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**Biology Focus**

**Keywords,**

**Explanations &**

**Exam Question Revision**

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# Introduction

Over 75 exercises with more than 1400 questions; all adapted from past Higher and Ordinary Level Leaving Certificate examination papers. The number of exercises per topic reflects the frequency at which the topic is asked and hence its importance.

If students are unsure of the correct answer they can research the answer themselves. This will help them engage with the subject and promote self-directed learning. Having a number of answers supplied also reduces the initial search of the topic to a minimum.

As opposed to being divided into ‘Chapters’ that cover numerous elements of the syllabus simultaneously, each section of the book relates to a single element of the syllabus. Each section is divided between **KEYWORDS** and **EXPLANATIONS**. Students are required to have a general understanding of the **KEYWORDS** listed at the beginning of each section. Detailed explanations of keywords are unlikely to be required in an exam context, but familiarity with the terms will contribute to the student’s comprehension of the topic at hand.

The **EXPLANATIONS** section lists words that previous exam papers have required students to explain in detail. Students should therefore familiarise themselves with the in-depth explanations provided.

Very often it is necessary to understand the meaning of terms in order to answer a question even if definitions are not required, e.g. Q10 (b) 2012 Higher Level (see below); it is necessary to know the meaning of the words in bold in order to answer the question.

(b) In the sweet pea plant the texture and colour of the testa (seed coat) are governed by two pairs of **alleles**, which are not **linked**. The allele for smooth (S) is **dominant** to the allele for wrinkled (s) and the allele for yellow (Y) is dominant to the allele for green (y).

(i) State the Law of Segregation andthe Law of Independent Assortment.

(ii) Using the above symbols, and taking particular care to differentiate between upper case and lower case letters:

1. give the **genotype** of a pea plant that is **homozygous** in respect of seed texture and **heterozygous** in respect of seed colour.
2. state the **phenotype** that will result from the genotype referred to in 1.

The book highlights the brevity and detail of answers required in the examination.

The INDEX can be used to quickly find the explanations of the more important keywords. Solutions are available to all exercises.

# 1.1.3 Scientific Method and Experimentation

**KEYWORDS**

Biology

Control

Data

Double blind

Experiment

Hypothesis

Placebo

Principle or Law

Theory

Replicate

Scientific method

Standard

**EXPLANATIONS**

|  |
| --- |
| **Biology**: the study of living things. |
| **Control**: used in experiments as a standard against which your results can be compared. |
| **Data:** **information**, observations or measurements collected from the results of experiments. |
| **Double-blind testing**: e.g. during trials to examine the effectiveness of a new pill, two sample groups are taken. Neither the control group nor the group being tested knows which is taking the real pill and which is taking the placebo.  This ‘double-blind’ testing method avoids bias during the trials. |
| **Hypothesis**: groundless assumption (educated guess) taken from known facts or observation. |
| **Placebo**: dummy ‘pill’ used as a control in medical tests. It does not contain any ‘medicine’. |
| **Principle or Law**: this is a proven theory. |
| **Replicate**: make a duplicate of, repeat an experiment or procedure. |
| **Theory**: a proven hypothesis. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | What is an hypothesis? |  |
| 2 | What an hypothesis may develop into |  |
| 3 | Importance of a control in an experiment |  |
| 4 | How the results of an experiment may be presented. |  |
| 5 | Measurements, observations or information from an experiment |  |
| 6 | Duplicate(s) of an experiment or procedure |  |
| 7 | A proven hypothesis |  |
| 8 | After formulating an hypothesis a scientist will devise... |  |
| 9 | Where a scientist may publish the results of investigations |  |
| 10 | Test of hypothesis or test of prediction |  |
| 11 | Why repeat an experiment many times? |  |
| 12 | Why is a control used when carrying out experiments? |  |
| 13 | The process of science |  |
| 14 | The value of the scientific method is limited by ... |  |
| 15 | A good experiment examines ... |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Data | F | Our ability to interpret results | K | Table / Graph |
| B | Educated guess based on observation | G | Replicate | L | Theory |
| C | Experiment | H | Scientific journal or Internet | M | Theory |
| D | Experiments | I | Scientific method | N | To compare (with experiment) |
| E | One variable at a time | J | Standard for comparison | O | To verify results or minimise error |

# 1.2.3 Characteristics of Life and Food

**KEYWORDS**

Anabolism

Carbohydrates

Catabolism

Cell

Continuity of life

Disaccharide

Egestion

Excretion

Glucose

Lactose

Life [characteristics of]

