A-Level Biology Transition Pack – Mark Scheme

1. Cells

- Prokaryotic cells: no nucleus, circular DNA, smaller (1–5 μm). Eukaryotic cells: nucleus, linear DNA, organelles.
- Mitosis produces 2 identical diploid cells for growth and repair.
- Diffusion = movement down concentration gradient; osmosis = water via partially permeable membrane; active transport = against gradient using ATP.
- SA:V ratio decreases as size increases, limiting exchange efficiency.

2. Organisation & Exchange

- Heart pumps blood; arteries = thick walls, high pressure; veins = valves; capillaries = thin walls for diffusion.
- Alveoli: large SA, thin walls, good blood supply.
- Enzymes break macromolecules into monomers (e.g. amylase → sugars).
- Fick's Law: rate ∝ surface area × concentration gradient / thickness.

3. Infection & Immunity

- WBCs: phagocytosis, antibodies, antitoxins.
- Vaccination introduces antigens → memory cells formed.
- Pathogens: bacteria, viruses, fungi, protists.
- Primary response is slow; secondary is faster due to memory cells.

4. Bioenergetics

- Photosynthesis: $CO_2 + H_2O \rightarrow$ glucose + O_2.
- Limiting factors: light, CO_2, temperature, chlorophyll.
- Aerobic respiration uses oxygen; anaerobic does not.
- ATP provides energy for cellular processes.

5. Homeostasis

- Homeostasis = maintaining stable internal conditions.
- Insulin lowers glucose; glucagon raises glucose.
- Nervous = fast, short-term; hormonal = slow, long-lasting.
- Receptors detect → CNS processes → effectors respond.

6. Genetics & Evolution

- Gene = section of DNA; allele = variation.
- Dominant expressed if present; recessive needs two copies.
- Natural selection: advantageous traits increase survival.
- DNA → mRNA → protein (translation at ribosome).

7. Ecology

- Ecosystem = interaction of organisms and environment.
- Energy decreases at each trophic level due to losses.
- Biodiversity = variety of species.
- Only ~10% energy transferred between trophic levels.

Extended Questions Mark Scheme (6 markers)

Level 3 (5–6 marks): Detailed explanation, correct terminology, clear logical structure.

Level 2 (3–4 marks): Some correct points, some structure, minor inaccuracies.

Level 1 (1–2 marks): Basic statements, limited detail.

0 marks: No relevant content.

Independent Research Task Mark Scheme

4 marks: Accurate science, clear explanation, examples included.

3 marks: Mostly accurate, some detail.

2 marks: Basic understanding.

1 mark: Limited attempt.