

1 Manipulation of a Honeybee Colony

The Candidate will be aware of:

1.1 the care needed when handling a colony of honeybees;	<ul style="list-style-type: none"> • Keep in mind safety of self and, particularly, others (consider proximity to public and precautions to be taken) • Be slow and gentle when manipulating the colony in order to as much as possible keep the bees calm
1.2 aware of the reactions of honeybees to smoke;	<ul style="list-style-type: none"> • Bees fear for the colony, ingest nectar/honey, and in doing so make themselves full, heavy and less inclined to sting • Make sure smoke not too hot or too much smoke is applied as the Bees may react badly
1.3 the personal equipment needed to open a colony of honeybees and the importance of its cleanliness;	<ul style="list-style-type: none"> • Essential – suit, gloves, smoker, hive tool, spare fuel and lighter • Desirable – bee brush, icing sugar dispenser, container for removed brace comb, container with washing soda for cleaning equipment and cover cloth • Occasional use – queen cage, queen marking pen and cage • Must clean equipment between hives and after apiary visit • Beekeepers are a conduit for the spread of disease
1.4 aware of the reasons for opening a colony;	<ul style="list-style-type: none"> • To check if “queenright”, sufficient stores and presence of disease • To check the results of previous manipulations • To perform new manipulations to achieve specific objectives
1.5 the need for stores;	<ul style="list-style-type: none"> • During the season a thriving colony requires 10lb honey to survive a week (equivalent of 2 x brood frames of stores) • Stores primarily means carbohydrate (nectar or honey) also pollen for protein to feed the brood • To provide the bees with food during the june gap, late autumn, winter and early spring months and during prolonged periods of poor weather in the “honey flow” season
1.6 aware of the importance of record keeping;	<ul style="list-style-type: none"> • To help manage stocks more effectively by; <ul style="list-style-type: none"> ◦ Reminding you what you found and what you did ◦ Enabling you to plan what needs to be done next • Record information like date, weather, queen sighting, queen cells, brood, stores, space, temper, varroa, supers feed
1.7 Able to open a colony of honeybees and keep the colony under control;	<ul style="list-style-type: none"> • Spend a moment observing bees at the entrance before smoking in order to recognise normal behaviour • Work from behind entrance if “warm” way and side if “cold” way • Put roof upturned on floor and supers on roof, with crown board on top to prevent robbing • Check underside of excluder (or crown board) for queen and return her to the brood • Demonstrate that you are aware of the use of cover cloths, which prevent more bees from flying up and help maintain the hive temperature • Demonstrate that you are aware that sometimes using spray of tepid water can be better than smoke, as the former calms them, while the later might panic them • Return frames in the same order
1.8 able to demonstrate lighting and the use of the smoker;	<ul style="list-style-type: none"> • Show you know what fuels are available, which are coolest and that fresh grass in the top prevents hot ash being blown into the hive • Few puffs at the entrance and wait for it to take effect • Keep it alight, keep it close at hand • Occasional use and waiting for it to take effect if the bees become too agitated • Demonstrate use to control bees and drive them down before replacing parts • Know how to put it out safely, block top with grass is a good method

