

Biology

Practice Questions





Instructions

Individual, exam-style questions

The questions contained in this booklet match the style of questions that are typically asked in exams. This booklet is not however, a practice exam. Elevate's research with top students identified that top students do more practice questions than anyone else. They begin the process of testing their knowledge early in the year.

Therefore, we have provided exam-format questions that are sorted by topic so that you can answer them as you learn the information, rather than waiting until the very end of the year to complete exams.

Comments, questions?

Let us know if you need any further advice by visiting <u>www.elevateeducation.com</u>. You can comment on any of our material, or head to the FAQ section and ask us a question. Also, you can find us on social media so you can stay up to date on any brand new tips we release throughout the year.

Other information

Every effort has been made to ensure the accuracy of the information expressed in this booklet, but no warranty or fitness is implied. If you'd like to provide any feedback on this booklet, let us know at <u>admin@elevateeducation.com</u>.

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Cells

- 1. What is the role of the cell membrane?
- 2. Give 3 differences between plant and animal cells.
- 3. What are 2 differences between eukaryotic and prokaryotic cells?
- 4. What is the difference between the cytoplasm and cytosol of a cell?
- 5. Draw and label a cell membrane according to the fluid-mosaic model.
- 6. Which statement is true? Chloroplasts...
 - a. Contain glycogen.
 - b. Are found in all plant cells.
 - c. Are found in some bacterial cells.
 - d. Contain layers of internal membranes
- 7. Eukaryotic cells have membrane-bound organelles that result in

compartmentalization of the cell. Why is this useful to the cell?

- 8. Which of the following are statements made about mitochondria in cells are true:
 - a. Contain circular DNA.
 - b. Are the site of glycolysis.
 - c. Prepare proteins for the Golgi apparatus.
 - d. Produce 34-38 ATP molecules per molecule of glucose.
- 9. What is the function of cholesterol in cell membranes?
- 10. What is the role of the Golgi apparatus in protein export?
- 11. What is apoptosis?
- 12. Why does apoptosis occur? Give 2 reasons.



Cellular Transport

- 1. What is the difference between simple diffusion and active transport?
- 2. What is the difference between simple diffusion and facilitated diffusion?
- 3. What is the difference between endocytosis and exocytosis?
- 4. What is meant by selective permeability?
- 5. What do the terms hypo-osmotic, iso-osmotic and hyperosmotic indicate?
- 6. Why is facilitated diffusion faster than simple diffusion when solute concentration is low?
- The concentration of sodium ions, Na+, in human blood plasma is approximately 150 mmol/L. In the cytosol of red blood cells the concentration of these ions is approximately 30 mmol/L. Explain how this difference in concentration is maintained.
- 8. When animal or plant cells are placed in water, water enters the cell.
 - a. What is the term used to describe this movement into a cell?
 - b. Animal cells placed in water swell, and in some cases burst. Why do plant cells not burst in this situation? Refer to cell structure in your answer.
- 9. How does a monosaccharide (such as glucose) enter an epithelial cell?



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Bio macromolecules

Proteins & Enzymes

- What is the difference between the primary structure and secondary structure of a protein?
- Describe what is meant by the tertiary structure and quaternary structure of a protein?
- 3. How many different polypeptides are possible from joining the amino acid residues alanine, glycine and glutamic acid?
- 4. Protein A, made by a particular cell type is released for use by other cells.
 - a. What is the site of synthesis of protein A?
 - b. Which organelle is involved in exporting protein A?
- 5. Show diagrammatically the action of an enzyme using the "induced fit" model.
- 6. What conditions affect the optimal activity of an enzyme?
- 7. How does an increase in temperature impact the activity of an enzyme?
- 8. Describe how a competitive inhibitor decreases enzyme activity?
- 9. What role does the tertiary structure play in the three-dimensional shape of an enzyme?
- 10. What are the two distinctive types of secondary structures that arise from polypeptide chains?
- 11. What happens to the rate of reaction as substrate concentration increases? (Hint: A graph may help in your explanation)
- 12. Explain the mechanism by which a non-competitive inhibitor decreases enzyme activity.





Carbohydrates

- 1. What is the name of the bond that links glucose monomers together?
- 2. An important structural carbohydrate in insects is:
 - a. Chitin
 - b. Glucose
 - c. Cellulose
 - d. Glycogen
- 3. Is glycogen found in animals or plants, and what is its role?
- 4. Is cellulose found in animals or plants, and what is its role?

Lipids

- 1. What is the main role of lipids in the human body?
- 2. What is the difference between unsaturated and saturated fats?
- 3. Consider unsaturated and saturated fats. What state (solid, liquid, gas) are they found at room temperature?

