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## Self-Assessment for Senior Biology

### How to use these chapters to revise

Reading your book and trying to learn it all off will not get you a good grade in biology unless you are one of the few lucky people that have a photographic memory!

To be successful in an exam you need to know exactly what you are expected to learn. Then you need to find a way that you can study and learn the information successfully. Different people learn best in different ways. Some of the ways you can learn are by listening, making mind maps, making notes. To be a successful learner you need to revise many times, practice using the information so that you will remember it and to focus on meaning and understanding. The following chapters will help you do this. The first part of each chapter has the Self-Assessment for the topic. This is followed by exam question practice. The exam questions are all from past exam papers from 2004 -2010. They are in short question format to make it easier for you to revise.

All the chapters follow the same format. Remember success in your examination depends on hard work – not luck!

### How to revise

* Chose the topic that you wish to revise.
* Read the relevant chapter in your book. When you think that you have a good understanding of the topic
* Try to answer the “self-assessment questions” without using your text book.
* Use the traffic light code to mark yourself.

**Traffic Light Code**

Green : I know it all

Orange : I have some idea – check the answers

Red : I need to start studying this section

* Check your answers to see where your learning is at. Continue to revise until you think that all your traffic lights are green.
* When you think that you know all the answers to these questions complete the practice exam questions.
* Make sure that you understand why the answers given are correct and where you went wrong in your answer
* Go back through the assess your learning questions and use your book to fill in any gaps in your knowledge
* Repeat this process until all your traffic lights are green and you can answer all the practice exam questions correctly.

Then you are good to go for your exams!

## Hints for answering the questions and boosting your grade

* Read the question carefully – make sure that you fully understand what is being asked.
* Stop, Think and plan your answer - Do not write the first thing that comes into your head, especially if a long answer is required.
* Use the mark allocations to guide you on the level of detail needed for each answer.
* Generally marks are awarded in multiples of three. If a question is given six marks then you will need two separate points.
* If more than one point is needed try to answer the question in bullet point form.
* Write each point of information in a separate sentence.
* You should make sure that you answer is easy to read and is clear and concise.
* Use the amount of space allocated as a guide to the length and detail needed to get full marks for the question. If the paper has only allocated one line for the answer you will not gain any more marks by writing an essay!
* Make sure that all your diagrams fill the space provided and are clearly labelled.
* If you use a formula to answer the question make sure to write it on the exam paper.
* Show all the calculations not just the final answer and remember to include units.
* Follow instructions given in the question exactly. If you are asked to select two correct answers – only select two, no more and no less. You can lose marks by having a wrong answer cancel out a correct answer.
* Attempt every question – if you are not sure about the answer make an intelligent guess. Do not leave blank answers

## Biology, the Scientific Method and Experimentation

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Biology | **Red** | **Orange** | **Green** |
| 1 | Define the term Biology |  |  |  |
| 2 | Can you name three areas of study incorporated in Biology? |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | The Scientific Method | **Red** | **Orange** | **Green** |
| 1 | Can you state the process of the Scientific Method |  |  |  |
| 2 | Can you elaborate on each of the following:   1. Observation, 2. Hypothesis, 3. Design experiment, 4. Collect & Interpret Data, 5. Conclusions, 6. Compare to Existing Knowledge 7. Reporting, 8. Developing Theory & Principle |  |  |  |
| 3 | Can you state the limitations of:   1. Value of the Scientific Method (including extent of basic knowledge), 2. Basis of investigation, 3. Application to the natural world in a state of change, 4. Accidental discovery. |  |  |  |
| 4 | Can you state some possible sources of errors |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Experimentation | **Red** | **Orange** | **Green** |
| 1 | State the Principles of experimentation. |  |  |  |
| 2 | Explain each of the following in relation to experimentation: |  |  |  |
|  | * Planning & Design |  |  |  |
|  | * Safety Procedures |  |  |  |
|  | * Experimental Control |  |  |  |
| 3 | Why are the following important in experimentation: |  |  |  |
|  | * Sample Size |  |  |  |
|  | * Random Selection |  |  |  |
|  | * Replicates |  |  |  |
|  | * Double-Blind Testing |  |  |  |

### Practice Exam Questions

1. Define Biology
2. What is a hypothesis?
3. What might a hypothesis develop into?
4. Explain the purpose of a control in a scientific experiment.
5. Explain each of the following terms in relation to the scientific method: hypothesis, control, data, replicate, theory.
6. As a result of her observations a scientist may formulate a ……………… She will then progress her investigation by devising a series of ………………….. and then carefully analysing the resulting … ………………………………..
7. If a scientist wished to determine the effect of a certain herbicide on weed growth she would include a control in the investigation. Suggest a suitable control in this case.
8. The use of replicates is an important aspect of scientific research. What, in this context, are replicates?
9. Suggest where a scientist may publish the results of her investigations.

## Characteristics of Life

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Characteristics of Life** | **Red** | **Orange** | **Green** |
| 1 | Define the term: life. |  |  |  |
| 2 | What is meant by the "characteristics of life"? |  |  |  |
| 3 | List the "characteristics of life", |  |  |  |
| 4 | Explain each of the following in relation to the "characteristics of life":   1. Nutrition, 2. Excretion, 3. Response 4. Reproduction |  |  |  |

### Practice Exam Questions

Exam questions on this topic are incorporated into nutrition, excretion, response and reproduction.

## Cell Structure

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Cell Structures** | **Red** | **Orange** | **Green** |
| 1 | Can you name the components of a plant cell that you see under a light microscope? |  |  |  |
| 2 | Can you name the components of the animal cell that you see under the light microscope? |  |  |  |
| 3 | Can you state the position & function of the cell membrane? |  |  |  |
| 4 | Can you state the position & function of the cell wall? |  |  |  |
| 5 | Can you state the position & function of nucleus? |  |  |  |
| 6 | Can you state the position & function of the vacuole? |  |  |  |
| 7 | Can you state the position & function of the chloroplast? |  |  |  |
| 8 | Can you detail the ultra-structure of the cell membrane? |  |  |  |
| 9 | Can you detail the ultra-structure of the mitochondrion? |  |  |  |
| 10 | Can you detail the ultra-structure of the chloroplast? |  |  |  |
| 11 | Can you detail the ultra-structure of the nucleus, including the nuclear pores? |  |  |  |
| 12 | Can you give the position and function of the ribosome? |  |  |  |
| 13 | Can you give the position and function of DNA? |  |  |  |
| 14 | Can you define and distinguish between the terms prokaryotic and eukaryotic? |  |  |  |

### Practice Exam Questions

1. Name a powerful type of microscope that is used to show what cells are made of in much greater detail (cell ultrastructure).
2. True or false. If the eyepiece lens of a microscope is marked X10 and the objective lens is marked X4, the total magnification is X14.
3. If the magnification of a microscope eyepiece is X 10 and the magnification of the objective lens is X 40, what magnification results when a slide is viewed using both of these lenses?
4. State **two** features visible under a light microscope that indicate that cells are typical plant cells.
5. What stain did you use for viewing plant cells on the slide?
6. Name the stain that you used when examining an animal cell under the microscope.
7. Describe the difference in colour or depth of colour, if any, between the nucleus and cytoplasm when the stained cell was viewed under the microscope.
8. For which purpose did you use methylene blue or iodine solution when examining cells with the microscope?
9. What is usually found in the cytoplasm of a plant cell?
10. Where in a cell would you expect to find phospholipids?
11. State a function of each of the following components of a cell. (i) Ribosome, (ii) Cell membrane.
12. State **two** ways in which red blood cells differ from typical body cells e.g. from the cheek lining.
13. Name **two** features of a plant cell which are not normally associated with an animal cell.
14. The liquid in which chemical reactions take place in the cell is …
15. True or false. Plant cells have chloroplasts; animal cells do not have chloroplasts.
16. True or false. Cell membranes let only some molecules pass through.
17. Name a cell organelle, apart from the nucleus, in which DNA is found.
18. Where in the cell would you expect to find most DNA?
19. State a function of the cell membrane
20. Name the organelle (component) of the cell in which photosynthesis takes place.
21. How do phospholipids differ from other lipids?
22. True or false. RNA is not found in ribosomes
23. What is a selectively permeable (semi-permeable) membrane?
24. State **one** feature that would allow you to identify an eukaryotic cell
25. Where in the cells of a leaf is chlorophyll found?
26. Give **two** characteristic features of eukaryotic cells. What corresponding term is used to describe bacterial cells?
27. Name a substance found in the vacuole of a plant cell.
28. Give **two** locations in a cell at which there is a selectively permeable membrane.
29. In relation to membranes in cells, explain what is meant by *selective permeability.*

## Cell Diversity

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Cell Diversity** | **Red** | **Orange** | **Green** |
| 1 | What is a tissue? |  |  |  |
| 2 | Name 2 plant tissues |  |  |  |
| 3 | Name 2 animal tissues |  |  |  |
| 4 | What is tissue culture? |  |  |  |
| 5 | Give 2 uses of tissue culture |  |  |  |
| 6 | What is an organ? |  |  |  |
| 7 | Name 1 plant organ |  |  |  |
| 8 | Name 1 animal organ |  |  |  |
| 9 | What is meant by an organ system? |  |  |  |
| 10 | Give examples of 2 organ systems in animals |  |  |  |

### Practice Exam Questions

1. In biology, what is meant by the terms *organ and tissue*?
2. Name **two** tissues found in animals. Give the functions of the tissue referred to.
3. What is meant by tissue culture? Give **one** application of tissue culture.
4. Suggest a reason why sterile conditions are needed in tissue culture.
5. Name the gas needed to release energy to make a skin graft.
6. Suggest the most suitable temperature to make skin cells grow for a skin graft.
7. What type of cell division, mitosis or meiosis, is involved in tissue culture?
8. Give **one** other application of tissue culture apart from skin grafting.

## Biomolecules – Food

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Function of Food** | **Red** | **Orange** | **Green** |
| 1 | State the function of food |  |  |  |
| 2 | Name three reasons for requiring food |  |  |  |
| 3 | Name three reasons for requiring food |  |  |  |
| 4 | Name six common chemical elements in food |  |  |  |
| 5 | Name five elements present in dissolved salts |  |  |  |
| 6 | Name 3 trace elements required |  |  |  |
| 7 | Define Biomolecular Structures |  |  |  |
| 8 | In simple biomolecular units what is the ratio of the combination of elements? |  |  |  |
| 9 | What is the general formula for a carbohydrate? |  |  |  |
| 10 | Name the element components, biomolecular components and sources of: carbohydrates, fats & oil and proteins. |  |  |  |
| 11 | Carbohydrates are composed of indivisible units. Give examples of these. |  |  |  |
| 12 | What a vitamin is. |  |  |  |
| 13 | Name one water-soluble vitamin.  Name one water in-soluble (fat-soluble) vitamin |  |  |  |
| 14 | List the sources of these vitamins |  |  |  |
| 15 | Define Anabolic and Catabolic |  |  |  |
| 16 | Give an example of each |  |  |  |
| 17 | Outline the structural role of carbohydrates |  |  |  |
| 18 | State the structural role of proteins |  |  |  |
| 19 | What is the role of lipids in cell membranes? |  |  |  |
| 20 | Carbohydrates & lipids act as a \_\_\_\_\_\_\_ source of energy |  |  |  |
| 21 | Proteins act as \_\_\_\_\_\_\_ and are made of \_\_\_\_\_ \_\_\_\_\_ |  |  |  |
| 22 | Regulators of metabolic activity are \_\_\_\_\_\_\_\_ |  |  |  |
| 23 | Give used for vitamins C & D |  |  |  |
| 24 | Name disorders associated with deficiency of a water-soluble and a water in-soluble vitamin |  |  |  |
| 25 | State the requirements & use of any 2 minerals in plants |  |  |  |
| 26 | State the requirements & use of any 2 minerals in animals |  |  |  |
| 27 | State 5 reasons why water is important for organisms |  |  |  |

### Practice Exam Questions

1. What is a disaccharide?
2. Name a monosaccharide and state a role for it in living organisms.
3. What is the ratio of hydrogen atoms to oxygen atoms in a carbohydrate?
4. Name the chemical elements present in carbohydrates.
5. When two monosaccharides unite they form a …
6. Describe a test for a named polysaccharide.
7. Name the reagents used to test for a reducing sugar.
8. State one way in which carbohydrates differ from fats.
9. Name the reagents used to test for a protein.
10. When using Fehling’s or Benedict’s solution which of the following is correct?
11. No heat needed.
12. Heat but do not boil.
13. Boil
14. Name the test **or** name the chemical used to test the sports drink for the presence of glucose (reducing sugar).
15. Name the test **or** give the chemicals used to test a sports drink for the presence of protein.
16. Cellulose is a polysaccharide. What is it formed from?
17. Name an important group of biomolecules that plants make from nitrates.
18. Fats are composed of fatty acids and …
19. What name is given to fats that are liquid at room temperature?
20. Name a chemical element found in proteins that is not found in carbohydrates.
21. Fats are composed of oxygen, hydrogen and …
22. When an iodine solution is added to a food sample and remains red-brown in colour ………………… is absent.
23. State a use of each of the following in the biology laboratory. Biuret test (copper sulphate and sodium hydroxide solutions).
24. State a use of each of the following in the biology laboratory. Benedict’s (or Fehling’s) test.
25. Name the four elements that are always present in protein.
26. What is saprophytic nutrition?
27. Biomolecules of the general formula Cx(H2O)y are examples of …
28. Name a structural polysaccharide.
29. Name a group of biomolecules in the blood which are too large to pass through the filtration system of the nephron.
30. State a role for cellulose in living organisms.
31. Name a polysaccharide that has a different role to cellulose. What is the role of the polysaccharide that you have named?
32. An example of a protein that has a structural role is
33. State two functions of fats in the human body
34. Give an example of a carbohydrate that has a structural role. Where would you expect to find this carbohydrate in a living organism?
35. State a role of carbohydrates other than a structural one.
36. Cellulose is an example of a structural …
37. Name a carbohydrate found in the cell wall of plant cells.
38. Give an example of a protein that has a structural role.
39. Give two functions of water in a living organism.
40. How do fats differ from oils at room temperature?
41. Name a fat-soluble vitamin, a good source of it and a deficiency disease caused by it.
42. Vitamins are either water-soluble or ……-soluble
43. Vitamin … is an example of a water-soluble vitamin.
44. Name a disorder associated with a deficiency of a named vitamin in the human diet.
45. A trace element in the human diet. E.g. …
46. Name two minerals required by the human body and give their functions
47. In the human diet zinc, iron and copper are examples of …
48. In carbohydrates, which two elements are in the ratio 2:1?
49. Name the small biomolecules that are joined together to make a protein.
50. Give one function of proteins in living organisms.
51. True or False. Glucose is a monosaccharide.
52. True or False. Nitrogen is a trace element.
53. True or False. Eggs are a good source of fat in the diet.
54. True or False. Lipids are made of amino acids.
55. True or False. Iodine turns starch to a blue-black colour.
56. What is a triglyceride?
57. Vitamins may be divided into two groups depending upon their solubility. Name these two groups.