1.9 able to demonstrate the use of a hive tool;	<ul style="list-style-type: none"> • Keep tool in hand at all times • It can be used for a variety of purposes: scraper, lever for boxes and frames • Good practice is to wash it in washing soda between hives
1.10 able to remove combs from the hive and identify worker, drone and queen cells or cups if present, and to comment on the state of the combs;	<ul style="list-style-type: none"> • Remove an outermost edge frame or dummy board making space to operate • Demonstrate responsible temporary storage of removed frames (perhaps in a spare brood box or carefully propped against the hive or even leaning against the queen excluder which might be leaning up to the hive entrance) • Do not “roll” bees, but use space made to move frames along then slowly lift them out • Once found, some beekeepers temporarily trap the queen in a matchbox or queen cage to avoid losing or damaging her • Recognise and comment on brood pattern (colour, age, type etc.), brace comb and spacing
1.11 able to identify the females castes and the drone;	<ul style="list-style-type: none"> • Females – workers and queen (or telltale signs of Queen)
1.12 able to identify brood at all stages;	<ul style="list-style-type: none"> • Eggs, larvae, pupae (sealed in cells)
1.13 able to demonstrate the difference between drone, worker and honey cappings	<ul style="list-style-type: none"> • Honey cappings are paler and waxier • Brood cappings are various biscuit shades and look more fibrous in texture • Drone cells have a larger surface area and are deeper (longer) too
1.14 able to identify stored nectar, honey and pollen;	<ul style="list-style-type: none"> • Nectar is clear and uncapped, • Honey is capped • Pollen is uncapped and a range of colours • All three normally present in an arc round brood cells on the outermost frames
1.15 able to take a sample of worker bees in a match box or similar container	<ul style="list-style-type: none"> • Either shake bees onto an appropriate surface, e.g. Hive roof or position populated brood frame appropriately • Place the open part of a matchbox over the bees and close it before removing it from the surface
1.16 able to state the number of worker bees required for adult disease diagnosis sample	<ul style="list-style-type: none"> • 30 or so live bees • 2-300 dead bees for suspected poisoning, most likely found outside the hive
1.17 able to demonstrate how to shake bees from a comb and how to look for signs of brood disease;	<ul style="list-style-type: none"> • Make space by removing two frames • Shake bees sharply from frame whilst it is still low in the brood chamber <ul style="list-style-type: none"> ○ Hold lugs firmly ○ Jerk firmly downwards, avoid hitting sides as you do so ○ May need to do a second/third time to remove all the bees

2 Equipment

The candidate will be:

2.1 able to name and explain the function of the principle parts of a modern beehive;	<ul style="list-style-type: none"> • Stand, Open Mesh Floor, Entrance Block, Brood Box, Brood Frame, Foundation, Queen Excluder, Super, Super Frame, Crown Board, Porter Escape and Roof • Know different types of hive: <ul style="list-style-type: none"> ○ National (commercial with deeper brood frames) ○ WBC, classic bee house ○ Langstroth, outside UK most popular hive, has jumbo brood box ○ Dadant, similar to Langstroth, biggest hive available ○ Smith, similar to National except frames have short lugs, popular with bee farmers who move hives around
2.2 aware of the concept of bee space and its significance in the modern beehive;	<ul style="list-style-type: none"> • The height of a bee $\frac{3}{8}$th inch or 6-9 mm • It is the crawl space needed by the bee to pass easily between two structures <ul style="list-style-type: none"> ○ Not so small they will propolise it <6mm ○ Not too large they will brace comb it > 9mm • Vertically you must opt for top or bottom bee space and not mix the two • Hoffman frames are designed to set correct space, other frame types may need spacers
2.3 able to assemble a frame and fit it with wax foundation;	<ul style="list-style-type: none"> • Nails across Hoffman shoulders • Trap foundation wire loop between wedge and top bar and nail within loops • Nail up into both bottom bars
2.4 be aware of the reasons for the use of wax foundation;	<ul style="list-style-type: none"> • To encourage bees to build the desired (worker or drone) sized cells in an orderly manner across the whole available surface
2.5 aware of the spacing of combs in the brood chamber and super for both foundation and drawn comb and methods used to achieve this spacing;	<ul style="list-style-type: none"> • Brood chamber – bee space (11 or 12 frames in National) • Spacing can be achieved using Hoffman Frames, castellated spacers, metal or plastic ends • Super frames can be set wider once drawn comb is employed so more honey is stored per frame using either different castellations or size of end spacers

3. Natural History of Honeybee

The Candidate should be:

3.1 able to give an elemental account of the development of queens, workers and drones in the honeybee colony;

