note: Table 2 shows appropriate diagrams.*

	Transmitter architecture
3B1	Identify the items in a simple transmitter block diagram and recall their order of interconnection: Microphone, audio (microphone) amplifier stage, frequency generation stage, modulator stage, RF power amplifier stage, feeder and antenna.
	Oscillators
3C1	Recall that the oscillator in a simple transmitter sets the frequency on which the transmitter operates. Recall that incorrect setting of this stage can result in operation outside the amateur band and interference to other users.
	Microphone amplifiers and modulators
3E1	Recall that the microphone amplifier amplifies the signal from the microphone to the level required to drive the modulator and limits the audio frequencies to those required for communication. Recall the need to ensure that the microphone gain control (where fitted) is correctly adjusted.
	RF power amplifiers
3F1	Recall that the RF power amplifier stage increases the power of the modulated RF signal to the final output level.
3F3	Recall that the RF power amplifier output must be connected to a correctly matched load to work properly and that use of the wrong antenna can result in damage to the transmitter.
	Transmitter interference
3G1	Recall that excessive amplitude modulation causes distorted output and interference to adjacent channels. Recall that excessive frequency deviation will cause interference to adjacent channels.
	Receiver concepts
3H1	Recall that the function of a radio receiver is to recover information sent from one place to another using electromagnetic radiation/wireless technology. Recall that the process of recovering information from a modulated radio frequency signal is known as demodulation.
3H2	Identify the items in a simple receiver block diagram and recall their order of interconnection: Antenna, feeder, wanted signal selection and RF amplification, demodulation/detection, audio amplification and loudspeaker or headphones. *Note: See table 2.*

	Demodulation
3K1	Recall that the detector/demodulator stage recovers the original information from the modulated signal. Recall that the audio amplifier ensures the recovered modulation is strong enough to drive headphones or a loudspeaker.
	SDR transmitters and receivers
3M1	Recall that the SDR receiver takes in all electromagnetic signals from the antenna and digitises this input for processing in software. Recall that a mathematical operation enables all the signals to be sifted into separate frequency components. Recall that the required signal is selected using a filter defined in software. Recall that demodulation is carried out in software. Recall that Software Defined Radio (SDR) receivers convert incoming signals to digital format and then perform filtering and demodulation on the signal using software and that SDR transmitters generate modulated radio signals using software.
	Section 4 – Feeders and antennas
	Feeders
4A1	Recall the correct cable types to use for RF signals and that coaxial cable is most widely used because of its screening properties. Identify Twin Feeder & Coaxial as types of feeder. Understand that twin feeder is balanced having equal and opposite signals in the two wires. Understand that coaxial feeder is unbalanced with the signal on the centre conductor surrounded by a screen.
4A2	Recall that some RF energy is converted to heat in feeders so they exhibit loss. Recall that feeders cause loss of signal strength on both transmit and receive; the longer the cable, the greater the loss. Recall that feeder loss increases with frequency and that low loss feeders (lowest dB per unit length) should be used at VHF and UHF.
	Baluns
4B1	Recall the difference between balanced and unbalanced antennas and that a balun should be used when feeding a dipole with coaxial cable (which is unbalanced).
	Antenna concepts
4C1	Recall that the purpose of an antenna is to convert electrical signals into radio waves (and vice-versa) and that these are polarised according to the orientation of the antenna, e.g. a horizontally oriented antenna will radiate horizontally polarised waves.

