

## Topic 1 Key Concepts in Biology

Produce revision flash cards for the following questions. Each card should contain a minimum of two questions and a maximum of three questions. The one side should have the questions and the other side should have the answers.

### Questions for topic 1

1. What are the main differences between eukaryotic and prokaryotic cells?
2. Name examples of prokaryotic cells and eukaryotic cells.
3. Draw a labelled diagram of a plant and animal cell.
4. Write down the structures that are unique to a plant cell.
5. Write down the role of the nucleus, cytoplasm, and cell membrane.
6. Write down the role of the mitochondria and ribosomes.
7. Write down the role of a cell wall, large vacuole and chloroplasts.
8. Draw a labelled diagram of bacteria.
9. What are the differences between chromosomal DNA and plasmid DNA?
10. Name the other structures found in a bacteria.
11. What is the role of flagellum?
12. Name three examples of specialised cells.
13. Sperm and egg cells are haploid, what does the term haploid mean?
14. Write down the function of an egg cell.
15. Draw a labelled diagram of an egg cell.
16. List and describe the three main adaptations of an egg cell.
17. Write down the main function of the sperm cell.
18. List and describe the 4 adaptations of the sperm cell.
19. Draw a labelled diagram of ciliated epithelial cells and write down where they are found.
20. List down the three main adaptations of the ciliated epithelial cells.
21. Write a definition for magnification and resolution.
22. How do light microscopes work and what do light microscopes allow us to do?
23. How do electron microscopes work and why are these microscopes better than light microscopes?
24. What do electron microscopes allow you to do?
25. Write a method for how you use a light microscope.
26. What is the role of using stain on your specimen?
27. Draw the formula triangle that incorporates magnification, image size and actual size.
28. List the rules for writing answers as standard form.
29. How do you convert from micrometres to millimetres and from millimetres to micrometres?
30. What are enzymes?
31. Draw a diagram to show the lock and key model to explain how enzymes work?
32. Enzymes are highly specific, what does this mean?
33. Draw a graph to show the effect of temperature on enzyme activity.
34. Write a description for the graph for before 37 degrees Celsius and a description for after 37 degrees Celsius.
35. Draw a graph to show the effect of pH on enzyme activity.
36. Write a description for the pH graph.
37. Draw a graph to show the effect of substrate concentration on enzyme activity.
38. Write two descriptions for the substrate concentration graph; one before the line plateaus and one after.
39. Write a method to describe how to investigate the effect of pH on enzyme activity.
40. How do you calculate rate of reaction?
41. Name the enzyme that breaks down starch into sugars?
42. Name the enzyme that breaks down proteins into amino acids?
43. Name the enzyme that breaks down lipids into glycerol and fatty acids?
44. Why are enzymes important in breaking down large molecules in digestion?
45. What does Benedict's Reagent test for and how is it used and what is a positive result?
46. What does iodine test for and how do we use this chemical and what is a positive result?
47. What does emulsion test involve and what does it test for?
48. What does the biuret test involve and what does it test for?
49. What is the name for the method to see how much energy is in food?
50. Write down the method for testing how much energy is in food?
51. Write a definition for diffusion.
52. Write a definition for osmosis.
53. Write a definition for active transport.
54. Where does active transport occur?
55. Write a method for testing for osmosis.
56. How do you calculate percentage change?

## Topic 2 Cells and Control

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questions and a maximum of three questions. The one side should have the questions and the other side should have the answers.

### Questions for topic 2

1. Where are your chromosomes found and how many do you have in a normal body cell?
2. What are the differences between haploid and diploid?
3. What is the function of mitosis?
4. What is the outcome of mitosis?
5. What are the key steps involved in the cell cycle?
6. What are the individual stages in mitosis?
7. What happens in interphase?
8. What happens in prophase and metaphase.
9. What happens in anaphase and telophase?
10. What happens in cytokinesis?
11. What three steps are involved in growth?
12. What is the definition of growth and what two steps are involved?
13. What are the key characteristics of growth in animals including what happens in growth and cell differentiation and cell division?
14. What are the key characteristics of growth in plants?
15. What is cancer?
16. What do we use percentile charts for and what do they show?
17. What does the 50<sup>th</sup> percentile line show?
18. Why would doctors investigate when looking at the percentile chart?
19. Where do you find stem cells and why are they so special?
20. What are meristems and where do you find them?
21. How are stem cells used? Include 3 different areas.
22. What makes up the central nervous system?
23. What are the two types of scanner that are used to investigate brain function?
24. What is the role of the cerebrum, cerebellum and medulla oblongata?
25. What are the differences between the CT scanner and the PET scanner?
26. Why is treating problems with the CNS tricky?
27. What is a neurone and what are the key features on a neurone?
28. What is the order of the reflex arc?
29. Draw a sensory neurone and describe its function?
30. Draw a motor neurone and describe its function?
31. Draw a relay neurone and describe its function?
32. What is a synapse and draw a diagram?
33. How do reflexes prevent injury?
34. List the events that occur at the synapse.
35. How does a reflex help to protect the eye?

