

# T Level Animal Care and Management: Animal Management Core Pathway

## Questions and answers

### Unit 1: Health and Safety

#### Page 13 – Recap questions

1.

- Employers are responsible for conducting risk assessments for lone workers.
- Employers must provide safe systems of work and appropriate communication methods for lone workers.
- Employees are responsible for following safety protocols and using PPE as provided.
- Employees must be aware of hazards and report risks or concerns to their employer.

2.

- RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations): Requires reporting of serious injuries, diseases, or dangerous occurrences to ensure accountability and preventative actions in future.
- COSHH (Control of Substances Hazardous to Health Regulations): Requires control over hazardous substances like chemicals to ensure safe handling, storage, and disposal.
- Manual Handling Operations Regulations: Mandates that employers assess and manage risks related to lifting or moving heavy objects or animals to prevent injury.
- PUWER (Provision and Use of Work Equipment Regulations): Requires employers to ensure that all equipment is safe and well-maintained for employee use.  
Only award marks if each regulation's purpose is accurately explained.

3.

- Risk assessments help identify and manage workplace hazards in the animal management sector.
- They are necessary to prevent accidents and injuries, especially in environments with animals.
- The Management of Health and Safety at Work Regulations 1999 is the specific regulation that requires employers to carry out risk assessments for their employees.

4.

- Example Answer: A biohazard is any biological substance that poses a threat to the health of living organisms, particularly humans.
- A biological hazard that can cause harm or disease in humans or animals.

A relevant example of a biohazard is: Bodily fluids (e.g., blood), bacteria like Salmonella, or a virus like rabies. Other Acceptable Answers: Examples such as animal waste, contaminated medical instruments, or zoonotic pathogens.

5.

- Zoonotic diseases are infections that can spread from animals to humans.
- Zoonotic diseases are infections transmitted from animals to humans. They can cause serious illnesses in humans, sometimes with severe symptoms or even life-threatening consequences.
- These diseases can lead to outbreaks or pose a risk of significant health problems in human populations.

6.

- Wearing appropriate Personal Protective Equipment (PPE), such as gloves or masks.
- Using safe storage and handling procedures, such as keeping chemicals in labelled containers.
- Ensuring proper ventilation in areas where hazardous materials are used.
- Following standard operating procedures and training protocols for hazardous material handling.

7.

Animal welfare is about the care of animals. It ensures animals' physical and mental well-being, safety, and health (e.g., "Animal welfare refers to the well-being of animals, ensuring they are safe, healthy, and able to express natural behaviours.").

Animal welfare is the practice of caring for animals to ensure their physical and mental well-being, allowing them to live in a safe and healthy environment where they can express natural behaviours.

8.

- Biological hazards (e.g., disease transmission or zoonotic diseases).
- Chemical hazards (e.g., cleaning agents, disinfectants).
- Physical hazards (e.g., bites, scratches, or injuries from equipment).
- Environmental hazards (e.g., poor ventilation, extreme temperatures).

"Chemical hazards, like cleaning agents, are a common hazard in animal habitats."

"Chemical hazards, like cleaning agents, are a common hazard in animal habitats."

9.

- Training improves handlers' ability to care for animals or increases safety for humans and animals: Examples include training for proper handling techniques or use of personal protective equipment (PPE).
- Training directly supports animal welfare standards: training minimises risks of injury, stress, or neglect, ensuring animals are treated according to welfare standards (e.g., "Training reduces human error, improves safety, and ensures animals receive the proper care needed for their well-being.").

Training is essential because it ensures that staff know how to handle animals safely, reducing risks of injury and stress, which supports overall welfare standards.

10.

- Large zoo mammals

- Large birds of prey
- Venomous animals

11.

- Use of protective equipment (such as gloves, face shields, or appropriate tools)

12.

- A hazard is a potential source of harm or adverse effect.

13.

- A respirator is used to protect the respiratory system
- It protects against inhaling harmful particles, dust, or airborne pathogens in animal care environments

E.g.

A respirator is used to protect the respiratory system from harmful particles and airborne pathogens, which is especially important when working with animals that may carry infectious diseases.

14.

- PPE protects the person wearing it from hazards
- It helps prevent injuries from animal bites, scratches, or exposure to chemicals
- PPE reduces the risk of cross-contamination and ensures a safer environment for both humans and animals.

Example Answer:

"PPE is important in animal care because it protects staff from injuries, such as bites and scratches, and minimises exposure to chemicals. It also helps reduce the risk of cross-contamination between animals and humans, ensuring a safer environment."

15.

- For identifying a type of PPE.
- For explaining a specific use related to animal care.

Example Answer:

- "Gloves: Protect hands from bites, scratches, and exposure to chemicals."
- "Eye protection: Shields the eyes from particles, sprays, or harmful chemicals."

16.

- Identifies that it's a risk assessment that is "ongoing" or "continuous" in nature.
- Explains that a dynamic risk assessment is a continuous or real-time evaluation of risks, which allows adjustments to be made as situations change. The answer should indicate awareness that risks can shift and require constant monitoring.

Example Answer for:

"A dynamic risk assessment is a continuous process of evaluating and adapting to changing risks in real-time to ensure safety."

17.

- Provides a simple reason, such as "to keep people safe" or "because conditions change."
- Explains that in animal fieldwork, conditions can rapidly change (such as weather or animal behaviour), and a dynamic risk assessment is crucial for adapting to these changes to ensure safety for animals, workers, and the public.
- Provides an example within the answer:
  - sudden weather changes
  - wild animal reactions
  - assessing terrain safety
  - managing animal behaviour

Example Answer:

Dynamic risk assessment is essential in animal fieldwork because conditions, such as weather or animal behaviour, can change unexpectedly. This ongoing assessment allows workers to adjust safety measures as needed, ensuring the protection of both animals and staff in unpredictable environments.

18.

- Identifies any valid environmental factor affecting risk:
  - "Weather conditions"
  - "Contamination"
  - "Animal behaviour"

19.

- Correctly identifies elimination as removing a hazard entirely from the work environment.
- Expands to explain that this involves redesigning or changing tasks to prevent exposure to the hazard altogether.

*Example Full Answer:*

"Elimination in risk control means completely removing a hazard from the workplace, such as changing or redesigning a job to avoid the risk entirely."

20.

- Acceptable answers: Elimination, Substitution, Engineering Controls, Administrative Controls, Personal Protective Equipment (PPE).

*Example Full Answer:*

"Two methods in the hierarchy of control are engineering controls and administrative controls."

21.

- States that PPE is the least effective control measure compared to other methods in the hierarchy.
- Explains that PPE does not eliminate the hazard or reduce the risk itself; it only minimises the effect of exposure.
- Highlights that PPE should only be used when other control measures (e.g., elimination or substitution) are not feasible or sufficient.

*Example Full Answer:*

PPE is the last resort in hazard management because it is the least effective control measure. Unlike elimination or substitution, PPE does not remove or reduce the hazard itself but simply provides a barrier between the worker and the hazard. It should only be used when other methods cannot fully control the risk.

**Page 20 and 21 – Recap questions**

1.

- Personnel
- Animal Welfare
- Environment

2.

Examples include (any three of the following):

- Fire: Evacuate animals and staff to pre-designated safe areas; have fire extinguishers and alarms.
- Power Cut: Use backup generators to keep essential operations running.
- Animal Escape: Implement containment protocols with recapture equipment.
- Disease Outbreak: Follow isolation and disinfection protocols to prevent spread.
- Unauthorised Public Access: Increase security measures to restrict access.
- Extreme Weather: Secure animals in stable shelters to protect from cold, flooding, or wind damage.

3.

Award 3 marks for a clear explanation that highlights:

- The importance of animal safety and health
- Reduction of stress and potential harm
- The ethical importance of humane handling and care in emergencies

4.

- Identify that the act requires employers to provide a safe working environment.
- Mention the need for risk assessments.
- Explain that it impacts emergency planning by mandating clear safety procedures for both staff and animals.

5.

- Identify legal repercussions or prosecution.
- Mention a potential impact on the business's reputation.
- Note that non-compliance can lower staff morale.

6.

- identify the Control of Substances Hazardous to Health (COSHH) 2002 and explain that it governs the handling of hazardous substances, which is critical in managing chemical exposure emergencies.
- Identify the Regulatory Reform (Fire Safety) Order 2005 and explain that it requires fire safety measures and protocols to protect both staff and animals during fires.

7.

- Fire
- Animal Escapes
- Disease Outbreaks
- Natural Disasters
- Chemical Spills

8.

Identify a control measure from the list below and a brief explanation:

- Risk Assessments – Evaluating hazards regularly to prevent accidents.
- Clear Emergency Protocols – Documenting and displaying protocols so all staff know the procedures.
- Regular Training – Conducting training ensures staff are ready and know their roles in emergencies.
- Safety Equipment – Having fire extinguishers, first aid kits, PPE, etc., on hand minimises risks.
- Communication Systems – Using alarms or radios for quick alerts to inform staff of emergencies.

9.

Identify that training and drills are important for emergency preparedness and explain why:

- Ensures that staff can respond effectively under pressure.
- Reinforces knowledge of protocols, leading to a quicker, safer response in emergencies.

10.

- Clear and direct language – Staff should use simple, concise language to avoid misunderstandings.
- Timely communication – All relevant staff should be informed immediately to prevent delays.
- Documentation of actions – Documenting actions and decisions for legal and follow-up purposes is essential.

11.

- Harm or injury to people or animals.
- Compromised animal welfare leading to suffering or loss of life.
- Legal repercussions such as fines or lawsuits.
- Damage to reputation which can result in loss of clients and trust.
- Reduced staff morale causing anxiety and potential turnover.

Explanation of seriousness:

- Each consequence should be linked to why it poses a serious risk. For example:
- Harm or injury impacts the well-being of both staff and animals, which could result in severe health and safety issues.
- Legal repercussions could result in financial loss or regulatory action, jeopardising the facility's operations.

12.

- Importance of regular training: Staff training ensures preparedness for emergencies and helps reduce risks to people and animals.
- Specific training benefits: Training in animal and human first aid allows staff to provide critical initial care, stabilising the injured before professional help arrives.
- Example of training benefit: For example, fire safety training prepares staff to evacuate animals quickly and use fire extinguishers safely, minimising harm in a fire incident.

13.

- DEFRA: Responsible for managing animal health and welfare policies during emergencies.
- APHA: Handles notifiable diseases and biosecurity risks.
- HSE: Ensures workplace safety compliance and manages risks to staff and public health.

14.

- Animal escapes.
- Zoonotic diseases.
- Hazardous conditions (e.g., fire, contaminated water).
  
- Animal escapes: Police.
- Zoonotic diseases: Local authorities or emergency services.
- Hazardous conditions: Fire brigade or power companies.

15.

- Initial Assessment as the first critical action:
  - Ensures the nature and scale of the emergency are understood (1 mark).
  - Helps identify immediate threats to life, property, or the environment (1 mark).

16.

- Identifying two relevant emergency situations, e.g., animal escapes, zoonotic disease outbreaks, visitor injuries.
- Outline appropriate key procedures to manage these, e.g., containment protocols, public evacuation routes, liaison with emergency services.

17.

- Identifying a primary concern, e.g., water quality issues, filtration failure, public safety incidents.
- Explain appropriate responses, such as prioritising aquatic life support systems and implementing crowd control measures.

### Page 27 – Recap questions

1.

- Health and Safety at Work Act 1974 (HASAWA)
- Manual Handling Operations Regulations 1992 (MHOR)
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)

2.

- MHOR aims to minimise risks associated with manual handling.
- Employer responsibilities, e.g., conducting risk assessments or providing equipment.
- Employee responsibilities, e.g., following safety instructions.
- Link this to the animal management context, e.g., using mechanical aids or teamwork when handling animals.

3.

- Risk assessment identifies hazards and helps in planning safer handling tasks:
  - Example 1: Assessing the need for lifting aids, such as a harness or trolley, when moving heavy feed bags.
  - Example 2: Identifying the safest way to restrain a large, distressed animal using teamwork and equipment.