Queen

- **Egg** – laid in or moved by workers to queen cell (like monkey nut hanging down)
- **Lava** – continuously fed on royal jelly
- **Adult Activities**
 - 1-5 days after emergence – groomed and fed by workers
 - About 3 days wings fully open and is capable of flight
 - 5-14 days series of mating flights
 - 5 days after final mating starts to lay eggs
 - Continues laying productively for 2-3 years

Workers

- **Eggs** – laid in open cells, at first erect, gradually lying down
- **Larvae** – cared for by adult workers
 - Continuously fed (first 2 days royal jelly, then mixture royal jelly, honey and pollen)
- **Pupae** – in sealed cells, no feeding, develops into adult and emerges on its own
- **Adult Activities**
 - 1-2 days after emergence – cleans cells and warm brood nest
 - 3-5 days – feed older lava with honey and pollen
 - 6-10 days – feed younger larvae with royal jelly
 - 11-18 days – ripen nectar, produce wax and construct comb
 - 19-21 days – guarding and ventilation, take exercise and orientation flights to learn to fly and locate the hive
 - 22+ days – forage for nectar, pollen, water or propolis

Drones

- Same development as workers, until adult stage, when only role is to mate with queen

3.2 able to state the periods spent by the female castes and the drone in the four stages of their life (egg, larva, pupa and adult);

	Queen	Worker	Drone
Egg hatches	3 days	3 days	3 days
Larva sealed	8 days	9 days	10 days
Adult emerges	16 days	21 days	24 days
Death	Upto 5 years but 2-3 years in reality due to beekeeper	About 6 weeks, but 3-6 months in winter	Until Autumn if not mated, otherwise after mating

3.3 able to give an elemental description of the function of the queen, worker and drone in the life of the colony;

- Queen (1), only female completely sexually developed, lay eggs
- Drones (300), to fertilize queen “on the wing”
- Workers (30-60,000) to nurse/feed young, draw out comb, build stores, forage for nectar

3.4 able to give a simple description of wax production and comb building by the honeybee;

Formed from honey/nectar and secreted from 8 small wax glands underneath the abdomen of the bee. The soft wax pours into 8 pockets beneath the glands where it solidifies into tiny discs. It is then removed and passed to the mouth and where it is worked into hexagonal cells called combs, which are used to form the basic structure of the hive.

3.5 aware of the importance of pollination to flowering plants and consequently to farmers and growers;

- As bees collect nectar, pollen (plant sperm cells) sticks to their fine hairs. This aids pollination of flowers with each visit by the bee.
- Honeybees are specialist foragers so a single bee will focus on a single plant type thus enhancing pollination success
- Many crops are dependent on insect pollination to successfully set seed

3.6 able to name the main local flora from which honeybees gather pollen and nectar;	<ul style="list-style-type: none"> • Very Early – crocus, snowdrops, flowering currant, hazel • Spring – fruit blossoms, rape, dandelions, sycamore, garden flowers • Summer- field beans, borage, garden flowers, clovers, chestnuts (propolis) • Autumn – blackberries, ivy, willowherb 		
3.7 able to give a simple definition of nectar and a simple description of how it is collected, brought back to the hive and converted into honey;	<ul style="list-style-type: none"> • Nectar is a sugar substance created by flowers to entice insects to visit • Nectar is up to 80% water, bees will preference lower water content nectar • Nectar is ingested by the bee into its honey stomach and regurgitated back at the hive • Hive bees add enzymes to the nectar to break down its complex sugars and then store it in the comb • Nectar is fanned to evaporate and reduce water content to about 18% at which point it will not ferment • Finally, when ripe it is sealed under capping of wax 		
3.8 able to give a simple description of the collection and use of pollen, water and propolis in the honeybee colony;		Collection	Use
	Nectar	Carried from flowers in honey stomach of foraging bees then processed into honey by hive bees	Food – carbohydrate for energy
	Pollen	Carried from flowers in pollen baskets on hind legs (will attach to hairs all over bee until combed and pressed into baskets). Converted into bee bread by hive bees for feeding to larvae	Food – protein for growth
	Propolis	Carried from plant wounds and buds in pollen baskets	<ul style="list-style-type: none"> • Used to seal cracks in hive • Reinforce and clean old comb • Entomb dead animals in hive • Limits bacterial and fungal growth
	Water	Carried in stomach	<ul style="list-style-type: none"> • Mixed with honey before bees eat it or feed to brood • Used to cool hive on hot days – action of evaporation
3.9 able to give an elementary description of swarming in a honeybee colony;	<ul style="list-style-type: none"> • Swarming is when a queen and a cross section of bees leave the hive to establish a new colony • It can be triggered by a reduction in levels of queen substance because the queen is old or because the hive has insufficient room for new brood • The initial swarm is a prime swarm and contains the old queen. If more than one replacement queen hatches, the stronger/est queen might kill the other/s or drive it/them out, in which case the swarm is called a cast • Before swarming the old queen will be starved for up to a week so that she can fly, the bees in a swarm will have 4 days supplies in their stomachs in order to ensure they have sufficient stores to establish a new colony site 		