## The Human Digestive System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Human Digestive System** | **Red** | **Orange** | **Green** |
| 1 | Can you define the following terms?  Heterotrophic nutrition,  Autotrophic nutrition,  Herbivore,  Carnivore,  Omnivore |  |  |  |
| 2 | Can you explain why organisms need to digest food? |  |  |  |
| 3 | Why do organisms need a digestive system? |  |  |  |
| 4 | Can you define the following Terms?  Ingestion  Digestion  Absorption  Egestion |  |  |  |
| 5 | Can you label a diagram of the human alimentary canal and its associated glands? |  |  |  |
| 6 | Can you explain the function(s) in digestion of each part of the alimentary canal including the associated glands |  |  |  |
| 7 | Can you define and explain Peristalsis? |  |  |  |
| 8 | Can you draw the four types of human teeth |  |  |  |
| 9 | Explain and write out the Human dental formula |  |  |  |
| 10 | Give the function of incisors, canines, pre molars and molars |  |  |  |
| 11 | Describe how food is mechanically broken down by the teeth, peristalsis and contractions of the stomach wall |  |  |  |
| 12 | Explain the role of bile salts in chemical digestion |  |  |  |
| 13 | Name one enzyme that breaks down carbohydrate and give its   1. Role in chemical digestion 2. Production Site 3. pH at the site of action 4. Products |  |  |  |
| 14 | Name one enzyme that breaks down protein and give its   1. Role in chemical digestion 2. Production Site 3. pH at the site of action 4. Products |  |  |  |
| 15 | Name one enzyme that breaks down fat and give its   1. Role in chemical digestion 2. Production Site 3. pH at the site of action 4. Products |  |  |  |
| 16 | Describe how the structure of the small intestine is suited to its function in digestion of  food  Include: infoldings of wall to increase surface area, enzyme secreting glands in the wall, liver and  pancreas secreting into duodenum |  |  |  |
| 17 | Describe how the structure of the small intestine is suited to its function in absorption of  digested food (villi, rich blood supply, thin walls) |  |  |  |
| 18 | Label a diagram of a single villus and give the functions of the labelled parts |  |  |  |
| 19 | Outline the role of the large intestine in  (1) Reabsorbing water  (2) Eliminating faeces |  |  |  |
| 20 | Define symbiotic bacteria |  |  |  |
| 21 | Know two function of Symbiotic bacteria in the digestive tract |  |  |  |
| 22 | Outline the benefits of dietary fibre |  |  |  |
| 23 | Can you describe how the blood transports nutrients? |  |  |  |
| 24 | Can you describe how carbohydrates and proteins are absorbed from the small intestine into the blood? |  |  |  |
| 25 | Can you describe how fats are absorbed from the small intestine into the blood? |  |  |  |
| 26 | Can you name the vein that transports nutrients form the small intestine to the liver? |  |  |  |
| 27 | Can you name the vein that transports nutrients and urea from the liver to the heart? |  |  |  |
| 28 | Can you describe how nutrients are transported from the liver to cells that require these nutrients? |  |  |  |
| 29 | Can you list the functions of the liver? |  |  |  |
| 30 | Can you describe how waste products are transported by the blood to the kidney? |  |  |  |
| 31 | Can you explain the term Balanced Diet? |  |  |  |
| 32 | Can you state two aspects of a person’s diet that usually] leads them to have a balanced diet? |  |  |  |
| 33 | Do you know how a person’s gender impacts their dietary needs |  |  |  |
| 34 | Do you know how a person’s age impacts their dietary needs |  |  |  |
| 35 | Do you know how a person’s activity level impacts their dietary needs |  |  |  |
| 36 | Can you list five food groups? |  |  |  |
| 37 | Can you explain the term Food Pyramid? |  |  |  |
| 38 | Can you draw a human Food Pyramid? |  |  |  |
| 39 | Can you state the recommended number of daily servings of each of five food groups for an average adult? |  |  |  |

### Practice Exam Questions

1. What is peristalsis?
2. The hepatic portal vein carries blood from the alimentary canal to the …
3. What are the products of fat digestion?
4. What is the role of bile in fat digestion?
5. State a role of beneficial bacteria in the alimentary canal
6. State **two** good sources of protein in the human diet.
7. Proteins are digested to simpler substances. What are these simpler substances called?
8. State **two** ways in which villi are adapted for the absorption of soluble foods.
9. State **one** function of protein in the human body.
10. Name a process by which soluble foods are absorbed into the blood from the small intestine.
11. What type of food is mainly absorbed into the lacteal?
12. What are the final products of the digestion of a protein? …
13. Give **two** good sources of protein in the human diet.
14. State **one** reason that your body needs protein.
15. Distinguish between autotrophic and heterotrophic nutrition.
16. What is meant by egestion? From where does egestion occur?
17. Bile is secreted by the …
18. State **one** reason why a low pH is important in the stomach
19. What is the function of the larynx?
20. Where is the epiglottis? What is its function?
21. Name a carbohydrate-digesting enzyme in the human alimentary canal. Where in the alimentary canal does this enzyme act? State the enzyme’s product(s).
22. State the precise location of the liver in the human body.
23. State a role that the liver plays in the digestive process.
24. Write the dental formula for an adult human.
25. What is meant by absorption?
26. Give **one** function of symbiotic bacteria in the human digestive system.
27. Where in the digestive system are the products of digestion absorbed? State **one** way in which this part of the system is adapted for absorption.
28. In which part of the digestive system is water absorbed? Give another function of this part of the digestive system.
29. An organ for churning of food to chime is the …
30. Symbiotic bacteria in the large intestine produce …
31. Waves of contractions passing along the gut is …
32. What types of teeth grind food into smaller pieces?
33. What substance emulsifies fats?
34. Distinguish between mechanical and chemical digestion.
35. Explain how the small intestine is adapted for the absorption of the products of digestion.
36. Name the part(s) of the digestive system in which the following are absorbed into the blood.
37. The products of digestion,
38. Water.
39. Name a structure in the human digestive system, other than teeth, which is involved in mechanical digestion
40. Bile is involved in digestion in the human body.
41. Where is bile produced?
42. Where is bile stored?
43. Where does bile act in the alimentary canal?
44. What is the role of peristalsis in the digestive system?
45. Where do the products of digestion enter the blood?
46. How do these products of digestion pass into the blood?
47. Name a process involved in the passage of the products of digestion into the blood.
48. State a benefit of dietary fibre.
49. What is meant by the term *digestion*?
50. From what part of the digestive system does the digested food enter the blood?
51. State **one** role of the pancreas in digestion and **one** role of the gall bladder in digestion.
52. Name the blood vessel that carries the digested food to the liver.
53. State **two** functions of the liver – other than the processing of digested food.
54. The colon contains many symbiotic bacteria – mostly ‘good’ bacteria. State **two** benefits we get from these bacteria.
55. Give **one** role for **each** of the following types of teeth: Incisors and Molars.
56. Describe the following changes that happen to food in the stomach: Mechanical changes and Chemical changes.
57. What is the pH of the stomach contents?
58. Where does the partially digested food go when it leaves the stomach?
59. What is meant by a ‘balanced’ diet?
60. Distinguish between autotrophic nutrition and heterotrophic nutrition.
61. Explain what is meant by the term *pH*.
62. Suggest a biological explanation for the following: A person who has suffered from constipation may be advised to increase the amount of wholegrain cereal in her/his diet.
63. Name a substance transported to the liver by the blood in the hepatic portal vein.
64. Where in the human body is the liver located in relation to the stomach?
65. Where is bile stored after it has been made in the liver?
66. Give **one** role that the bile salts play in the digestive process.
67. Give **two** further functions of the liver, other than the manufacture of bile.

## Metabolism and Enzyme

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Metabolism and Enzymes** | **Red** | **Orange** | **Green** |
| 1 | What is meant by metabolism? |  |  |  |
| 2 | Where does all the energy on earth come from? |  |  |  |
| 3 | What are Enzymes? |  |  |  |
| 4 | How do enzymes work? |  |  |  |
| 5 | Why is the shape of an enzyme important? |  |  |  |
| 6 | Explain the role of enzymes in plants and animals including role in metabolism |  |  |  |
| 7 | Explain the effects of pH & temperature on enzyme activity. |  |  |  |
| 8 | Describe the steps involved in Bioprocessing (types of immobilisation etc.)  What are the advantages of bioprocessing? |  |  |  |
| 9 | Give some examples of the uses of Bioprocessing. |  |  |  |
| 10 | What is the function of enzymes? |  |  |  |
| 11 | What does the “Active site” of an enzyme refer to? How does it work? |  |  |  |
| 12 | What is meant by saying the “Optimum” activity of an enzyme? |  |  |  |
| 13 | What is meant by denaturation of an enzyme? How does heat denaturation occur? |  |  |  |
| 14 | Describe how you would Investigate effect of pH on enzyme rate  Draw a labelled diagram to show how you would carry out this experiment |  |  |  |
| 15 | Describe how you would Investigate effect of temperature on enzyme rate  Draw a labelled diagram to show how you would carry out this experiment |  |  |  |
| 16 | Describe how you would Prepare one enzyme immobilisation and examine its application  Draw a labelled diagram to show how you would carry out this experiment |  |  |  |
| 17 | Describe how you would To Investigate the effect of heat denaturation on enzyme activity  Draw a labelled diagram to show how you would carry out this experiment |  |  |  |

### Practice Exam Questions

1. What term is used to describe a cellular reaction in which large molecules are broken down to smaller ones?
2. Give an example of a catabolic reaction
3. What is metabolism?
4. Is energy release a feature of anabolic or catabolic reactions?
5. To which group of molecules do enzymes belong?
6. Name an enzyme and matching substrate
7. What is an enzyme?
8. Name an enzyme that is involved in the digestion of fat
9. What term best describes the shape of an enzyme?
10. Suggest a temperature at which human enzymes work best.
11. What is an amylase? Name a site of amylase action. What is the approximate pH value at this site?
12. Is an enzyme a lipid, a protein or a carbohydrate?
13. Where in a cell are enzymes produced?
14. Name an enzyme that turns fats to fatty acids and glycerol.
15. What is meant by an enzyme’s optimum pH?
16. What is a denatured enzyme?
17. Answer the following in relation to a lipase:
18. Where is it secreted?
19. Where does it act?
20. 3. What is the approximate pH at its site of action?
21. Amylase is an enzyme that is found in saliva. State the substrate and the product of this enzyme.
22. What is a denatured enzyme?
23. Name a carbohydrate-digesting enzyme in the human alimentary canal. Where in the alimentary canal does this enzyme act? State the enzyme’s product(s).
24. Name an anabolic process carried out by plants.
25. To which group of biomolecules do enzymes belong?
26. Name a factor that influences the activity of an enzyme.
27. Name the small molecules which are the building blocks for these biomolecules.
28. The action of the enzyme amylase on its substrate starch is an example of a catabolic reaction. Explain each of the underlined terms.
29. Suggest one reason why enzymes are not found in body soap or shampoo.
30. What is meant by the *specificity* of an enzyme?
31. Explain how the Active Site Theory may be used to explain the specificity of enzymes.
32. True or false. Immobilised enzymes can act as catalysts
33. What is a bioreactor?
34. State **one** advantage of using an immobilised enzyme in a bioreactor.
35. What is meant by immobilisation?
36. Name a substance that is used to immobilise enzymes.
37. Give **two** advantages of using immobilised enzymes.
38. Give **one** application of a named immobilised enzyme. In your answer, refer to substrate, enzyme and product.
39. Describe how you immobilised an enzyme in the course of your practical work.
40. Give one advantage of bioprocessing using an immobilised enzyme.
41. Bioprocessing often involves the use of immobilised enzymes in a bioreactor. What does the term *immobilisation* refer to when used about enzymes? Explain the term *bioreactor*.
42. Give **one** example of the use of immobilised enzymes in bioreactors. In your answer name the enzyme, the substrate and the product.

## Osmosis

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Movement through Cell Membranes** | **Red** | **Orange** | **Green** |
| 1 | What does the term Selectively permeable mean? |  |  |  |
| 2 | What do selectively permeable membranes do? |  |  |  |
| 3 | What does diffusion mean?  What does osmosis mean?  What is the difference between the diffusion + osmosis? |  |  |  |
| 4 | What is meant by turgor? |  |  |  |
| 5 | What appearance does a turgid plant cell have? Explain? |  |  |  |
| 6 | How does high salt or sugar concentrations help preserve certain foods? |  |  |  |
| 7 | What is meant by plasmolysed? |  |  |  |
| 8 | Describe using a labelled diagram how you could investigate osmosis |  |  |  |

### Practice Exam Questions

1. What is osmosis?
2. What process is responsible for the uptake of minerals in a plant?
3. By what **process** does water enter a plant?
4. Explain how water enters the plant at the root hair.
5. Water enters the outermost cells of the root by osmosis. What does this tell you about the cell sap of these outermost cells?
6. Where precisely does water enter a plant?
7. In which tissue does water ascend through the plant?
8. Describe how minerals such as nitrates enter the root of a plant from the soil.
9. Osmosis has been described as a special case of diffusion. Explain why.
10. What is meant by osmoregulation?
11. Give an example of osmosis in plants.
12. In relation to membranes in cells, explain what is meant by *selective permeability*
13. What is diffusion? In the case of a named molecule, give a precise location at which it diffuses in the human body.
14. Explain the biological basis for the use of high sugar or high salt concentrations in the preservation of food.

## Homeostasis

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Homeostasis** | **Red** | **Orange** | **Green** |
| 1 | Define Homeostasis |  |  |  |
| 2 | Say why homeostasis is necessary in living organisms. |  |  |  |
| 3 | Discuss the role of homeostasis in temperature, fluid balance and chemistry of cells and organisms |  |  |  |
| 5 | Explain why organisms must maintain constant conditions in their cells and bodies |  |  |  |
|  | Explain the terms endoderm and ectoderm |  |  |  |
| 6 | Explain diffusion |  |  |  |
| 7 | Explain how organisms need to develop exchange systems which include the respiratory and excretory systems |  |  |  |
| 8 | Explain how gases, nutrients and toxic wastes are exchanged by diffusion between cells and their environment |  |  |  |
| 9 | Understand that the efficiency of exchange is proportional to the surface area over which diffusion can take place. |  |  |  |
| 10 | Understand that large organisms have problems with diffusion |  |  |  |
| 11 | Say how these problems of size can be overcome  such as :   1. the body may be flattened, thus reducing the distance between the two surfaces e.g. the leaves of plants 2. increasing the surface area e.g. alveoli in the respiratory system 3. c. the body may develop systems where the material is brought to the body surface e.g. by respiratory and excretory systems |  |  |  |
|  |  |  |
|  |  |  |
| 12 | Explain why large active animals such as humans also require a circulatory system |  |  |  |
| 13 | Say what factors control the rate of gaseous exchange and excretory functions. |  |  |  |

### Practice Exam Questions

1. What is the source of the heat that keeps the body at a fairly constant temperature?
2. What is homeostasis?
3. State the role of the kidneys in homeostasis.
4. Describe the ways in which the body responds when its internal temperature rises above the normal level.
5. Describe briefly the hormonal and nervous responses that occur when internal body temperature drops.
6. The human being is an endotherm. What does this mean?
7. Describe the role of the sweat glands in relation to body temperature.
8. What happens to the small arteries (arterioles) in the skin when the external temperature drops?
9. What is the main source of body heat in endotherms?
10. What is homeostasis? Note **one** reason why it is important in the human body.
11. What is meant by an ectotherm?
12. Suggest **two** situations which may result in a drop in the water content of the blood.
13. Describe briefly **one** way by which the skin helps to retain heat in cold conditions.
14. State **two** ways in which the body is insulated against loss of heat.

## The Human Breathing System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Human Breathing System** | **Red** | **Orange** | **Green** |
| 1 | Define Homeostasis |  |  |  |
| 2 | Say why homeostasis is necessary in living organisms. |  |  |  |
| 3 | Explain why organisms must maintain constant conditions in their cells and bodies |  |  |  |
| 4 | Explain diffusion |  |  |  |
| 5 | Understand that the efficiency of exchange is proportional to the surface area over which diffusion can take place. |  |  |  |
|  | Understand that large organisms have problems with diffusion |  |  |  |
| 6 | Say how these problems of size can be overcome |  |  |  |
| 7 | Increasing the surface area e.g. alveoli in the respiratory system |  |  |  |
| 8 | The body may develop systems where the material is brought to the body surface e.g. by respiratory and excretory systems |  |  |  |
| 9 | Explain why large active animals such as humans also require a circulatory system |  |  |  |
| 10 | Draw and identify the breathing tract in humans |  |  |  |
| 11 | Give the function of the parts |  |  |  |
|  | Nasal and buccal cavities, pharynx, epiglottis, glottis, larynx, trachea, bronchi, bronchioles, alveoli |  |  |  |
| 12 | Explain the essential features of the alveoli and capillaries as surfaces over which gas exchange takes place |  |  |  |
| 13 | Describe the mechanism of breathing -- how we inhale and exhale air |  |  |  |
| 14 | Give the role of the diaphragm, the intercostal muscles and brain (exclude CO2, levels) in breathing |  |  |  |
| 15 | Explain pressure changes in the thoracic cavity during breathing |  |  |  |
| 16 | Outline gaseous exchange in alveoli |  |  |  |
| 17 | Give the role of haemoglobin in oxygen transport |  |  |  |
| 18 | Explain source of carbon dioxide from the plasma |  |  |  |
| 19 | Explain water vapour exhalation. |  |  |  |
| 20 | Carry out the breathing exchange experiment using limewater or bicarbonate indicator |  |  |  |
| 21 | Describe the experiment to show the effect of exercise on the breathing rate |  |  |  |
| 22 | Compare healthy lungs with lungs of unhealthy respiratory systems and note the differences |  |  |  |
| 23 | Demonstrate the effect of cigarette smoking using cotton wool, bicarbonate indicator, etc |  |  |  |
| 24 | Explain one breathing disorder, e.g. from asthma and bronchitis |  |  |  |
| 25 | Give possible causes of the disorder |  |  |  |
| 26 | Describe prevention and treatment of the disorder |  |  |  |

### Practice Exam Questions

1. Distinguish between breathing and respiration.
2. Where do cilia occur in the breathing system? What is their function?
3. State precisely the events that take place at the alveoli. How are the alveoli adapted for these events?
4. Breathing rate in humans is controlled by the concentration of a gas dissolved in blood. Which gas is this?
5. The bronchioles end in small sacs. What is the name of these sacs?
6. Name the muscles that are used in breathing.
7. Breathing causes pressure changes in the thoracic cavity. Describe briefly how these pressure changes are brought about.
8. The trachea contains rings of cartilage. Suggest a function of this cartilage.
9. State one possible cause of asthma or bronchitis.
10. Give an example of a treatment for asthma or bronchitis.
11. Suggest one way in which a person might adapt his/her lifestyle to minimise the effects of asthma or bronchitis.
12. Name the blood vessels that bring this blood back from the lungs.
13. Describe briefly the role of the diaphragm and intercostal muscles in inhalation. In your answer refer to volume and thoracic air pressure.
14. Name the process involved in the passage of gas between the alveolus and the blood.
15. Give **three** ways in which an alveolus is adapted for efficient gas exchange.
16. True or false. Humans receive oxygen from the air they inhale.
17. Apart from water, name **one** other substance which is found in sweat.
18. State the location in the human body of the following muscles which are used for breathing: diaphragm, intercostal muscles.
19. How did you measure the breathing rate **or** the pulse?
20. Which gas, dissolved in the blood, can trigger deeper or faster breathing?