4.

- Conducting risk assessments for manual handling tasks.
- Providing appropriate equipment to reduce manual handling risks (e.g., trolleys or hoists).
- Training employees on proper manual handling techniques tailored to specific tasks.

5. - 3 marks MISSING ANSWER

6.

- Prosecution for breaches of legislation.
- Fines imposed for negligence.
- Reputational damage impacting client trust and employee morale.
- Health and safety orders (e.g., improvement notices or prohibition orders).

7.

- Keeping the back straight and bending at the knees when lifting.
- Holding the load close to the body for better stability.
- Planning the lift by assessing the load and clearing the route.

Why is it important:

- Reduces the risk of musculoskeletal injuries.
- Ensures safe handling of unpredictable or heavy animals and equipment in the animal management sector.

8.

- Task
- Load
- Working Environment
- Individual Capability
- Other Factors

9.

- Identify hazards (e.g., slippery floors, uneven surfaces, poor lighting).
- Explain how a clutter-free area facilitates safe movement.

10.

- The use of lifting aids (e.g., trolleys, lifting straps).
- Mention seeking assistance from a colleague.

11.

- Mention the importance of physical capability.
- Explain how lack of strength or experience can lead to injury.
- Mention factors like training and health conditions.

12.

- Mention that assistance should be sought when the task is too difficult or dangerous alone.
- Correctly name and explain any two factors (weight, size, shape, distance, risk of injury, or environmental conditions).

13.

- Size can make lifting more difficult.
- Shape affects grip or handling.
- Irregular or bulky shapes might need special handling techniques.

## Page 27 – Practice questions:

1. Award up to 4 marks for an answer explaining the importance of cleanliness and organisation:
  - 2 marks for explaining that a clean workspace reduces the risk of disease transmission and infection in animals and humans.
  - 2 marks for explaining that the organisation improves efficiency and minimises risks of accidents, like slips and falls or improper handling of animals and equipment.
2. Award up to 4 marks for an answer describing steps in a risk assessment:
  - 2 marks for correctly identifying a hazard (e.g., assessing environment, equipment).
  - 2 marks for explaining how to evaluate and document the potential risks and suggest control measures.
3. Award up to 6 marks for identifying and explaining hazards:
  - 3 marks for each hazard explained (1 mark for identifying the hazard and 2 marks for describing associated risks).
  - Examples of hazards could include chemical exposure (e.g., risk of skin irritation or respiratory issues) and animal handling (e.g., risk of bites or scratches).
4. Award up to 6 marks for outlining employer responsibilities:
  - 2 marks each for any three responsibilities, such as:
    - Providing adequate PPE.
    - Conducting regular risk assessments.
    - Training staff in health and safety procedures.
5. Award up to 3 marks for:
  - 1 mark for identifying the importance of reducing strain on muscles and joints.
  - 1 mark for mentioning the prevention of injuries (e.g., back strains, pulled muscles).
  - 1 mark for noting the relevance to long-term health and safety compliance in the workplace.
6. Award up to 3 marks for:
  - 2 marks per responsibility: 1 mark for identifying the legal duty (e.g., following COSHH guidelines, reporting hazards) and 1 mark for explaining how it contributes to a safe workplace (e.g., reducing risk of chemical exposure, preventing accidents).
7. Award up to 2 marks per hazard and 1 mark for a mitigation strategy:
  - e.g Hazard - exposure to extreme weather; Mitigation - provide shelter and temperature control.
  - e.g Hazard - exposure to toxic plants; Mitigation - regular inspection and removal of harmful vegetation.
8. Award up to 2 marks per risk and control measure:
  - Risk of bites/scratches – Control: use protective equipment, such as gloves.
  - Risk of zoonotic diseases – Control: follow hygiene protocols, such as hand washing.
  - Risk of unpredictable behaviour – Control: conduct a brief behaviour assessment before handling.

## Unit 2: Sustainability

### Page 34 – Recap questions:

1.

- Refuse: avoiding unnecessary waste, such as single-use plastics in animal care.
- Reduce: minimising waste, such as using fewer resources like food and packaging.
- Reuse: finding new uses for waste materials, such as reusing old bedding for cleaning.
- Repurpose: transforming waste into new products, like using animal waste for compost.
- Recycle: properly sorting and recycling materials like plastics, paper, and glass to reduce landfill waste.

2.

Purpose: the environmental protection act 1990 provides the framework for the management and disposal of waste in the UK. It sets out the duties of care for individuals and businesses in managing hazardous waste, waste management licensing, and guidelines for safe disposal.

3.

- Role: the animal by-products (enforcement) (England) regulations 2013 govern the disposal and processing of animal by-products (ABPS). This includes the handling of waste, such as animal carcasses, body parts, or other by-products from veterinary care.
- Importance: it is important because these regulations ensure that animal by-products are disposed of safely to prevent disease transmission and to protect public and environmental health.

4.

- Clinical waste relates to medical or body-fluid contaminated items.
- Hazardous waste includes dangerous, toxic, or harmful materials.
- There is a clear distinction between clinical waste being specific to medical contamination and hazardous waste being a broader category of danger to health or the environment.

5.

- Controlled waste, clinical waste, biohazardous waste **PROVIDE ONE EXAMPLE ACTION REQUIRED FOR EACH?**

6.

- **WHY IS IT IMPORTANT FOR licensed carriers in managing waste safely.**
- Mention legal compliance and the minimisation of risks (health, environmental, or animal welfare).

7.

- Improved health and safety (prevents contamination and reduces the spread of diseases).

- Environmental protection (minimises risks to the environment, such as pollution).

8.

- Financial implications (fines and penalties).
- Legal action (prosecution or lawsuits).
- Environmental damage (contamination of water, soil, or air).

9.

The act sets out responsibilities for waste management and pollution control, ensuring that animal care facilities dispose of waste safely and in compliance with environmental regulations.

### Page 34 – Practice questions:

1.

- Refuse (1 mark):
  - Definition: to avoid creating waste by not purchasing unnecessary products or using single-use items.
  - Explanation (1 mark): prevents waste from entering the system in the first place, reducing the overall environmental impact.
- Reduce (1 mark):
  - Definition: to minimise the amount of waste produced by using fewer resources.
  - Explanation (1 mark): reduces the volume of waste, making disposal easier and lowering environmental impact.
- Reuse (1 mark):
  - Definition: to use products and materials more than once before discarding them.
  - Explanation (1 mark): extends the life of items, reducing the need for new resources and minimising waste.
- Repurpose (1 mark):
  - Definition: to find new uses for old products or materials rather than throwing them away.
  - Explanation (1 mark): reduces waste and maximises the use of materials, contributing to sustainability.
- Recycle (1 mark):
  - Definition: to process used materials so they can be made into new products.
  - Explanation (1 mark): minimises the need for raw materials and reduces landfill waste.

2.

- Identification of hazardous waste (1 mark):
  - Definition of hazardous waste (e.g., chemicals, contaminated sharps, pharmaceutical waste, etc.) And how it is identified in an animal care environment.
  - Specific examples (e.g., used syringes, expired medications, disinfectants).

- Segregation (1 mark):
  - Hazardous waste must be separated from other types of waste to prevent contamination and ensure proper disposal.
  - Actions such as labelling waste containers clearly as “hazardous” and using the correct colour-coded bins.
- Use of licensed disposal (1 mark):
  - Hazardous waste must be disposed of by licensed carriers or through licensed waste disposal facilities to ensure safe treatment and disposal.
  - Explanation of why licensed carriers are required, particularly to ensure compliance with environmental laws.
- Handling and storage precautions (1 mark):
  - Precautions such as wearing PPE (personal protective equipment), safe storage (e.g., sealed containers), and correct labelling.
  - Reasoning: these actions prevent exposure to harmful substances and reduce the risk of contamination or accidents.
- Environmental protection and compliance (1 mark):
  - Ensuring compliance with relevant regulations (e.g., the environmental protection act 1990, hazardous waste regulations).
  - Explanation of why non-compliance could lead to fines, legal consequences, and environmental damage.

3.

- Regulations governing clinical waste (2 marks):
  - The environmental protection act 1990 – requires clinical waste to be managed safely, particularly with respect to healthcare and veterinary settings.
  - The waste (England and Wales) regulations 2011 – provides legal framework for managing waste, including clinical waste, by categorising it and requiring proper disposal.
  - The animal by-products (enforcement) (England) regulations 2013 – pertain to animal products that are deemed clinical waste and the specific disposal methods needed.
- Classification and segregation of waste (1 mark):
  - Clinical waste must be separated from other waste types (e.g., using special bins for needles, dressings, and blood-soaked materials).
  - Proper labelling of clinical waste is necessary to ensure compliance with regulations.
- Disposal requirements (1 mark):
  - Clinical waste must be collected, stored, and disposed of through licensed carriers and must follow health and safety protocols.
  - Failure to comply with regulations could lead to penalties, legal issues, and contamination risks.
- Environmental impact (1 mark):
  - Emphasise that proper disposal of clinical waste prevents environmental contamination and protects public health.
  - Non-compliance could result in hazardous substances polluting the environment.

4.

- Financial consequences (2 marks):
  - Fines for non-compliance with regulations (e.g., from the environment agency).
  - Costs of ineffective waste management, such as increased disposal fees or remediation costs.
  - Potential loss of clients due to reputational damage or legal actions.
- Environmental consequences (2 marks):
  - Pollution of soil, water, or air if hazardous or clinical waste is improperly disposed of.
  - Harm to local wildlife or ecosystems if waste enters natural habitats.
  - Increased landfill use if recyclable materials are not properly managed.
- Reputational damage (1 mark):
  - Negative public perception of the animal care facility, leading to a loss of business or public trust.
  - Long-term effects on the facility's ability to operate or expand.

5.

- Controlled waste (2 marks):
  - Controlled waste refers to waste that is subject to legal regulation due to its potential impact on health or the environment.
  - Examples: clinical waste, hazardous waste, animal by-products.
  - Regulatory handling: must be segregated, labelled, and disposed of through licensed carriers, following specific protocols to reduce harm.
- Non-controlled waste (2 marks):
  - Non-controlled waste refers to waste that is less harmful and not subject to the same stringent controls.
  - Examples: general waste, such as domestic waste and recyclables.
  - Regulatory handling: can be disposed of more freely but still must be managed according to basic waste disposal guidelines (e.g., recycling, landfill).
- Comparison (1 mark):
  - Controlled waste requires more stringent handling due to its potential to cause harm, whereas non-controlled waste can be managed with fewer restrictions but still requires proper disposal.

## Unit 3: Biosecurity

### Page 47 – Recap questions

1.

The purpose of biosecurity is to prevent the introduction and spread of harmful organisms such as diseases, pests and invasive species. Three examples of biosecurity methods are footbaths at farm entrances, quarantining new animals and controlling pests such as rats.

2.

Invasive species are plants or animals that have been introduced to an area that they are not native to. They are classed as invasive if they reproduce and then out-compete native species, potentially putting them at risk of extinction.

3.

Public awareness to biosecurity is vital because it plays a role in preventing the spread of disease and protecting both animal and human health. This in turn reduces costs, protects the livelihood of farmers and safeguards the biosecurity of ecosystems.

Public awareness can be improved through education campaigns such as posters, social media, TV adverts, and school and college lessons. Facilities where biosecurity is important such as zoos and farms can display posters explaining why visitors must follow the rules.

4.

Defra creates national biosecurity policies and legislation which include rules for import / export, animal movement and disease control. They coordinate emergency responses in the case of disease outbreak and provide guidance to farmers, vets and the public on biosecurity.

APHA is an executive agency of Defra. Their roles include monitoring for disease outbreaks in animals and plants, investigating disease outbreaks and enforcing biosecurity measures.

5.

Breaching biosecurity can have wide-reaching implications including:

- Disease outbreaks
- Animal suffering
- Financial losses
- Public health risks
- Environmental damage
- Legal consequences

6.