Metabolism

Minerals

Nutrition

Organ System

Organisation

Reproduction

Response

Trace element

Sex cell

**EXPLANATIONS**

|  |  |  |
| --- | --- | --- |
| **Anabolism**: a chemical reaction which joins small molecules to make larger, more complex ones using enzymes, e.g. photosynthesis, protein synthesis, etc. Anabolic reactions require (need) energy. | | |
| **Catabolism**: a chemical reaction which breaks down a large molecule into simpler ones using enzymes, e.g. respiration, digestion. Catabolic reactions release (produce) energy. | | |
| **Cell**: basic/smallest structural unit of living things capable of functioning independently. Contains the living contents and organelles of the cell and is surrounded by a cell membrane. | | |
| Description: Description: 07 | | Description: Description: 07 |
| **Continuity of life**: the ability of organisms to exist from one generation to the next. This is achieved by cell division. | | |
| **Egestion**: elimination of faeces (unabsorbed material) from the body. This is not excretion. | | |
| **Excretion:** is the elimination of the waste products of [metabolism](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\M.doc#Metabolism) from a [cell](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\C.doc#Cell), [tissue](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\T.doc#Tissue) or [organ](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\O.doc#Organ). | |  |  | | --- | --- | | ORGAN | EXCRETORY PRODUCTS | | Skin | Sweat = Water (95%), Salt (2%), Carbon dioxide (3%), Urea (tiny%) | | Lungs | Carbon dioxide and Water vapour | | Kidneys | Water, Urea, Uric acid, Na, Cl, K | | Stomata (in plants) | Oxygen, water vapour | |  |  | | |
| **Life (characteristics of)**: distinctive features or traits possessed or shared by all living organisms. These are **S**ensitivity (or responsiveness), **N**utrition, **O**rganisation, **R**eproduction and **E**xcretion, | | |
| **Metabolism**: all chemical processes in living cells.  Enzymes catalyse metabolic reactions. Includes anabolism and catabolism. | | |
| **Nutrition**: the process involved in making or obtaining food (energy and materials) from the environment. | | Description: Description: 29 |
| **Organ systems**: a group of organs working together to carry out a function, e.g. digestive system. | | |
| **Organisation:** organisms are composed of cells. These cells function together to form tissues, organs, organ systems, individuals (organisms) and populations. | | **E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\08.09.jpg** |
| **Reproduction**: the ability of an organism to produce new individuals of its own kind by either sexual or asexual means. | | |
| **Response:** the ability of living organisms to react to changes in their internal and external environments.  It is a form of defence that allows the organisms survive. | | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | All chemical reactions in living organisms |  |
| 2 | Catabolism + anabolism = ? |  |
| 3 | Removal of the waste products of metabolism |  |
| 4 | Gamete |  |
| 5 | Needed for movement, heat, internal transport, etc. |  |
| 6 | Zinc, iron and copper are examples of... |  |
| 7 | What is meant by a trace element? |  |
| 8 | True or False. Nitrogen is a trace element. |  |
| 9 | A polysaccharide contains many sugar units. True or False |  |
| 10 | True or False. Glucose is a monosaccharide. |  |
| 11 | Ratio of hydrogen to oxygen atoms in a carbohydrate |  |
| 12 | Biomolecules of the formula Cx(H20)y are examples of... |  |
| 13 | The chemical elements present in carbohydrates |  |
| 14 | A monosaccharide |  |
| 15 | Made of two sugar units or monosaccharides |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 2:1 | F | Excretion | K | Minerals or trace elements |
| B | Carbohydrates | G | False | L | Sex cell |
| C | Carbon; Hydrogen; Oxygen | H | Glucose; Lactose | M | Mineral needed in small amount, e.g. < 0.01% |
| D | Disaccharide | I | Metabolism | N | True |
| E | Energy | J | Metabolism | O | True |

# 1.3.3 Biomolecules

**KEYWORDS**

Amino acid

Benedict’s

Carbohydrates

Carbon

Cellulose

Chitin

Copper

CuSO4

Disaccharide

Fehling’s

Glycerol

Glycogen

Hydrogen

Iodine

Iron

Maltose

Monosaccharide

Nitrogen

Oxygen

Phosphorous

Polysaccharide

Reducing sugar

Starch

Sulfur

Trace element

Vitamins

Zinc

**EXPLANATIONS**

|  |
| --- |
| **Trace element**: minerals required in very small amounts by organisms but essential for normal growth and development. |