36. List the key features of the eye.
37. What is the function of the following; cornea, iris, lens
38. What two types of cell do you find in the retina?
39. What is the role of the optic nerve?
40. Describe how you look at a near object.
41. Describe how you look at a far object.
42. What is the difference between long-sighted and short sighted?
43. What is colour blindness?

### **Topic 3 Genetics**

**Produce revision flash cards for the following questions. Each card should contain a minimum of two questions and a maximum of three questions. The one side should have the questions and the other side should have the answers.**

#### **Questions for topic 3**

1. What is sexual reproduction?
2. What are the male and female gametes and how many chromosomes do they have?
3. What happens to the gametes at fertilisation?
4. What type of cell division does a zygote undergo?
5. What is the function of meiosis?
6. Before the first division on meiosis, what must happen first in the cell cycle?
7. What happens in the first division in meiosis?
8. What happens in the second division in meiosis?
9. How many cells produced in meiosis and are they genetically different or identical?
10. What type of cells are produced at the end of meiosis?
11. When cells reproduce asexually, what type of cell division do they use and what is the result of asexual reproduction?
12. List the advantages of asexual reproduction.
13. List the disadvantages of asexual reproduction.
14. List the advantages of sexual reproduction.
15. List the disadvantages of asexual reproduction.
16. Describe the structure of DNA (Include 4 points).
17. What is a nucleotide?
18. What are the base pairing rules and what bond is formed between the bases?
19. What are chromosomes?
20. What are genes?
21. What is a genome?
22. Write a method for extracting DNA from fruit cells.
23. What is the purpose of the detergent?
24. What is the purpose of salt?
25. Why do you filter the mixture?

26. Why is ice cold ethanol used?
27. Proteins are made of what and how many are there?
28. Why do you get unique proteins?
29. What does DNA code for?
30. What does the order of the bases in the gene determine?
31. Each amino acid is coded for by how many bases and what do you call this?
32. What does each gene contain?
33. What is non-coding region?
34. What is a mutation?
35. What is a genetic variant and what can this cause to happen?
36. What happens if a mutation occurs in the non-coding region?
37. What the two steps involved in protein synthesis and where do they occur?
38. List the steps involved in transcription and draw a diagram.
39. List the steps involved in translation and draw a diagram.
40. Who was Gregor Mendel and what was his main discovery?
41. What experiments did Gregor Mendel carry out?
42. What was Mendel's three conclusions?
43. Why did it take a while for people to understand Greg Mendel's work?
44. What is an allele?
45. What is the difference between homozygous and heterozygous?
46. How do we represent dominant and recessive alleles?
47. What is the difference between genotype and phenotype?
48. If an organism displays the dominant allele, how many copies of that allele must the organism have?
49. If an organism displays the recessive allele, how many copies of that allele must the organism have?
50. What is monohybrid inheritance?
51. How do you get a 3:1 ratio?
52. What is the genotype of a male and female?
53. Draw a punnett square diagram to show how sex is inherited.
54. What chromosomes do the egg and sperm carry?

55. What is a family pedigree chart?
56. How is a characteristic sex-linked?
57. What is the difference between the X and Y chromosome?
58. Why do men get sex-linked genetic disorders?
59. What causes colour blindness?
60. How do we represent the alleles for a carrier and unaffected male of colour blindness?
61. Draw a diagram to show a genetic cross between a carrier and a unaffected male for colour blindness.
62. What are the genotypes and phenotypes for blood groups?
63. What is special about the blood groups gene?
64. Draw a genetic diagram to show a cross between blood group A and blood group B.
65. What is variation?
66. What are the two types of genetic variation?
67. What is the difference between genetic variation and environmental variation?
68. How does genetic variation come about?
69. Why are environmental variations known as acquired characteristic?
70. How do new alleles arrive through genetic mutations?
71. What is the role of human genome project?
72. List the main advantages of the human genome project?
73. What are the disadvantages of the human genome project?