- Emotional impact – farmers care deeply about the animals in their care. Losing an entire herd or flock can lead to mental health concerns such as anxiety and depression.
- Financial impact – losing animals has a massive impact on income, destroying current and future earnings from milk, meat, eggs, breeding, etc. Additional costs will come from disinfection and loss of reputation. The government may offer compensation but it may not fully cover the losses experienced.
- Practical impact – farmers may need to pause or shut down operations during disease investigation and clean up impacting workers. Rebuilding a large herd or flock will take time; it is a slow, expensive process.
- Long term effects – some farmers may feel let down by the authorities, especially if they have lost a lot of animals however, the experience may lead to stricter biosecurity practices in the future.

7.

Positive factors:

- Staff training – when staff are well trained in biosecurity, procedures are more likely to be followed and mistakes are less likely.
- Strict access controls – limiting who can enter certain areas such as quarantine or isolation reduces the chance of introducing or spreading pathogens.
- Good hygiene practices – thorough and frequent cleaning helps kill bacteria, viruses and parasites before they can spread.
- Effective pest control – keeping rats and other pests under control reduces the risks of disease being introduced to a captive collection of animals.
- Clear biosecurity policies – well written policies and procedures ensure that all employees know what to do to prevent disease outbreaks and what steps to take if they suspect an animal may be unwell.

Negative factors:

- Poor hygiene practices – failing to clean animal enclosures, tools, PPE, and food prep areas can introduce and encourage the growth of pathogens.
- Lack of quarantine – failing to quarantine animals new to the collection could introduce disease.
- Overcrowding – too many animals in an enclosure increases stress and disease transmission.
- Uncontrolled access – visitors, delivery drivers and even other animals entering without biosecurity check can introduce disease.

8.

- Animals that are brought into the UK illegally will not have passed through the rigorous biosecurity measures required when importing them. They may have been transported using ways that encourage the spread of disease that could affect animals, people and the environment.
- If these species are released or escape, they may become an invasive species, impacting local ecosystems and spreading disease.

- Illegally imported species are difficult to track and trace because these animals do not have the required records. This means authorities cannot trace outbreaks and alert the necessary people.

9.

- Zoonotic diseases are diseases that can be passed from animals to humans. Examples are rabies and salmonella.
- A notifiable disease must be legally reported to Defra or the APHA because of the risk it poses to animals, humans or the economy. Examples are avian influenza and foot-and-mouth disease.
- An anthroponotic disease is a disease that can be transmitted from humans to animals. Examples are tuberculosis and the common cold.

10.

- Defra sets national policy and legal frameworks that provide guidelines for dealing with animal diseases. They coordinate national responses, communicate with the public and media and oversee agencies like APHA, ensuring they have the resources needed to act quickly in case of an outbreak.
- APHA detects and investigates disease outbreaks. They carry out control measures such as quarantine, culling, cleaning and movement bans. They work with farms and other animal collections to enforce biosecurity measures. They monitor high risk diseases to catch them early and work with vets and animal keepers to provide advice, training and updates during outbreaks.

11. Ho

Restriction zones are clearly defined areas that are set up around a site where disease has been confirmed. These zones limit who can enter and exit and area. They set up disinfection points to ensure vehicles, footwear and PPE do not transmit disease into or out of the area.

These restriction zones help the APHA with monitoring animals, testing nearby sites and identifying any new cases early which protects the wider population.

12. Explain five different control measures that can be used to maintain biosecurity. Discuss their effectiveness in different types of collections.

MISSING ANSWER

13.

Education on biosecurity is vital to help prevent the spread of disease:

- Public – members of the public can accidentally spread disease by entering areas they shouldn't with pathogens on their clothing, boots or vehicles.

- Pet owners – people who keep exotic pets or farm animals can contribute to disease outbreaks if they do not understand hygiene or quarantine.
- Students who are training to work in the animal industry must learn good biosecurity measures as these will be vital in their future careers.

14.

Regular testing can pathogens and parasites during the early stages of infection which then allows treatment to be provided before spreading.

Preventative measures such as inoculation and vaccination support the animal's immune system to reduce the severity of disease and therefore reduce the risk of the infection spreading.

15.

Vectors are organisms that carry and transmit disease, often without getting sick themselves. Common examples include fleas, ticks, mosquitos, rats and flies.

- Environmental management – removing standing water reduces mosquitos whilst keeping the environment clean removes food waste deterring rats and flies.
- Chemical control – use of approved insecticides such as flea / tick treatment prevents infestation but does not harm the animals it is applied to.
- Biological control – natural predators can be used to control pests where safe or appropriate. For examples, certain fish can be used to eat mosquito larvae.
- Vaccination – in areas where vectors (such as mosquitos or other flying insects) are hard to control, animals can be vaccinated against the diseases they carry.

16.

Many pathogens are transmitted through the air. Ventilation without filtration can allow disease to spread from infected areas.

Poor ventilation can also increase the spread of disease within an area as moist, stagnant air encourages pathogens to grow.

17.

This means an animal is carrying a disease but doesn't show any signs of illness. Carriers can still spread disease to other animals and in cases, humans.

18.

Hygiene is vital in preventing the introduction and spread of disease in animal collections. It prevents new diseases being introduced to the collection, prevents the spread of disease, protects humans from zoonotic diseases, increases animal welfare, reduces the spread of parasites and is a legal requirement.

19.

- Animal Health Act 2002
- Animal Welfare Act 2006
- Welfare of Animals (Transport) (England) Order 2006
- Zoonoses Order (Amendment) (England) Order 2021

20.

Defra and APHA work together to protect the UK from biosecurity threats involving both plants and animals.

Defra:

- Creates national policies and laws
- Coordinates the national response to disease outbreaks
- Communicates with the public
- Funds and oversees agencies like APHA

APHA:

- Carries out surveillance and disease testing
- Responds to disease outbreaks by investigating disease, setting up quarantine zones and coordinating culling.
- Enforces biosecurity and laws
- Supports education and research

21.

If disease is discovered, movement restrictions can be put in place under Animal Health Act.

New or sick animals must be isolated to prevent the spread of infectious disease under the Zoonoses Order 1989 and Welfare of Animals (Transport) (England) Order 2006.

Notifiable diseases must be reported to APHA or Defra immediately under the Animal Health Act and Zoonoses Order.

The Animal Health Act requires animals infected with certain diseases to be humanely culled.

The Welfare of Animals (Transport) (England) Order 2006 requires vehicles being used to transport animals to be thoroughly disinfected.

**Page 48 – Practice questions:**

1. (6 marks)

Legislation plays a vital role in maintaining biosecurity by preventing the introduction and spread of infectious diseases among animals, humans, and the environment. It ensures that individuals and organisations follow standard procedures to reduce risks.

One key piece of legislation is the Animal Health Act 2002, which provides powers to control notifiable diseases such as foot-and-mouth disease and avian influenza. This act enables the government to impose movement restrictions, culling, and disinfection measures to limit outbreaks.

The Welfare of Animals (Transport) (England) Order 2006 supports biosecurity by setting out rules for transporting animals safely, minimising stress and disease transmission during travel.

Another important regulation is the Control of Substances Hazardous to Health (COSHH) Regulations 2002, which requires proper handling and disposal of hazardous biological materials, such as faeces or infected bedding, to protect both human and animal health.

These laws not only protect animal welfare and public health but also help prevent economic losses in agriculture and animal industries. Without legislation, there would be inconsistent practices, leading to higher risks of disease outbreaks.

## 2. (5 marks)

Poor biosecurity can lead to disease outbreaks, which may result in high veterinary bills, treatment costs, and the loss of animals. This can damage the facility's reputation, leading to fewer clients and reduced income. If a disease spreads, the facility may be forced to close temporarily or permanently, causing serious financial loss.

Environmentally, poor biosecurity can lead to the spread of pathogens into local wildlife populations or water systems, disrupting ecosystems. Contaminated waste, such as infected bedding or faeces, may also pollute the environment if not disposed of properly.

Overall, poor biosecurity risks both financial stability and environmental health.

## 3. (8 marks)

1. Isolate infected animals immediately to prevent the disease from spreading to healthy individuals. This may involve using a designated quarantine area.
2. Report the outbreak to the appropriate authorities if the disease is notifiable, in accordance with the Animal Health Act 2002.
3. Restrict movement within the facility by limiting access to affected areas and stopping the movement of animals, staff, or equipment between enclosures.
4. Increase hygiene and disinfection protocols, including cleaning all surfaces, equipment, and clothing that may have come into contact with the disease.
5. Use personal protective equipment (PPE) such as gloves, masks, and aprons to protect staff and prevent further contamination.

6. Dispose of contaminated waste (e.g. bedding, food, faeces) safely and in line with The Environmental Protection Act 1990 to avoid spreading pathogens into the environment.
7. Monitor all animals closely for signs of illness and keep accurate records to track the spread and response to the disease.
8. Communicate with staff and visitors, ensuring everyone is aware of the outbreak and understands the procedures in place to minimise risk.

These steps help to contain the disease, protect animal welfare, safeguard public health, and maintain the organisation's legal and ethical responsibilities.

4. (6 marks)

When introducing new animals into a collection, quarantine is essential. New arrivals should be kept separate for a period (usually 2–6 weeks) to monitor for signs of disease before they are put with animals in the main collection. This helps prevent the spread of infectious diseases.

Staff should use PPE (e.g., gloves, overalls) and follow strict hygiene protocols, such as handwashing and disinfecting tools, to reduce the risk of cross-contamination. All animals should have a health check by a vet, and their vaccination and parasite treatment records should be up to date before entry. It is good practice to carry out faecal sampling to test for parasites and pathogens.

If these measures are not followed, serious consequences may occur, including the spread of disease, animal suffering or death, costly veterinary treatment, and possible legal action under the Animal Welfare Act 2006 or Animal Health Act 2002. An outbreak could also damage the organisation's reputation and force temporary closure.

5. (5 marks)

Biosecurity plays a crucial role in conservation by protecting endangered species from exposure to disease, especially in captive breeding programmes and during reintroduction to the wild. These animals often have weaker immune systems, and an outbreak could wipe out years of conservation work.

Strict measures such as quarantine, disease screening, and controlled environments help ensure that animals are healthy before being introduced to others or released. Biosecurity also protects wild populations from catching diseases carried by captive animals.

Without effective biosecurity, conservation efforts can fail due to disease outbreaks, leading to animal deaths, loss of genetic diversity, and wasted resources. Therefore, it is essential for the success and sustainability of conservation programmes.

6. (5 marks)

Proper staff training ensures that employees understand how diseases spread and how to prevent them, reducing the risk of zoonotic disease transmission, such as salmonella or ringworm.

Training helps staff use personal protective equipment (PPE) correctly, handle animals safely, and follow protocols for cleaning, disinfecting, and waste disposal. It also includes emergency procedures and reporting systems if a disease is suspected.

When staff are well trained, they are less likely to make errors that could lead to accidents, bites, or exposure to harmful pathogens. This not only protects their health but also ensures the facility complies with health and safety legislation, such as the Health and Safety at Work etc. Act 1974 and COSHH Regulations 2002.

## 7. (8 marks)

Urban farms are very popular visitor attractions for the public, especially for families with children. These kind of attractions must be aware of the added risks this poses to biosecurity and put measures into place to reduce the risks.

High visitor numbers carries a higher risk of pathogens being carried on boots and pushchair wheels which means diseases can be brought into the farm and spread between enclosures. One way to reduce this risk is by using foot dips that all visitors must walk through at set points around the farm.

Ensuring that visitors are restricted to certain areas also limits the spread of disease. Areas such as isolation and quarantine, and incubation should not be open to the public to give animals a chance to rest as well as limiting the number of people who have access.

Signage must be clearly visible around the farm ensuring that visitors know which areas they can enter, which animals they can feed and reminding people not to feed snacks to animals. Some animals carry diseases which may impact pregnant women (toxoplasmosis in sheep) so signage must be very clear on the dangers of this, advising pregnant women not to touch these animals.