4C2	Understand the concept of an antenna radiation pattern. Identify the polar diagrams for the half wave dipole and Yagi antennas. Identify the directions of maximum and minimum radiation. Understand that half-wave dipoles (mounted vertically), λ/4 (quarter wavelength) ground planes and 5/8 λ antennas are omni-directional. *Note: only dipole and Yagi antennas will be examined for radiation pattern.*
4C3	Understand that antenna gain is due to its ability to focus radiation in a particular direction. Recall that a Yagi antenna typically has a higher gain because of its improved focussing ability. Recall the gain of an antenna is normally expressed relative to a half-wave dipole and measured in dB (Higher dB value is a higher gain). Recall that the directional power is expressed as Effective Radiated Power (ERP) and that the apparent power increase is known as gain. Recall that ERP is calculated by multiplying the power applied to the antenna feed point by the gain of the antenna. Calculate ERP given antenna input power and antenna gain. *Note: dB conversion table (3, 6 & 10) will be provided.*
4C4	Recall that antenna gain can also be expressed relative to a theoretical antenna that radiates equally in all directions and this is shown as EIRP, Effective Isotropic Radiated Power. Recall that 10W EIRP is equivalent to 6.1W ERP.
4C5	Recall that VHF and UHF signals will normally be received most effectively when the transmitter and the receiver have the same antenna polarisation and that this is less important at HF because the polarisation may change during ionospheric reflection.
4C6	Recall that the connection point of the feeder to the antenna is called the feed point. Recall that at the design frequency the feed point has an impedance that should match the impedance of the feeder and the transmitter. Recall that the feed point impedance of an antenna is related to the dimensions of the antenna and the wavelength of the applied signal. Recall that if the feed point impedance of the antenna does not match that of the feeder, energy will be reflected back down the feeder; the proportion reflected depending upon the degree of mismatch.
	Types of antenna
4D1	Identify the half-wave dipole, λ/4 (quarter wavelength) ground plane, Yagi, end-fed wire and 5/8 λ (five eighths wavelength) antennas. Understand that the sizes of HF and VHF antennas are different because they are related to wavelength, though they operate on the same basic principles. Understand that the λ/2 (half wavelength) dipole has a physical length approximately equal to a half wavelength of the correct signal.

	Standing waves
4E1	Recall that the antenna system must be suitable for the frequency of the transmitted signal. Recall that if an antenna is not correctly designed for the frequency it will not match the transmitter and will not work effectively. Recall that if the antenna does not match the feeder some power from the transmitter will be reflected back towards the transmitter causing standing waves.
4E2	Recall that an SWR meter shows whether an antenna presents the correct match to the transmitter and is reflecting minimum power back to the transmitter. Recall that a high SWR, measured at the transmitter, is an indication of a fault in the antenna or feeder and not the transmitter. Recall that the transmitter may be damaged in the presence of a high SWR much greater than 2:1.
	Antenna matching units
4F1	Recall that where an antenna has not been designed for the frequency being used, the feed resistance will change resulting in a mismatch and that an Antenna Matching Unit (AMU), also sometimes referred to as an ATU, can correct the mismatch and is used to ensure that the transmitter can supply energy to the antenna without damage to the transmitter.
	Plugs and Sockets
4G1	Recall that the plugs and sockets for RF should be of the correct type and that the braid of coaxial cable must be correctly connected to minimise RF signals getting into or out of the cable. Identify BNC, N, SMA and PL259 plugs as shown in Table 2.
	Section 5 – Propagation
	Radio propagation: key concepts
5A1	Recall that radio waves normally travel in straight lines. Recall that they can be refracted, diffracted and reflected. Recall that radio waves get weaker as they spread out.
5A2	Recall that VHF and UHF signals normally pass through the ionosphere and at these frequencies propagation is within the troposphere situated below the ionosphere.
	Ionosphere
5B1	Recall that the ionosphere comprises layers of ionised gases at heights between 70 and 400km above the earth. Understand that ionisation is caused mainly by ultraviolet rays from the sun.