## **Topic 4 Natural Selection and Genetic Modification**

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### **Questions for topic 4**

1. What is evolution?
2. Describe the 6 steps in natural selection.
3. How do random mutations help bacteria?
4. Bacteria resist antibiotic, how does this help the bacteria?
5. How does antibiotic resistance provide evidence for evolution?
6. What other evidence is there for evolution?
7. What is a fossil?
8. How do fossils provide evidence for evolution?
9. What did Charles Darwin discover?
10. How did Charles Darwin discover this?
11. How did Alfred Wallace work contribute to Darwin's discovery?
12. What does the evidence of evolution show about a common ancestor?
13. What are the three areas of Biology that evolution has affected?
14. How has evolution affected classification?
15. How has evolution affected antibiotic resistance?
16. How has evolution affected conservation?
17. What does the term hominid mean?
18. When did humans and chimpanzees evolve from a common ancestor?
19. Describe the key features of Ardi in terms of age, latin name, where was Ardi discovered, structure of the feet, arms, legs, brain size and how they walked?
20. Describe the key features of Lucy in terms of age, latin name, where Lucy was discovered, structure of the feet, arms, legs, brain size and how they walked?
21. Describe the key features of Turkana Boy in terms of age, latin name, where Lucy was discovered, structure of the feet, arms, legs, brain size and how they walked?
22. Draw a timeline for Ardi, Lucy, Turkana Boy and today?
23. How has brain size evolved over time and why?
24. How has tool used changed over time?
25. What did Homo habilis use for tools?
26. What did Homo erectus use for tools?
27. What did Homo neanderthalensis use as tools?
28. What did Homo sapiens use as tools?
29. How can scientists calculate the age of a stone tool or fossil?
30. What is the pentadactyl limb?
31. How does the pentadactyl limb provide evidence of evolution?
32. What is classification and how are organisms classified?
33. What is the 5 kingdom classification system? Name the Kingdoms and examples of each.
34. How are kingdoms subdivided? (think KPCOFGS – think of your saying?)
35. Why did the 5 kingdom classification system change?
36. What is the classification level above a Kingdom now and how many are there?
37. What are the three domains and give examples of each?
38. Why in modern day classification systems do we have 3 domains and then kingdoms?
39. What is selective breeding?

40. What can selective breeding be used for?
41. Write a simple method for describing the process of selective breeding.
42. What two ways is selective breeding useful? Describe each one.
43. What are the three main disadvantages of selective breeding?
44. What is tissue culture?
45. How can tissue culture be used?
46. Write a simple method to describe how tissue culture can be used to produce plants.
47. How can animal tissue culture be used in medical research?
48. How do you carry out tissue culture of animal cells?
49. What is genetic engineering?
50. What are restriction enzymes?
51. What is DNA ligase?
52. What is meant by the term recombinant DNA?
53. Draw a diagram to show the process of genetic engineering?
54. What is a sticky end and why are they important?
55. What is a plasmid and where do you find them?
56. Name the 4 key ways genetic engineering can be helpful?
57. How can crops be genetically modified to be resistant to insects?
58. How can GMOs be used to provide more food for people?
59. How else can we increase food production?

## **Topic 5: Health, Disease and the development of medicines**

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### **Questions for topic 5**