Any areas where visitors may have contact with animals must provide hand washing facilities. This reduces the risk of disease transmission via the faecal-oral route. This is especially important for children who regularly put their fingers in their mouth.

Animals must be checked daily to ensure they are healthy. Any animals that are showing potential signs of illness should be moved into isolation areas away from visitors. This gives the animal a chance to rest and recover and also reduces the risk of visitors having contact with an animal that may be carrying disease.

Risk assessments must be carried out annually and measures put in place to reduce the likelihood of biosecurity breaches. Failing to adhere to biosecurity protocols could lead to zoonotic outbreaks, prosecution, being forced to close down, loss of reputation and breaches of animal welfare. Biosecurity is vital not only for the animals but staff and visitors as well.

## Unit 4: Supply Chain

### Page 61– Recap questions:

1.  
A network of businesses that get a product or service to a consumer/client.
2.  
Convention on International Trade in Endangered Species  
Places controls such as licenses on the trade of certain species.
3.  
To ensure that there is organisation and reduced time or energy wastage for example to reduce costs within the chain.
4.  
To ensure fairness, ethical sustainability and social responsibility. Also to meet legal and moral standards with a positive impact on people, the planet and the business.
5.  
The process of ensuring all elements of a supply chain operate effectively, efficiently and safely.
6.  
Feeds (raw/live), Clinical supplies, Bedding, Equipment, Deadstock disposal.
7.  
This is a complex chain where goods pass through multiple intermediaries –before reaching the consumer/client.
8.  
Variety of things including; lack of quantity of product, poor quality, poor animal welfare, staff wellbeing decreasing, job losses, loss of revenue/profits/sales, poor customer relationships, lack of trust in business, cashflow problems and need to reassess business model.
9.  
Political  
Economic  
Socio-cultural  
Technological  
Legislative  
Environmental
- 10.

The potential customers that a company aims to attract – it is the ideal audience for the business's offerings.

11.

Customers who make significant or high-volume purchases.

12.

Those who are offering alternative goods or services that meet the same needs.

13.

Direct: direct from manufacturers or suppliers in smaller quantities and more frequently.

Bulk: large quantities of a product purchased at one time often to secure lower prices.

14.

Service agreements define what the service to be provided is, for how long, what the price and payment structure is, what the performance expected is and how to terminate the agreement.

Sales agreements identify the buyer and seller, what is being sold, prices and payment terms, delivery terms and warranties/ guarantees provided.

**Page 69– Recap questions:**

1.

Tools, ladders, light bulb replacements, vacuum cleaner, mops and buckets, brooms and dustpans, cleaning materials and bins.

2.

Perishable stock can only be stored in the short term such as feed or animals and non-perishable stock can be stored longer term without changing such as blankets and grooming equipment.

3.

Legislation are laws and bills enforced by the courts, regulations are formal guidelines only that help apply the laws and are in addition to them. Codes of practise are neither laws nor regulations and outline standards and working practices, breaching them is not an offence though can be used as evidence of not meeting laws.

4.

Animal Welfare Act 2006

5.

To track animal health, diets and supply inventory.

6.

It ensures that items are used or sold in the correct order minimising waste, maintaining quality and maximising efficiency.

7.

Minimum is the least amount of stock that can be held before it impacts the business negatively.

Maximum is the most amount of stock that should be held before it impacts on the business negatively.

8.

It can impact on the demand for different stock at different times of the year, so items need to be ordered in time for the seasons they will be in greater demand and ordered less when the demand is lower.

9.

Cost – reduced profitability and increased expenses

Wastage – unnecessary waste, impacting on finances, animal welfare and the environment

Failing to comply with relevant legislation, regulations and codes of practice leading to legal penalties such as fines, damage to reputation, loss of customer trust and risk to animal and staff health

10.

Considerations include; cost, space, labelling, accessibility, temperature, lighting, humidity, weight, security, contamination and sustainability.

11.

Care must be taken unloading and putting away deliveries to ensure no harm to staff or animals occurs.

### **Page 70– Practice questions:**

1. (6 marks)

A supply chain is made up of a network of businesses that get a product or service to a client/consumer. It is made up of raw materials (the initial materials), transportation (movement of materials), production (turning of raw materials into the product), distribution & delivery (movement of the product to final consumer (3 marks). An animal management example would be; product is a dog bed, raw materials are stuffing, fabric and thread which are transported from manufacturers to company making the beds, production of the dog beds then distribution and delivery of dog beds to clients (3 marks)

2. (5 marks)

Legislation can impact on:

- The trade of animals – Convention on International Trade in Endangered Species of Wild Fauna and Flora (Cites) controls international trade so that the survival of the species is not threatened (1 mark)
- How they are housed and cared for – Animal Welfare Act 2006 ensures animal welfare needs are met
- How they are transported – The Welfare of Animals (Transport) (England) Order 2006 established rules for the transport of live animals to ensure their welfare during transit (1 mark)
- How their health is maintained – Veterinary Surgeons Act 1966 ensures veterinary care that upholds the health and productivity of animals (1 mark)
- Which licenses are required for their production – The Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018 establishes licensing requirements for businesses involving animals (1 mark)

3. (5 marks)

Each part of the chain is dependent on the previous and next part of the chain in order to function fully and supply the customer (1 mark). The customer relies on both the supplier and the distributor to get their drying coat when they need it (typically when the weather is wet and cold) (1 mark). The suppliers of the dog coats rely on the businesses supplying the raw materials in a timely fashion and in suitable quantities in order for them to make the beds (1 mark). The suppliers also rely on the distributors to collect and deliver the coats to the customers without this taking too long (1 mark). The distributors also rely on customer demand and supplier production for their business to be profitable (1 mark).

4. (4 marks)

Positive global impact (1 mark) – by sourcing materials from suppliers who have fair labour practises so that their workers are not exploited, paid a fair wage and have good working conditions (1 mark).

Environmental sustainability (1 mark) – by sourcing materials that cause minimal environment impact so that there is limited wastage to landfill, reduced air pollution and waterways pollution (1 mark).

5. (3 marks)

Fallen stock services are businesses that legally collect and dispose of fallen stock (1 mark). Fallen stock is another name for dead livestock and horses can also be dealt with as fallen stock (1mark). The service includes collection by an approved transporter and disposal following government guidelines at places such as hunt kennels, incinerators, maggot farms or rendering plants (1 mark).

6. (1 mark)

Animal and Plant Health Agency (1 mark)

7. (6 marks)

- Direct Supply Chain (1 mark): Producer to Consumer. The producer directly sells to the consumer. (1 mark)
- Extended Supply Chain (1 mark): Producer to Distributer to Retailer to Consumer. Goods pass through multiple intermediaries in the chain from producer to consumer. (1 mark)
- Lean Supply Chain (1 mark): Just-in-Time. The consumer only receives the goods as they are need from the chain, which aims to reduce waste. (1 mark)

8. (6 marks)

Primary suppliers are directly involved in the production of the main goods or delivery of main services (1 mark). Secondary suppliers also supply goods however these are component materials or services that support the processes of the primary suppliers (1 mark). Tertiary suppliers also supply goods or services however they provide these to the secondary suppliers (1 mark).

Animal Management Example:

- Primary suppliers - supply animals to the pet trade (1 mark)
- Secondary suppliers – supply feed and bedding to primary suppliers (1 mark)
- Tertiary suppliers – supply raw materials for food and bedding (1 mark)

9. (5 marks)

If a business is failing to meet supply chain demands, it can have a negative impact on staff wellbeing (1 mark). Being unable to sustain a business can cause stress and anxiety for owners which can lead to poor physical and mental wellbeing such as susceptibility to illness and depression (1 mark). It can mean that staff cuts are required which will lower wellbeing of staff during the consultation and redundancy process, there may be issues with sleeping and eating during this time (1 mark). Reduced staffing will add pressure to those left in the business, increasing workload and potentially causing burnout for the staff (1 mark). If the business has animal stock to maintain and the supply chain demands for feed and other husbandry items are not meet it can lead to stress and anxiety for staff again leading to susceptibility to disease and disorders (1 mark).

10. (5 marks)

Socio-cultural factors are those that are driven by the way societies are organised and traditions, beliefs and practices (1 mark). As research is carried out into pet animal nutrition it shapes the changes in tastes or trends for pet food sold, for example raw diets have become more popular recently for dogs. (1 mark). Trends for fashion can also influence stock in a pet shop for example pet clothing has become much more popular in the last decade than previously (1 mark). A better knowledge of animal behaviour has led to training equipment being in greater demand

such as clickers. Traditions for working dogs in the countryside has kept a demand for items such as slip leads, whistles and dummies in rural areas higher (1 mark). The importance of pets in the UK has kept the demand for pet care supplies higher than in some other countries including broad ranges of pet bedding and toys (1 mark).

11. (3 marks)

Market segments are distinct groups of customers within a broader market, categorised based on shared characteristics, behaviours or needs (1 mark).

Pet retail stores can segment their pet accessories into sustainable eco-friendly or high-end luxury or affordable (1mark). This allows them to appeal to more market segments, than if they just focussed on one segment such as high-end luxury, and therefore be more profitable (1 mark).

12. (4 marks)

- Procurement of electricity (1 mark)
- Procurement of waste disposal services (1 mark)
- Procurement of laptops for staff (1 mark)
- Procurement of online training courses for staff (1 mark)

13. (4 marks)

- Syringes (1 mark) used for injecting animals with medication such as vaccinations, antibiotics and steroids (1 mark)
- Cat food (1 mark) to feed animals that are staying in the practice for the day or overnight or for supplying to clients as specialised diets post-surgery (1mark)

14. (6 marks)

- Straw (1 mark) – used for bedding and if not stored correctly can become damp and mouldy which could lead to respiratory health issues for the horses and skin irritation (1 mark).
- Feed (1 mark) – if feed is not stored correctly in feed bins so water can get into the feed or vermin, this can contaminate the feed so that it is not providing the nutrients required, can make the horses ill and diseases can spread from the vermin (1 mark).
- Wormers (1 mark) – these items need to be stored at set temperatures given on their packaging and if these are not kept to it can led to degradation of the wormer meaning that it may not adequately prevent worms. They also have expiry dates and need to be used before the date again to ensure that full prevention occurs (1 mark)

15. (5 marks)

If a business fails to meet legal requirements they can be enforced via the courts with penalties (1 mark). If a business fails to meet regulations it has not failed to meet legislation (1 mark) as they are formal guidelines only that help apply the laws (1 mark). Failure to meet codes of

practice is again not failing to meet legislation (1 mark) as they are guidelines from a professional body only though can be used as evidence in a court case as failure to meet a law (1 mark)

16. (4 marks)

It sets out controls on veterinary medicines (1 mark) and medicated feeds (1 mark). In particular it describes the storage requirements for controlled drugs (1 mark) as these have to be stored in specialised cabinets that have to meet certain standards of design and fixture (1 mark).

17. (5 marks)

DEFRA produces codes of practice (1 mark) for the care of guinea pigs which includes details of stocking densities and space requirements for housing guinea pigs (1 marks) which will influence how many guinea pigs can be kept at one time (1 mark). APHA produces guides about notifiable diseases (1 mark). There are no notifiable diseases for guinea pigs however the breeder may keep other animals that fall under APHA surveillance which could led to increases or decrease in guinea pig stock. (1 mark)

18. (4 marks)

Stock rotation ensures that stock items are sold or used in the correct order based on expiry dates (1 mark). By stocking shelves with the newer stock at the back and the older stock at the front you can ensure that the older stock is sold (or used) first (1 mark). This is called first in first out (FIFO) (1 mark). By being efficient with stock rotation, it means that less stock has to be thrown out or destroyed due to passing its expiry date and so reduces wastage as well as being more sustainable (1 mark).

19. (5 marks)

Stock records for a cat breeder are used for the cats themselves and the stock needed for cat husbandry and breeding (1 mark). If records are maintained for the cats themselves, it is easy to show prospective buyers the history of the animals being sold whether they are kittens or breeding males and females (1 mark). This transparent information which helps build the breeders reputation as a good breeder (1 mark) and also meet requirements for The Governing Council of the Cat

## Unit 5: Learning Theories

### Page 83– Recap questions:

1.