DNA / Nucleic Acids

- 1. List the three components of a DNA nucleotide.
- 2. Describe the sequence of events that occur during transcription & translation.
- 3. A particular DNA double helix is 100 nucleotide pairs long and contains 25 cytosine bases. How many adenine bases are present in this DNA double helix?
- 4. The sequence of bases in a strand of DNA is TACGTGC. What is the sequence of bases on an mRNA molecule synthesized from this strand?
- 5. What are 2 differences between RNA and DNA?
- 6. Where is tRNA found in a cell? Describe it's role.



Biochemical Processes

Types of Reactions

- 1. What is the difference between the exergonic and endergonic reactions?
- 2. What is the difference between anabolic and catabolic reactions?
- 3. Which of the following is an example of a catabolic reaction:
 - a. Sucrose from fructose and glucose.
 - b. ATP and water from ADP and inorganic phosphate.
 - c. Fatty acids and glycerol from lipids.
 - d. Glucose and oxygen from carbon dioxide and water.

Plants

- 1. What is the difference between positive tropism and negative tropism?
- 2. Explain the role of auxin in cell elongation? Where does it act?
- 3. Bananas change colour from green when unripe, to yellow when ripe and brown

when overripe. What hormone is responsible for this and how does it do this?

Photosynthesis & Cellular Respirations

- 1. What is the equation for photosynthesis?
- By referring to the equation for photosynthesis, explain why oxygen concentration in the air surrounding the plants can be used as a measure of the rate of

photosynthesis.

- 3. What is the equation for cellular respiration?
- 4. What is the energy-storing molecule that is produced by aerobic respiration?
- 5. From question 4, how does this energy-storing molecule store and release energy?



- 6. What is the energy yield per molecule of glucose as a result of aerobic respiration?
- 7. Consider the electron transport chain as part of aerobic respiration.
 - (a) Within a cell, where does the electron transport chain occur?
 - (b) Describe what happens during this stage. Include all products in your answer.
- 8. Name the energy carrying or charged products of the light dependent reactions of photosynthesis?
- 9. Temperature is a limiting factor in photosynthesis. Name one other limiting factor.
- 10. Consider animal cells. What are the main inputs and outputs of the following

processes in aerobic respiration?

- (a) Glycolysis
- (b) Krebs cycle
- (c) Electron transport chain
- 11. What are the main inputs and outputs of the light dependent stage and light

dependent states of photosynthesis?

Cellular Communication & Signal Transduction

- The three steps of signal transduction are reception, transduction and induction.
 Explain what occurs at each of these stages.
- Explain how the characteristics of a hormone will influence the way in which it initiates signal transduction in a cell. (Hint - Discuss lipid and protein hormones in your answer).
- 3. How does a protein hormone initiate a cellular response?
- 4. How does a steroid hormone initiate a cellular response?
- 5. State two differences between nervous communication and hormonal

communication in humans.





- 6. When humans touch a hot stove, we pull away immediately as a reflex. Explain whether the nervous system or the endocrine system of your body controls this reflex.
- 7. Skin cells are continually dying and being replaced by new cells. The ongoing death and subsequent replacement of these skin cells is an example of what cellular process?
- 8. What is meant by the term "autocrine"?

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Genetics

Sexual & Asexual Reproduction

- 1. What is meant by the term "linked genes"?
- 2. What is the advantage of "crossing over" in gamete formation/meiosis?
- 3. What is meant by the term "homologous chromosomes"?
- 4. Give all the steps of Mitosis.
- 5. Give all the steps of Meiosis.
- 6. During meiosis, crossing over and recombination occur between homologous

chromosomes. Describe the outcome of recombination.

- 7. What are 2 differences between mitosis and meiosis?
- 8. What are 2 differences between binary fission and mitosis?
- 9. What is the difference in the number of daughter cells created by mitosis and meiosis?

Evolution & Natural Selections

- 1. What is a gene pool?
- 2. What is meant by genetic drift?
- 3. What is the bottleneck effect?
- 4. Explain what is meant by the founder effect in the context of population genetics?
- 5. What is the difference between natural selection and selective breeding?





Homeostasis

- 1. What is homeostasis?
- 2. What is meant by the term negative feedback?
- 3. Antidiuretic hormone (ADH or Vasopressin) is important in controlling water balance.
 - (a) What organ of the body releases antidiuretic hormone?
 - (b) Explain the action of antidiuretic hormone in controlling water balance.
- 4. The antagonistic pair of hormones, glucagon and insulin, are important in maintaining blood glucose homeostasis. Consider Jane who is a sugar fiend. What response is initiated after Jane consumes an entire packet of jellybeans and what is the result? Include in your answer the stimulus, receptor, control centre, effector organ, response and result. (Hint - A flow chart may be used in your answer).