## The Excretory System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Excretory System** | **Red** | **Orange** | **Green** |
| 1 | Draw the structure of the urinary excretory system in humans |  |  |  |
| 2 | Label these parts -- kidney, ureter, urinary bladder, and urethra |  |  |  |
| 3 | Give the basic function of the urinary excretory system in humans |  |  |  |
| 4 | Explain the role of the kidney in regulating body fluids |  |  |  |
| 5 | Explain the role of the kidney extracting wastes and toxins from the blood and recycling valuable substances |  |  |  |
| 6 | Explain the term filtration, reabsorption and secretion -- thus regulating the body fluids and chemistry of the body |  |  |  |
| 7 | Explain the term filtration |  |  |  |
| 8 | Explain the term reabsorption |  |  |  |
| 9 | Explain the term secretion |  |  |  |
| 10 | Identification of the site of filtration and reabsorption in the cortex, medulla and renal pelvis |  |  |  |
| 11 | Identify the position of secretion in the kidney |  |  |  |
| 12 | Describe the pathway of urine from the kidney to the urethra |  |  |  |
| 13 | Recognise and label a T.S of human skin |  |  |  |
| 14 | Write a report on “Unhealthy Urinary Systems” include   * bacterial urinary tract infections * formation of kidney stones * renal tubule failure * dialysis * kidney transplants |  |  |  |
| 15 | Draw the Nephron and its associated blood supply |  |  |  |
| 16 | Explain how urine is formed |  |  |  |
| 17 | Why the blood is under pressure in the glomerulus |  |  |  |
| 18 | Why the plasma is force-filtered |  |  |  |
| 19 | Say what components of the plasma are not filtered and why |  |  |  |
| 20 | Explain the term " Glomerular filtrate" |  |  |  |
| 21 | Explain the term "proximal convoluted tubule " |  |  |  |
| 22 | Explain what substances are reabsorbed into the blood |  |  |  |
| 23 | Explain how substances are reabsorbed into the blood |  |  |  |
| 24 | Give the roles of the Loop of Henle and the distal convoluted tubule |  |  |  |
| 25 | Give some of the components found in urine |  |  |  |
| 26 | Give the pathway for urine from the nephron to the kidney |  |  |  |
| 27 | Explain how reabsorption of water in the collecting duct is under hormonal influence |  |  |  |
| 28 | Explain the term osmoregulation |  |  |  |
| 29 | Show how osmoregulation is an example of a homoeostatic mechanism |  |  |  |
| 30 | Give the pathway for urine from the nephron to the kidney |  |  |  |
| 31 | Explain how reabsorption of water in the collecting duct is under hormonal influence |  |  |  |
| 32 | Give the full name for ADH |  |  |  |
| 33 | Say what conditions stimulate ADH release |  |  |  |
| 34 | Explain how ADH secretion [action] depends on the water content of the blood. |  |  |  |

### Practice Exam Questions

1. To what structure does the urethra link the kidney?
2. Name an organ in the human body, other than the kidney, in which excretion takes place.
3. Where does filtration occur in the kidney?
4. Suggest a treatment that may be used for a person whose kidneys are not carrying out their normal functions.
5. Removal from the body of the waste products of metabolism is called …
6. True or false. Urea is formed in the kidneys.
7. To what structure does the ureter connect the kidney?
8. Name an excretory substance present in urine.
9. Name an excretory organ in the human body other than the kidney. Name a substance, other than the one you have named in (v), excreted by this organ.
10. Filtration is an essential process in the formation of urine. In what part of the kidney does it take place?
11. Reabsorption of useful substances takes place in the kidney. In what part does this occur?
12. Distinguish between ureters and urethra.
13. Explain the terms: plasma; glomerular filtrate.
14. Explain why red blood cells are normally absent from glomerular filtrate.
15. The concentration of glucose is the same in plasma and glomerular filtrate. Why is this?
16. Why is glucose normally absent from urine?
17. Following a period of heavy exercise an athlete may produce only a small volume of concentrated urine. Explain this observation.
18. What is meant by excretion?
19. Name **two** products excreted by the human.
20. Where does reabsorption of salt take place within the kidney?
21. To what organ does the ureter link the kidney?
22. Name the fluid present in the ureter.
23. What is meant by excretion?
24. Urea and carbon dioxide are excretory products of the human body. In the case of each product name a substance from which it is derived.
25. Where in the kidney is Bowman’s capsule located?
26. Give the part of the nephron in which each of the following takes place:
27. Filtration,
28. Reabsorption of amino acids.
29. Give **two** features of the nephron that aid filtration.
30. Filtration ensures that cells and valuable substances are not lost from the body when urine is being formed. Name **two** of these substances or cells.
31. Which organ is attached to the kidney by the ureter?
32. Name **two** substances excreted by the kidneys.

## The Circulatory System, Heart and the Blood

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Blood and Circulation** | **Red** | **Orange** | **Green** |
| 1 | Can you explain the term 'Closed Circulation System' |  |  |  |
| 2 | Can you list the main parts of the human closed circulation system |  |  |  |
| 3 | Can you explain the difference between the Pulmonary Circuit and the Systemic Circuit |  |  |  |
| 4 | Can you draw the human heart showing the internal structure |  |  |  |
| 5 | Can you fully label the diagram of the human heart |  |  |  |
| 6 | Can you mark the path followed by blood through the heart |  |  |  |
| 7 | Can you mark the path of blood through the pulmonary circuit |  |  |  |
| 8 | Can you mark the path of blood through the systemic circuit |  |  |  |
| 9 | Can you explain the term Portal System and give an example |  |  |  |
| 10 | Can you identify the Hepatic Portal Vein on a diagram of the human circulation system |  |  |  |
| 11 | Can you describe how the muscle in the wall of the heart is supplied with blood |  |  |  |
| 12 | Can you give a simple explanation for the heartbeat and how it is controlled |  |  |  |
| 13 | Can you list the four main parts of blood and give the function of each part |  |  |  |
| 14 | Can you give the main differences between red cells and ordinary body cells |  |  |  |
| 15 | Can you name the chemical in red blood cells that has a high affinity for oxygen |  |  |  |
| 16 | Can you name two types of white blood cell and give the function of each type |  |  |  |
| 17 | Can you describe the main properties of white blood cells |  |  |  |
| 18 | Can you give the structural differences and the reason for these differences between arteries, veins and capillaries? |  |  |  |
| 19 | Can you draw diagrams of arteries, Veins and capillaries? |  |  |  |
| 20 | Can you state the effect of smoking on the circulation system giving details of three substances in cigarette smoke and their individual effects on circulation |  |  |  |
| 21 | Can you give two beneficial effects of exercise on the circulation system |  |  |  |
| 22 | Can you describe how to investigate the effect of exercise on the pulse rate in the laboratory |  |  |  |
| 23 | Can you explain how fat and salt and being overweight affect the circulation system |  |  |  |
| 24 | Can you explain what causes pulse and state the average pulse rate in humans |  |  |  |
| 25 | Can you explain Blood Pressure |  |  |  |
| 26 | Can you list the three main parts of the lymphatic system and give the function of each part |  |  |  |
| 27 | Can you describe how to identify the Ventral and Dorsal sides and the Left and Right sides of the heart prior to beginning a dissection |  |  |  |
| 28 | Can you describe how the heart is dissected |  |  |  |
| 29 | In a dissected heart can you identify the exact position where blood enters the coronary arteries in the heart? |  |  |  |
| 30 | Do you know the precise location of the SA node? |  |  |  |
| 31 | Do you know the precise location of the AV node? |  |  |  |
| 32 | Can you explain the term Systole? |  |  |  |
| 33 | Can you explain the term Diastole? |  |  |  |
| 34 | Can you name the specialised muscle tissue in the heart wall? |  |  |  |
| 35 | Can you describe one specialisation of the heart muscle? |  |  |  |
| 36 | Can you explain the role of systole and diastole in the cardiac cycle? |  |  |  |
| 37 | Can you list the sequence of events in the cardiac cycle in the correct order? |  |  |  |

### Practice Exam Questions

1. Name **two** tissues that are present in the walls of arteries and veins and give a function of each of these tissues.
2. Veins contain valves whereas arteries do not. What is the function of the valves?
3. To which group of blood cells do lymphocytes belong?
4. Name the artery that supplies the heart muscle with blood.
5. To where does the pulmonary artery carry blood?
6. What is the function of the bicuspid valve?
7. What is the average resting rate of the human heart in beats per minute?
8. Name the liquid part of blood.
9. Name **two** substances that are dissolved in the liquid part of blood.
10. Cardiac muscle may be described as a contractile tissue. Explain the meaning of the underlined term.
11. Which chamber of the heart has the greatest amount of muscle in its wall?
12. Blood contains red cells and white cells. State **one** function for **each** of these.
13. What is the function of a semilunar valve?
14. Where in your dissection did you find the origin of the coronary artery?
15. Name **two** types of lymphocyte and state a role of each when viruses or other microorganisms enter the blood.
16. True or false. A nucleus is absent from human red blood cells.
17. Valves are present in veins. What is their function?
18. The wall of capillaries is only one cell thick. How is this related to their function?
19. Why are valves not needed in arteries?
20. Which has the bigger lumen (cavity), an artery or a vein?
21. State a precise location in the human body where red blood cells are made.
22. Name the chamber of the heart that receives blood back from the lungs.
23. From which blood vessel is the afferent arteriole derived?
24. Suggest a reason why it is important to know a person’s blood group.
25. Is the blood in the Aortaoxygenated or deoxygenated?
26. Give **one** reason why the wall of the left ventricleis thicker than the wall of the right ventricle.
27. What is blood plasma? Give a role for blood plasma.
28. Name **two** types of cell found in the blood and give a function for each of them.
29. The ABO blood group system has four blood groups. What are these **four** groups?
30. Name the following blood vessels;
31. The vessels that carry blood from the aorta to the kidneys.
32. The vessels that supply the heart’s muscle with blood.
33. Name the blood vessel that joins the ileum to the liver.
34. To which main blood vessel does the renal artery link the kidney?
35. The human circulatory system has two circuits. Give the name of each of these circuits. Which of these circuits involves the pumping of blood by the left ventricle?
36. Write a short note on **each** of the following: 1. Pulse, 2. Blood pressure.
37. Comment on the effect of **each** of the following on the circulatory system: 1. Diet, 2. Exercise.
38. Give **two** ways, other than colour, in which a red blood cell differs in structure or composition from a typical body cell such as one in the cheek lining.
39. What is the role of the SA (Sino atrial) and AV (atrio ventricular) nodes in the heart?
40. Give the **precise** locations of **both** the SA and the AV nodes in the heart.
41. Name the blood vessel referred to in each of the following cases: (i) The vein connected to the lungs. (ii) The artery connected to the kidneys. (iii) The vein that joins the intestine to the liver.
42. The following questions relate to the human heart:
43. Give the precise location of the heart in the human body.
44. What structure(s) protects the heart?
45. Name the upper chambers of the heart.
46. Name the valve between the upper and lower chambers on the left-hand side.
47. What is the average resting human heart rate?
48. Give two factors which cause an increase in heart rate.
49. Name the blood vessels that bring oxygen to the heart muscle.
50. Explain why the walls of the lower chambers of the heart are thicker than the walls of the upper chambers.
51. Name the blood vessel that brings oxygenated blood to the liver.
52. Name the cavity of the body in which the heart and lungs are located.
53. State **one** way in which heart muscle differs from other muscles in the body.

## Structure, Food Storage, Transport and Cohesion Tension Theory in Flowering Plants

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Structure in the flowering plant | **Red** | **Orange** | **Green** |
| 1 | Can you correctly put the following labels on a diagram of the external parts of a flowering plant  Root, stem, leaf, flower, seed, apical bud, auxiliary bud petiole, node and internode and lenticels |  |  |  |
| 2 | Can you state 4 functions of the root |  |  |  |
| 3 | Can you name the two root types |  |  |  |
| 4 | Can you identify and label four zones on in a diagram of a longitudinal section of a root |  |  |  |
| 5 | Can you state the function of each of four root zones |  |  |  |
| 6 | Can you define the term meristem and identify two locations in a flowering plant |  |  |  |
| 7 | Can you label the location of three different tissue types in a cross section of a root |  |  |  |
| 8 | Can you label the location of three different tissue types in a longitudinal section of a root ( dermal, ground and vascular) |  |  |  |
| 9 | Can you label the location of xylem and phloem in a transverse section of a root |  |  |  |
| 10 | Can you draw and label a xylem tracheid |  |  |  |
| 11 | Can you draw and label a xylem vessel |  |  |  |
| 12 | Can you label the external parts of a stem |  |  |  |
| 13 | Can you state the function of lenticels |  |  |  |
| 14 | Can you give four functions of a stem |  |  |  |
| 15 | Can you label three different tissue types in a cross section of a stem? ( dermal, ground and vascular) |  |  |  |
| 16 | Can you label the different tissue types in a longitudinal section of a stem |  |  |  |
| 17 | Can you draw and label phloem |  |  |  |
| 18 | Can you state the function of Xylem and phloem |  |  |  |
| 19 | Can you label the petiole, leaf blade, mid ribs and veins on a diagram of leaf attached to a stem |  |  |  |
| 20 | Can you state four differences between monocots and dicots |  |  |  |
| 21 | Can you give an example of a dicot plant and an example of a monocot plant |  |  |  |
| 22 | Can you give four functions of a leaf |  |  |  |
| 23 | Can you describe and give the reason for all the main steps in preparing and examining a dicot stem under the microscope |  |  |  |
| 24 | Can you draw a dicot stem as seen under the microscope x 100 and x 400 |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Food Storage in the Flowering Plant | **Red** | **Orange** | **Green** |
| 1 | Can you name one plant that has a root modified to store food? |  |  |  |
| 2 | Can you name one plant that has a stem modified to store food |  |  |  |
| 3 | Can you name one plant that has leaves modified to store food |  |  |  |
| 4 | Can you label a diagram of a modified root, e.g. a carrot? |  |  |  |
| 5 | Can you label a diagram of a cross section of a modified leaf e.g. an onion bulb? |  |  |  |
| 6 | Can you label a diagram of a modified stem e.g. a potato? |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Transport in the Flowering Plant | **Red** | **Orange** | **Green** |
| 1 | Can you explain the meaning of the statement that plants have an Autotrophic Nature? |  |  |  |
| 2 | Can you explain why plants need a transport system, listing the materials that need to be transported? |  |  |  |
| 3 | Can you describe how water enters the root including the role of the root hairs? |  |  |  |
| 4 | Can you describe and explain how water moves across the root tissue to reach the xylem? |  |  |  |
| 5 | Can you explain how water moves up the stem to the leaf? |  |  |  |
| 6 | Do you know the role of root pressure and transpiration in water movement up the stem? |  |  |  |
| 7 | Can you explain how the cuticle and stomata function in controlling water loss from the plant? |  |  |  |
| 8 | Can you explain how minerals are absorbed by the root? |  |  |  |
| 9 | Can you explain how minerals travel from the root to all parts of the plant? |  |  |  |
| 10 | Can you state two ways a leaf gets carbon dioxide? (two ways) |  |  |  |
| 11 | Can you explain how carbohydrates produced in photosynthesis are transported away from the leaf? |  |  |  |
| 12 | Do you know how oxygen gas, produced in photosynthesis, is transported away? |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Cohesion Tension Theory | **Red** | **Orange** | **Green** |
| 1 | Can you name the two Irish Scientists that proposed the Cohesion-Tension model of Xylem Transport? |  |  |  |
| 2 | Can you explain the term cohesion? |  |  |  |
| 3 | Can you explain the term Adhesion? |  |  |  |
| 4 | Can you explain the term transpiration? |  |  |  |
| 5 | Can you explain how tension arises in a column of water in the xylem? |  |  |  |
| 6 | Can you define osmosis? |  |  |  |
| 7 | Can you dray and label xylem tissue |  |  |  |
| 8 | Can you give the main points explaining how water can rise to great heights in a plant against the force of gravity? |  |  |  |

### Practice Exam Questions

1. State **three** functions of a root.
2. What is a meristem?
3. Give **two** functions of a stem.
4. Give **one** main function of the leaf.
5. Where would you find a meristem in a root?
6. Name a tissue found in plants. Give a function of the tissue referred to.
7. Name **two** vascular tissues and give **one** way in which they differ.
8. State a function of ground tissue.
9. State a function of dermal tissue.
10. What is meant by a vascular tissue?
11. The walls of xylem vessels are reinforced with …
12. How is xylem adapted for its role in water transport?
13. Name the tube-like tissue found in the stem in which water moves through the plant.
14. Name the two vascular tissues found in a vascular bundle.
15. Draw a labelled diagram to show a longitudinal section of phloem. Include the following labels in your diagram: sieve tube; sieve plate; companion cell
16. In which of the vascular tissues does water transport occur?
17. State **one** way in which this tissue is adapted for water transport.
18. In which direction does water transport take place?
19. Through which microscopic **structures** does water enter a plant from the soil?
20. Name **one** process that causes water to move upwards in a plant.
21. Consider that night has fallen and the plant is in darkness. Suggest what will happen to the **amount** of water moving through the plant **and** give a reason for your answer. State a function of sieve tubes.
22. Where in a leaf would you expect to find cells with most chlorophyll?
23. State a function of companion cells.
24. True or false. Parallel leaf veins are characteristic of monocotyledonous plants.
25. State one way in which a transverse section through a monocotyledonous stem differs from a dicotyledonous stem.
26. An organism which makes its own food is called a(n) …
27. What is the point of entry of carbon dioxide to a leaf?
28. What is a meristem?
29. Tiny holes called … allow gases to enter and leave the leaf.
30. Name a factor that influences the diameter of the stomata.
31. Name the apertures in stems that are equivalent to the stomata . What is the function of the stomata?
32. Give a function of the guard cell.
33. Name **two** gases that enter or leave the leaf.
34. Plants obtain carbon dioxide from the air. Name **two** processes that release this gas into the air.
35. True or false. Lenticels serve the same function as stomata.
36. Name the process by which the gases move in or out of the leaf.
37. What term is used to describe the nutrition of plants?
38. Name a plant in which the leaves are modified for food storage
39. Name a type of modified stem that functions in food storage.
40. Name a carbohydrate that you would expect to find in the modified leaves of a bulb.
41. Strong forces of attraction exist between water molecules. Give an account of the importance of these forces in raising water to great height in trees.
42. Why is a dicotyledonous (dicot) plant so called?
43. Name a dicotyledonous plant.
44. What is a cotyledon?
45. State **two** ways by which plants have adapted to protect themselves.
46. In the spongy mesophyll, gases can diffuse throughout the leaf. Name **one** such gas.
47. State one difference between the seeds of monocotyledons and dicotyledons other than the number of seed leaves.