The principle that animals have the capacity to experience positive and negative emotions.

2.

- Animal Welfare Act 2006
- Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018
- Animal Welfare (Sentience) Act 2022

3.

When animals in a social group learn behaviours from other members of the group.

4.

Mental processes in the mind that lead to knowledge and understanding.

5.

Behaviours that are the result of genetics and not learnt.

6.

3-17 weeks depending on breed.

7.

Nature refers to innate behaviour that is influenced by evolution and nurture refers to learnt behaviour that develops during a lifetime. These combining forces of genetics (nature) and environment (nurture) impact on an animal's behaviour.

8.

Young can imprint on human carers rather than their own species, creating difficulties for hand reared animals returning to the wild and surviving.

9.

Life stage, health status, diet and emotional state.

10.

Habituation is when responses decrease or stop due to repeated or constant exposure to a stimulus. Sensitisation is the opposite when responses increase from repeated exposure.

11.

An animal forms an association between an unconditioned stimulus and a neutral stimulus to give a conditioned response to conditioned stimulus.

12.

- Positive reinforcement
- Negative reinforcement
- Positive punishment
- Negative punishment

13.

Less Intrusive **M**inimally **A**versive

14.

- Setting goals
- Planning
- Implementing
- Documenting
- Evaluating
- Re-adjusting

**Page 83– Practice questions:**

1. (4 marks)

Latent learning is when an animal acquires knowledge by observing something but only uses that knowledge later, not immediately (1 mark). Whereas insight learning is when the animal suddenly 'sees' the solution to a problem by viewing the situation as a whole and mentally working out the solution there and then. (1 mark).

A rat can show latent learning in a maze. It will explore its surroundings and when food is later put in the maze it is quicker to find the food than a rat that is not allowed to explore first (1 mark).

Chimpanzees using tools to problem solve is an example of insight learning such as using a stick to 'fish' for termites. (1 mark)

2. (3 marks)

This is where animals learn a behaviour by observing the behaviour being performed by others (1 mark). Young cheetahs (1 mark) learn how to hunt by observing their mother hunting (1 mark).

3. (4 marks)

Innate behaviours are those which are not learnt (1 mark) and are the result of genetics (1mark) whereas learned behaviours develop over the lifetime of an individual (1 mark) and can be one of the following types or a combination of them; social learning, trial and error learning, observational learning, latent learning, and insight learning (1mark).

4. (4 marks)

This is a critical period in a kitten's development from birth to 7/8 weeks (1 mark) when it is important for them to have a wide range of experiences in different situations, other animals and people (1 mark). These experiences in this period enable them to learn how to react suitable as

an adult in social interactions (1 mark). Without this learning they may react inappropriately towards their human carers, other cats or other animals (for example too much aggression) or find the interactions too stressful leading to potential rehoming problems or ill health due to chronic stress. (1 mark)

5. (4 marks)

Nature is the influence of evolution and genetics on an animal (1 mark). Innate behaviour that is influenced by genetics (nature) rather than learnt explains some but not all an animal's behaviour (1 mark). Nurture is the experiences and environment of an animal during its lifetime (1 mark). Therefore, behaviours that are learnt during an animal's lifetime (nurture) are also part of its behaviour and most animals have a combination of nature and nurture in their behaviour (1 mark).

6. (4 marks)

Filial imprinting (1 mark) is where the young learn the characteristics of their mother so that they stay close to her which is an important survival strategy for their care at an early age (1 mark).

Sexual imprinting (1 mark) is where young learn the appearance of their mother to help with mate choice in later life which is important for selecting the correct mate in terms of species and hence survival of genes via reproduction (1 mark).

7. (5 marks)

A variety of factors may influence an adult dog's behaviour such as:

1. Genetics – behaviour can be innate, and some breeds of dog have been selected for certain behaviours during the development of the breed, such as herding in border collies (1 mark)
2. Socialisation period experiences – dogs that have been socialised well in the critical period from 3-17 weeks will react well to other dogs, humans, cats etc. though those who haven't may be fearful and or aggressive (1 mark).
3. Health status – dogs that have an illness may become withdrawn and less active or even aggressive to protect itself from further pain (1 mark).
4. Diet – diets can have an impact on activity levels in dogs and can cause over or under activity in daily behaviours (1 mark).
5. Emotional state – a dog that is stressed due to illness or care or being abused by its carers can show this through its behaviour where it may act unpredictably in everyday situations such as increased hiding or increased aggression (1 mark).

8. (3 marks)

This is where an individual's reactions to a stimulus decrease or stop after repeated or constant exposure to the stimulus (1 mark). A domestic dog (1 mark) will be habituated to approaching seagulls on a daily beach walk and will stop barking at them over time (1 mark).

9. (3 marks)

Dogs (1 mark) can be trained to be desensitised to barking and lunging at a vacuum cleaner being turned on and used. Initially the cleaner would need to be in another room and the dog rewarded (positive reinforcement) for not reacting to the noise (1 mark). Over time the noise

level would gradually be increased and again rewarding the dog for not barking until the dog can be in the same room as the cleaner without barking or lunging at it (1 mark).

10. (6 marks)

Pavlov studied the production of saliva in dogs in response to food and managed to use associative learning to get the dogs to produce saliva in response to a bell (1 mark). This form of associative learning is called classical conditioning or respondent conditioning (1 mark). The presentation of food (unconditioned stimulus UCS) resulted in saliva production (unconditioned response UCR) (1 mark). He then introduced a neutral stimulus (NS) of a bell which produced no saliva response (UCR) unless it was paired with the presentation of food (1 mark). After repeated exposure to the bell (NS) and food (UCR) the dogs went on to produce saliva at just the ringing of the bell and no food (1 mark). At this point of associative learning the bell is now a conditioned stimulus (CS) and the saliva production a conditioned response (CR) (1 mark).

11. (5 marks)

Operant conditioning is when an animal learns to associate an outcome (such as a reward) with performing a behaviour rather than a particular stimulus (1 mark).

In zoos this can be used to get animals to perform certain behaviours by rewarding them for performing them. For example:

- Polar bears (1mark) can be trained to stand on their hind legs with their front paws on the enclosure sides so that their paws and claws can be checked. They are rewarded for this behaviour with food. (1 mark).
- Keeper talks rely on animals being present for the talk in a place where the visitors can see them. These areas are usually called stations. Ring tailed lemurs (1 mark) are initially lured to the station with food and they learn to associate going to the platform with a positive outcome of food and so perform the behaviour willingly during displays for a food reward (1 mark).

12. (4 marks)

- Positive Reinforcement (1 mark)
- Negative Reinforcement (1 mark)
- Positive Punishment (1 mark)
- Negative Punishment (1 mark)

13. (4 marks)

Positive reinforcement is where something pleasant (positive) happens after a behaviour is performed and so increases the likelihood of the behaviour being repeated (reinforcement) (1mark).

A domestic cat (1 mark) is more likely to go into its cat basket willingly if it receives a treat for doing so. By repeatedly food rewarding a cat for going near and then entering the basket it will eventually willingly enter the basket with less trouble (1 mark).

Guide dogs are trained to stop at the roadside by rewarding the behaviour with a food reward. Initially they are trained to sit for a treat and then this is extended to sitting at the roadside for a treat. They learn to sit before crossing the road through this positive reinforcement (1 mark).

## Unit 6: Anatomy and Physiology

### Page 89– Recap questions:

1.

- Amylase – breaks down starch into sugars
- Protease – breaks down proteins into amino acids
- Lipases – break down lipids (fats) into fatty acids and glycerol

2.

In the large intestine.

3.

Meat is much easier to digest than plant matter therefore they do not need as long a digestive tract. Plant matter takes longer to digest so herbivores have longer intestines to give them more time to break down cellulose.

4.

Cellulose cannot be digested through mechanical and chemical digestion alone. Bacteria in the caecum (in the hindgut) ferment cellulose which extracts energy from material that would otherwise only be used as fibre.

5.

Cecotropes are soft, nutrient-rich droppings that some herbivores (like rabbits) re-ingest to absorb vitamins and nutrients made by bacteria. Faeces are waste and not re-eaten.

6.

Cow, sheep, goat, deer, moose, giraffe, reindeer, okapi

7.

- Rumen – This is a fermentation vat where bacteria breaks down cellulose in plant matter through the process of fermentation.
- Reticulum – acts like sieve; anything that has been fully digested passes through into the omasum. Anything large is formed into a bolus (a ball) and regurgitated for further chewing.
- Omasum – Water and salts are absorbed.
- Abomasum – Sometimes referred to as the “true stomach”, this is where digestive acids and enzymes carry out chemical digestion.

8.

Chewing it a second time (called “chewing the cud”) breaks down plant matter whilst saliva adds more amylase, both of which improve digestion.

9.

Stones go into the gizzard and help grind up food. Birds don’t have teeth so this replaces chewing. Over time, these stones will break down releasing nutrients.

10.

The cloaca is a common exit for the digestive, urinary and reproductive systems in birds, reptiles and amphibians.

11.

- Mandibulates, such as beetles, have chewing mouthparts (mandibles)
- Haustellates, such as mosquitoes, have sucking or piercing mouthparts.

12.

Owls swallow prey whole. Any indigestible parts, such as bones, fur or feathers, are formed into a pellet which is regurgitated.

**Page 94– Recap questions:**

1.

- Aerobic respiration – uses oxygen, takes place in the cytoplasm and mitochondria, has several stages (glycolysis, krebs cycle, electron transport chain), produces a maximum of 38 ATP per molecule of glucose.
- Anaerobic respiration – does not use oxygen, takes place in the cytoplasm, only has one stage – glycolysis, produces 2 ATP plus lactic acid per molecule of glucose.

2.

It draws air into the lungs by creating pressure changes as the floor of the mouth moves. This is known as “buccal pumping”.

3.

Frog skin is permeable to gases allowing oxygen and carbon dioxide to diffuse in and out. This is especially useful when the frog is under water.

4.

Animals require a lot of ATP to power all the processes in the body. Anaerobic respiration can only produce a maximum of 2 ATP per molecule of glucose which is not enough. Anaerobic respiration also produces lactic acid which is toxic to the animal body in high amounts.

5.

Insects breathe through small holes in the side of their body called "spiracles". These are connected to a network of tracheae and tracheoles which deliver air directly to body tissues, bypassing the circulatory system.

Mammals use lungs to draw air into the body and blood to transport oxygen to body tissues.

6.

Pneumatic bones are hollow, air filled bones. They increase airflow and oxygen exchange during respiration and make the bird lighter for flight.

7.

Birds use a uni-directional airflow system:

Air flows into the posterior airsacs then moves into the lungs where gas exchange occurs. The air then flows into the anterior airsacs and finally out of the body. This takes two full breaths and allows oxygen to be absorbed during exhalation making it a very efficient system.

8.

- Unidirectional airflow through the lungs for constant gas exchange.
- Airsacs move air keeping the lungs supplied even during exhalation.
- There is no mixing of fresh and used air.
- Bird haemoglobin has a higher affinity for oxygen.
- Pneumatic bones increase airflow and oxygen exchange, this is especially useful at high altitudes.

**Page 100– Recap questions:**

1.

Erythrocytes (red blood cells) transport oxygen from the lungs to body tissues.

2.

Haemoglobin. Binds to oxygen to transport it to body tissues.

3.

- B Lymphocytes (B-Cells) – produce antibodies to neutralise pathogens
- T Lymphocytes (T-Cells) – Target infected and abnormal body cells
- Neutrophils – Engulf and destroy bacteria and dead cells via phagocytosis
- Eosinophils – Combat parasites and play a role of allergic reactions
- Basophils – Release histamine during allergic reactions and inflammation
- Monocytes – Engulf and destroy large particles and dead cells via phagocytosis

4.