5B2	Recall that on HF most communication relies on the waves being refracted in the ionosphere. Recall that HF can provide world-wide propagation depending on how well the ionosphere refracts the waves back to the earth. Recall that this varies with frequency, time of day, season and solar activity. Recall that a band is said to be 'open' when it supports skywave propagation.
	VHF and above
5C1	Recall that hills cause radio shadows and that signals become weaker as they penetrate buildings. Recall that at VHF/UHF, range decreases as frequency increases and that in general VHF/UHF waves have a range not much beyond line of sight. Recall that sporadic E and atmospheric ducting can increase the range of VHF and UHF signals.
5C2	Recall that falling snow, hailstones and heavy rain can attenuate signals at UHF and above.
5C3	Recall that the range achieved at VHF/UHF is dependent on antenna height, antenna gain, a clear path and transmitter power. Understand that higher antennas are preferable to higher power as they improve both transmit and receive performance. Recall that outdoor antennas will perform better than indoor antennas.
	Section 6 – Electro magnetic compatibility (EMC)
	EMC concepts
6A1	Recall that electromagnetic compatibility (EMC) is the avoidance of interference between various pieces of electronic equipment.
6A2	Recall that the ability of any piece of electronic or radio equipment to function correctly in the presence of strong RF signals is known as immunity.
6A3	Recall that radio transmitters can cause interference to nearby electronic and radio equipment.
6A4	Recall that radio receivers can also suffer from interference from local and other sources.
	Sources of interference and their effects
6B1	Recall that the more power a station runs, the more likely it is to cause interference. Recall that some types of transmission are more likely to cause interference to TV, Radio and telephones than others. Recall that AM and SSB modes are the most likely to cause problems, FM and some of the HF data modes are least likely to cause problems.

	Routes of entry
6C1	Recall that interference occurs through local radio transmissions being conveyed to the affected equipment through pick up in house wiring, TV antenna down-leads, telephone wiring etc and particularly at VHF/UHF by direct pick-up in the internal circuits of the affected equipment.
	Filtering and remedial measures
6D1	Recall that the immunity of most types of equipment can be increased by fitting suitable external chokes and filters in mains or antenna leads. Recall that the filters should be fitted as close to the affected device as possible.
6D4	Recall that transmitting into a dummy load is a good test for any unwanted RF being conducted out of the transmitter along its power supply leads and any connected interface leads and into the mains. Recall that a dummy load is a screened resistor of the correct value and a suitable power rating connected instead of an antenna to allow the transmitter to be operated without radiating a signal.
	Station design and antenna placement/general principles
6E1	Recall that EMC problems can be minimised by siting antennas as far away from houses as possible, as high as possible, and using balanced antennas at HF. Recall that, at HF, horizontal dipoles are less likely to be a problem and that end-fed wires can present significant EMC problems. Recall that information on avoiding interference can be obtained from the RSGB's EMC team and experienced local amateur radio club members.
6E2	Recall that the function of the RF earth connection in an amateur station is to provide a path to ground to minimise RF currents entering the mains earth system and causing interference to other electronic equipment.
	Station design and antenna placement/mobile installations
6F1	Recall that it is the vehicle owner's responsibility to ensure that any radio installation is compatible with the vehicles electrical and management systems and does not affect vehicle safety. Recall that the fact of the installation may have to be disclosed to the vehicle insurers. Recall that professional advice should be sought for all vehicle installations.
6F2	Recall that any tests following mobile radio equipment installation should be done with the vehicle stationary with all vehicle electronic systems operating before any on-road tests are carried out.
6F3	Recall that vehicle ignition and battery charging systems can cause electrical interference to reception on mobile radio equipment.