## Biomolecules 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | From what is cellulose formed? |  |
| 2 | A polysaccharide with a different role to cellulose |  |
| 3 | Chemical used to test for starch |  |
| 4 | Reagent used when testing for a reducing sugar |  |
| 5 | Reagent(s) used when testing for a protein |  |
| 6 | Initial colour of reagent(s) used to test for a reducing sugar |  |
| 7 | Does the test for reducing sugar require heat? |  |
| 8 | Positive result in the test for reducing sugar |  |
| 9 | Initial colour of reagent(s) used to test for a protein |  |
| 10 | Does the test for protein require heat? |  |
| 11 | Positive result in the test for protein |  |
| 12 | Vitamins are either water-soluble or ... -soluble |  |
| 13 | Fats are composed of oxygen, hydrogen and ... |  |
| 14 | Two monosaccharides unite to form a ... |  |
| 15 | Vitamin ... is an example of a water-soluble vitamin |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Biuret or CuS04 and NaOH | F | Disaccharide | K | No |
| B | Blue | G | Fat | L | Starch; Glycogen |
| C | Blue | H | Fehling's or Benedict's | M | Violet |
| D | Brick red | I | Iodine | N | Vitamin B or C |
| E | Carbon | J | Monosaccharide units or Glucose | O | Yes |

## Biomolecules 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Biuret reagent (or CuS04 and NaOH) is (are) used to test for ... |  |
| 2 | Benedict's (or Fehling's) is used to test for ... |  |
| 3 | An example of a fat-soluble vitamin |  |
| 4 | An example of a reducing sugar |  |
| 5 | Example of a polysaccharide |  |
| 6 | Made up of many sugar units |  |
| 7 | A good source of Vitamin D in the diet |  |
| 8 | Fats are composed of fatty acids and ... |  |
| 9 | Fats that are liquid at room temperature |  |
| 10 | Essential organic catalysts of metabolism |  |
| 11 | Element found in proteins not found in carbohydrates |  |
| 12 | Good sources of protein |  |
| 13 | Proteins are composed of simpler substances called ... |  |
| 14 | Elements found in carbohydrate |  |
| 15 | Elements found in protein |  |
| 16 | Elements found in fat |  |
| 17 | An element associated with protein apart from C, H, O and N |  |
| 18 | An example of a water-soluble vitamin |  |
| 19 | Chemical used to show the presence of starch |  |
| 20 | End product of protein digestion |  |
| 21 | Is heat necessary to test for reducing sugar? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Amino acid | H | Glucose; Maltose | O | Protein |
| B | Amino acids | I | Glycerol | P | Reducing sugar |
| C | Carbon; Hydrogen; Oxygen | J | Iodine | Q | Sulfur |
| D | Carbon; Hydrogen; Oxygen | K | Lean meat; Fish; Eggs | R | Vitamin A or D or E or K |
| E | Carbon; Hydrogen; Oxygen; Nitrogen | L | Nitrogen | S | Vitamin B or C |
| F | Cellulose; Starch; Glycogen; Chitin | M | Oils | T | Vitamins |
| G | Dairy products | N | Polysaccharide | U | Yes |

