Revision practice

Pearson Edexcel · International A-Level · Biology

Original open focus revision; complete specification coverage remains unfinished.

1 Digestion, transport and health evidence

- digestion
- absorption

■ Question 1

Which statement about bile is correct?

- It is a protease
- It emulsifies lipids
- It breaks every nutrient into monomers

Available marks: 2.

Worked answer

It emulsifies lipids

- Absorption moves soluble products into blood or lymph. Thin exchange surfaces and a large surface area shorten diffusion paths and increase transfer. Enzyme activity and transport are different processes.

■ Question 2

9 of 36 participants report an outcome. Calculate the percentage.

Available marks: 4.

Worked answer

25 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Bile is not an enzyme. A positive food test identifies a component under the test conditions; it does not show that a food is healthy or unhealthy in every diet.

2 Osmosis and a fair potato experiment

- osmosis
- control variable

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■ Question 1

Why blot all samples before the final weighing?

- To remove surface solution consistently
- To remove water lost from inside the cells
- To make the final masses larger and easier to read

Available marks: 2.

Worked answer

To remove surface solution consistently

- Use percentage change to compare samples with different initial masses. A zero percentage change estimates a solution concentration with no net water movement. This is an estimate from a trend, not proof that water molecules stop moving.

■ Question 2

A 4.00 g cylinder ends at 3.60 g. Find percentage mass change.

Available marks: 4.

Worked answer

-10 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Blotting removes surface solution. Weighing a wet cylinder without blotting adds liquid that did not enter the cells. Repeats reduce random variation but do not correct a miscalibrated balance.

3 DNA, protein synthesis and evidence

- transcription
- translation

■ Question 1

Which change can leave the amino-acid sequence unchanged?

- A substitution producing a synonymous codon
- Every deletion of one base
- Every insertion of one base

Available marks: 2.

Worked answer

A substitution producing a synonymous codon

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- A codon comprises three bases. The genetic code is degenerate: more than one codon can specify the same amino acid. A substitution can therefore be silent, while insertions or deletions can shift the reading frame.

■ Question 2

A coding mRNA segment has 63 bases including a stop codon. Find peptide length.

Available marks: 4.

Worked answer

20 amino acids

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

The number of bases is not automatically the number of amino acids. Real genes include regulatory regions and, in eukaryotes, often introns; a whole gene length is not a peptide-length calculation.

4 Cell measurements and scale

- magnification
- resolution

■ Question 1

Which comparison of two cell images is reliable?

- Compare screen lengths only
- Convert both lengths using their own scale bars
- Assume both images have the same zoom

Available marks: 2.

Worked answer

Convert both lengths using their own scale bars

- A scale bar provides a known real distance in the same image. Convert the image length and real length to the same unit before dividing. Magnification is a ratio and has no unit.

■ Question 2

An image is 12 mm long; the cell is 40 micrometres long. Calculate magnification.

Available marks: 4.

Worked answer

300

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

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A nucleus is not the only cell structure. Do not claim bacteria have no DNA, or that more magnification always means better resolution.

5 Inheritance, variation and probability

- allele
- genotype

■ Question 1

What does a 25% probability in Aa × Aa mean?

- One in four of the children will have genotype aa
- Each fertilization has probability one quarter of aa under this model
- The fourth child is more likely to be aa

Available marks: 2.

Worked answer

Each fertilization has probability one quarter of aa under this model

- In a simple monohybrid cross Aa × Aa, gametes carry A or a. Combining independent gametes gives AA, Aa, Aa and aa. The predicted probabilities describe many possible fertilizations, not a fixed order of children.

■ Question 2

In Aa × aa, what percentage of offspring are predicted to be aa?

Available marks: 4.

Worked answer

50 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

A dominant allele can be rare. Mutation is a source of new variation; selection changes the relative success of existing variants rather than directing mutations toward a goal.

6 Sampling populations without choosing the answer

- quadrat
- population

■ Question 1

Which method investigates change from a path into woodland?

- Choose only large plants
- Use a transect with fixed sampling distances

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- Take one convenient sample

Available marks: 2.

Worked answer

Use a transect with fixed sampling distances

- Estimate total abundance by multiplying mean density by area, with consistent units. This assumes sampled areas represent the habitat. Patchiness and too few samples widen uncertainty.

■ Question 2

Mean count is 6 in a 0.5 square metre quadrat. Find density per square metre.

Available marks: 4.

Worked answer

12

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Quadrats suit organisms that do not move quickly. A food chain arrow shows the direction of energy transfer, not the direction a predator travels.

7 Enzyme rate and controlled measurements

- enzyme
- denaturation

■ Question 1

Which change best tests the effect of pH?