Receives blood returning to the heart (via the vena cava) and pumps it to the right ventricle.

5.

It pumps oxygenated blood from the lungs to the left atrium of the heart.

6.

The right ventricle pumps blood to the lungs which require low pressure.

The left ventricle pumps blood to the rest of the body. The thicker muscular walls of the left ventricle allow it to produce enough pressure to do this.

7.

- The sinoatrial node produces an electrical pulse. This causes the atria to contract.
- The atrioventricular node receives the impulse and delays it briefly.
- The impulse travels through the bundle of His and Purkinje fibres. This causes the ventricles of contract, completing the heart beat.

8.

- Environmental temperature – when an animal is too hot, the heart rate will increase along with vasodilation of blood vessels in the skin. This channels blood away from the core into the skin reducing body temperature.
- Exercise – during exercise, the animal body produces carbon dioxide as a result of increased cellular respiration. Carbon dioxide is acidic which triggers an increase in heart rate and respiration rate to increase oxygen and decrease carbon dioxide levels.
- Stress – When an animal feels threatened, the sympathetic nervous system triggers the “fight or flight” response. This increases adrenaline levels which in turn increases heart rate. This makes an animal stronger and faster so it can defend itself or flee.

9.

Arteries – they carry blood at high pressure so thick walls prevent rupture and help maintain blood pressure.

10.

Veins – Veins carry blood back towards the heart and are under much lower pressure than arteries. Valves prevent the backflow of blood.

11.

- Returns interstitial fluid to the blood stream.
- Absorbs and transports fats from the digestive system.
- Produces lymphocytes (lymph nodes)
- Delivers immune system cells where needed.

12.

Skeletal muscle contractions, blood vessel contractions, breathing movements and valves that prevent the backflow of blood.

13.

- Tonsils – Traps and destroys pathogens entering through the nose and mouth.
- Thymus – Site where T Lymphocytes mature. Most active in juveniles.
- Lymph nodes – Filter lymph to remove pathogens, dead cells and debris.
- Spleen – Stores white blood cells. (The spleen has other functions not related to the lymphatic system – filters blood, removes old red blood cells and platelets to be recycled in the liver)

14.

A two chambered heart pumps blood in a single circuit (heart – gills – body – heart) which means blood pressure is limited by the pressure the gills can take. Large and active mammals require blood to be pumped to the body under much pressure for faster delivery.

15.

In a double circulatory system, oxygenated and deoxygenated blood are separated. Deoxygenated blood can be pumped to the lungs under lower pressure whilst oxygenated blood can be pumped to the body under much higher pressure. This allows for fast, efficient delivery of oxygen to the body.

**Page 104 – Recap questions:**

1.

To produce and release hormones, chemical messengers that control important functions such as growth, metabolism and reproduction.

2.

- Pituitary gland (in the brain). This controls other glands and releases hormones that affect growth, reproduction and water balance.
- Thyroid gland (in the neck). Produces hormones such as thyroxine which controls metabolism (how quickly the body uses energy).
- Adrenal glands (on top of the kidneys). Produce adrenaline which controls the “fight or flight” response and cortisol, also known as the “stress hormone”.
- Pancreas (in the abdomen). Releases insulin to lower blood sugar and glucagon to increase blood sugar.
- Ovaries (in the lower abdomen). Produce oestrogen and progesterone which regulate reproduction and sexual development in female animals.
- Testes (outside the lower abdomen). Produce testosterone which regulates reproduction and sexual development in male animals.

3.

The hypothalamus (in the brain). It links the nervous and endocrine systems and gives instructions to the pituitary gland.

4.

Chemical messengers made by endocrine glands. They travel through the blood stream to organs and tissues to control specific tasks around the body.

5.

Circulating hormones travel around the body from their producing gland to their target organ or tissue. For example, insulin is released by the pancreas into the bloodstream to lower blood sugar.

Locally acting hormones act in the area where they are made. A good example of this is histamine which is produced by mast cells and basophils and act upon nearby blood vessels and immune cells causing inflammation and allergic responses.

6.

Homeostasis is the body's way of maintaining internal conditions. The body works best when all internal factors (e.g. temperature, water levels, glucose levels) are within ideal levels. Homeostasis ensures that the body maintains these ideal levels.

7.

Endothermic generate their own body heat using energy from the food they consume. To help maintain temperature within ideal levels, endothermic animals use different hair, fur or feather types to insulate them based on the environment they live in.

If an animal is cold, they will shiver to produce heat whilst vasoconstriction reduces blood flow in the limbs, channelling more blood into the core.

If an animal is too hot, they will sweat or pant to lose heat whilst vasodilation increases blood flow in the limbs, channelling blood into the skin, away from the core.

These processes are controlled by the hypothalamus.

8.

Thermoregulation ensures that body temperature remains within the tolerance limits of enzymes. If enzymes become too hot, they denature and are unable to perform their functions. If it is too cold, biochemical reactions cannot take place as efficiently causing the animal to become ill or die.

9.

Osmoregulation is controlled by a hormone called antidiuretic hormone (ADH).

If an animal is dehydrated, ADH causes the kidneys to retain water therefore producing less urine. Dehydration also triggers a strong desire to find water to drink.

If an animal has too much water, ADH causes the kidneys to produce more, dilute urine.

### **Page 112 – Recap questions:**

1.

- The pentadactyl limb is a five-fingered limb common across vertebrates.
- Wings are adapted for flight. The digits are elongated or fused to support wing membranes (bats) or feathers (birds) for lift and gliding.
- Fins are adapted for swimming. The bones are flat and paddle-like allowing for powerful propulsion and steering in water. Seen in dolphins and whales.
- Hands are adapted for manipulation of the environment and climbing. Primates are an excellent example of this. The opposable thumb gives great dexterity when manipulating objects.

- Horses have evolved a single toe or hoof for running. This gives greater strength which is necessary for such a large animal to run at speed. Five smaller toes would be more likely to break.

2.

The hyoid bone in cats supports the tongue and larynx (voice box). It allows the animal purr, meow and swallow.

3.

- Retractable claws allow cats to climb and grip prey.
- Powerful muscles and flexible spine allow speed, leaping and stealthy movement.
- Forward facing eyes provide depth perception for accurate hunting.
- Long tail acts as a counterbalance.

4.

- Tendons connect muscle to bone and allow movement.
- Ligaments connect bone to bone to stabilise joints and limit movement to prevent injury.

5.

- Support – holds the body up.
- Protection – the skull protects the brain, the ribcage protects the heart and lungs.
- Movement – the bones act as levers for the muscles to pull against.
- Haematopoiesis – blood cell production in bone marrow
- Mineral storage – stores calcium and phosphorus

6.

- Cervical (neck)
- Thoracic (chest)
- Lumbar (lower back)
- Sacral (pelvis)
- Caudal / coccygeal (tail)

7.

- Ball and socket – hip and shoulder
- Hinge – knee and elbow

- Pivot – neck (between the atlas and axis vertebrae)
- Saddle – base of the thumb
- Condylod – wrists and jaw
- Gliding – Between vertebrae, wrist and ankle

8.

The baculum is a bone found in the penis of many animals and supports erection during mating. Animals without a baculum must rely on blood filling erectile tissue in order to maintain erection. The baculum allows longer mating times and increases the success rate of reproduction. Examples of species with a baculum are dogs, cats, bears and many species of primate.

**Page 118 – Recap questions:**

1.

- Forebrain – controls thinking, memory and emotions.
- Midbrain – processes sight and sound, and controls reflexes.
- Hindbrain – controls movement and balance along with autonomic functions such as breathing.

2.

Hypothalamus

3.

The cerebellum coordinates movement, balance and posture.

4.

- Central nervous system (CNS) – brain and spinal cord
- Peripheral nervous system (PNS) – all the nerves coming from the spinal cord to the rest of the body.

The PNS delivers messages from the CNS around the body.

5.

- Afferent neurons are sensory neurons which carry signals from the body to the CNS.
- Efferent neurons are motor neurons which carry signals from the CNS to muscles or glands.

6.

The ANS controls automatic body processes such as heart rate, breathing, digestion and pupil size without any conscious effort from the animal.

7.

- The sympathetic nervous system triggers the “fight or flight” response. This increases heart and breathing rate, slows digestion and prepares animals to deal with danger.
- The parasympathetic nervous system triggers the “rest and digest” response. This returns heart and breathing rate to resting levels, increases digestion and allows normal functions to resume.

8.

- Cone cells detect colour and work best in bright light.
- Rod cells detect light and dark. They are important for night vision.

9.

- Malleus (hammer)
- Incus (anvil)
- Stapes (stirrup)
- These bones amplify sound vibrations from the eardrum and pass them to the inner ear.

10.

The olfactory epithelium in the nasal cavity contains receptor cells that detect molecules in the air. These cells send signals via the olfactory nerve to the brain’s olfactory bulb.

11.

- Sweet
- Sour
- Salty
- Bitter
- Umami (savoury)

12.

- Forward-facing eyes give better depth perception because the image from each eye overlaps into one 3-dimensional image.

- Side-facing eyes benefit prey because each eye is able to see a different angle. This gives a very wide field of view allowing the animal to spot predators coming from a much wider angle.

13.

Jacobsen's organ (also known as the vomeronasal organ) detects pheromones and scent particles in the air. Snakes use their forked tongue to collect particles from the air and then deliver the particles to the Jacobsen's organ. Many animals use this to help find prey and mates.

14.

The Ampullae of Lorenzini are electroreceptors covering the shark's snout that detect electric fields produced by muscle movement and heartbeats in prey.

15.

Echolocation is when animals produce sound waves which bounce off objects and back to the animal. Bats use this system to hunt in the dark without flying into objects. Dolphins use this system to navigate and find fish, even in murky water.

16.

The lateral line is a line of sensory cells along the side of a fish's body. Water enters the cells and minute hairs detect the direction and speed of movement. This information is used by the fish to avoid predators.

**Page 121 – Recap questions:**

1.

Electrolytes are minerals such as sodium, potassium, calcium and chloride that carry an electric charge in body fluids. They play an essential role in nerve signal transmission, muscle contraction, maintaining fluid balance (osmosis) and regulating pH in the body.

2.

Following ultrafiltration, the kidneys reabsorb substances that the body requires such as glucose, water, amino acids and salts. If this didn't occur, the body could face deficiencies.

3.

Ultrafiltration occurs in the glomerulus of the nephrons inside the kidneys. High blood pressure forces water, glucose, urea and other small molecules out of the blood and into the Bowman's

capsule. Large molecules such as blood cells and proteins are too large to pass through the membrane and stay in the blood.

The filtrate that is captured by the Bowman's capsule is used to create urine.

4.

Erythropoietin (EPO) stimulates the bone marrow to produce red blood cells.

Renin helps to control blood pressure by triggering vasoconstriction whilst the kidneys retain water and salt.

Calcitriol (active form of Vitamin D) helps the body absorb calcium from food.

5.

Ammonia is a toxic waste product made when proteins are broken down. The liver converts ammonia into urea (the urea cycle / ornithine cycle) which is less toxic, soluble in water and can be excreted by the kidneys in urine.

6.

The type of water a fish is in determines the osmotic pressures the fish is under.

Saltwater fish live in water where the high salinity of the water puts the fish under a lot of osmotic stress as water tries to leave the body. In order to conserve water and excrete excess salt, fish produce very small amounts of very concentrated urine.

Freshwater fish live in water with very low salinity which puts the fish under a lot of osmotic stress as water tries to enter the body. In order to prevent excess water intake, fish produce lots of dilute urine to get rid of the excess water taken in via osmosis.

#### **Page 126 – Recap questions:**

1.

The epididymis stores and mature sperm cells.

2.

Fertilisation typically occurs in the uterine tubes or fallopian tubes.

3.

Oestrogen helps developing follicles mature into ova, develops secondary sex characteristics and promotes mating behaviours.

Progesterone maintains the uterine lining for implantation of the zygote and supporting the growing foetus.

4.

- Makes flying easier (less weight and drag)
- Reduces the risk of injury during mating.