# 1.3.4 Biomolecular Components

**KEYWORDS**

Amino acids

Disaccharide

Fat-soluble

Fatty acids

Glycerol

Glycogen

Lipids

Polysaccharide

Proteins

Starch

Triglyceride

Vitamins

Water-soluble

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Amino acid**: structural unit of proteins, containing an amino group (-NH2).  There are twenty common amino acids found in proteins. | Description: Description: 03 |
| **Fatty acid**: Component of lipids. The smallest lipid is a triglyceride (see below). | Description: Description: 03 |
| **Glycogen**: storage polysaccharide found in animal cells only, e.g. muscles, liver and brain. | |
| **Triglyceride**: smallest lipid consisting of three fatty acid and one glycerol molecule. | |
| **Vitamin**: An essential organic catalyst of metabolism.   * Needed in small amounts, cannot be produced in the body. * Must be supplied continuously and in sufficient quantities. * Some are water-soluble, e.g. vitamin B and vitamin C, and * Some are fat-soluble, e.g. vitamin A, vitamin D, vitamin E and vitamin K. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Food type identified using Sudan III or brown paper |  |
| 2 | Elements found in both carbohydrates and fats |  |
| 3 | One way in which carbohydrates differ from fats |  |
| 4 | Difference between phospholipids and other lipids |  |
| 5 | Difference between oil and fat |  |
| 6 | How one fat may differ from another, in terms of composition |  |
| 7 | Groups of Vitamins |  |
| 8 | Glycerol and three fatty acids |  |
| 9 | Lipids are made of amino acids. True or False |  |
| 10 | All vitamins are fat soluble. True or False |  |
| 11 | Eggs are a good source of fat in the diet. True or False |  |
| 12 | Positive result of the Fehling's or Benedict's test |  |
| 13 | Number of common amino acids found in proteins |  |
| 14 | Use for a water bath in biological investigations |  |
| 15 | Lipids are made up of fatty acids and ... |  |
| 16 | Good source of protein in the human diet |  |
| 17 | How amino acids differ from monosaccharides, in terms of composition |  |
| 18 | What carbohydrates and fats have in common, in terms of composition |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 20 | G | False | M | Lean Meat; Fish; Cheese; Eggs; Pulses |
| B | Amino acids contain Nitrogen | H | Fat (or oil or lipid) | N | Oil is liquid fat is solid at room temperature |
| C | Carbon; Hydrogen and Oxygen | I | Fat-soluble and Water-soluble | O | One fatty acid replaced with a phosphate group |
| D | Carbon; Hydrogen and Oxygen | J | Glycerol | P | Orange or Brick red |
| E | Different fatty acids | K | Hydrogen and Oxygen not in 2:1 ratio | Q | Triglyceride |
| F | False | L | Keep temperature constant or vary it | R | True |

# 1.3.6 Role of Biomolecules

**KEYWORDS**

Anabolic

Anabolism

Catabolic

Catabolism

Cell membrane

Cellulose

Chitin

Collagen

Deamination

Digestion

Elastin

Enzymes

Glycogen

Immunity

Keratin

Lactose

Monosaccharide

Myosin

Photosynthesis

Replication

Respiration

Structural protein

Synthesis

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Anabolism**: a chemical reaction which joins small molecules to make larger, more complex ones using enzymes, e.g. photosynthesis, protein synthesis, etc. Anabolic reactions require (need) energy. | |
| **Catabolism**: a chemical reaction which breaks down a large molecule into simpler ones using enzymes, e.g. respiration, digestion. Catabolic reactions release (produce) energy. | |
| **Cellulose**: complex carbohydrate (polysaccharide) forming the cell walls of plant cells. It is made from chains of glucose molecules. | Description: Description: 03 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | A reaction in which large molecules are broken down to smaller ones |  |
| 2 | Example of a catabolic reaction |  |
| 3 | Example of an anabolic reaction in a plant |  |
| 4 | Is energy release a feature of anabolic or catabolic reactions? |  |
| 5 | Is the process of protein synthesis anabolic or catabolic? |  |
| 6 | Is the process of converting ADP to ATP anabolic or catabolic? |  |
| 7 | A monosaccharide |  |
| 8 | Cellulose is a polysaccharide. What is it formed from? |  |
| 9 | Name a polysaccharide that has a different role to cellulose |  |
| 10 | A protein that has a structural role |  |
| 11 | Cellulose is a structural ... |  |
| 12 | A structural polysaccharide |  |
| 13 | Precise location of cellulose |  |
| 14 | Functions of fats |  |
| 15 | Metabolic function of proteins |  |
| 16 | Role of lipids in cells |  |
| 17 | Cellulose |  |
| 18 | Essential organic catalysts of metabolism |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anabolic | G | Cellulose; Chitin | M | Keratin; Myosin; Elastin; Collagen |
| B | Anabolic | H | Component of membranes; Storage; Energy | N | Photosynthesis; Protein synthesis; Replication |
| C | Carbohydrate or Polysaccharide | I | Enzymes or Immunity (antibodies) | O | Respiration; Digestion; Deamination |
| D | Catabolic | J | Glucose; Lactose; Ribose | P | Starch; Glycogen; Chitin |
| E | Catabolic | K | Glucose; Monosaccharide molecules | Q | Structural carbohydrate of plants |
| F | Cell wall | L | Insulation; Energy storage; Cell membrane | R | Vitamins |