## Respiration

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Respiration | **Red** | **Orange** | **Green** |
| 1 | What is meant by the term Aerobic respiration? |  |  |  |
| 2 | What is the function of aerobic respiration in living things? |  |  |  |
| 3 | Can you write a balanced equation for respiration? |  |  |  |
| 4 | Outline briefly the main events in respiration |  |  |  |
| 5 | What is meant by anaerobic respiration? Which type of respiration releases more energy? |  |  |  |
| 6 | What is meant by fermentation? |  |  |  |
| 7 | In what part of the cell does (a) The first stage take place in and (b) The Second Stage take place in? |  |  |  |
| 8 | What type of microorganisms play a role in fermentation? |  |  |  |
| 9 | Outline how microorganisms are used in bioprocessing |  |  |  |
| 10 | What is a bioreactor? |  |  |  |
| 11 | What is meant by Glycolysis? What part of the cell does this stage occur? |  |  |  |
| 12 | There are two types of anaerobic respiration lactic acid fermentation and alcohol fermentation what is the difference between each type? |  |  |  |
| 13 | What occurs in Kreb’s cycle? |  |  |  |
| 14 | What part of the cell does the Krebs Cycle take place in? |  |  |  |
| 15 | Describe how you would investigate the production of alcohol by Yeast  Draw a labelled diagram to show how you would carry out this investigation |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Respiration for Higher Level | **Red** | **Orange** | **Green** |
| 1 | What is meant by Glycolysis? What happens to the 6 carbon glucose molecule at this stage? |  |  |  |
| 2 | What is released? |  |  |  |
| 3 | What happens next if oxygen is present? |  |  |  |
| 4 | What happens next if oxygen is absent? |  |  |  |
| 5 | There are two types of anaerobic respiration lactic acid fermentation and alcohol fermentation what is the difference between each type? |  |  |  |
| 6 | What are the products of anaerobic respiration when fermentation occurs? |  |  |  |
| 7 | What are the products of anaerobic respiration in humans? |  |  |  |
| 8 | What is pyruvate broken down into? |  |  |  |
| 9 | What happens to Acetyl co A |  |  |  |
| 10 | What are the main events of the Krebs Cycle |  |  |  |
| 11 | What is the electron transport system? |  |  |  |
| 12 | What is the function of the ETS? |  |  |  |
| 13 | Where are the electrons transferred? |  |  |  |
| 14 | What does oxygen combine with and what is formed? |  |  |  |
| 15 | How is ATP formed? |  |  |  |
| 16 | How many molecules of ATP are produced? |  |  |  |

### Practice Exam Questions

1. Aerobic respiration is a two-stage process. The first stage takes place in the cytoplasm. Where does the second stage take place?
2. Yeast cells produce ethanol (alcohol) in a process called fermentation.

* Is this process affected by temperature?
* Name a substance that yeast can use to make ethanol.
* Name a substance produced during aerobic respiration that is not produced during fermentation.

1. Give an account of a chemical test to demonstrate that alcohol (ethanol) has been produced in fermentation. Include the initial colour and final colour of the test.
2. Why does fermentation eventually cease?
3. Anaerobic respiration by micro-organisms is called fermentation. Give **one** example of industrial fermentation, including the type of micro-organism and the substance produced.
4. True or false. Aerobic respiration is the release of energy in the absence of oxygen
5. Distinguish between aerobic and anaerobic respiration.
6. When lactic acid builds up in the blood, a person is said to be in oxygen debt. This debt must eventually be paid. Suggest how the debt is paid.
7. Write a balanced equation to summarise aerobic respiration.
8. Suggest **one** reason why living organisms need to respire.
9. Some of the carbohydrates produced in photosynthesis are used in respiration. What is respiration?
10. What is the first stage process of respiration called?
11. In the first stage of respiration there is a release of ATP as glucose is converted to another substance. Name this other substance.
12. In respiration the acetyl group enters a cycle of reactions. What name is given to this cycle? Where in the cell does this cycle take place?
13. To what is pyruvic acid (pyruvate) converted under anaerobic conditions in:
14. Yeast?
15. A human muscle cell?
16. Under aerobic conditions pyruvic acid (pyruvate) is converted to an acetyl group and in the process a small molecule is released. Name this small molecule.
17. Identify X and Y in the following equation which is a summary of aerobic respiration.

C6H12O6 + 6X 🡪 6Y + 6H20

1. If yeast cells are kept under anaerobic conditions, alcohol (ethanol) and another substance are produced. (i) What are anaerobic conditions? (ii) Name the other substance produced.
2. Does the first stage of respiration require oxygen?
3. Comment on the amount of energy released in the first stage of respiration.
4. What name is given to the first stage of respiration?
5. Where in the cell does the second stage of respiration take place?
6. Where in a cell does this first stage of respiration take place?
7. Does the second stage of respiration require oxygen?
8. Comment on the amount of energy released in the second stage of respiration.
9. Name a compound to which pyruvic acid (pyruvate) may be converted, in the absence of oxygen.
10. State **two** ways in which the energy that is released during respiration is used in the human body.
11. Which stage of respiration releases more energy?
12. Explain briefly what is meant by respiration.
13. In stage 1 of respiration, glucose is partly broken down. Where in the cell does this happen?
14. The first stage of respiration takes place in the cytosol. What is the cytosol?
15. Does the first stage of respiration release a small or large amount of energy?
16. Where in the cell does the second stage of aerobic respiration take place?
17. Suggest a situation in which some cells in the human body may not be able to engage in the second stage of aerobic respiration
18. True or false. Stage 1 of respiration requires oxygen.
19. True or false. Stage 1 of respiration takes place in the cytoplasm.
20. True or false. Stage 2 of respiration takes place in the cytoplasm.
21. True or false. Some of the energy released in respiration is lost as heat.
22. Where does the second stage of respiration take place?
23. Give **two** industrial uses of the anaerobic respiration of yeast.
24. Suggest a role for NAD / NADP+ in cell activities.
25. The first stage ends with the formation of pyruvate (pyruvic acid). In **anaerobic** conditions, what is produced from this pyruvate: 1. In muscle cells, 2. In yeast cells?
26. If conditions are **aerobic**, pyruvate next passes to an organelle in which the second stage of respiration takes place. Name this organelle.
27. Pyruvate is broken down to CO2 and a two-carbon compound. Name this two-carbon compound.
28. This two-carbon compound passes directly into a series of reactions in the second stage of respiration. Name this series of reactions and give one product, other than electrons, of these reactions.
29. The electrons released from the above reactions pass along a transport chain and in the process energy is released. 1. To what use is this energy put? 2. At the end of the transport chain what happens to the electrons?
30. Aerobic respiration takes place in two main stages – stage 1 and stage 2. Indicate whether each of the following statements refers to stage 1 or to stage 2.

A. Takes place in the mitochondria.

B. Produces a large amount of energy.

C. Takes place in the cytoplasm.

D. Does not require oxygen.

1. One of your practical activities was to prepare alcohol using yeast. Answer the following questions in relation to this activity:

A. Name the solution in which you placed the yeast at the start of the activity.

B. Give the temperature at which you then kept the solution.

C. How did you know that alcohol production had ceased?

D. Name the test or chemical(s) used to show that alcohol had been produced.

1. Write a word equation to show what happens when **yeast** breaks down glucose in the absence of oxygen.

## Photosynthesis

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Photosynthesis** | **Red** | **Orange** | **Green** |
| 1 | Define the term photosynthesis |  |  |  |
| 2 | Can you write the balanced equation for photosynthesis? |  |  |  |
| 3 | Where do plants get Light, Carbon Dioxide and Water from? |  |  |  |
| 4 | What part of the plant does photosynthesis take place in? |  |  |  |
| 5 | Why do plants need to photosynthesise? |  |  |  |
| 6 | What is the function of chlorophyll? |  |  |  |
| 7 | List the main events in photosynthesis |  |  |  |
| 8 | How is light absorbed? |  |  |  |
| 9 | What happens to the trapped energy? |  |  |  |
| 10 | What are the products of the splitting of water? |  |  |  |
| 11 | What happens to the oxygen that is produced by the splitting of water? (2 things) |  |  |  |
| 12 | How is glucose formed? |  |  |  |
| 13 | What is ATP, what is its role in the cell? |  |  |  |
| 14 | How does ADP become ATP and gain more energy? |  |  |  |
| 15 | Describe how you would Investigate the influence of light intensity or carbon dioxide on the rate of photosynthesis. |  |  |  |
| 16 | Draw a labelled diagram to show how you would carry out this investigation |  |  |  |
| 17 | How can humans increase or decrease the rate of photosynthesis? Where does the supply of electrons come from and what are they used for? |  |  |  |
| 18 | How many stages are there in photosynthesis? |  |  |  |
| 19 | What part of the chlorophyll does the light stage take place in? |  |  |  |
| 20 | How is light energy transferred to the electrons? |  |  |  |
| 21 | Explain pathway 1 and pathway 2 for electron flow |  |  |  |
| 22 | What are the end products of the light stage? |  |  |  |
| 23 | What part of the chloroplast does the dark stage take place in? |  |  |  |
| 24 | What is NAD+ reduced to? |  |  |  |
| 25 | What function does this molecule then have? |  |  |  |
| 26 | Where does the plant get carbon dioxide for the dark stage? |  |  |  |
| 27 | What happens to the carbon dioxide in the dark stage? |  |  |  |
| 28 | What is the end product of the dark stage? |  |  |  |

### Practice Exam Questions

1. Name the process that takes place in plants in which this energy is converted to a usable form.
2. Write a balanced equation to summarise the process of photosynthesis.
3. Name the energy source for photosynthesis.
4. In what main part of a plant does most photosynthesis take place?
5. Name the structures in plant cells in which photosynthesis takes place.
6. What is the primary role of chlorophyll in photosynthesis?
7. Name the gas used in photosynthesis.
8. Name the gas produced during photosynthesis.
9. Carbon dioxide is essential for photosynthesis. Where does it enter the leaf?
10. From your knowledge of photosynthesis suggest a way to increase the yield of plants such as lettuces in a greenhouse.
11. In addition to carbon dioxide another small molecule is needed for photosynthesis. Name this other molecule.
12. State a precise role for each of the following in photosynthesis: (i) Carbon dioxide, (ii) Water.
13. Suggest **one** way in which the rate of photosynthesis of plants in a greenhouse could be increased.
14. What is the relationship between the rate of photosynthesis and **either** the light intensity **or** the carbon dioxide concentration.
15. Most Irish tomatoes are grown in greenhouses. State **two** ways a commercial producer could increase her/his crop yield of tomatoes.
16. The cells in the palisade layer contain many organelles that carry out photosynthesis. Suggest why the cells here contain more of these organelles than the cells in the spongy mesophyll.
17. Where in a plant cell does photosynthesis take place?
18. For which purpose did you use an aquatic plant such as pondweed rather than a terrestrial plant when investigating the rate of photosynthesis?
19. During the first stage of photosynthesis energised electrons enter two pathways. Where do the energised electrons come from?
20. Give the alternative name of the first stage of photosynthesis.
21. Two products of the light stage of photosynthesis are vital for the dark stage. Name each of them.
22. In the second stage of photosynthesis compounds of the general formula Cx(H2O)y are formed. What name is given to this group of compounds?
23. From which simple compound does the plant obtain the H used to make compounds of general formula Cx(H2O)y?
24. Light energy trapped by chlorophyll is used to split water. List **three** products that result when water is split
25. Name the simple compound that supplies the necessary energy for the second stage reactions in photosynthesis.
26. Explain the part played by NADP- in photosynthesis.
27. Why is the dark stage of photosynthesis given the alternative name of the light-independent stage?
28. Name a gas that is essential for the dark stage of photosynthesis.
29. What happens to water molecules when they reach the sites of photosynthesis?
30. During photosynthesis oxygen is produced.
31. From what substance is oxygen produced?
32. In which stage of photosynthesis is oxygen produced?
33. 3. Give **two** possible fates of oxygen following its production.
34. In photosynthesis water (H2O) is split into three products.
35. Name these **three** products.
36. State what happens to each of these products.
37. Energised electrons play a central role in ATP formation during photosynthesis. What is an energised electron?
38. ATP is an abbreviation. What does it stand for?
39. What is the role of ATP in cells?
40. In which of the stages of photosynthesis does ATP form?

## Microbiology

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Diversity of Organisms | **Red** | **Orange** | **Green** |
| 1 | Can you list the five kingdoms used to classify plant and animals? |  |  |  |
| 2 | Can you discuss the plant kingdom using the flowering plant as an example |  |  |  |
| 3 | Can you discuss the animal kingdom using the human as an example |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Monera | **Red** | **Orange** | **Green** |
| 1 | Can you name 3 main types of bacterial cells? |  |  |  |
| 2 | Can you outline the structure of bacteria? |  |  |  |
|  | Can you draw a bacterial cell showing plasmid, cytoplasm, flagella and capsule? |  |  |  |
| 3 | Can you explain reproduction of bacteria? |  |  |  |
|  | What happens to bacteria when conditions are unfavourable for growth? |  |  |  |
| 4 | Can you explain nutrition of bacteria? |  |  |  |
|  | Can you explain parasitic and saprophytic nutrition? |  |  |  |
|  | Can you give explain autotrophic nutrition in bacteria to include chemosynthetic and photosynthetic bacteria? |  |  |  |
| 5 | Can you state the factors affecting growth of micro-organisms? |  |  |  |
| 6 | Can you define the term: Pathogenic? |  |  |  |
| 7 | Can you define the term: antibiotics? |  |  |  |
| 8 | Can you state the role of antibiotics? |  |  |  |
| 9 | Can you outline the potential effects of the abuse of antibiotics? |  |  |  |
| 10 | Can you name 2 Beneficial & 2 Harmful bacteria? |  |  |  |
| 11 | Can you describe the eukaryotic nature of bacteria? |  |  |  |
| 12 | Describe the growth curve of bacteria |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Laboratory Procedures for Micro-organisms | **Red** | **Orange** | **Green** |
| 1 | Can you outline the distribution of bacteria and fungi in nature? |  |  |  |
| 2 | Can you discuss and outline the Laboratory Procedures for Micro-organisms |  |  |  |
| 3 | Can you state the precautions necessary when working with micro-organisms? |  |  |  |
| 4 | Can you define the terms: Asepsis & Sterility |  |  |  |
| 5 | Can you outline containment & disposal methods in relation to microbes? |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Fungi | **Red** | **Orange** | **Green** |
| 1 | Define the terms: saprophytic & parasitic in relation to fungi? |  |  |  |
| 2 | Discuss the structure Rhizopus with reference to:  Hyphae and Mycelium, Rhizoids, Sporangiophores, Stolon. Apophysis. Columella. Sporangium and spores |  |  |  |
| 3 | Discuss the life cycle of Rhizopus with reference to:   * production of progametangia; * formation of gametangia and suspensors; * zygospore formation; * germination of zygospore; |  |  |  |
| 4 | Explain nutrition in fungi? |  |  |  |
| 5 | Outline the process of reproduction of Yeast with reference to budding |  |  |  |
| 6 | Can you name two Beneficial & two Harmful fungi? |  |  |  |
| 7 | Can you discuss Edible and Poisonous fungi? |  |  |  |
| 8 | Can you identify and give the functions for the following structures: rhizoid, sporangium, gametangium and zygospore. |  |  |  |
| 9 | Can you Investigate the growth of leaf yeast using agar plates and controls? |  |  |  |
| 10 | Can you describe the prokaryotic nature of fungi? |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Protista | **Red** | **Orange** | **Green** |
| 1 | Can you explain the nuclear structure of Amoeba? |  |  |  |
| 2 | Can you explain the sub cellular structure of Amoeba? |  |  |  |

### Practice Exam Questions

1. To which kingdom do bacteria belong?
2. Name any **two** of the main bacterial types (shapes).
3. By which method do bacterial cells reproduce?
4. What is the function of flagella on bacteria?
5. Some bacteria are *anaerobic*. What does this mean?
6. What are *pathogenic* bacteria?
7. Give **two** example of the economic importance of bacteria.
8. Describe two ways in which the skin helps to defend the body against pathogenic micro-organisms.
9. What do bacteria form when environmental conditions become unfavourable?
10. Other than being prokaryotic, state **two** ways in which a typical bacterial cell differs from a typical human cell (e.g. cell from cheek lining).
11. What are antibiotics?
12. Describe how some bacteria respond in order to survive when environmental conditions become unfavourable.
13. Distinguish between photosynthetic and chemosynthetic bacteria. Give an example of each type.
14. Name **two** forms of heterotrophic nutrition found in bacteria.
15. Explain what is meant by antibiotic resistance and suggest how it may develop.
16. What is a nutrient medium?
17. Give two meanings for the term sterile.
18. Antibiotics should not be prescribed for a person suffering from a viral infection. Suggest a reason for this.
19. Give examples of **two** harmful bacteria.
20. Briefly explain chemosynthesis.
21. Give **two** activities of symbiotic bacteria in the human digestive system.
22. How may apparatus be sterilised?
23. To which kingdom do yeasts belong?
24. To which kingdom does *Rhizopus* belong?
25. State **one** way in which yeast is beneficial to humans.
26. Give **two** industrial uses of the anaerobic respiration of yeast.
27. State **one** feature that indicates that *Rhizopus* belongs to the kingdom Fungi.
28. Yeasts are eukaryotic organisms. What does this mean?
29. Saprophytic and parasitic fungi are widespread in nature. Explain each of the underlined terms.
30. Give **one** example of a beneficial fungus and **one** example of a harmful fungus.
31. State a function for each of the following structures that are found in fungi; rhizoid, sporangium, gametangium, zygospore.
32. What term is used to describe the nutrition of *Rhizopus*? Explain the importance of this type of nutrition in nature.
33. Name another organism that you have studied in your biology course that belongs to the same kingdom as *Rhizopus*.
34. Distinguish between hypha and mycelium.
35. In the case of alkaline pyrogallol or an anaerobic jar state:
36. An investigation in which you used it,
37. The precise purpose for its use in the investigation that you have indicated.
38. What type of asexual reproduction is shown in yeast?
39. Which type of division, mitosis or meiosis, is involved in budding?
40. For which purpose did you use petroleum jelly in the investigation of the growth of leaf yeast on agar plates?
41. For which purpose did you use antiseptic wash solution in the investigation of the growth of leaf yeast on agar plates?
42. Name the nutrient medium on which you grew leaf yeast
43. Name the container in which you grew the leaf yeast.
44. In the case of starch or skimmed milk agar plates state the following:
45. An investigation in which you used it,
46. The precise purpose for its use in the investigation that you have indicated.
47. Distinguish between batch and continuous flow food processing using micro-organisms in the food industry.
48. Explain how *Rhizopus* gets its food.
49. What form of heterotrophic nutrition does *Rhizopus* have?
50. Outline the importance of this type of nutrition in nature.
51. Mushrooms also belong to the kingdom fungi. A restaurant owner decides to collect and cook wild mushrooms from a local forest. Suggest **one** reason why this may not be a good idea.
52. To which kingdom does *Amoeba* belong?
53. What does the animal plankton feed on?