- Change pH and temperature together
- Use buffers of different pH at one temperature
- Change enzyme concentration at each pH

Available marks: 2.

Worked answer

Use buffers of different pH at one temperature

- Measure rate using product formed per unit time or a fixed endpoint. For an endpoint test, 1/time is a rate proxy if the same amount of product or substrate change defines the endpoint each time.

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■ Question 2

A fixed endpoint takes 50 s. Calculate the rate proxy 1/time.

Available marks: 4.

Worked answer

0.02 1/s

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

An optimum is specific to the enzyme and conditions. Low temperature usually slows the reaction; it does not necessarily denature the enzyme. Endpoint intervals limit precision.

8 Uncertainty, gradients and model testing

- uncertainty
- systematic error

■ Question 1

Which is most likely a systematic error?

- A balance reads 0.20 g when empty
- Repeated values fluctuate either side of the mean
- Random differences in reaction time

Available marks: 2.

Worked answer

A balance reads 0.20 g when empty

- For a product or quotient, adding fractional uncertainties is a common maximum-uncertainty approximation. For a difference, add absolute uncertainties. A nonzero intercept can reveal an offset or an incomplete model.

■ Question 2

A 40 cm reading has an absolute uncertainty of 1 cm. Find percentage uncertainty.

Available marks: 4.

Worked answer

2.5 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Repeating readings reduces random uncertainty in a mean but does not automatically remove a zero error. Do not quote more decimal places than your measurement can support.

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9 Photosynthesis and limiting factors

- limiting factor
- photosynthesis

■ Question 1

A rate-light graph reaches a plateau. What follows?

- Light is still certainly the only limit
- Another factor may now limit the rate
- Photosynthesis has stopped

Available marks: 2.

Worked answer

Another factor may now limit the rate

- Change only one factor when testing a limiting factor. At low light, extra light may increase rate. At a plateau, the changed factor is no longer the main limit in that range; the graph alone does not identify which other factor is limiting.

■ Question 2

9.0 cubic centimetres of gas are collected in 3.0 minutes. Find the rate.

Available marks: 4.

Worked answer

3 cm^3/min

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Moving a lamp changes light and may also change temperature. A photosynthesis experiment needs control of heating, not just a ruler.

10 Disease transmission and immune response

- pathogen
- antigen

■ Question 1

What explains the spread of antibiotic resistance?

- Bacteria deliberately change all their genes
- Resistant variants survive and reproduce more successfully
- Antibiotics turn viruses into bacteria

Available marks: 2.

Worked answer

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Resistant variants survive and reproduce more successfully

- After vaccination, memory cells can support a faster secondary response. Antibiotic resistance arises through heritable variation and selection; an individual bacterium does not choose to become resistant because it needs to survive.

■ Question 2

12 cases occur among 600 people. Find cases per 1,000 people.

Available marks: 4.

Worked answer

20

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Antibiotics do not act on viruses in the same way they act on bacteria. A vaccine is not an immediate cure for an established infection.

11 Respiration, ATP and energy transfers

- respiration
- ATP

■ Question 1

Why use a temperature-controlled water bath for respirometry?

- To make every organism the same mass
- To reduce gas-volume changes unrelated to respiration
- To stop oxygen uptake

Available marks: 2.

Worked answer

To reduce gas-volume changes unrelated to respiration

- Anaerobic processes allow ATP production when oxygen supply cannot support the required aerobic rate, but give less ATP per glucose. In humans lactate can accumulate; yeast can produce ethanol and carbon dioxide.

■ Question 2

0.60 cubic centimetres are used in 3.0 minutes by 2.0 g of tissue. Find the mass-specific rate.

Available marks: 4.

Worked answer

0.1 cm^3/min/g

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- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Breathing ventilates the lungs; respiration consists of chemical reactions in cells. A moving respirometer marker can also reflect temperature or pressure changes.

12 Feedback and internal conditions

- homeostasis
- negative feedback

■ Question 1

Which response opposes a rise in blood glucose?

- Increased insulin action
- Increased release of glucose from glycogen
- Stopping all cellular respiration

Available marks: 2.

Worked answer

Increased insulin action

- When blood glucose is high, insulin helps increase glucose uptake and storage as glycogen. When it is low, glucagon supports release of glucose from stores. These responses are coordinated, not identical effects of two hormones.

■ Question 2

A value rises from 4.0 to 5.0. Calculate the percentage increase.

Available marks: 4.

Worked answer

25 %

- Appropriate relation; consistent substitution; correct result; meaningful unit and interpretation.

Negative feedback does not mean the response is harmful or the measured value becomes negative. Diabetes has different mechanisms; do not treat every case as a failure to make insulin.

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