# 1.3.8 Biomolecules and Minerals

**KEYWORDS**

Antibodies

Amino acids

Calcium

Chitin

Enzyme

Glycogen

Iron

Magnesium

Mineral

Proteins

Rickets

RNA

Scurvy

**EXPLANATIONS**

|  |
| --- |
| **Mineral** (element): inorganic compound needed in small quantities for the correct functioning of the body, or an organism  Minerals are used by organisms in three ways:   1. to form rigid body framework: calcium in bones and plant cell walls 2. to form body tissues, e.g. iron used to make haemoglobin for blood (animal), magnesium used to make chlorophyll for photosynthetic cells (plant) 3. to function in cellular and body fluids. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Polysaccharide other than cellulose |  |
| 2 | Colour change that indicates a positive result for protein |  |
| 3 | Small molecules which are the building blocks for proteins |  |
| 4 | Role of ribose |  |
| 5 | Deficiency of Vitamin A |  |
| 6 | Deficiency of Vitamin C |  |
| 7 | Deficiency of Vitamin D |  |
| 8 | Group of biomolecules to which enzymes belong |  |
| 9 | Good source of Vitamin A |  |
| 10 | Good source of Vitamin D |  |
| 11 | Functions of fat in the body |  |
| 12 | Role of carbohydrates other than structural |  |
| 13 | Function of protein in the body |  |
| 14 | Protein which changes reaction rates |  |
| 15 | Minerals required by the human body |  |
| 16 | Needed for haemoglobin formation |  |
| 17 | Needed for bone and teeth development |  |
| 18 | Needed for chlorophyll formation |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Amino acids | G | Enzyme | M | Night blindness |
| B | Blue to Purple or violet | H | Growth; Repair; Muscles; Enzymes; Immunity (antibodies) | N | Proteins |
| C | Calcium | I | Insulation; Energy; Storage; Cell membrane | O | Rickets |
| D | Carrots | J | Iron | O | RNA |
| E | Dairy products | K | Iron; Calcium | Q | Scurvy |
| F | Energy store or release | L | Magnesium | R | Starch; Glycogen; Chitin |