	Social aspects and testing
6G1	Recall that EMC problems have the potential for causing neighbour disputes. Recall that the RSGB produce EMC and Interference information leaflets. Recall that advice is available from the RSGB EMC Committee and recall the role Ofcom in dealing with cases of interference.
6G2	Understand that the station log will be of considerable assistance in dealing with complaints of interference, and that this is a good reason to keep a log of all transmissions. Understand the merits of both the amateur and the complainant keeping a log of the instances of interference. Understand the merit of conducting tests in cooperation with the complainant in instances of interference.
	Section 7 – Operating practices and procedures
	Good operating practices and procedures
7A1	Understand why one should listen on a frequency before calling and then ask if the frequency is in use.
7A2	Recall how to make a CQ call in SSB and FM modes**.**
7A3	Understand the need to move off the calling channel when on VHF/UHF once contact is established. Understand the meaning of Centre of Activity.
7A4	Recall the phonetic alphabet.
7A5	Understand the advisability and common practice of keeping a log. Understand why UTC is used for logging time. Recall that a log should detail the following information: date, time, mode, call sign of station worked for QSL and contest purposes.
7A6	Understand that the transmission of music and the use of offensive or threatening language whilst on the air are unacceptable in amateur radio. Understand how to respond to music or inappropriate language overheard or received from other stations.

	Band plans
7B1	Recall why band plans are used. Identify items on a typical band plan (e.g. calling frequencies and recommended modes). Recall that narrow band modes are at the lower end of most bands. Recall that lower sideband operation normally occurs below 10MHz and upper sideband above 10MHz. Recall that transmissions on beacon frequencies must be avoided. *Note: For the purposes of the examination narrow modes are CW and data.* *A copy of the relevant band plans will be available during the examination but may not be ones in current use.* *Reference Booklets containing examination band plans are available on the RSGB web site.*
7B2	Recall that frequency bands are allocated for particular use, e.g. broadcasting, aeronautical, maritime and amateur. Recall the frequency bands for HF, VHF, and UHF radio signals. Recall that some amateur bands are shared with or adjacent to other spectrum users. Identify items on a provided chart of spectrum users.
	Repeaters
7C1	Recall that repeaters are mainly intended to extend the range of mobile stations. Recall why a frequency offset between transmit and receive is needed. Recall why a CTCSS tone is needed to access a repeater and why different repeaters may have different tones. Recall why repeaters may have a ‘reset’ tone and a time-out facility. Recall that simplex operation on repeater frequencies should not take place. *Note: Questions may ask why particular facilities (such as frequency offset) exist, what operational issue they address or how they should be used to establish or maintain a contact.*
	Connecting input devices to transmitters
7D1	Recall that connecting anything other than the supplied microphone to the transmitter requires correct operation of the PTT line and that the audio signal levels are correct.
	Codes and abbreviations
7E2	Recall the meaning of the RST code, the number of divisions of each of the three items, and their order of merit.

	Digital interfaces
7F1	Recall that there are Digital Voice (DV) and Digital Data (DD) modes available and that different systems may not be compatible. Recall that appropriate radio equipment is needed for each of these digital systems. Recall that DV radios may embed the call sign in the transmission and this will need to be adjusted if using borrowed equipment.
7F2	Recall that users of Digital Voice (DV) should check that the channel is not in use by other modes. Recall that users of FM should check that the channel is not in use by other modes. Recall that such checks are not 100% reliable.
	Satellites
7G1	Recall that amateur satellites operate in allocated frequencies within the bands Recall that terrestrial operation on satellite frequencies should not take place.
	Section 8 – Safety
	Electricity
8A1	Recall that high voltages carry a risk of electrocution and high currents carry a risk of overheating and fire.
8A2	Recall that where a safety earth has been fitted it must not be removed. Recall that special care is needed with earthing arrangements and the Local Authority building department must be consulted before making changes such as an RF earth.
8A3	Recall the correct way to wire a 3-pin mains plug.
8A4	Recall that fuses to be fitted in accordance with manufacturer's instructions. Recall that a fuse is a thin wire designed to melt, breaking the circuit, when passing an excessive current. Recall that the reason for a blown fuse needs to be properly investigated.
8A5	Understand that a Residual Current Circuit Breaker with Overcurrent (RCBO) protection will give better protection against electric shock than relying solely on a conventional fuse which only protects against excessive current. *Note: The candidate should appreciate that an RCBO will detect currents to earth of about 30mA whereas a fuse will only blow at several amps and only when the fault is a short circuit (L-N or L-E).* *The candidate should also understand that contact with both live and neutral may result in fatal injury.* *The mechanics of RCBO operation (differential current sensing) is not examinable.*