<p>3.10 able to give an elementary description of the way in which the honeybee colony passes the winter.</p>	<ul style="list-style-type: none"> • Winter workers – large fat bodies, live for up to 6 months, cluster in a hive to retain warmth, vibrate wing muscles to generate heat • Rotate positions to take turns on the colder outer edge of the cluster • 10-20k workers over winter to regenerate colony in spring • No drones • Queen in centre of cluster • Warmer days water and cleansing flights, water employed on stores
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4. Beekeeping

The Candidate should be:

4.1 able to give an elementary description of how to set up an apiary;	<p>Site</p> <ul style="list-style-type: none"> • Consideration for the public • Availability of forage and water • Environment – wind, sun, damp, frost pocket, flooding, livestock • Access and space for the beekeeper <p>Set up</p> <ul style="list-style-type: none"> • Hive Stand • Position close to high barrier to make bees go up • Warning notices 		
4.2 able to describe what precautions should be taken to avoid the honeybees being a nuisance to neighbours and livestock;	<ul style="list-style-type: none"> • Consider flight paths to main areas of forage and to water and of cleansing flights • Erect barriers to encourage bees to fly up out of hive above head height • Avoid sites bordering roads where pedestrians or riders might pass • Keep only good tempered bees • Build good relations with locals, giving talks and showing them the bees – try to gain their interest, cooperation, support and respect • Take steps to avoid swarming 		
4.3 able to describe the possible effects of honeybee stings on humans and able to recommend suitable first aid treatment;	<p>Effects</p> <ul style="list-style-type: none"> • Local reactions (urticaria) – pain, itching, redness, swelling and heat • General reaction (anaphylaxis) – systemic shock including breathing difficulties, swelling of lips, tongue or eyelids, vomiting, dizziness, pain • It is good practice to carry a mobile phone to inspections and know the grid reference/post code of your apiary in case of an unexpected emergency <table> <tr> <td> <p>Treatment Mild Reaction</p> <ul style="list-style-type: none"> • Remove sting by scraping sideways with hive tool • Remain calm • Puff smoke on site of sting to minimise stinging response by other bees • Take sprin or antihistamine as appropriate </td><td> <p>Treatment Severe Reaction</p> <ul style="list-style-type: none"> • Move away from hive • Remove sting • Administer Epipen if one is carried and has been authorised by sufferer • Sit and remain calm • Loosen clothing • Deep Breathing • Recovery position • Call Ambulance </td></tr> </table>	<p>Treatment Mild Reaction</p> <ul style="list-style-type: none"> • Remove sting by scraping sideways with hive tool • Remain calm • Puff smoke on site of sting to minimise stinging response by other bees • Take sprin or antihistamine as appropriate 	<p>Treatment Severe Reaction</p> <ul style="list-style-type: none"> • Move away from hive • Remove sting • Administer Epipen if one is carried and has been authorised by sufferer • Sit and remain calm • Loosen clothing • Deep Breathing • Recovery position • Call Ambulance
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4.4 able to give an elementary description of the annual cycle of work in apiary;	<ul style="list-style-type: none"> • Winter – clean, mend, replace, store equipment – check food levels and top up as necessary – possible varroa treatment (oxalic acid if no brood) – check for wind and pest damage • Spring – continue to check food levels if spring weather is poor – return queen excluder – regular inspections – swarm prevention and control – add supers – monitor varroa levels – possible bailey comb change • Summer – continue inspections – continue varroa IPM – replace old frames – make up Nucs – replace queens • Late Summer – remove honey – varroa treatment • Autumn – combine weak colonies – remove excluder – supply winter food – prevent robbing, pest control measures – make secure for winter 		