Waterfowl have a penis as they mate on water. Mating via a cloacal kiss would result in the sperm being washed away.

Ratites (ostriches, emus, cassowary, rhea and kiwis) have a penis as their large size makes a cloacal kiss difficult. These birds do not fly so did not evolve to lose their penis.

5.

Cats are “induced ovulators”. This means the female cat ovulates when she receives the specific stimulation of the barbs on the cat’s penis scraping the walls of the vagina. This gives the male’s sperm the highest chance of fertilising the egg.

6.

Marsupials give birth to offspring in a very under-developed state. Immediately after birth, the offspring crawls into the mother’s pouch where it attaches to a teat. The baby will continue to develop in the mother’s pouch with the milk containing the right balance of nutrients to support each stage of growth.

7.

Two hemipenes greatly increase the chance of mating success in snakes. They can use either side, depending on the position they are in during mating.

8.

- **Proestrus** – Hormones rise, female not yet receptive.
- **Oestrus** – Female is receptive and ovulation may occur.
- **Metestrus** – Ovulation is complete, corpus luteum forms.
- **Dioestrus** – Corpus luteum active, high progesterone.
- (*Anoestrus*) – Resting stage between cycles (in species with seasonal cycles).

9.

Metoestrus – it produces progesterone which prepares and maintains the uterine lining for pregnancy.

10.

Luteinising hormone (LH) triggers ovulation and stimulates the formation of the corpus luteum.

11.

Fertilisation is the point at which the egg and sperm join and form a zygote.

Implantation is when the zygote embeds into the uterine lining and begins to develop into an embryo.

12.

Oxytocin and prostaglandins.

**Page 132 – Recap questions:**

1.

- Epidermis – this is the outer layer that provides a waterproof barrier that protects the body from pathogens and prevents water loss.
- Dermis – contains blood vessels, nerves, hair follicles, sweat glands and sebaceous glands. This layer supports thermoregulation and allows the body to feel external stimuli.
- Hypodermis – made of fat and connective tissue. Acts as insulation, shock absorption and energy storage.

2.

- Apocrine sweat glands are found most commonly in armpits and groin. They produce a thick, oily sweat which contains pheromones. Animals use this for scent marking and communication.
- Eccrine sweat glands produce a watery sweat. This plays a major role in thermoregulation.

3.

Sebum is an oily substance that moisturises and waterproofs the skin and hair. It is vital to maintain the health of skin and hair.

4.

- A blood clot forms to prevent further bleeding.
- Inflammation occurs due to a histamine reaction. This triggers an immune response to fight infection.
- New cells are produced to repair the epidermis.
- Collagen is laid down by fibroblasts in the dermis.
- Depending on the severity of the wound, this process may produce a scar.

5.

The epidermis is formed from tightly packed cells made from keratin. This provides a tough, waterproof barrier preventing microbes entering and water loss. The skin acts as a physical shield protecting all internal parts of the body.

6.

Sebum and sweat are slightly acidic which helps kill or block pathogens.

7.

- Contour feathers cover the body and wings, give shape and help with flight and protection.
- Down feathers are fluffy and soft. They are found under contour feathers and provide insulation.
- Flight feathers are long and stiff. They are found on the wings and tail and are specialised for flight and steering.
- Semiplumes provide an additional layer of insulation.
- Filoplumes provide sensory information about temperature, wind speed and feather movement. They work in a similar way to whiskers in mammals.
- Bristle feathers are found around the eyes and beak and provide protection from dust and insects, much like eye lashes in other species.

8.

This gland is found near the base of the tail and produces oils that are used to waterproof feathers, maintain their flexibility and condition, and provide antimicrobial protection.

9.

- Reptile skin is dry, scaly and keratinised. It has evolved to help retain water in arid environments.
- Amphibian skin is moist, smooth and permeable. Amphibians are able to perform gas exchange through their skin when in the water.

1. (6 marks)

Different species of animal have evolved different digestive systems suited to their diets.

Ruminant animals such as cattle or sheep are generally considered to have the most efficient digestive system as they are able to extract nutrients from tough, low quality plant material. They have a four-chambered stomach that allows microbial fermentation in the rumen. Here, bacteria break down cellulose into energy-rich volatile fatty acids (VFA) as the first stage of digestion.

Hindgut fermenters such as horses and rabbits also use bacterial fermentation but this is generally less efficient than in ruminants. These species ferment plant material in the caecum which is located after the small intestine so some nutrients are lost.

Monogastric species such as cats and dogs are unable to digest cellulose. In these species, plant matter forms dietary fibre which bulks out the faeces making transit through the intestines easier.

2. (6 marks)

Animals have different digestive tract lengths that have adapted to the type of food they eat.

Herbivores eat plant material that contains cellulose which is hard to digest. Having a longer digestive tract gives a longer transit time allowing longer for digestion and absorption to occur. Many herbivores also have specialised organs as part of their digestive system (such as the four-chambered stomach in ruminants or the enlarged caecum in hindgut fermenters). These species rely on bacterial fermentation to break down cellulose in plant matter.

Carnivores eat meat which is high in protein and easy to digest. They have much shorter digestive systems than herbivores because they don't require bacterial fermentation or long digestion times.

Omnivores have a digestive system in between that of herbivores and carnivores as they eat both plant matter and meat. A moderate length digestive system gives more flexibility to animals that are eating a varied diet.

3. (6 marks)

Mammals breathe using lungs with alveoli, where gas exchange occurs. Air moves in and out through tidal ventilation, meaning the air flows in both directions and mixes inside the lungs.

Birds have a unique system with unidirectional airflow through the lungs, supported by air sacs. This allows continuous, efficient gas exchange without mixing old and new air, making it more efficient than mammalian respiration—especially important for flight.

Amphibians, like frogs, often use cutaneous respiration—they can absorb oxygen through their skin, which must stay moist. Some also use simple lungs (frogs) or gills (in tadpoles), but their lung structure is less developed than in birds or mammals.

4. (4 marks)

Aerobic respiration is a complex process with three main stages. It uses oxygen to break down glucose and produces carbon dioxide, water, and a large amount of energy (ATP).

Anaerobic respiration has just one stage and occurs without oxygen and produces less energy, along with lactic acid in animals (or ethanol and CO<sub>2</sub> in some microbes).

Aerobic respiration is more efficient, while anaerobic respiration is useful for short bursts of activity when oxygen is limited.

5. (4 marks)

The heart has four chambers, two atria that receive blood and two ventricles that pump blood. The left side of the heart has much thicker, muscular walls to pump blood around the body under high pressure.

Heartbeat is generated by the sinoatrial node which causes the atria to contract. This signal then passes through the atrioventricular node, through the Purkinje fibres causing the ventricles to contract.

6. (3 marks)

- The circulatory system transports immune system cells (leukocytes such as phagocytes or lymphocytes) to areas of the body where injury or infection are detected.
- The circulatory system connects to the lymphatic system which produces leukocytes, filters pathogens and activates immune response.

7. (6 marks)

Homeostasis is the body's way of ensuring key factors such as water levels, glucose levels and temperature remaining within ideal levels.

Insulin is produced in the pancreas and lowers blood glucose levels by allowing cells to take in glucose and encouraging the liver to store glucose as glycogen. If an animal is unable to produce insulin, it will lead to diabetes where blood glucose levels can become dangerously high.

Another important hormone is antidiuretic hormone (ADH), made in the hypothalamus and released by the pituitary gland. It controls water balance in the body by making the kidneys reabsorb more water, therefore making smaller amount of concentrated urine. This is vital for maintaining blood pressure and hydration.

Both of these hormones play a vital role in maintaining balance within the body, allowing biochemical processes to function as they should.

8. (6 marks)

- Ligaments connect bone to bone which holds joints together and prevents damage from excessive or irregular movement.
- Tendons connect muscle to bone. As the muscle contracts, it pulls on the tendon which pulls on the bone moving the limb. As muscles can only produce a pulling force, they work in pairs; one muscle pulls the joint in one direction (e.g. bicep causing flexion of the limb) and the other pulls the limb in the opposite direction (e.g. tricep causing extension of the limb).

9. (8 marks)

The pentadactyl limb is an adaptation seen in vertebrate animals that has very similar bone patterns. For example, the leg consists of femur – tibia and fibula – tarsals – metatarsals.

Different species show adaptations of the length, shape and position of these bones depending on how they have evolved to live. For example, primates have long phalanges (fingers) with an opposable thumb allowing them to climb and manipulate objects. This allows these species to move through the trees with ease as well as use tools to find food.

Bats have elongated phalanges to support the wing membranes allowing flight. These mammals fly in order to hunt insects and evade predators.

Other species, such as the horse have evolved legs that look very different, however, all the same bones are present. Horses have evolved very strong legs with a single toe or hoof. This adaptation evolved due to the size of horses; a large animal running on five small toes would risk breaking more delicate bones.

The pentadactyl limb is an excellent example of how animals evolve in ways that benefit their lifestyle and environment.

10. (3 marks)

- A – Femur
- B – Ribcage
- C – Metatarsals

11. (6 marks)

Prey species like rabbits rely heavily on hearing and vision to detect predators. Their large ears can rotate to pick up sounds from different directions, helping them hear predators like foxes approaching. Rabbits also have eyes on the sides of their head, giving them a wide field of vision to spot danger early and escape quickly.

Predators, such as owls, use highly developed hearing and vision to hunt. Owls have forward-facing eyes for depth perception, helping them judge distances accurately when swooping down on prey. They also have asymmetrical ear placement, allowing them to pinpoint sounds in three dimensions, even in complete darkness.

These sensory adaptations help both prey and predators survive—by avoiding danger in prey, and successfully hunting in predators.

12. (4 marks)

- The sympathetic nervous system prepares the body for 'fight or flight' responses during stress or danger. It increases heart rate, dilates pupils, and diverts blood to muscles to help the animal react quickly.
- The parasympathetic nervous system supports 'rest and digest' functions. It slows the heart rate, stimulates digestion, and conserves energy, helping the body recover and maintain normal function after stress.

Together, these systems work in balance to maintain homeostasis and respond appropriately to different situations.

13. (4 marks)

Desert dwelling species such as camels have very long loop of Henle in the nephrons of their kidneys. This means the filtrate from the glomerulus and Bowman's capsule has a longer transit time, allowing more water to be reabsorbed into the bloodstream.

This means that camels produce small amounts of very concentrated urine, maximising the amount of water retained by the body.

14. (5 marks)

When amino acids are broken down in the liver, they produce ammonia, a toxic byproduct. This is converted into urea through the ornithine cycle (urea cycle). Urea is less harmful and can be transported in the blood where the kidneys can filter it out.

In the kidneys, the glomerulus filters urea, salts, glucose and water from the blood. The kidney nephrons return water and salts to the body where required and everything remaining is sent to the bladder as urine via the ureter.

Urine is stored in the bladder until the animal releases it via the urethra.

15. (4 marks)

When follicles mature, the bird ovulates an ovum in the form of an egg yolk with a blastodisc (the genetic material from the female). The ovum travels into the infundibulum where it is fertilised by waiting sperm. From here, the ovum travels into the magnum where the albumin (egg white) is added.

In the isthmus, fine membranes are added around the albumin. Next the calcium shell is added in the uterus. This is the longest part of the process and takes around 20 hours. When the shell is complete, the egg travels through the vagina and out through the cloaca.

16. (8 marks)

The oestrus cycle prepares the female's body for reproduction:

- Proestrus – Here, oestrogen levels rise as the follicles in the ovaries develop into ova. At this point, the female is not yet ready to mate. Physical signs like swelling of the vulva may appear.
- Oestrus – This is also known as being “in heat”. Here, oestrogen levels are highest which triggers ovulation. Female animals will be receptive to mating.
- Metoestrus – The corpus luteum produces progesterone which prepares the uterine lining for pregnancy.
- Dioestrus – during this phase, the progesterone levels remain high. If the animal falls pregnant, she will remain in dioestrus until she is ready to give birth at which point the corpus luteum breaks down and progesterone levels fall.