8A6	Recall that work inside equipment should only be carried out with the power sources disconnected. Recall why it is important to follow manufacturer's instructions for servicing equipment.
8A7	Understand that all equipment should be controlled by a clearly marked master switch, the position of which should be known to others in the house or club. Recall that, in the event of an accident or fire involving electricity, the first action is to switch off the power. Recall that the casualty must not be touched unless the power has been switched off.
8A8	Recall that some batteries can supply very high currents which can be hazardous if subjected to short circuit. Recall that battery charging must be in accordance with manufacturer instructions and that lithium batteries in particular can cause fire and explosion if not properly treated. Understand that different battery technologies require different charging techniques and must use the correct type of charger.
	Using tools
8B1	Recall that eye protection must be worn when using tools to prevent eye damage from small metal particles (swarf).
8B2	Recall that all tools, including power tools, can be hazardous and should be handled with care and appropriate precautions taken.
8B7	Recall that eye protection must be worn when soldering to prevent solder or flux from splashing into the eyes. Recall that a soldering-iron stand must be used to avoid skin contact with the hot bit of the iron when not in use. Recall that soldering work stations must be well ventilated to avoid inhalation of solder fumes, which can cause breathing problems particularly to asthmatics.
	Working at height
8C1	Recall that antenna erection is potentially hazardous and that it is advisable to have someone to help you. Understand the need for at least one adult to be present.
8C2	Recall that a ladder should be used at the correct angle (4:1 height-to-base ratio). Understand that ladders must be adequately secured to prevent them slipping. Understand why it is important not to overreach from a ladder, to prevent falling off.
8C3	Understand why, when working at height, a tool belt or similar device to carry tools should be used, and that it will help prevent falling objects. Understand the need to wear hard hats when working at height or when others are working at height.

	Working with RF
8D1	Recall that the main health effect of exposure to electromagnetic radiation is heating of body tissue and that the eyes are particularly susceptible to damage.
8D2	Recall that guidance on safe levels of RF radiation is available from government and international bodies, Health Security Agency and the International Commission on Non-Ionising Radiation Protection (ICNIRP).
8D3	Recall what a waveguide is and why it is unwise to look down a microwave frequency waveguide or to stand close to or in front of high-gain antennas as they may be in use.
8D4	Recall that antenna elements and other conductors carrying RF should not be touched whilst transmitting. Recall that antennas should be mounted where people will not come into accidental contact with them. *Note: this does not apply to low powered devices such as hand-held equipment.*
	Lightning
8E1	Recall that particularly high antennas may need special protection against lightning. Recall that the local authority building department may be able to offer advice.
	Working mobile and portable
8F1	Recall that elevated wires, masts and antennas must be suitably located and secured. Recall that antennas and feeders must not be sited close to overhead power cables. Recall that a lethal electric shock can result from antennas and ladders coming into contact with or attracting arcing from overhead lines.
8F2	Understand the reasons for not having wires trailing across the floor, trip hazards and the risk of frayed insulation.
8F3	Recall that excessive volume when wearing headphones can cause damage to hearing.
8F4	Recall that operating in temporary premises and/or outdoors can introduce new hazards e.g. temporary mains connections, trailing cables, damp ground. Recall the additional safety precautions that should be taken whilst operating in temporary premises and/or outdoors e.g. risk assessment, cable routing, protection, correct fusing, use of RCBO's, no adjustments or repairs to live equipment. Recall that advice should be sought where you are unsure.

8F5	Recall that safety is everybody's responsibility and that one must be alert to any potentially unsafe circumstance, warn others and report the matter to the appropriate person. Recall this equally applies in your own 'shack' and when entertaining visitors.

Note: See combined syllabus for the Introduction and Examination Material parts of the specification.