4.5 able to describe the preparation of sugar syrup and how and when to feed bees;	<ul style="list-style-type: none"> • Spring and emergency feed 1 kg sugar 1 litre of water • Autumn feed 2 kg sugar 1 litre of water, winter stores need to be 15 – 20 kg, at least 6 outer brood frames • Time to feed in spring or autumn if stores low, building up nuc or to a swarm after 48 hours of housing • Feeding full size hive via rapid feeder or reservoir • Feed Nuc or swarm via contact feeder to prevent robbing • Feed at night and to all hives at same time 	
4.6 aware of the need to add supers and the timing of the operation;	<ul style="list-style-type: none"> • Need to add, to avoid overcrowding and to increase stores • Apply when previous super is full of bees not honey • Bees will work on closest super, add above existing super for speed of application or below if planning to remove full super earlier than rest. • If you need to add more than one super put sheet paper between to avoid scattering bees across all supers. 	
4.7 able to give an elementary account of one method of swarm control;	Prevention <ul style="list-style-type: none"> • Use strain of bees less likely to swarm • Use young queen • Provide ample room • Ensure good ventilation • Inspect for queen cells every 7 days 	Control <ul style="list-style-type: none"> • Creation of a Nucleus or Artificial swarm • Make more space • Clipping Queen • Excluder like device at entrance of hive • Bailey comb change • Remove queen cells (unless bees have swarmed)
	Artificial Swarm <ol style="list-style-type: none"> 1. Put all brood frames bar one and queen in new hive to the side of existing hive, supers remain on original hive, fill out original with frames and fresh foundation 2. After a few days swap new hive to other side of original 3. Take down all bar two best queen cells in new hive 4. After new hive queen is laying can unite with original or keep separate if planning increase <p>Note if doing for Varroa control need to remove brood frame from original when capped and put uncapped brood in new hive after 21 days again remove when capped.</p>	
4.8 able to describe how to take a honeybee swarm and hive it;	<ul style="list-style-type: none"> • Initial contact – find out if honeybees or not, address, height, position and size of cluster • Liase with owner – what will happen, time to attend, clear area of people • Prepare equipment – ladder, secateurs, bed sheet, skip or sturdy box, string, smoker, fuel, matches, protective clothing, assistant! • Collection – detach/knock swarm into box, invert box on sheet, raise up box edge to allow flying bees to rejoin swarm, return late in day, re-invert box, tie up sheet to make bee tight • Disposal – rehive on clean frames and new foundation by shaking out swarm on white cloth and ramp to hive or if time short shake directing into brood box., feed 48 hours later, requeen if swarm shows adverse tendencies <p>Notes – until the comb has been drawn out and the queen is laying, put a queen excluder between brood box and floor to deter absconding. Also good time for chemical varroa treatment as no brood or honey</p>	