## Ecology

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Ecology, Ecosystem, Biosphere and Habitat | **Red** | **Orange** | **Green** |
| 1 | Define the term: ecology |  |  |  |
| 2 | Define the term: ecosystem |  |  |  |
| 3 | Name a range of ecosystems demonstrating diversity |  |  |  |
| 4 | Explain the term: biosphere |  |  |  |
| 5 | Define the term: habitat |  |  |  |
| 6 | List examples of habitats |  |  |  |
| 7 | Define and give examples of the following as applied to terrestrial (land) and aquatic (water) environments:   1. Abiotic, 2. Biotic, 3. Climatic factors and 4. Edaphic factors |  |  |  |
| 8 | What is the primary source of energy |  |  |  |
| 9 | The pathway of energy flow is also known as \_\_\_\_\_\_\_ |  |  |  |
| 10 | Present a grazing food chain |  |  |  |
| 11 | Present a food web |  |  |  |
| 12 | Construct a pyramid of numbers and explain its use |  |  |  |
| 13 | Explain the term: niche and give examples |  |  |  |
| 14 | Define the term: nutrient recycling by organisms |  |  |  |
| 15 | Outline and draw the Carbon Cycle |  |  |  |
| 16 | Outline and draw the Nitrogen Cycle |  |  |  |
| 17 | Explain the limitations of use regarding the size of organisms |  |  |  |
| 18 | State two inferences that can be made regarding the shape of the pyramid |  |  |  |
| 19 | Explain the energy loss shown in the pyramid |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Study of an Ecosystem | **Red** | **Orange** | **Green** |
| 1 | Present an overview of diversity of life forms in an ecosystem |  |  |  |
| 2 | Identify a number of habitats from the selected ecosystem |  |  |  |
| 3 | Identify five plants and animals using simple keys |  |  |  |
| 4 | Draw up keys for identification of organisms |  |  |  |
| 5 | Identify and use various apparatus required for collection methods |  |  |  |
| 6 | Explain the difference between a Qualitative & Quantitative study for plants and animals |  |  |  |
| 7 | Can you complete Frequency and Percentage Cover surveys |  |  |  |
| 8 | Can you correlate choice of habitat for organisms to Abiotic Factors |  |  |  |
| 9 | Investigate and report on any 3 Abiotic Factors |  |  |  |
| 10 | Explain the necessity for and give examples of Structural/Competitive/Behavioural adaptations |  |  |  |
| 11 | State one adaptation by one organism in the selected ecosystem |  |  |  |
| 12 | Explain and identify the role of the organism in energy transfers |  |  |  |
| 13 | Draw a food chain of the study area |  |  |  |
| 14 | Draw a food web of the study area |  |  |  |
| 15 | Draw a food pyramid of the study area |  |  |  |
| 16 | Discuss the necessity for analysis and assessments of results obtained |  |  |  |
| 17 | Identify local ecological issues related to selected organisms |  |  |  |

### Practice Exam Questions

1. Explain the following terms that are used in ecology: biosphere, habitat and niche.
2. Explain the following terms that are used in ecology: Biosphere; Habitat; Consumer; Producer; Niche.
3. An organism that eats another organism is called a …
4. The place where an organism lives is called its …
5. What is a pyramid of numbers?
6. The primary source of energy in an ecosystem is the …
7. The parts of the earth and atmosphere in which life is found is called the …
8. In ecology what is meant by a trophic level?
9. Explain the following terms that are used in ecology: niche, edaphic factor, symbiosis.
10. What is meant by nitrogen fixation?
11. What is meant by nitrification?
12. What is the function of the nitrogen cycle?
13. What term do ecologists use to describe an animal which kills and eats other animals?
14. Give four factors that influence the size of the human population.
15. If the population of prey declines suggest two possible consequences for the predators.
16. What is the principal source of energy for the Earth’s ecosystems?
17. Name a producer.
18. What is meant by an abiotic factor?
19. State one way in which a named organism is adapted to the ecosystem.
20. What is a quadrat frame?
21. Give two abiotic factors that you investigated, describe how you measured each one.
22. What term is used for the organism from which a parasite obtains its food?
23. What is a habitat?
24. List three abiotic factors that you investigated.
25. In the case of a named organism give an adaptation feature that you noted.
26. What is an ecosystem?
27. What does an ecologist mean by competition?
28. The use of one species to control the population of another species is called biological control. Suggest one advantage and one disadvantage of biological control.
29. Name a group of organisms involved in nitrogen fixation.
30. What is meant by a pyramid of numbers?
31. A relationship between two organisms in which both benefit is called
32. In ecological studies it is found that the distribution of organisms is influenced by abiotic and biotic factors. Distinguish between the underlined terms.
33. From an ecosystem that you have investigated give an example of an abiotic factor that influences the distribution of a named plant in the ecosystem.
34. In the case of a named ecosystem give an example of a biotic factor that influences the distribution of a named animal.
35. Construct a grazing food chain containing at least four trophic levels.
36. The conversion of atmospheric nitrogen to nitrates by bacteria is called …
37. Give two sources of the carbon dioxide that is found in the atmosphere.
38. Farmers add nitrates as fertilizers to the soil. They are advised not to spread fertilizers if heavy rain is forecast. Why do you think they are given this warning?
39. Explain what is meant by pollution.
40. Give an example of pollution and describe how this form of pollution can be controlled.
41. Give an example of a human activity that results in the pollution of air or water
42. Explain what is meant by conservation.
43. Give a brief account of a conservation practice with which you are familiar.
44. Explain conservation in relation to wild plants and animals.
45. Suggest two reasons for conserving wild species.
46. State one conservation practice from agriculture or fisheries or forestry
47. Describe a human activity that may result in pollution. Suggest a way in which this pollution could be prevented.
48. Suggest a possible effect on a human population that may result from an increased availability of contraception.
49. Outline the problems associated with the disposal of waste. Suggest two ways of minimising waste.
50. Waste management is becoming an increasingly difficult matter. Suggest two reasons for this.
51. Describe one method of waste management by reference to agriculture, fisheries or forestry.
52. Suggest some ways of minimizing waste.
53. Waste management is a matter of growing concern in Ireland as the population expands. Outline three problems associated with waste disposal.
54. Give one example of the use of micro-organisms in waste management.
55. Suggest two ways to prevent or control pollution.
56. Write a short paragraph (about 5 lines) on waste management.
57. What term is used by ecologists to describe the organisms that form the base of a pyramid of numbers?
58. What is meant in ecology by a quantitative survey?
59. Give an example of an herbivore and of a carnivore found in an ecosystem you have studied (not domesticated or farm animals).
60. What is meant by the term ‘fauna’?
61. In ecological studies what is a key?
62. Describe three methods used by plants to protect themselves from adverse external environments.
63. Explain the term *niche*.
64. Explain the term *edaphic*.
65. Give an example of an edaphic factor.
66. Distinguish between quantitative and qualitative surveys in an ecosystem.
67. Why is a quadrat unsuitable for studying most animal populations?
68. Suggest a plant that would not be suitable to survey using a quadrat.
69. State one possible source of error in a survey of an ecosystem.
70. Decomposition is essential for the addition of nutrients to the soil. Explain the underlined term.
71. Name two groups of micro-organisms in the soil which are responsible for decomposition.
72. If all the primary producers were removed from an ecosystem (e.g. by disease) suggest what would happen to the primary consumers?
73. Name an ecosystem you have studied **and** construct a simple food chain from that ecosystem.
74. Why are elements recycled in nature?
75. Is the following statement true or false? Give a reason for your answer. Food chains are usually short.
76. Is the following statement true or false? Give a reason for your answer. The herbivores in an ecosystem normally live long lives.
77. Is the following statement true or false? Give a reason for your answer.   
    The only remaining natural ecosystems in Ireland, for example mountain land above the heather line and salt marsh, are ones for which mankind has no use.
78. Where are primary producers found in a pyramid of numbers?
79. Using named examples, construct a simple **inverted** pyramid of numbers.
80. Using a food web from your field study
81. Name **one** primary producer.
82. Name **one** herbivore **and one** carnivore from the web.
83. Name **one** omnivore from the web.
84. What would happen to the number of caterpillars if all the thrushes died in a habitat?
85. Name two pieces of apparatus used to collect animals from an ecosystem.
86. A situation in which one organism lives on or in a second species, feeding on it and causing it harm is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
87. Organisms capable of making their own food are called\_\_\_\_\_\_\_\_\_\_\_
88. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is all the members of a species living in an area
89. Micro-organisms and other organisms that return nutrients to the environment by decay are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_
90. A situation in which two organisms of different species live together and at least one benefits is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
91. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is a struggle between organisms for a scarce resource.
92. One organism killing and eating another organism is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
93. Distinguish between contest competition and scramble competition by writing a sentence about each.
94. Name a factor, other than competition, that controls wild populations.
95. What deduction is it possible to make from each of the following observations?
96. In a particular area the population of a predator did not decline following a big reduction in the population of its main prey.
97. Mortality levels resulting from infection by a particular virus tend to decline over the years.
98. Where some members of a species remain in the same general area throughout life and some members are migratory, mortality levels tend to be higher in the migratory part of the population.
99. There is a greater variety of herbaceous (non woody) plants in areas where grazing species, such as rabbits, are more plentiful than in areas where grazing species are less plentiful.
100. In some species of migratory ducks in the northern hemisphere it is found that the wintering grounds of the males lie further south than those of the females.

## Cell Continuity, Diversity and Mitosis

### Self-Assessment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Cell Continuity, Diversity and Mitosis** | **Red** | **Orange** | **Green** | |
| 1 | Explain the term cell continuity |  |  |  |
| 2 | Explain what chromosomes are  Where they are found in a cell  What their function is |  |  |  |
| 3 | Define the term haploid number |  |  |  |
| 4 | How many chromosomes are found in a diploid human cell  Can you write this correctly |  |  |  |
| 5 | Define the term diploid number |  |  |  |
| 6 | Say how many chromosomes are found in a haploid human cell  Write this correctly |  |  |  |
| 7 | Explain the term cell cycle |  |  |  |
| 8 | Say what is meant by Interphase  Say what happens in this phase |  |  |  |
| 9 | Define the term mitosis |  |  |  |
| 10 | Explain the process in simple terms to show chromosome behaviour |  |  |  |
| 11 | Draw labelled diagrams illustrating the stages of mitosis and describe what is happening in each diagram |  |  |  |
| 12 | Give a definition of cancer |  |  |  |
| 13 | State two possible causes of cancer |  |  |  |
| 14 | State the difference between malignant and benign tumours  Give an example of each type |  |  |  |
| 15 | State the primary function of mitosis for single-celled organisms |  |  |  |
| 16 | State the primary function of mitosis for multicellular organisms |  |  |  |
| 17 | Define the term meiosis |  |  |  |
| 18 | State the functions of meiosis |  |  |  |

### Practice Exam Questions

1. Name a human cell that is haploid
2. What is meant by the diploid number of a cell?
3. If the diploid number in a cell is 46, the haploid number is …
4. The haploid number of chromosomes is found in the human egg and sperm. Explain the underlined term.
5. True or false. Mitosis is the division of a nucleus into two identical nuclei
6. State a function of mitosis in a single-celled organism.
7. State a function of mitosis in a multicellular organism.
8. State one way in which mitosis differs from meiosis.
9. How many cells are formed when a cell divides by mitosis?
10. For what purpose do single-celled organisms use mitosis?
11. For convenience of study, mitosis is divided into four stages. List these in order.
12. What term is used to describe a group of disorders of the body in which cells lose the normal regulation of mitosis?
13. Some cells in the human body undergo meiosis. Give one function of meiosis.
14. Where does meiosis occur in the human male?
15. Give the names of the two processes involving DNA which take place during interphase.
16. Give **one** location where mitosis occurs in flowering plants.
17. True or False. The cells produced by mitosis are identical.
18. True or False. Meiosis gives rise to variation.
19. True or False. Mitosis always produces four new cells.
20. True or False. Meiosis is never involved in gamete formation.
21. True or False. Single-celled organisms use mitosis for reproduction.
22. What is the function of spindle fibres?
23. Tissues grow by cell division. Name the type of cell division by which tissues grow.
24. What is the role of mitosis in single-celled organisms?
25. What medical term is used for the group of disorders in which certain cells lose normal control of mitosis?
26. Name the stage of mitosis in which the chromosomes are located at the equator of the cell and before they begin to separate.
27. To what are the chromosomes attached during metaphase and anaphase
28. Towards the end of mitosis, in what type of cell does a cell plate form?

