MARK SCHEME

Pearson Edexcel GCSE (9-1) Biology · Paper 1: Key Concepts, Cells & Control, Genetics, Natural Selection, Health & Disease (Topics 1–5)

Foundation Tier — Separate Science · Total: 100 marks

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This mark scheme is designed for use by examiners. Alternative correct answers should be accepted. Marks in brackets [1] indicate one mark. Points separated by / indicate alternatives. Underlined words are essential. ★ indicates Higher Tier only marks.

Question 1 [4 marks]

(a) [1 mark]

What is the function of chloroplasts?

• C. Site of photosynthesis [1]

(b) [1 mark]

Which of the following correctly describes osmosis?

• B. Movement of water molecules from high to low water potential through a partially permeable membrane [1]

(c) [1 mark]

Which type of drug is effective against bacterial infections?

• C. Antibiotics [1]

(d) [1 mark]

Cystic fibrosis is caused by which type of allele?

• B. Recessive [1]

Total for question 1: 4

Question 2 [5 marks]

The diagram shows a eukaryotic cell.

(a) [3 marks]

Identify THREE structures found in an animal cell. For each, give ONE function.

• Nucleus: contains DNA / controls the cell [1]

• Mitochondrion: site of aerobic respiration / releases energy [1]

• Ribosome: site of protein synthesis [1] — accept cell membrane with function

(b) [2 marks]

State TWO structures that are present in a plant cell but NOT in the cell shown.

• Cell wall [1]

• Chloroplast [1] — accept permanent vacuole

Total for question 2: 5

Question 3 [7 marks]

A student investigates osmosis using potato cylinders placed in sucrose solutions of different concentrations.

(a) [2 marks]

Define osmosis.

• Net movement of water molecules [1]

• from high to low water potential through a partially permeable membrane [1]

(b) [3 marks]

A potato cylinder placed in a concentrated sucrose solution decreases in mass. Explain why.

• The concentrated solution has a lower water potential than inside the potato cells [1]

• Water moves out of the potato by osmosis [1]

• Cells lose water and become plasmolysed/flaccid → potato decreases in mass [1]

(c) [2 marks]

State TWO variables the student should control in this investigation.

• Temperature [1]

• Length/mass of potato cylinders at the start / same potato variety [1] — accept time in solution, volume of solution

Total for question 3: 7

Question 4 [7 marks]

Enzymes control chemical reactions in living organisms.

(a) [2 marks]

Explain what is meant by the term "active site" of an enzyme.

• The part of the enzyme where the substrate binds [1]

• Has a specific shape complementary to the substrate [1]

(b) [3 marks]

Describe the effect of temperature on enzyme activity. Include in your answer what happens above the…

• Increasing temperature increases rate of enzyme activity up to the optimum [1]

• Above the optimum temperature, the enzyme is denatured [1]

• The active site permanently changes shape — substrate can no longer bind — reaction stops [1]

(c) [2 marks]

Name the enzyme that digests proteins. State the products of this digestion.

• Protease [1]

• Amino acids [1]

Total for question 4: 7

Question 5 [7 marks]

Vaccination has been used to greatly reduce the incidence of many communicable diseases.

(a) [4 marks]

Explain how a vaccine protects a person against a specific disease.

• Vaccine contains dead/weakened/harmless antigens from the pathogen [1]

• Lymphocytes produce antibodies that are specific to those antigens [1]

• Memory cells are produced and stay in the body [1]

• If the real pathogen is encountered later, rapid antibody production occurs before illness develops [1]

(b) [2 marks]

Explain what is meant by "herd immunity" and why it is important.

• When enough people in a population are vaccinated/immune that the pathogen cannot spread easily [1]

• Protects those who cannot be vaccinated (e.g. very young, immunocompromised) [1]

(c) [1 mark]

State why antibiotics are NOT effective against viral diseases like influenza.

• Antibiotics target bacterial structures which viruses do not have [1]

Total for question 5: 7

Question 6 [6 marks]

This question is about genetic inheritance.

(a) [1 mark]

What is meant by a "dominant allele"?

• An allele that is expressed in the phenotype even when only one copy is present [1]

(b) [3 marks]

Cystic fibrosis is caused by a recessive allele (f). Two carrier parents (Ff × Ff) have a child. Use…

• Gametes (F and f for each parent) shown on Punnett square [1]

• Offspring: FF, Ff, Ff, ff [1]

• 50% / 2 in 4 probability of being a carrier (Ff) [1]

(c) [2 marks]

Describe TWO symptoms of cystic fibrosis.

• Any two of: thick sticky mucus in lungs [1]; repeated respiratory infections [1]; difficulty digesting food / digestive problems [1]; infertility in males [1]

Total for question 6: 6

Question 7 [6 marks]

(a) [6 marks]

Describe the structure and function of the small intestine in the digestion and absorption of food. …

• Pancreas secretes amylase (starch → sugars), protease (protein → amino acids), lipase (fat → fatty acids and glycerol) into small intestine [1]

• Bile from liver emulsifies fat — increases surface area for lipase digestion [1]

• Products of digestion (amino acids, sugars, fatty acids and glycerol) absorbed across villi [1]

• Villi provide large surface area for absorption [1]

• Walls of villi are one cell thick — short diffusion distance [1]

• Dense capillary network — absorbed nutrients transported to rest of body rapidly [1]

Total for question 7: 6