If the animal does not fall pregnant, the corpus luteum breaks down and progesterone levels fall.

Anoestrus - At this point, the hormone levels drop, allowing the reproductive tract to repair in preparation for the next oestrus cycle.

The length of each stage of the oestrus cycle depends on the species.

## Unit 7: Animal Health

### Page 140 – Recap questions:

1.

- Animal Welfare Act 2006
- Veterinary Surgeons Act 1966
- Veterinary Medicine Regulations 2013
- Animal Welfare (Licensing of Activities Involving Animals) (England) Regulations 2018

2.

- POM-V
- POM-VPS
- NFA – VPS
- AVM – GSM

3.

- Ectoparasiticides are used to prevent and treat ectoparasitic infections (parasites that live on an animal).
- Endoparasiticides are used to prevent and treat endoparasitic infections (parasites that live in an animal).

4.

Controlled drugs are those that are considered to be dangerous or otherwise harmful by the Misuse of Drugs Act 1971. They must be stored in safe custody in a controlled drugs cabinet.

5.

A suitably qualified person. This is someone who can legally prescribe or supply veterinary medicines (POM-VPS & NFA-VPS).

6.

A controlled drugs register is a record of the supply and use of controlled drugs.

7.

- Enteral
- Parenteral
- Topical
- Inhalation

8.

Yes they can in certain circumstances listed in Schedule 3 of the Veterinary Surgeons Act 1966. Such as a pet owner carrying out minor medical treatment or emergency first aid. Minor surgery

that requires entry into the body cavity is not allowed for owners, registered veterinary nurses and student veterinary nurses.

9.

For lesser charges a penalty fine of up to £1000

For greater charges a conviction and fine

**Page 151 – Recap questions:**

1.

- Direct Transmission (Physical contact such as licking, biting, mating)
- Indirect Transmission (Through contaminated objects or organisms)
- Airborne Transmission (Inhalation of airborne pathogens)
- Droplet Transmission (Spread through moisture droplets from sneezing, coughing, barking)
- Ingestion (Consumption of contaminated food or water)
- Vector Transmission (Transmitted via organisms like mosquitoes or ticks)
- Fomite Transmission (Spread via contaminated surfaces such as bedding, clothing, or equipment)

2.

- Neonates (Highly susceptible due to underdeveloped immune systems; prone to neonatal septicemia, hypothermia, dehydration)
- Juveniles (Developing immune responses but still vulnerable; common issues include parvovirus, roundworm infections)
- Adults (Working, Breeding) (Stronger immunity but stress can cause susceptibility; common diseases include respiratory infections and reproductive issues)
- Senior Animals (Declining immunity and organ function; prone to arthritis, heart disease, kidney disease)
- Geriatric Animals (High susceptibility to chronic illnesses; common issues include cognitive dysfunction, cancer, diabetes)

3.

- Coughing
- Wheezing
- Nasal discharge
- Labored breathing

4.

- The immune system may be compromised, leading to reduced resistance against infections.
- The cardiovascular system can be affected by parasites such as heartworms, leading to circulation problems.
- Respiratory infections like pneumonia can decrease oxygen supply, impacting overall health.

5.

- Quarantine measures for new or sick animals to prevent disease transmission.
- Disinfection of equipment, surfaces, and enclosures to minimize the risk of infection.
- Controlled access to animal areas to limit exposure to potential pathogens.

6.

- The primary goal of supportive care is to maintain overall health and comfort during illness.
- Examples include fluid therapy to prevent dehydration and pain relief to reduce suffering.

7.

- Notify the Animal and Plant Health Agency (APHA) immediately.

8.

- Bluetongue is spread by a vector
- specifically biting midges.

9.

- Culling is used to remove infected or at-risk animals to prevent disease spread.
- An example is the culling of infected and exposed birds in response to Avian Influenza (Bird Flu)

10.

- Isolate infected animals
- disinfect equipment, wear protective clothing
- seek veterinary and medical advice, use antifungal treatment.

11.

- Rabies is a notifiable disease
- because it is highly fatal and poses a serious risk to humans and animals.
- Immediate actions include seeking veterinary/medical attention, euthanizing infected animals, reporting the case to authorities, and vaccinating animals in high-risk areas.

12.

- maintaining hand hygiene, cleaning animal enclosures, avoiding raw pet food, and preventing cross-contamination in food preparation.

13.

- 1 mark for correctly defining a zoonotic disease (A disease that can be transmitted between animals and humans).
- 1 mark for naming one correct example from the text (e.g., Rabies, Leptospirosis, Salmonella, Brucellosis, Toxoplasmosis).
- 1 mark for naming a second correct example.

14.

- correctly explain the transmission method (Contact with infected urine, contaminated water, soil, or wounds on the skin; rodents are common carriers).
- list at least two symptoms (e.g., fever, vomiting, muscle pain, jaundice, kidney failure, lethargy, loss of appetite, increased thirst, difficulty breathing, blood in urine).

15.

- An endoparasite is a parasite that lives inside the body of its host.
- An ectoparasite is a parasite that lives on the surface of the host.
- Examples of endoparasites are Roundworms, Tapeworms, Flukes, Giardia.
- Examples of ectoparasites are Ticks, Fleas, Lice, Mites.

16.

- Deficiency of vitamin D,
- Deficiency of calcium, or phosphorus.

17.

- Taurine is crucial for heart and eye health in cats.
- Its deficiency can lead to vision impairment, dilated cardiomyopathy, and reproductive issues.

18.

- Excessive food intake combined with insufficient exercise
- high-calorie diet with poor nutrient balance.

19.

- Cushing's Disease (Hyperadrenocorticism)

20.

- Metabolic Bone Disease (MBD)

**Page 160 – Recap questions:**

1.

- Preserve life
- Prevent the situation from worsening

- Promote recover

2.

It does not diagnose the problem – it gives time to get the animal to the vets, though it can be lifesaving.

3.

The need to be protected from pain, suffering, injury and disease.

4.

It is important to not make the situation worse due to hazards in the environment. This can be for the animal, other animals, first aiders. It may be the hazards are too great. The hazard can be the animal themselves.

5.

Blunt nosed scissors to avoid additional stabbing injuries.

6.

Tick remover. Though could use tweezers if not available being careful to remove the tick's mouth parts.

7.

- Burns (dry heat)
- Scalds (wet heat)

8.

- Bruising to the skin, where the tissue is damaged underneath.
- Cold compress or ice wrapped in a towel pressed to the area.

9.

It can cause swelling of the airways and prevent adequate air flow to and from the lungs.

10.

Ideally not as they may be stopping further bleeding, better for a vet to remove in supervised conditions.

11.

Hyperthermia is where the animal's temperature is dangerously high and hypothermia is where the animal's temperature is dangerously low.

12.

The power should be turned off before touching the animal.

13.

- Topical medicines such as antiseptic sprays or creams
- Asthma inhalers

- EpiPens

**Page 161 – Practice questions:**

1. (2 marks)

- Animal Welfare Act 2006 requires prevention of suffering which may require medication (need law and example for 1 mark)
- Veterinary Surgeons Act 1966 restricts the prescribing of medication to those who are qualified to do so (need law and example for 1 mark)

2. (3 marks)

This is a prescription only medicine (1 mark) that can only be prescribed by a vet following a diagnosis (1 mark). Examples include antibiotics, hormone products, anti-inflammatories, antivirals, some vaccines, some wormers and anaesthetics (give one of these for 1 mark)

3. (3 marks)

- Scenarios: injured in a road traffic accident, caught in fencing, attacked by a predator, attacked by a domestic dog or cat (1 mark for describing one of these)
- Named wild animal: hedgehog, rabbit, hare, badger, otter, deer, seals, any named UK bird, any named UK rodent, stoat, weasel, any UK sea mammal (1 mark for naming one, does not need to be species name)
- Medication: painkillers, reduce pain of injury, anti-inflammatory, to reduce inflammation in injury, antibiotics (in case of bacterial infection of wound), steroids (to aid recovery), anaesthetics to allow for surgery (1 mark for naming one of these types of drugs and why it would be given)

4. (4 marks)

- Anti emetic medicines are used to prevent or decrease sickness/vomiting (1 mark). The sickness/vomiting can be caused by ingesting a toxic substance or may be due to disease or disorder (1 mark)
- Emetic medicines are used to induce vomiting when something inappropriate has been ingested (1 mark). The ingested item may be a toxic substance such as chocolate in dogs or an item that is small enough to be removed from the body easily by vomiting. (1 mark)

5. (1 mark)

Misuse of Drugs Act (MDA) 1971

6. (3 marks)

Any 3 of the following for 1 mark each:

- Bolted to the wall or floor
- Lock must be different to any other lock on the premises

- Must not have anything attached to it which identifies it as a CD cabinet
- Preferably double locked (with separate keys)

7. (2 marks)

Any two of the following for 1 mark each:

- Companion only
- Farm only
- Equine only
- Avian only

8. (4 marks)

- Ensures medicines are in date when used as it is an offence to supply or administer out of date medicine (1 mark) For example ensuring expiry dates are complied with, by using soonest expiry dates first (1 mark)
- Having a record of the medicines held in stock ensures waste reduction and saving money (1 mark). For example, it stops over ordering and potentially having to throw away expired medicine that is not used in time (1 mark)

9. (4 marks)

Enteral routes are those which are internal via the mouth, rectum or tube into the gastrointestinal tract (1 mark). They can be given in feed, tablet or as tablets with the aim to get the medication directly to the gastrointestinal tract (1 mark). The parental route however is any other internal route into the body and is usually administered via a needle (1 mark). Parental routes include, intravenous, intramuscular, subcutaneous and intra-articular. (1 mark)

10. (4 marks)

The Veterinary Surgeons Act 1966 ensures animals are only treated by those qualified to do so – veterinary surgeons. (1 mark). Schedule 3 lists exceptions to this for non-qualified staff (1 mark). It allows for the administration of emergency first aid to save a life or relieve pain and suffering by anyone (1 mark). It lists out circumstances when people other than vets may carry out minor medical treatment or minor surgery not involving the body cavity (1 mark)

11. (3 marks)

- Is the procedure medical treatment or minor surgery not involving the body cavity
- Is the animal under your care
- Can you delegate to this person
- Does the person feel capable and have sufficient experience
- Have you considered the specific risks of this case
- Are you able to direct or supervise

(1 mark each for any of the above)

20. (3 marks)

- Preserve life (1 mark)
- Prevent the situation from worsening (1 mark)
- Promote recovery (1 mark)

21. Describe three situations where hazards in the environment may limit what first aid can be offered immediately. (6 marks)

- The animal may be in the road where they are in danger of being hit again (1 mark) or the first aider may be in danger of being hit so it might not be safe to attempt to reach the animal until the traffic is stopped (1 mark)
- The animal may be caught on barbed wire fencing which might further injure the animal as it struggles (1 mark) or may injure the first aider whilst they attempt to help the animal so it might not be safe to attempt to reach the animal until suitable equipment arrives (1 mark)
- The animal on ice may be at risk of falling through the ice and becoming trapped under the ice (1 mark) as may the first aider so will not be safe for the person to go onto the ice until suitable equipment arrives (1 mark)

22. (6 marks)

- Bandages (1 mark) – used to cover wounds once dressed and help stop bleeding (1 mark)
- Cotton wool (1 mark) – used to clean injuries and for padding to absorb blood (1 mark)
- Tick remover (1 mark) – used to safely remove ticks fully ensuring the mouthparts are extracted from the body (1 mark)

23. (6 marks)

- Laceration – this is a torn jagged wound (1 mark). The wound should be cleaned to removed debris and prevent infections (1 mark). Antiseptic solution should be applied and the wound covered and wrapped to stop further bleeding (1 mark)
- Contusion – this is bruising to the skin with damaged tissue underneath (1 mark). A cold compress or ice wrapped in a towel should be applied to the affected area (1 mark). This will help to reduce the swelling and pain. (1 mark).