## Variation, DNA and Protein Synthesis

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Variation, DNA and Protein Synthesis** | **Red** | **Orange** | **Green** |
| 1 | Give the term used to describe the differences in organisms |  |  |  |
| 2 | Define the term species. |  |  |  |
| 3 | Give an example of a species |  |  |  |
| 4 | Define the term heredity |  |  |  |
| 5 | Give an example of heredity |  |  |  |
| 6 | Define the term gene expression |  |  |  |
| 7 | Give an example of gene expression |  |  |  |
| 8 | Define a gene |  |  |  |
| 9 | Outline the role of a gene |  |  |  |
| 10 | Describe the structure of a chromosome |  |  |  |
| 11 | Describe the structure of DNA |  |  |  |
| 12 | Describe the structure of a Nucleotide |  |  |  |
| 13 | Outline the specific purine and pyrimidine couples – complementary base pairs. |  |  |  |
| 14 | Name the four bases and the base pairs in DNA |  |  |  |
| 15 | Explain Hydrogen bonding |  |  |  |
| 16 | Refer to the double helical structure of DNA |  |  |  |
| 17 | Distinguish between coding and non-coding structures. |  |  |  |
| 18 | Explain why RNA is a complementary structure to DNA |  |  |  |
| 19 | Name the bases in RNA |  |  |  |
| 20 | Outline the structure of RNA |  |  |  |
| 21 | Explain the function of mRNA |  |  |  |
| 22 | Describe the triplet base code |  |  |  |
| 23 | Outline Chromosome sequencing of coding and non-coding (junk DNA) sequences. |  |  |  |
| 24 | Outline DNA replication |  |  |  |
| 25 | Outline the steps in protein synthesis |  |  |  |
| 26 | Explain how DNA contains the code for protein |  |  |  |
| 27 | Understand why enzymes unwind the DNA |  |  |  |
| 28 | Explain how this code is transcribed to mRNA |  |  |  |
| 29 | Describe the role of RNA polymerase |  |  |  |
| 30 | Explain what a codon is |  |  |  |
| 31 | Explain how the mRNA code is translated on the ribosome |  |  |  |
| 32 | Understand that ribosome is composed of subunits |  |  |  |
| 33 | Explain how amino acids are assembled in the correct order determined by the codons on mRNA |  |  |  |
| 34 | Understand a stop codon on mRNA signals the release of the protein |  |  |  |
| 35 | Understand that the protein folds into its functional shape |  |  |  |
| 36 | Give the location of protein synthesis |  |  |  |
| 37 | Explain how genes control cell activities by producing proteins |  |  |  |
| 38 | Describe the role of RNA polymerase |  |  |  |
| 39 | Describe the molecular involvement of DNA, mRNA, tRNA, rRNA and amino acids in the process of protein synthesis |  |  |  |

## Genetic Inheritance, Evolution, Profiling and Genetic Engineering

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Genetic Inheritance, Evolution, Profiling and Genetic Engineering** | **Red** | **Orange** | **Green** |
| 1 | Define gamete |  |  |  |
| 2 | Outline gamete formation |  |  |  |
| 3 | Give the function of gametes in sexual reproduction |  |  |  |
| 4 | Define fertilisation |  |  |  |
| 5 | Define allele |  |  |  |
| 6 | Differentiate between the terms homozygous and heterozygous. |  |  |  |
| 7 | Differentiate between genotype and phenotype |  |  |  |
| 8 | Differentiate between dominant and recessive |  |  |  |
| 9 | Define incomplete dominance |  |  |  |
| 10 | Show the inheritance to the F1 generation in a cross involving Homozygous parents  (Show the genotypes of parents, gametes and offspring) |  |  |  |
| 11 | Show the inheritance to the F1 generation in a cross involving Heterozygous parents  (Show the genotypes of parents, gametes and offspring) |  |  |  |
| 12 | Show the inheritance to the F1 generation in a cross involving Sex determination XX x XY  (Show the genotypes of parents, gametes and offspring) |  |  |  |
| 13 | Describe the work of Gregor Mendel leading to the expression of his findings in two laws |  |  |  |
| 14 | State the Law of Segregation |  |  |  |
| 15 | Explain the Law of Segregation |  |  |  |
| 16 | State the Law of Independent Assortment |  |  |  |
| 17 | Explain the Law of Independent Assortment |  |  |  |
| 18 | Show the inheritance to the second filial generation (F2) of two unlinked traits using the Punnet square technique |  |  |  |
| 19 | Define linkage |  |  |  |
| 20 | Explain the change in 1:1:1:1 probability for a dihybrid heterozygote crossed with a dihybrid recessive organism. (Knowledge of crossing over is not required). |  |  |  |
| 21 | Explain sex linkage of genes |  |  |  |
| 22 | Give examples of common sex linked traits |  |  |  |
| 23 | Explain non-nuclear inheritance |  |  |  |
| 24 | Identify two causes of variation |  |  |  |
| 25 | Identify two types of mutations |  |  |  |
| 26 | Give an example of each type of mutation |  |  |  |
| 27 | List two agents responsible for increased mutation rates |  |  |  |
| 28 | Define evolution |  |  |  |
| 29 | Outline the Darwin and Wallace Theory of natural selection |  |  |  |
| 30 | Discuss the evidence of evolution from any one source (e.g. fossils, comparative anatomy or the study of embryos) |  |  |  |
| 31 | Define the process of DNA profiling |  |  |  |
| 32 | Outline the four stages involved in DNA profiling |  |  |  |
| 33 | Give any two applications of DNA profiling |  |  |  |
| 34 | Define Genetic Screening |  |  |  |
| 35 | Give a use for genetic screening |  |  |  |
| 36 | Describe the steps involved in the isolation of DNA |  |  |  |
| 37 | Draw diagrams to illustrate this activity |  |  |  |
| 38 | Can you define genetic engineering? |  |  |  |
| 39 | Do you understand that DNA from different organisms can be joined together? |  |  |  |
| 40 | Can you give examples of this? |  |  |  |
| 41 | Do you know what a restriction enzyme is and does? |  |  |  |
| 42 | Can you explain the process of isolation? |  |  |  |
| 43 | Can you explain the process of cutting? |  |  |  |
| 44 | Can you explain the process of insertion? |  |  |  |
| 45 | Can you explain the process of transformation? |  |  |  |
| 46 | Can you explain the process of expression? |  |  |  |
| 47 | Can you outline three applications of genetic engineering? |  |  |  |
| 48 | Can you discuss the ethical issues associated with GE? |  |  |  |

### Practice Exam Questions

1. Genetics is the study of \_\_\_\_\_\_\_\_\_\_\_
2. In a woman the sex chromosomes are XX; in a man they are \_\_\_\_\_\_\_\_\_\_\_
3. Explain briefly what is meant by a gene.
4. True or false. Human chromosomes are found in the nucleus.
5. Where in the nucleus would you find genes?
6. What is the significance of the fact that the two allele pairs are located on different chromosome pairs?
7. The genetic code is contained within the DNA of chromosomes. Briefly describe the nature of this code.
8. What is meant by non-coding DNA?
9. What is a chromosome?
10. What is meant by sex-linked?
11. What is meant by the term segregation as used in genetics?
12. State the products of segregation when an organism is heterozygous in respect of the dominant allele A.
13. State the Law of Independent Assortment.
14. Define the following terms as used in genetics: linkage, sex linkage.
15. True or false. Chromosomes are made of DNA and lipid
16. What is meant by the term DNA profiling?
17. State two uses of DNA profiling.
18. Explain each of the following terms in relation to DNA: replication, transcription.
19. Name the four bases that are found in DNA.
20. What is meant by a triplet code?
21. The triplet code is transcribed into mRNA. What does this statement mean?
22. The DNA molecule is composed of two strands held together by paired bases.

Which base can link only to thymine?

Which base can link only to cytosine?

1. “The same amount of DNA is present in nuclei of cells taken from the liver, heart, pancreas and muscle of a rat.” Use your knowledge of DNA and mitosis to explain this statement.
2. Name the type of bonding which occurs between members of a base pair in DNA.
3. What are the stages involved in DNA profiling.
4. Give two applications of DNA profiling.
5. In order to make proteins, DNA is first transcribed as \_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Give one structural difference between DNA and RNA.
7. Name the nitrogenous bases whose first letters are A and C.
8. DNA contains the instructions needed to make protein. These instructions are called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ code.
9. In relation to protein synthesis

1. What is transcription?

2. What is a triplet and state the role of a triplet.

3. Describe the role of tRNA.

1. What term is used to describe an individual’s genetic makeup?
2. What term is used by biologists to describe differences within a population with respect to features such as height?
3. Explain the following terms that are used in genetics: dominance, genotype, and phenotype.
4. Explain each of the terms: alleles, recessive.
5. Explain the following terms, which are used in genetics: allele, homozygous, genotype.
6. The allele for brown eye (B) is dominant to the allele for blue eye (b).  
   Explain each of the underlined terms.
7. For hair colour black (B) is dominant over brown (b). Seán is heterozygous (Bb) and Máire is homozygous (bb).  
   1. What colour is Seán’s hair?  
   2. What colour is Máire’s hair?
8. What is a mutation?
9. State one cause of mutation.
10. Give an example of a condition, found in the human population that results from a mutation.
11. When the normal control of mitosis in a cell is lost, cancer may result. Suggest two possible causes of cancer.
12. A change in the genetic material of an organism is called \_\_\_\_\_\_\_\_\_\_\_\_\_
13. Give a brief account of the Theory of Natural Selection.
14. Name a scientist responsible for the Theory of Natural Selection
15. What is meant by the term evolution?
16. Describe the process of natural selection.
17. Give an account of the evidence for evolution from a named source.
18. True or false. Organisms of the same species can usually produce fertile offspring.
19. Explain the following terms as used in genetics: species, variation.
20. Name the scientists who are associated with the Theory of Natural Selection and refer to any one observation that prompted its development.
21. What is meant by genetic engineering?
22. State two applications of genetic engineering, one involving a micro-organism and one involving a plant.
23. What is meant by genetic screening?
24. Parents who are suspected of being carriers of disease-causing alleles may be advised to consider a genetic test. Suggest a role for such a test after in-vitro fertilisation.
25. Give one example of genetic engineering involving an animal and one example involving a plant.
26. Give two biological advantages of breastfeeding.
27. Explain the terms: allele and dominant.
28. Name three processes involved in genetic engineering.
29. Give an example of an application of genetic engineering in each of the following cases:
30. A micro-organism,
31. An animal,
32. A plant.
33. State Mendel’s Law of Segregation.
34. Name two cell organelles, other than the nucleus, that contain DNA.
35. Explain the terms alleles and dominant.
36. What term is used to describe alleles that lie on the same chromosome?
37. What is the significance of inherited variation in the evolution of species?
38. Variation is essential for natural selection. Mutation can give rise to variation. Give two causes of mutation.
39. Give one source of evidence for the occurrence of evolution.
40. In DNA profiling, what are used to cut DNA strands into fragments?
41. Name the plant from which you isolated DNA in your practical studies.
42. For what precise purpose did you use freezer-cold ethanol (alcohol) in your isolation of DNA?
43. Protein synthesis involves both transcription and translation.

1. Where in a cell does transcription occur?

2. What type of RNA is involved in transcription?

3. In what organelle does translation occur?

4. What must happen to the newly formed protein before it can begin to work?

1. When a pure-breeding black cat was mated with a pure-breeding white cat, all the kittens were black. Which fur colour, black or white, is recessive in these cats?
2. Give one example of an inherited human characteristic.
3. Give one example of a non-inherited human characteristic.
4. Which structures in sperm and egg nuclei are responsible for biological inheritance?
5. Where in plant cells is DNA found?
6. The genetic makeup of an individual is called its \_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. A sex cell is also known as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. A change in the structure of DNA is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. A part of DNA with information to make one protein is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. The allele expressed in the heterozygous condition are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. The study of biological inheritance is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
12. Distinguish between the terms
13. haploid and diploid.
14. homozygous and heterozygous.
15. genotype and phenotype.
16. segregation and independent assortment.
17. Explain the terms transcription and translation.
18. In which structures in the cell does translation occur?
19. How many bases in sequence make up a codon in mRNA?
20. Each mRNA codon specifies one of three possible outcomes during protein synthesis. Name   
    these three possible outcomes.
21. What does the letter ‘t’ stand for in tRNA?
22. During translation one end of a tRNA molecule attaches to an mRNA codon. What is usually attached to the other end of the tRNA molecule?
23. What are the two main events in the replication of DNA?
24. Name the base in DNA that pairs with cytosine.
25. For which purpose did you use freezer-cold ethanol while extracting DNA from plant tissue?
26. For which purpose did you use washing-up liquid or other detergent while extracting DNA from plant tissue?
27. Red hair in humans is recessive to all other hair colours. A red-haired woman and a black-haired man, whose own father was red-haired, started a family. What is the % chance of obtaining offspring with red hair?
28. In Dalmatian dogs the allele for brown spots is recessive to the allele for black spots. The two parents were heterozygous in respect of spot colour. What is the % chance of obtaining offspring with black spots?
29. In roses there is incomplete dominance between the allele governing red petals and the allele governing white petals. Heterozygous individuals have pink petals. A plant with pink petals was crossed with a plant with white petals. What is the % chance of obtaining offspring with white petals?
30. In the fruit fly Drosophila the allele for full wing is dominant to the allele for vestigial wing. One parent was homozygous in respect of full wing and the other parent was heterozygous. What is the % chance of obtaining offspring with full wing?
31. In humans, brown eye (B) is dominant to blue eye (b). Two parents, one heterozygous for eye colour and the other with blue eyes, start a family.

(i) What is the genotype of the blue-eyed parent?

(ii) What are the possible gametes that each parent can produce?

(iii) Using a Punnett Square or another method work out the possible genotypes and phenotypes of their children.

1. Explain, in terms of what happens to body cells, what is meant by the term cancer
2. Give two possible causes of cancer.
3. Blood samples taken from a crime scene were put through a process called DNA profiling. During the process cells were broken down to release the DNA, which was then cut into fragments. The fragments were then separated.
4. What was used to cut the DNA?

2. On what basis were the DNA fragments separated?

3. Give an application of DNA profiling other than solving crime.

1. How are the two strands of a DNA molecule joined together?
2. What is ‘junk’ DNA?
3. Answer the following questions by referring to the procedures that you used to isolate DNA from a plant tissue:
4. Having obtained a plant tissue e.g. onion,
5. 1. What was the first procedure that you followed?
6. 2. What was the reason for that procedure?
7. Washing-up liquid is then used in the isolation. Give a reason for its use.
8. Salt (sodium chloride) is also used in the isolation. Give a reason for its use.
9. 1. What is a protease?

2. Why is a protease necessary when isolating DNA?

1. The final stage of the isolation involves the use of freezer-cold ethanol.
2. Describe how it is used.
3. For what purpose is it used?
4. In the antirrhinum (snapdragon) there is no dominance between the allele for red flower and the allele for white flower. Heterozygous individuals have pink flowers. The allele for tall stem is dominant to the allele for short stem. These pairs of alleles are located on different chromosome pairs.
5. What is the significance of the fact that the two allele pairs are located on different chromosome pairs?
6. A plant which had pink flowers and was heterozygous in respect of stem height was crossed with one which had white flowers and a short stem.
7. Using suitable symbols determine the genotypes of all the possible offspring of this cross.
8. For each of your answers, state the phenotype that would result.

## Human Reproduction

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Human Reproduction** | **Red** | **Orange** | **Green** |
| 1 | Draw and label the male reproductive system |  |  |  |
| 2 | Give the functions of the main parts of the male reproductive system |  |  |  |
| 3 | Draw and label the female reproductive system |  |  |  |
| 4 | Give the functions of the main parts of the female reproductive system |  |  |  |
| 5 | Outline the role of meiosis to produce sperm & egg cells |  |  |  |
| 6 | Define the term secondary sexual characteristics |  |  |  |
| 7 | Outline the roles of oestrogen, progesterone & testosterone |  |  |  |
| 8 | State the events in the menstrual cycle |  |  |  |
| 9 | Outline the role of oestrogen and progesterone in the menstrual cycle |  |  |  |
| 10 | Explain copulation |  |  |  |
| 11 | Outline methods of birth control to include   * Natural * Mechanical * Chemical * Surgical |  |  |  |
| 12 | State the location of fertilisation |  |  |  |
| 13 | Explain the term infertility |  |  |  |
| 14 | State 1 cause of male infertility |  |  |  |
| 15 | State the availability of corrective measures for male infertility |  |  |  |
| 16 | State 1 cause female infertility |  |  |  |
| 17 | State the availability of corrective measures for female infertility |  |  |  |
| 18 | Explain the term implantation |  |  |  |
| 19 | Explain placenta formation & list the functions of the placenta |  |  |  |
| 20 | Give an outline of the birth process [stages] |  |  |  |
| 21 | Explain In-vitro fertilisation & implantation |  |  |  |
| 22 | Outline milk production, & breastfeeding, including its biological benefits |  |  |  |
| 23 | Explain the term fertilised egg |  |  |  |
| 24 | List the sequence of development of an embryo from the fertilised egg |  |  |  |
| 25 | Explain the term blastocyst |  |  |  |
| 26 | Explain the term amnion |  |  |  |
| 27 | Explain how the placenta is formed from embryonic and uterine tissue |  |  |  |
| 28 | Describe the development of the embryo up to the third month of gestation |  |  |  |
| 29 | Describe in detail the stages in the menstrual cycle |  |  |  |
| 30 | Name two hormones produced by the pituitary gland that are involved in the cycle |  |  |  |
| 31 | Name two hormones produced by the ovary that are involved in the cycle |  |  |  |
| 32 | Explain the terms stimulation and inhibition |  |  |  |
| 33 | Describe in detail hormonal control of the cycle |  |  |  |
| 34 | Explain the term Negative feedback |  |  |  |
| 35 | Choose one of the following menstrual disorders - fibroids or endometriosis, and describe:   * A cause * A method of Prevention * A treatment |  |  |  |

### Practice Exam Questions

1. Explain what is meant by germ layers and name the germ layers that appear in early human development.
2. What is a placenta? From what tissues does a placenta form?
3. What is the difference between a nucleus of an egg cell and that of a somatic (body) cell of an animal?
4. What is fertilisation?
5. Where precisely does fertilisation normally occur in the human female?
6. List the **three** germ layers. Relate each of the germ layers that you have listed to an organ or system in the adult body.
7. True or false. A sperm contains the haploid number of chromosomes
8. What are secondary sexual characteristics?
9. Where are sperm produced?
10. State **one** cause of infertility in the female and **one** cause of infertility in the male.
11. What is the function of the prostate gland?
12. State **one** way in which a sperm differs from an ovum (egg).
13. State **three** functions of the placenta.
14. What is meant by *in vitro* fertilisation? What is done with the products of *in vitro* fertilisation?
15. What is meant by infertility? State **one** cause of infertility in the human male.
16. Name **three** methods of contraception and, in each case, explain how the method prevents conception.
17. Name a hormone associated with the maintenance of the placenta.
18. Describe the amnion and state its role.
19. Where is testosterone secreted in the body of the human male?
20. Give an example of a surgical method of male contraception. Suggest an advantage and a disadvantage of the method that you have named.
21. Give a brief account of the role of testosterone.
22. Where are sperm produced?
23. State **two** ways in which sperm differ from ova (eggs).
24. Name a gland that secretes seminal fluid.
25. State a function of seminal fluid.
26. What is meant by contraception?
27. What is the menstrual cycle?
28. Write notes on menstruation and a disorder of menstruation.
29. In which part of the human female reproductive system is the ovum (egg) formed?
30. Write notes on survival times for sperm and ova.
31. Give one cause of female infertility.
32. In which part of the human female reproductive system does fertilization occur?
33. Where is FSH produced?
34. Give one function of FSH.
35. Where is sperm stored in the human male?
36. State **two** functions of testosterone.
37. Give a cause of male infertility and suggest a corrective measure.
38. Which part of the female reproductive system is influenced by both FSH and LH?
39. In the female reproductive system where do the following occur:
40. Meiosis
41. Fertilisation
42. Implantation.
43. Give an account of the role of either oestrogen **or** progesterone in the menstrual cycle.
44. Name a human female menstrual disorder.