4.9 able to describe the signs of a queenless colony and how to test if a colony is queenless;	<ul style="list-style-type: none"> • Absence of eggs, then later absence of larvae and ultimately all brood • Bees listless, temperamental, agitated • Presence of sealed queen cell • Laying workers – more than one egg per cell or laid on side of cell • Observation at hive entrance shows that bees are not taking in pollen • Test by adding frame with eggs from another hive and see if queen cells are built 	
4.10 able to describe the signs of laying workers and of a drone laying queen;	<p>Laying worker</p> <ul style="list-style-type: none"> • Disorganised brood pattern • More than one egg per cell • Eggs on side rather than base of cell (shorter abdomen) • It is thought that laying workers exist in most colonies, but worker police remove eggs considered abnormal 	<p>Drone laying queen</p> <ul style="list-style-type: none"> • All laying pattern is drone <p>Rare as queen has run out of sperm so usually superceded.</p>
4.11 able to describe a simple method of queen introduction;	<p>Why</p> <ul style="list-style-type: none"> • To change behavioural problems • To eliminate certain diseases • To deal with poor productivity • To reduce likelihood of swarming • To make queenless colony queenright 	<p>How</p> <ul style="list-style-type: none"> • Colony should be receptive – remove existing queen if present and leave queenless for at least 24 hours • Colony should not have been queenless for more than 7-9 days in case of virgin queens • Insert the new queen using butler cage with fondant plug, hanging between two brood frames in centre of brood • Minimise stress to queen by retaining her attendants till last minute, do not introduce with her
4.12 aware of the dangers of robbing and how robbing can be avoided;	<p>Dangers</p> <ul style="list-style-type: none"> • Debilitates and depletes hive of bees and stores – if not detected can lead to starvation in winter • Leads to fighting 	<p>Prevention</p> <ul style="list-style-type: none"> • Feed during evenings • Feed all hives in apiary at the same time • Inspect quickly and if it starts, continue inspection on another day • Do not attract foreign bees by spilling fondant or sugar syrup • Keep exposed hive parts covered during manipulations • Reduce entrance in later summer and during periods of feeding, to allow bees to repulse robbers • Keep hive in good

		condition and mend any holes or damage <ul style="list-style-type: none"> • If it gets out of control, stop up entrance completely with grass or leaves, remove later or next day
4.13 able to describe one method of uniting colonies;	<ul style="list-style-type: none"> • This is achieved by positioning one brood box on top of another and allowing the bees to gradually grow accustomed to one another • Earlier in day, ensure no brace comb at bottom of brood box which is to be placed above the other and, if necessary, remove unwanted queen • In evening, remove roof and supers from bottom hive, place newspaper beneath queen excluder. Some people make small pilot holes in paper. • Position top brood box directly on queen excluder. If remaining queen is in this box, apply another queen excluder, but better if queen in lower box. • If returning supers to stack, ensure that there is a layer of newspaper separating components from different colonies • Replace roof etc. • As bees chew through newspaper their scents will amalgamate without fighting • About 7 days later, combine colony in one brood box, (ensuring queen is present). Remove surplus frames without brood and use any surplus with brood in another colony having shaken all bees off 	
4.14 aware of the reasons for uniting bees and the precautions to be taken;	Why <ul style="list-style-type: none"> • To create strong stock from two weak colonies • To introduce a queenless bees to a queenright colony • To make a queenless colony queenright 	Precautions <ul style="list-style-type: none"> • Remove one queen (oldest, least productive or poorest characteristics) or they will fight each other • Remove brace comb or one brood box will not fit snugly on top of the other • Do in evening when flying bees are in hive or will make the flying bees from top box homeless • Separate bees from different colonies with newspaper or the workers will fight • Leave alone for 7 days or will undo the exercise
4.15 able to describe a method used to clear honeybees from supers;	<ul style="list-style-type: none"> • Crownboard fitted with porter bee escapes and inserted below supers to be cleared • Other escape methods – cone, rhombus, curtain or Canadian escapes • Other clearance methods – mechanical blowing, use of chemical, use of bee brush 	