1. Define the term health.
2. What is the WHO?
3. What is disease?
4. What are communicable diseases and name examples.
5. What are non-communicable diseases and name examples.
6. What are pathogens and name the organisms.
7. What causes cholera and what are the symptoms?
8. How does cholera spread and how can we reduce/prevent transmission?
9. What causes TB and what are the symptoms?
10. How does TB spread and how can we reduce/prevent transmission?
11. What causes malaria and what are the symptoms?
12. How does malaria spread and how can we reduce/prevent transmission?
13. What causes stomach ulcers and what are the symptoms?
14. How do stomach ulcers spread and how can we reduce/prevent transmission?
15. What causes ebola and what are the symptoms?
16. How does ebola spread and how can we reduce/prevent transmission?
17. What is chalara ash dieback and what are the symptoms?
18. How does chalara ash dieback spread and how can we reduce/prevent transmission?
19. Describe the key characteristics of a virus?
20. Name the two different pathways a virus can take?
21. Describe the lytic pathway.
22. Describe the lysogenic pathway.
23. What is an STI and name two examples.
24. What causes chlamydia and what symptoms might there be?
25. How can we reduce the spread of chlamydia?
26. What is HIV?
27. What are the differences between HIV and AIDS?
28. What happens to a person when they get HIV?
29. How is HIV spread and how can it be reduced?
30. How can we treat HIV?
31. Name the physical defences that plants have against disease and how do they stop disease?
32. Name the chemical defence systems that plants have and how do they stop disease?
33. Where is quinine found and what is it used for?
34. Where is aspirin found and what is it used for?
35. What can plant pathologists do and why might their role be important?
36. Name examples of plants showing symptoms of disease.
37. Diagnostic testing allows accurate identification of specific pathogens, describe how scientists can detect antigens.
38. Diagnostic testing allows accurate identification of specific pathogens, describe how scientists can detect DNA.
39. What are the two types of primary defence systems in your immune system?
40. Describe how physical barriers prevent pathogens from entering the body.
41. Describe how chemical barriers prevent pathogens from entering the body.

42. How do your white blood cells protect you against disease?
43. What are B-lymphocytes and how do they protect you against disease?
44. List the events that take place in the specific immune response.
45. Draw the graph to show the primary and secondary immune response.
46. What is the primary response?
47. Why does it take longer for the immune system to respond when first infected with the pathogen.
48. What is the secondary immune response and why is this quicker?
49. What does the term immunisation mean?
50. What does immunisation involve?
51. How does immunisation prevent you from getting a disease?
52. What is herd immunity?
53. List the two key advantages of immunisation.
54. List the two disadvantages of immunisation.
55. What are monoclonal antibodies?
56. List the uses of monoclonal antibodies
57. List the steps involved to make a monoclonal antibody.
58. What are tumour cells (myeloma cell)?
59. What is a hybridoma?
60. Why are hybridoma cells useful?
61. Why are monoclonal antibodies useful.
62. What is hCG and when is it produced.
63. List the steps involved to show how a pregnancy test works. Draw a diagram with this.
64. How are monoclonal antibodies used to target cancer cells?
65. How are monoclonal antibodies used to diagnose cancer?
66. How are monoclonal antibodies used to target drugs to cancer cells?
67. How are monoclonal antibodies used to find blood clots?
68. Which pathogen do antibiotics work against?
69. How do antibiotics work?
70. What is penicillin and how was it discovered?
71. What are the two stages involved in the development of new drugs?
72. What does preclinical testing involve?
73. What does clinical testing involve?
74. How can we grow bacteria in the lab?
75. What is aseptic technique?
76. How do you make the agar plate?
77. What temperature do microorganisms need to be kept at and why?
78. List a method to how you can investigate the effectiveness of different antibiotics. Draw a picture.
79. What is contamination?
80. What is meant by the term 'inhibition zone'?
81. If you have a large inhibition zone around the disc, what does this tell you about the antibiotic?
82. List the different aseptic techniques that are involved to avoid contamination.
83. How do you calculate the area of the inhibition zone? Give an example as part of your answer.
84. How do you calculate the area of a colony?
85. What are risk factors?

86. Smoking is a major risk factor in cardiovascular diseases. How does smoking act as a risk factor?
87. Not getting enough exercise is another risk factor, what is this risk factor associated with?
88. If you have too many or not enough nutrients, what could this be a risk factor of?
89. Drinking too much alcohol is a risk factor of what diseases?
90. What are the risk factors associated with cardiovascular diseases?
91. How can risk factors interact and what might this cause?
92. What wide ranging effects can non-communicable diseases have ?
93. What is BMI and what does it show you?
94. Why is BMI not a reliable method?
95. What is waist-to-hip ratio and how do you calculate this?
96. What do the results of waist-to-hip ratio show?
97. What is a cardiovascular disease and how does it develop?
98. What changes in lifestyle can we make to treat CVD?
99. What are statins used for?
100. What are anticoagulants used for?
101. What are antihypertensives used for?
102. What are stents and how are they used?
103. What is a coronary bypass surgery and how does this help?
104. What are the problems with a donor heart surgery?