In the case of this disorder give: 1. A possible cause, 2. A method of treatment.

1. Give an account of the importance of the placenta during human development in the womb.
2. Outline how birth occurs.
3. What is meant by *in-vitro fertilisation*?
4. After implantation, the embryo first develops into a *morula* and then into a *blastocyst*. Explain the terms in italics.
5. Describe the process of birth.
6. Draw a labelled diagram of a human sperm cell.
7. Name **two** male secondary sexual characteristics.
8. Name the principal male sex hormone.
9. What is the function of the sperm duct (vas deferens)?
10. Name the part at which **each** of the following occurs:
11. Production of sperm cells.
12. Maturing of sperm cells.
13. Mixing of fluid with sperm cells.

## Reproduction of the Flowering Plant

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Reproduction of the Flowering Plant** | **Red** | **Orange** | **Green** |
| 1 | Draw a labelled diagram of a flower |  |  |  |
| 2 | State the function of the floral parts including Sepal, petal, stamen, carpel |  |  |  |
| 3 | State where the male gametes are produced |  |  |  |
| 4 | State what the embryo sac produces |  |  |  |
| 5 | Define the term pollination |  |  |  |
| 6 | Outline methods of pollination --Cross-pollination (inc wind& animal) & self-pollination. |  |  |  |
| 7 | Define the term fertilisation. |  |  |  |
| 8 | Outline and draw the structure of the seed |  |  |  |
| 9 | Give the function of following: testa, plumule, radicle, embryo, cotyledon attachments. |  |  |  |
| 10 | Outline the stages of seed development |  |  |  |
| 11 | Classify plants as monocotyledon or dicotyledon & distinguish between them. |  |  |  |
| 12 | Outline how fruit is formed |  |  |  |
| 13 | Outline seedless fruit production |  |  |  |
| 14 | Explain how fruit & seeds are dispersed |  |  |  |
| 15 | Explain the need for dispersal |  |  |  |
| 16 | Define the term dormancy. |  |  |  |
| 17 | State the advantages of dormancy |  |  |  |
| 18 | Define the term Germination |  |  |  |
| 19 | Discuss the factors necessary for germination |  |  |  |
| 20 | Explain the role of digestion and respiration in germination. |  |  |  |
| 21 | Describe the stages of seedling growth |  |  |  |
| 22 | Explain the term vegetative propagation |  |  |  |
| 23 | Give 1 example of vegetative propagation from   * stem * root * leaf * bud |  |  |  |
| 24 | Compare reproduction in plants by seed and by vegetative reproduction. |  |  |  |
| 25 | Describe 4 methods of artificial propagation in flowering plants. |  |  |  |
| 26 | Carry out an investigation to show the effects of water, oxygen and temperature on Germination |  |  |  |
| 27 | Draw diagrams to illustrate this activity |  |  |  |
| 28 | Carry out an investigation to show Digestive Activity during Germination, by using starch agar or skimmed milk plates |  |  |  |
| 29 | Draw diagrams to illustrate this activity |  |  |  |
| 30 | Outline pollen grain development from microspore mother cells |  |  |  |
| 31 | Explain meiotic division of these cells |  |  |  |
| 32 | Explain mitotic division of these cells |  |  |  |
| 33 | Discuss generative and tube nuclei formation |  |  |  |
| 34 | Discuss formation of pollen grains |  |  |  |
| 35 | Outline embryonic sac development |  |  |  |
| 36 | Discuss meiotic division and cell disintegration |  |  |  |
| 37 | Outline the formation of the egg cell by mitotic division |  |  |  |

### Practice Exam Questions

1. State a function of the sepal.
2. State a function of each of the following parts of a flower: petal; sepal; anther.
3. What is the function of the petal? Give **two** ways in which it may be adapted for this function
4. From what does a seed develop?
5. In relation to flowering plants explain what is meant by vegetative propagation.
6. Distinguish between endospermic and non-endospermic seeds.
7. Give **two** examples of natural vegetative propagation that involve different parts of a plant.
8. What is meant by the germination of a seed?
9. Suggest a benefit of artificial propagation.
10. Clones are genetically identical individuals. Are the products of vegetative propagation clones? Explain your answer.
11. State three environmental factors that are necessary for germination.
12. Describe **two** techniques of artificial vegetative propagation that are used for flowering plants.
13. From what part of the embryo plant within the seed does the root develop?
14. In which part of the flower is pollen produced?
15. Name a part of a flower that may develop into a fruit.
16. What happens to the two polar nuclei in the carpel?
17. In which part of a flower does a seed form?
18. Some flowers have nectaries. How are these flowers pollinated? Explain your answer.
19. Explain what is meant by pollination.
20. Name a part of a flower from which a fruit develops.
21. What is meant by germination?
22. In each of the following cases give **one** example of a plant that uses the stated method of seed dispersal:
23. Wind;

2. Animal.

1. What is the difference between self-pollination and cross-pollination?
2. List **three** factors that are essential for germination.
3. Why is it important for plants to disperse their seeds?
4. What is meant by the dormancy of seeds?
5. Name **two** ways in which cross-pollination happens.
6. Suggest an advantage of dormancy of seeds to a plant.
7. Suggest why cross-pollination is preferable to self-pollination.
8. What is meant by cross-pollination?
9. What is meant by the germination of a seed?
10. Name two methods of cross-pollination.
11. True or false. Light is essential for the germination of seeds.
12. State **one** reason why water is needed for germination
13. What is vegetative propagation?
14. Artificial propagation is widely used in horticulture. Give **two** examples of artificial propagation.
15. True or False. Endosperm is a food reserve in some seeds.
16. Suggest **one** advantage and **one** disadvantage of artificial propagation.
17. State a role for each of the following: sepal, anther, stigma, ovary.
18. The two male gametes in the pollen tube are derived from the generative nucleus. Do these gametes form as a result of mitosis or meiosis? Explain your answer.
19. Distinguish between pollination and fertilization.
20. State **one** method that is used to produce seedless fruits.
21. Give **one** location in a seed in which food is stored. Name a carbohydrate that you would expect to be present in this food store.
22. In which part of the flower is pollen produced?
23. Give **two** ways in which pollen may be transported to another flower.
24. What forms in the carpel after pollination and fertilization?
25. From what structure in the carpel does the seed develop?
26. State **two** locations in the seed where food may be stored.
27. The embryo plant within the seed has a number of parts. List **two** of these parts, apart from food stores, and give a role for each of them.
28. Following dispersal, the seed undergoes a period of dormancy. What is dormancy? Suggest **two** advantages of dormancy.
29. What is the role of the fruit?
30. State **three** factors necessary for the germination of a seed.
31. State a location in the seed where food is stored.
32. Seeds may remain inactive for a period before germination. What term is used to describe this period of inactivity?
33. List **three** characteristics in each case of;
34. An insect-pollinated flower,
35. A wind-pollinated flower.
36. What process follows pollination in the life cycle of a flowering plant?
37. From which structure in the seed does the root develop?
38. Why is digestion necessary in a germinating seed?
39. What is meant by *vegetative propagation*?
40. Horticulturists use a number of methods to artificially propagate plants. Suggest **one** advantage of artificial propagation.
41. Describe **two** methods used by horticulturists to artificially propagate plants.
42. Give **two** differences between vegetative propagation and propagation involving seeds.
43. Seeds and fruits need to be dispersed. Give:1. **Two** methods of dispersal, 2. **Two** advantages of dispersal to the plant.
44. Why does digestion occur in seeds during germination?
45. Name a part of the flower from which fruit forms.
46. Give **three** examples of the ways in which fruits are involved in seed dispersal.
47. Suggest why it is necessary for a plant to disperse its seeds.
48. Following dispersal most seeds enter a period of *dormancy*. What is *dormancy*?
49. Give an advantage of dormancy.
50. Name the stage in the plant’s life cycle that follows dormancy.
51. State **one** way in which it is possible to produce seedless fruits in horticulture.
52. Each seed is made up of an embryo*,* a food store and a seed coat (testa). One function of fruit is to aid dispersal. Explain **each** of the underlined terms.
53. By which method are the seeds of the fruits of **blackberries** and **sycamore** dispersed?
54. What term is given to the growth of an embryo into a plant?
55. In order for germination to be successful, certain environmental conditions must be present. Name any **two** of these conditions.
56. What is meant by the *dormancy* of seeds?
57. Give **one** way in which the dormancy of seeds is of benefit to plants.
58. Suggest **one** way in which knowledge of dormancy is useful to farmers and gardeners.
59. Water, oxygen and a suitable temperature are all required for the germination of seeds. In the case of **each** of these factors describe its effect on the process of germination.
60. Which part of the embryo in a germinating seed gives rise to each of the following parts of the seedling? 1. The root 2. The shoot.
61. Describe the development of pollen grains from microspore mother cells.
62. What is meant by the term *fertilisation*?
63. Give a brief account of the process of fertilisation in flowering plants.
64. Give a role for **each** of the following parts of a flower: **sepals**, **anther** and **stigma**.
65. For what purpose in an experiment did you use an anaerobic jar?
66. Draw a large labelled diagram to show the internal structure of a flower.
67. Give **two** ways by which pollen is transferred from one flower to another.
68. After fertilisation, what part of the flower becomes the fruit?
69. Many seedless fruits, e.g. grapes, are available in shops today. State **one** way of forming seedless fruits.
70. Sometimes artificial methods are used to propagate (reproduce) plants. Name any **two** methods of artificially propagating plants.

## Responses in the Flowering Plant

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Responses in the Flowering Plant** | **Red** | **Orange** | **Green** |
| 1 | Explain why organisms need to sense and respond to environmental changes |  |  |  |
| 2 | Explain why response is a form of defence that allows organisms to survive |  |  |  |
| 3 | Say why/how plants respond by growth |  |  |  |
| 4 | Name 4 external factors that regulate the growth of plants |  |  |  |
| 5 | Name the main internal factor that regulates these responses in plants |  |  |  |
| 6 | Explain what a growth regulator is |  |  |  |
| 7 | Explain where growth regulators are made in a plant |  |  |  |
| 8 | Explain what a meristem is |  |  |  |
| 9 | Draw the external structure of a flowering plant and highlight and identify meristematic regions |  |  |  |
| 10 | Explain the term "Tropism" |  |  |  |
| 11 | Define the term “phototropism" |  |  |  |
| 12 | Define the term "geotropism' |  |  |  |
| 13 | Define the term "thigmotropism", |  |  |  |
| 14 | Define the term "hydrotropism" |  |  |  |
| 15 | Define the term "chemotropism” |  |  |  |
| 16 | Say why phototropism is an important response for a plant, and give examples |  |  |  |
| 17 | Say why geotropism is an important response for a plant, and give examples |  |  |  |
| 18 | Devise a simple experiment to demonstrate phototropism |  |  |  |
| 19 | Define the term "growth regulator" |  |  |  |
| 20 | Say how growth regulators are transported within a plant |  |  |  |
| 21 | Explain the difference between a growth promoter and growth inhibitor. |  |  |  |
| 22 | Give an example of a regulator promoting growth |  |  |  |
| 23 | Give an example of a regulator inhibiting growth |  |  |  |
| 24 | Describe any four methods by which plants protect themselves from adverse external environments |  |  |  |
| 25 | Explain the term anatomical |  |  |  |
| 26 | Explain what heat shock proteins or stress proteins are for |  |  |  |
| 27 | List a variety of effects of plant growth regulators |  |  |  |
| 28 | Explain how plant tissue cutting are taken and why |  |  |  |
| 29 | Give a use of rooting powders in horticulture |  |  |  |
| 30 | Identify a number of plant protective measures (using live samples or pictures) |  |  |  |
| 31 | Give 2 examples of the use of plant growth regulators |  |  |  |
| 32 | Describe how you investigated the effect of IAA growth regulator on plant tissue |  |  |  |
| 33 | Draw diagrams to illustrate this activity |  |  |  |

### Practice Exam Questions

1. List **three** types of tropism.
2. Define tropism
3. Phototropism is the growth response of a plant to …
4. In the case of IAA state the following:
5. An investigation in which you used it,
6. The precise purpose for its use in the investigation that you have indicated.
7. Give an example of each of a growth regulator that inhibits growth.
8. State a site of auxin secretion.
9. How may the action of an auxin be considered similar to the action of a hormone in the human body?
10. What is an auxin?
11. Give **two** examples of uses of synthetic (man-made) auxins.
12. State a location in a flowering plant where a growth regulator is secreted
13. Give an example of the use of a synthetic growth regulator.
14. Suggest a benefit to the plant of the phototrophic growth response.
15. Give an example of a regulator in plants that inhibits growth.
16. Give **two** uses of plant growth regulators in horticulture.
17. Give the term used for the growth response towards light.
18. Why is phototropism of benefit to plants?
19. Name the group of substances that controls such responses.
20. What is a tropism?
21. What is a plant growth regulator?
22. The growth response of a light is called photosynthesis. T or F
23. What is the purpose of IAA?
24. What do you understand by the term adverse external environment?
25. Give two ways in which plants protect themselves from adverse external environments.
26. Name the group of substances in plants which control responses to external stimuli.  
    1. What name is given to the regions in plants in which these substances are produced?  
    2. Give locations for two of these regions.
27. Most plant shoots are positively phototropic. Explain the underlined term.  
    How does the plant benefit from this response?
28. Explain the mechanism of response by a plant to a named external stimulus.

## The Skeleton and Muscular System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Skeleton and Muscular System** | **Red** | **Orange** | **Green** |
| 1 | Give 4 functions of the skeleton |  |  |  |
| 2 | Name 4 parts of the body protected by the skeleton |  |  |  |
| 3 | Name the structural division of the skeleton into two parts |  |  |  |
| 4 | Use model of the human skeleton to identify the axial region and its main parts |  |  |  |
| 5 | Use model of the human skeleton to identify the appendicular region and its main parts |  |  |  |
| 6 | Name 4 component parts of the axial skeleton: |  |  |  |
| 7 | Locate and give a function for : skull, vertebrae, ribs, and sternum |  |  |  |
| 8 | Show the position and function of discs in relation to vertebrae. |  |  |  |
| 9 | Show the position of these vertebrae: cervical (7), thoracic (12), lumbar (5), sacrum (5), and coccyx (4). |  |  |  |
| 10 | Name the main component parts of the appendicular skeleton |  |  |  |
| 11 | Show the position of the pectoral and pelvic girdles and their attached limbs. |  |  |  |
| 12 | Name the two main parts of the Pectoral girdle |  |  |  |
| 13 | Use a model of the human skeleton to identify the clavicle (collar bone) and scapula (shoulder blade). |  |  |  |
| 14 | Name the appendages attached to the Pectoral girdle |  |  |  |
| 15 | Use a model of the skeleton to identify the humerus, radius, ulna, carpal, metacarpals, digits (fingers) containing phalanges. |  |  |  |
| 16 | Use a model of the skeleton to identify the Pelvic girdle |  |  |  |
| 17 | Name the appendages attached to the Pelvic girdle |  |  |  |
| 18 | Use a model of the skeleton to identify : femur, patella, tibia, fibula, tarsals, metatarsals, digits (toes) containing phalanges |  |  |  |
| 19 | Draw a long bone to show its anatomy |  |  |  |
| 20 | Name the cavity in the centre of the long bone |  |  |  |
| 21 | Tell the visual difference between compact and spongy bone |  |  |  |
| 22 | Give the composition of cartilage |  |  |  |
| 23 | Give the function of cartilage on the tips of the long bone |  |  |  |
| 24 | Give the composition of compact bone |  |  |  |
| 25 | Give the function of compact bone |  |  |  |
| 26 | Give the composition of spongy bone |  |  |  |
| 27 | Give the function of spongy bone |  |  |  |
| 28 | Say what fill the spaces of spongy bone |  |  |  |
| 29 | Give the function of red marrow |  |  |  |
| 30 | Give the function of yellow marrow |  |  |  |
| 31 | Visually identify the main parts of a long bone |  |  |  |
| 32 | Show the mineral content in bone |  |  |  |
| 33 | Show the organic component |  |  |  |
| 34 | Say what would happen if a bone was put in acid |  |  |  |
| 35 | Say what would happen if a bone was burned |  |  |  |
| 36 | Say what a joint is |  |  |  |
| 37 | Classify joints into different types |  |  |  |
| 38 | Show the position of the various types of joint on a model skeleton |  |  |  |
| 39 | Give the function of the different types of joint |  |  |  |
| 40 | Say what an immovable joint is |  |  |  |
| 41 | Give an example of an immovable joint |  |  |  |
| 42 | Say what an slightly movable joint is |  |  |  |
| 43 | Give an example of an slightly movable joint |  |  |  |
| 44 | Say what a synovial joint is |  |  |  |
| 45 | Describe the structure of one synovial joint. |  |  |  |
| 46 | Give an example of a hinge joint |  |  |  |
| 47 | Give an example of a ball & socket joint |  |  |  |
| 48 | Give the role of cartilage and ligaments in joints |  |  |  |
| 49 | Give the role of tendons |  |  |  |
| 50 | Explain the general relation of muscles to the skeleton |  |  |  |
| 51 | Explain the term "antagonistic muscle pairs" |  |  |  |
| 52 | Give an example of an antagonistic muscle pair |  |  |  |
| 53 | Explain the need for muscles to be in pairs like this |  |  |  |
| 54 | Use a model of the skeleton to highlight (a) the position and (b) the function of each type of joint. |  |  |  |
| 55 | Name 2 disorder of the musculoskeletal system |  |  |  |
| 56 | Explain what the symptoms of arthritis might be |  |  |  |
| 57 | For arthritis, give 1 possible cause, a prevention, and a treatment. |  |  |  |
| 58 | Explain what the symptoms of osteoporosis might be |  |  |  |
| 59 | For osteoporosis, give 1 possible cause, a prevention, and a treatment. |  |  |  |