4.16 able to describe the process of extracting honey from combs and method of straining and bottling honey for human consumption;	<ul style="list-style-type: none"> • Possible need for warming cabinet – rape or cool day • Uncap frames with hot knife • Insert in extractor, radial or tangential, uses centrifugal force to extract • Strain through pair of mesh filters into storage container • Leave to settle, bubbles and debris • Decant into jars, through filter if necessary 		
4.17 aware of need for good hygiene in the handling of honey for human consumption;	<ul style="list-style-type: none"> • Use food grade stainless steel or plastic containers • Cover hand, hair, clothing and environmental hygiene • Honey free from mould insect debris and other substances foreign to the composition of honey • Water content must be less than 20% • Honey should not have been heated excessively as this destroys its enzymes • New, sterile or sterilised honey jars and lids 		
4.18 aware of the legal requirements for the labelling and sale of honey;	<ul style="list-style-type: none"> • Description and illustrations should not mislead • Honey must come entirely from identified source • Include name and address of producer/packer/seller • Mandatory to include country of origin • Best before date – suggest 2 years • Lot number needs to be used so that honey can be traced • Honey must be sold in specific quantities, figures > 4mm high 		
4.19 able to give an elementary account of harvesting beeswax;	<ul style="list-style-type: none"> • Save all old comb, capping and pieces of wax • Wax floats to top of heated honey • Old comb/wax should be rendered separately from new, since new comb yields higher quality wax • Store wax in a way which protects from wax moth • Melt wax in soft water, do not boil • Strain through suitable container lubricated with liquid soap to aid release • Cool slowly • Can be exchanged for foundation with some suppliers 		
4.20 Aware of the need for good apiary hygiene;	<p>Disease is spread by the beekeeper, drifting and robbing. The Beekeeper through visiting multiple hives and swapping equipment can be a disease carrier so best practice includes:</p> <table border="1"> <tr> <td> Do's <ul style="list-style-type: none"> • Keep your equipment clean, includes bee suit, wellingtons and smoker • Change comb regularly • Buy bees from reputable/known source • Clean up any wax or honey left/spilt in the apiary • After extracting replace supers on same hive • Wear disposable gloves • Always put supers covered on upturned roof to prevent robbing </td><td> Don'ts <ul style="list-style-type: none"> • Feed honey to bees • Leave comb/honey in your apiary to be cleaned up/robbed • Leave wet supers around • Move equipment e.g. brood comb between hives </td></tr> </table> <p>Tips</p> <ul style="list-style-type: none"> • Propolis can be removed with washing soda • Wash bee suits regularly • Keep empty bucket with bee tight lid to collect scrapings • Face hives in different directions to reduce drifting • If visiting other peoples apiaries make sure bee suit and equipment is clean 	Do's <ul style="list-style-type: none"> • Keep your equipment clean, includes bee suit, wellingtons and smoker • Change comb regularly • Buy bees from reputable/known source • Clean up any wax or honey left/spilt in the apiary • After extracting replace supers on same hive • Wear disposable gloves • Always put supers covered on upturned roof to prevent robbing 	Don'ts <ul style="list-style-type: none"> • Feed honey to bees • Leave comb/honey in your apiary to be cleaned up/robbed • Leave wet supers around • Move equipment e.g. brood comb between hives
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4.21 aware of the need for regular brood comb replacement;	<ul style="list-style-type: none"> • Reduces opportunity for diseases and pests to establish • Good hygiene • Encourages colony to expand
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5.0 Disease, Poisoning and Pests			
The candidate will be:			
5.1 able to describe the appearance of healthy brood;	<ul style="list-style-type: none"> • Single eggs laid in base of cell • Pearly white, c-shaped, segmented larvae lying in a bed of milky brood food • Larvae of same age/size should be together • Capping colour varies (digestive biscuit colour) dry looking, slightly convex, without perforations • Even brood pattern (wall to wall apart from wires), few empty cells 		
5.2 able to describe the signs of bacterial diseases American Foul Brood (AFB) and European Foul Brood (EFB) and the fungal disease Chalk Brood and describe the effects on the colony;		Signs	Effects
	AFB	Affects sealed brood Sunken cappings Uneven pepperpot pattern Scales at bottom of cells Decomposing 'ropey' larvae Greasy perforated cappings	Disease progresses steadily, until most of brood affected and unable to replace its adult bees, therefore dying out Treatment Incineration of comb and bees Scorching of hive parts
	EFB	Affects mainly unsealed brood Discoloured yellow brown larvae in abnormal positions with melted appearance Cell contents not ropey Bad smell	Debilitates, but does not necessarily kill, colony for months or even years Treatment Shook swarm (outside hive if poss) Antibiotics Destruction of weak colonies
	CB	Affects only sealed brood Perforated cappings Hard white/grey chalk-like remains – mummies – easily removed and rattle	Healthy colonies can tolerate Treatment Replace comb
5.3 able to describe methods for detecting and monitoring the presence of varroa (a mite) and describe its effect on the colony including awareness of the effect of associated viruses;	Detection <ul style="list-style-type: none"> • Sudden decrease in adult population (few dead bees present) • Bees with deformed wings and abdomens • Numerous mites on bees, in pupae and on hive floor – use mesh floor and defra calculators • Other abnormalities (bald brood, poor pattern, patches of dead/neglected brood) 		Effect on colony <ul style="list-style-type: none"> • Little at low infestations • Slow replacement of bees • Foraging, brood rearing and defence processes break down • Ultimately, complete collapse
5.4 aware of acarine (a mite) and nosema (a fungus) and their effect on the colony;	Acariosis <ul style="list-style-type: none"> • Infestation of trachea • Clusters of bees appear confused and disorientated at front of hive • Bees climbing hive front and blades of grass but unable to fly • K wing (hooks holding wings together become detached) 		Nosemosis <ul style="list-style-type: none"> • Infection of gut • Dysentery, exacerbated by poor weather confinement • Shortens lifespan • Queens are less prolific • No approved treatments just avoid cross contamination and maintain healthy stocks

	<ul style="list-style-type: none"> • Shortens lifespan of overwintering bees (spring dwindling) and leads to colony demise • No approved treatments, just keep bees strong 	
5.5 able to describe ways of controlling varroa using integrated pest management techniques;	<ul style="list-style-type: none"> • Monitor throughout year • At least 4 varroa counts per year • Open mesh floors • Dust with icing sugar • Drone brood culling • Apiguard after honey harvest • Artificial swarm 	
5.6 aware of the current legislation regarding notifiable diseases and pests of the honeybee;	<ul style="list-style-type: none"> • Notifiable diseases <ul style="list-style-type: none"> ○ AFB ○ EFB • Notifiable Pests <ul style="list-style-type: none"> ○ Small Hive Beetle ○ Tropilaelaps • Contact Central Science Laboratory, NBU • Place the apiary in standstill • Do whatever you are told by the Inspector 	
5.7 aware of national and local facilities which exist to verify disease and advise on treatment;	<ul style="list-style-type: none"> • National Bee Unit (part of Defra) or Beebase • Regional Inspector Ian Homer, seasonal inspector Julian Parker • Local Association, Chairman Frank Rickett 	
5.8 aware of where to obtain assistance if any poisoning by toxic chemicals is suspected;	<ul style="list-style-type: none"> • Recognised by 100s dead bees outside entrance • Collect 200 bees • Contact local spray liaison officer • Send sample to NBU 	
5.9 able to describe how comb can be stored to prevent wax moth damage;	<ul style="list-style-type: none"> • Don't leave wax exposed to attract moths • Prepare frames before storage <ul style="list-style-type: none"> ○ Treat with Certan ○ Freeze for up to 24 hours • Wrap in clingfilm or tape up joints of frame boxes 	
5.10 able to describe how mice and other pests can be excluded from the hives in winter;	<ul style="list-style-type: none"> • Mouse guards • Wire netting to protect from woodpeckers • Fencing to protect from animals and humans 	