### Practice Exam Questions

1. Bones are joined to other bones by …
2. Name the type of joint at your elbow.
3. True or false. Tendons join muscles to bones.
4. Name a disorder other than cancer for each of the following and indicate a possible cause and a means of treatment:
   1. Musculoskeletal system,
   2. Nervous system.
5. Name a disorder of the musculoskeletal system. Give a possible cause of the disorder that you have named in (iii) and suggest a treatment for it.
6. State **two** functions of the human skeleton.
7. Name the part of the central nervous system that runs through the vertebrae.
8. The vertebrae form part of the axial skeleton. Name the vertebrae found in:
   1. The neck,
   2. The small of the back.
9. Give a function of ligaments.
10. Give a function of synovial fluid.
11. Give three roles of the skeleton.
12. Explain what is meant by the axial skeleton.
13. Suggest a treatment for a named disorder of the musculoskeletal system.
14. Give a function for each of the following:
    1. Red marrow,
    2. Cartilage,
    3. Tendon.
15. Explain what is meant by an antagonistic muscle pair and give an example in the human body.
16. A tendon joins ………………………………………… to bone.
17. Write a short note (about five lines) on **one** of the following: arthritis or osteoporosis.
18. Where are the discs in the human backbone?
19. What is the function of the discs in the human backbone?
20. Give a role for **each** of the following in the human body: (i) Yellow bone marrow, (ii) Red bone marrow.
21. What structures attach a muscle to a bone?
22. Which upper arm muscle contracts to raise the lower arm?
23. What is meant by the term *antagonistic pair* in reference to muscles?
24. Name the type of joint at the elbow.
25. Apart from movement, give **one** other function of the skeleton.
26. Suggest **one** reason why the bones of birds are almost hollow.
27. Tendons attach bone to bone. **T or F**

## The Nervous System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Nervous System** | **Red** | **Orange** | **Green** |
| 1 | Explain why organisms need to sense and respond to environmental changes |  |  |  |
| 2 | Explain why response is a form of defence that allows organisms to survive |  |  |  |
| 3 | Name the two main divisions of the nervous system |  |  |  |
| 4 | Identify the CNS and PNS on a diagram of the body's Nervous System |  |  |  |
| 5 | Say what a receptor is |  |  |  |
| 10 | Say what a neuron is |  |  |  |
| 11 | Identify 3 different types of neuron, that vary in size and shape. |  |  |  |
| 12 | Tell the difference between sensory, motor and interneurons |  |  |  |
| 13 | Draw a diagram of a motor neuron to show its structure |  |  |  |
| 14 | Give the function of -- cell body, dendrites, axon, myelin sheath, Schwann cell, and neurotransmitter vesicles. |  |  |  |
| 15 | Explain what an impulse is |  |  |  |
| 16 | Distinguish between a dendrite and an axon |  |  |  |
| 17 | Say what conduction of nerve impulses involves the movement of |  |  |  |
| 18 | Say what a neurotransmitter is |  |  |  |
| 19 | Say what a synapse is |  |  |  |
| 20 | Say what a synaptic cleft is |  |  |  |
| 21 | Explain the activation and inactivation of neurotransmitters. |  |  |  |
| 22 | Explain how some drugs inhibit or prolong the activation or deactivation of neurotransmitters |  |  |  |
| 23 | Distinguish between a presynaptic and a postsynaptic neuron |  |  |  |
| 24 | Give the role of the 3 types of neuron - sensory. motor, interneuron. |  |  |  |
| 25 | Give the position in the body of the 3 types of neurons - sensory. motor, interneuron. |  |  |  |
| 26 | Name the 5 main senses and related organs |  |  |  |
| 27 | Explain what interprets the information received by the sense organs |  |  |  |
| 28 | Name the main parts of the EYE |  |  |  |
| 29 | Give the function of each main part of the eye |  |  |  |
| 30 | Explain what short-sightedness means |  |  |  |
| 31 | Draw a diagram of the eye with light rays to show the problem of short sight |  |  |  |
| 32 | Show how a lens can be used to correct short sight |  |  |  |
| 33 | Explain what long-sightedness means |  |  |  |
| 34 | Draw a diagram of the eye with light rays to show the problem of long sight |  |  |  |
| 35 | Show how a lens can be used to correct long sight |  |  |  |
| 36 | Distinguish between a convex and a concave lens |  |  |  |
| 37 | Name the main parts of the EAR |  |  |  |
| 38 | Give the function of each main part of the ear |  |  |  |
| 39 | Name a hearing defect |  |  |  |
| 40 | Explain a possible hearing disability as a result of excessive noise levels. |  |  |  |
| 41 | Explain a corrective measure for a hearing defect |  |  |  |
| 42 | Use a model/diagram of the SKIN to show how it functions as a sense organ. |  |  |  |
| 43 | Use a model of the BRAIN to show its major parts in relation to function. |  |  |  |
| 44 | Give the location and function of the following parts of the brain: cerebrum, hypothalamus, pituitary gland, cerebellum, and medulla oblongata. |  |  |  |
| 45 | Identify the main parts of a cross-section of the spinal cord |  |  |  |
| 46 | Distinguish between white matter and grey matter |  |  |  |
| 47 | Give the function of cerebrospinal fluid |  |  |  |
| 48 | Give the function of the meninges |  |  |  |
| 49 | Explain what meningitis is |  |  |  |
| 50 | Distinguish between dorsal and ventral roots that project from the spinal cord. |  |  |  |
| 51 | Name a nervous system disorder |  |  |  |
| 52 | For paralysis, give 1 possible cause, prevention, and treatment. |  |  |  |
| 53 | For Parkinson's disease, give 1 possible cause, prevention, and treatment. |  |  |  |
| 54 | Show the location of nerve fibres and cell bodies in the Peripheral nervous system: |  |  |  |
| 55 | Identify cell bodies in the CNS and in ganglia |  |  |  |
| 56 | Explain what a ganglion is |  |  |  |
| 57 | Explain the role, structure and mechanisms of the reflex arc/action. |  |  |  |
| 58 | Use a prepared slide to identify, draw and label the main parts of a T.S. of the spinal cord. |  |  |  |
| 59 | Write a brief note on paralysis or Parkinson’s disease. |  |  |  |
| 60 | Describe a simple experiment to demonstrate reflex action |  |  |  |

### Practice Exam Questions

1. True or false. Motor neurons conduct impulses towards the central nervous system.
2. Name a disorder other than cancer for each of the following and indicate a possible cause and a means of treatment:
3. Musculoskeletal system,
4. Nervous system.
5. What is a neuron?
6. Distinguish between sensory, motor and interneurons (association neurons).
7. State a function of:
   1. Schwann cells,
   2. Myelin sheath.
8. In relation to Parkinson’s disease or paralysis give:
9. A possible cause,
10. A method of treatment.
11. Briefly explain the role of neurotransmitter substances.
12. Name the small gaps between neurons.
13. Neurons produce neurotransmitter substances. What is their function?
14. Give an example of a reflex action in humans.
15. Give a function of the myelin sheath.
16. Why are reflex actions important in humans?
17. What is the role of the motor neuron?
18. Write notes on neurotransmitters.
19. What is a reflex action?
20. Give **one** example of a reflex action.
21. Suggest an advantage of reflex actions.
22. Name a disorder of the human nervous system.
23. In the case of a disorder of the human nervous system state: A possible cause. A means of prevention or a treatment.
24. A motor neuron carries impulses to the brain. **T or F**
25. The central nervous system is made up of **two** main parts. Name **each** part.
26. Name a disorder of the nervous system.
27. Give **one** cause of a disorder of the nervous system **and** suggest a means of treating the disorder.
28. The hammer (malleus) is a very small bone located in the …
29. What is connected to the ear by the Eustachian tube?
30. Which is present in the middle ear, gas or liquid?
31. State the function of the cochlea.
32. State the function of the semi-circular canals.
33. Where would you find rods and cones?
34. Give **one** function of rods and **one** function of cones.
35. What is the function of the cornea?
36. What type of lens is used to correct long sight?
37. Where in the eye is the retina located?
38. Two types of cells that receive light are found in the retina. Name each of these.
39. The optic nerve is attached to the eye. What is the function of the optic nerve?
40. Suspensory ligaments, Cones, Optic nerve and Brain. Outline the roles in vision of the above structures.
41. Explain how the iris works.
42. Suggest a reason why two eyes are better than one.
43. What is the function of the Eustachian tube?
44. What is connected to the middle ear by the Eustachian tube?
45. What is the function of the cochlea?
46. The semi-circular canals in the ear are involved in balance T or F
47. What nerve carries messages from the retina to the brain?
48. Name the coloured part of the eye
49. What is the function of the pupil in the eye/
50. In which part of the eye would you find the rods and cones?
51. What is the function of the cones?
52. In the human ear, give the function of each of these parts:  
    (i) Eardrum, (ii) Cochlea, (iii) Auditory nerve, (iv) Semi-circular canals, (v) Eustachian tube.
53. In which part of the ear are nerve impulses generated?
54. In what part of the eye are nerve impulses generated?
55. Suggest one way by which the ear may be protected.
56. Explain how a corrective measure for a named defect of hearing or vision works.

## The Endocrine System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Endocrine System** | **Red** | **Orange** | **Green** |
| 1 | Explain why organisms need to sense and respond to environmental changes |  |  |  |
| 2 | Explain why response is a form of defence that allows organisms to survive |  |  |  |
| 3 | Say what an Endocrine system is |  |  |  |
| 4 | Define the term "hormone". |  |  |  |
| 5 | Say which biochemical many hormones are made of |  |  |  |
| 6 | Give 4 differences between hormone action as compared with nerve action |  |  |  |
| 7 | Distinguish between exocrine and endocrine glands, with examples |  |  |  |
| 8 | Draw an outline of the body to show the location of the principal endocrine glands |  |  |  |
| 9 | For each of the glands:   1. name one hormone it produces 2. give the function(s) of that hormone |  |  |  |
| 10 | For one hormone, describe its   1. deficiency symptoms, 2. excess symptoms, 3. corrective measures. |  |  |  |
| 11 | Explain what is meant by hormone supplements |  |  |  |
| 12 | Give 2 examples of the use of hormone supplements |  |  |  |

### Practice Exam Questions

1. Hormones are secreted by …………………………………..… glands.
2. What is a hormone?
3. In the case of **one** hormone state:
4. The gland that produces it.
5. A function of this hormone.
6. A deficiency symptom of this hormone.
7. State **one** way in which hormone action differs from nerve action.
8. True or false. Endocrine glands secrete hormones
9. The pancreas is both an exocrine gland and an endocrine gland. Explain the underlined terms.
10. Name a product of the endocrine portion of the pancreas and state one of its functions.
11. Other than the secretion of hormones, how does an endocrine gland differ from an exocrine gland?
12. State **two** ways in which hormone action differs from nerve action.
13. In the case of a **named** hormone give:

a deficiency symptom,

a corrective measure.

1. When the water content of the blood drops a hormone is released.

Name this hormone and the endocrine gland from which it is secreted.

Give a precise target area for this hormone.

How does the hormone reach the target area?

Explain the role of the hormone at its target area, when the water content of the blood is low.

1. Give **two** examples of the use of hormone supplements.
2. Name a hormone-producing gland in the human body.
   1. Where in the body is the gland located?
   2. Name a hormone that this gland secretes.
   3. State a role of this hormone.
   4. Describe what happens if the body experiences a deficiency of this hormone.
3. What term is used to describe the glands that secrete hormones in the human body?
4. Name the endocrine glands found in the neck region
5. Name the endocrine glands found on top of the kidneys
6. Name any **one** hormone produced by the body.
7. Give a deficiency symptom of a named hormone.
8. Give **one** example of the use of hormone supplements.
9. What is a hormone?
10. State two ways in which hormones are similar to plant growth regulators
11. What is meant by feedback in relation to hormone action?
12. Give a brief account of the feedback mechanism for a named hormone.
13. Describe one deficiency symptom of a named hormone.

## The Defence System

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **The Defence System** | **Red** | **Orange** | **Green** |
| 1 | Explain why organisms need to sense and respond to environmental changes |  |  |  |
| 2 | Name our two main lines of Defence |  |  |  |
| 3 | List the parts of the body involved in the general defence system |  |  |  |
| 4 | Say what a mucous membrane is |  |  |  |
| 5 | Say why the skin is called a structural barrier |  |  |  |
| 6 | Identify the sebaceous glands in a diagram of the skin |  |  |  |
| 7 | Give the function of the sebaceous glands |  |  |  |
| 8 | Give the function of mucus secreted by the respiratory and digestive tracts |  |  |  |
| 9 | Give the function of cilia in the respiratory system |  |  |  |
| 10 | Explain what a phagocyte is |  |  |  |
| 11 | Explain the term phagocytosis |  |  |  |
| 12 | Explain the term engulf |  |  |  |
| 13 | Explain a possible advantage of fever [high temperature] as a defence response |  |  |  |
| 14 | Explain the term "Specific defence system" |  |  |  |
| 15 | Explain what immunity means |  |  |  |
| 16 | Explain what is meant by the term "Antigen-antibody response". |  |  |  |
| 17 | Name some organs specific to the immune system |  |  |  |
| 18 | Show the position of the spleen, thymus and lymph nodes on a diagram of the body |  |  |  |
| 19 | Name 3 functions of the lymphatic system |  |  |  |
| 20 | Give differences between lymphocytes and monocytes |  |  |  |
| 21 | Say where lymphocytes and monocytes are produced |  |  |  |
| 22 | Say what an antigen is. |  |  |  |
| 23 | Give some examples of antigens |  |  |  |
| 24 | Say what an antibody is |  |  |  |
| 25 | Say how long Antigen immunity lasts |  |  |  |
| 26 | Define "Induced immunity” |  |  |  |
| 27 | Name two types of induced immunity |  |  |  |
| 28 | Explain what is meant by Active immunity |  |  |  |
| 29 | Explain what vaccination is |  |  |  |
| 30 | Name some disease you have been vaccinated against |  |  |  |
| 31 | Say why vaccination provides long term immunity |  |  |  |
| 32 | Explain what is meant by passive immunity |  |  |  |
| 33 | Give two examples of passive immunity |  |  |  |
| 34 | Say why passive immunity only provides short term protection |  |  |  |
| 35 | Write a short account of the work of Edward Jenner |  |  |  |

### Practice Exam Questions

1. What is meant by the term immunity?
2. Distinguish between active and passive immunity.
3. What is the purpose of vaccination?
4. Distinguish between antigen and antibody.
5. What is meant by the term immunity?
6. Outline briefly the role of B lymphocytes in the human immune system.
7. Distinguish between active and passive immunity.
8. “Vaccination gives rise to active immunity”. Explain this statement.
9. In certain situations a person is given a specific antibody rather than being vaccinated.   
   Is this an example of active or passive immunity?
10. Under what circumstances might an antibody, rather than a vaccination, be given?
11. Comment on the duration of immunity that follows the administration of an antibody.
12. Write notes on the role of lymphocytes.
13. What is meant by the term *immunity*?
14. The skin is an important part of our immune system. Outline **two** ways in which the skin provides immunity.
15. To help the immune system, many people receive vaccinations during their lifetime. What is meant by the term *vaccination*?
16. Antibiotics are usually not given to a person suffering from a viral infection. Suggest a reason for this

## ***Viruses***

### Self-Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Viruses** | **Red** | **Orange** | **Green** |
| 1 | Explain the problem of defining what a virus is, i.e. living or non-living? |  |  |  |
| 2 | Show you are aware of their huge variety of shapes |  |  |  |
| 3 | Explain their basic structure. |  |  |  |
| 4 | Describe viral replication |  |  |  |
| 5 | Explain why viruses are referred to as obligate parasites |  |  |  |
| 6 | Explain the economic and medical importance of viruses to humans, plants, animals |  |  |  |
| 7 | Describe two harmful examples and one beneficial example of viruses |  |  |  |

### Practice Exam Questions

1. Comment on the difficulty of describing a virus as a living organism.
2. Describe how virus reproduction takes place in a host cell.
3. Name the two main chemical components of a virus.
4. Comment briefly on the difficulty in classifying viruses as living organisms.
5. Name **two** diseases of humans caused by viruses.
6. What are the two main biochemical components of a virus particle?
7. Write notes on the economic and medical importance of viruses.
8. Explain why it is difficult to classify viruses as living organisms.
9. Give the **two** main chemical components of a virus.
10. Outline briefly how a virus replicates (reproduces).
11. Give **one** way in which viruses are beneficial and **one** way in which they are harmful.
12. Suggest a biological explanation for the following: Doctors are reluctant to prescribe antibiotics to patients suffering from common cold-like symptoms.
13. Is the following statement true or false? Give a reason for your answer. HIV / AIDS has orphaned many children in sub-Saharan Africa.
14. What is a virus made up of?
15. Briefly describe how viruses reproduce.
16. During 2009 swine flu spread through the population of many countries. Younger people were more at risk of becoming ill with swine flu than older people. Using your knowledge of the immune system, suggest a reason for this.
17. Where do you find the nucleic acid in a virus?
18. Where do you find the capsid in a virus?