# 1.4.2 - 1.4.6 Ecology

**KEYWORDS**

Abiotic factors

Autotroph

Biosphere

Biotic factors

Carnivore

Chlorophyll

Climatic Factor

Consumer

Ecology

Ecosystem

Edaphic factor

Food chain

Food web

Grazing Food Chain

Habitat

Herbivore

Omnivore

pH

Photosynthesis

Phytoplankton

Plankton

Predator

Primary consumer

Primary producers

Producer

Pyramid of numbers

Secondary Consumer

Tertiary Consumer

Trophic level

Water

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Abiotic factors**: these are the non-living features of an ecosystem (i.e. the physical and chemical conditions) that affect the community.  They include: temperature, light intensity, air speed, water current, humidity, ¬pH, dissolved oxygen, salinity, nitrate, phosphate and other plant nutrients. | |
| **Biosphere**: that part of the earth inhabited by living organisms, including land, ocean and the atmosphere in which life can exist. | |
| **Biotic factors**: these are the living features of an ecosystem that affect the other members of the community.  They include: plants for food and shelter; predators; prey; parasites and pathogens; decomposers; competitors; and pollinators. | |
| **Carnivore**: an animal or plant that feeds exclusively or mainly on animal flesh, e.g. fox, dog, ladybird, Venus fly-trap. | |
| **Climatic factors**: features relating to long term weather conditions that influence the life and distribution of the organisms that live in a particular environment, e.g. rainfall, humidity, temperature, light intensity and day length. | |
| **Ecology**: the study of how living things relate to and interact with each other and their environment. | |
| **Ecosystem**: a community of living organisms interacting with one another and their non-living environment within a particular area, e.g. woodland, hedgerow, seashore, tree, etc. | |
| **Edaphic factors**: the physical, chemical and biological characteristics of the soil that influence the distribution of organisms in a terrestrial ecosystem.  The major edaphic factors are: available (soil) water, mineral content, pH, humus, soil texture and structure. | |
| **Food chain**: a list of species such that each is food for the next species in the list. It is a chain of organisms through which energy is transferred. Usually begins with green plants (producers), eaten by small animal (primary consumer), then a larger animal (secondary consumer), etc. The final member of the chain is the tertiary consumer. Usually represented as follows:  primary producer 🡪 primary consumer 🡪 secondary consumer 🡪 tertiary consumer  e.g. rose 🡪 greenfly 🡪 ladybird 🡪 thrush  The 🡪 means ‘eaten by’. See grazing food chain. | |
| **Food web**: a chart showing all the feeding connections in the habitat/ecosystem.  It is constructed by showing the links between all the interconnecting food chains in the habitat/ecosystem.  There is usually more than one species at each trophic level. | Description: Description: 04 |
| **Grazing food chain**: is a food chain where the initial plant is *living*, e.g.:   1. grass 🡪 grasshoppers 🡪 frogs 🡪 hawks 2. rose bush 🡪 aphids 🡪ladybirds 🡪 thrushes 3. seaweed 🡪 winkles 🡪 crabs 🡪 herring gulls 4. phytoplankton 🡪 zooplankton 🡪 copepod 🡪 herring. | |
| **Habitat**: the particular place within the ecosystem where a population of organisms live and to which they are adapted. | |
| **Herbivore**: an animal that feeds exclusively or mainly on plants, e.g. rabbit. | |
| **Omnivore**: an animal that feeds on plants and animal flesh, e.g. human. | |
| **Primary consumer**: a herbivore which obtains its nutrition directly from plants; usually the second member of a food chain, e.g.  primary producer 🡪 primary consumer 🡪 secondary consumer 🡪 tertiary consumer. | |
| **Producer**: any organism capable of making its own food from inorganic materials, e.g. green plants. | |
| **Pyramid of numbers**: a diagram that represents the numbers of organisms at each trophic level in a food chain; pyramid representing a food chain.  Bottom layer is the largest and represents a very large number of primary producers; next layer **smaller** and represents a smaller number of primary consumers; and so on to the uppermost layer where there may be only one tertiary consumer. | |
| Description: Description: 04 | Description: Description: 05 |
| **Secondary consumer**: a carnivore which obtains its nutrition from animals, usually the third member of a food chain, e.g.  primary producer 🡪 primary consumer 🡪 secondary consumer 🡪 tertiary consumer. | |
| **Tertiary consumer**: a carnivore which obtains its nutrition from animals, usually the fourth member of a food chain, e.g.  primary producer 🡪 primary consumer 🡪 secondary consumer 🡪 tertiary consumer. | |
| **Trophic level (T)**: feeding level: the position or energy level of a species in a food chain.  Organisms in a habitat/community which obtain their food through the same number of links in a food chain belong to the same trophic level; thus   * **T1** =primaryproducers * **T2** =primary consumers = herbivores * **T3** =secondary consumer = small carnivores * **T4** =tertiary consumer = larger carnivores. | |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Sample food chains and their trophic levels** | | | | | | **Trophic level** | **1st = T1** | **2nd = T2** | **3rd =T3** | **4th =T4** | | **Stage** | **Producer** | **Primary consumer (herbivore)** | **Secondary consumer**  **(small carnivore)** | **Tertiary consumer**  **(large carnivore)** | | Hedgerow examples | hawthorn | caterpillar | robin | hawk | | Seashore examples | plankton | barnacle | whelk | crab | | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | The part of the planet where life occurs |  |
| 2 | The place where an organism lives |  |
| 3 | Living features |  |
| 4 | Source of energy for the earth |  |
| 5 | Interconnected food chains |  |
| 6 | Factors relating to the soil |  |
| 7 | Representation of the numbers of organisms at each trophic level |  |
| 8 | The position of an organism in a food chain |  |
| 9 | Any autotroph, i.e. organism that makes food, is a … |  |
| 10 | Organism that eats another organism (heterotroph) |  |
| 11 | Organism which feeds on a primary consumer |  |
| 12 | Non-living features |  |
| 13 | Abiotic factor example |  |
| 14 | Biotic factor example |  |
| 15 | Edaphic factor example |  |
| 16 | Organisms that form the base of a pyramid of numbers |  |
| 17 | Process that converts the sun's energy into a usable form |  |
| 18 | Animal plankton (zooplankton) feeds on ... |  |
| 19 | Substance needed by plants to photosynthesise |  |
| 20 | Primary producers are found here in a pyramid of numbers |  |
| 21 | Herbivores normally live long lives. True or False |  |
| 22 | The remaining natural ecosystems are ones for which we have no use. True or False |  |
| 23 | If tertiary consumers were removed what would happen to secondary consumers? |  |
| 24 | Food chains are usually short. True or False |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Abiotic | I | False | Q | Pyramid of numbers |
| B | Base or bottom | J | Food Web | R | Secondary consumers |
| C | Biosphere | K | Habitat | S | Soil type; pH of soil; Air, water or mineral content of soil |
| D | Biotic | L | Photosynthesis | T | The sun |
| E | Chlorophyll | M | Plant plankton (phytoplankton) | U | Their number would increase |
| F | Climatic; Edaphic; etc. | N | Predator (fox) influences distribution of rabbits | V | Trophic level |
| G | Consumer | O | Primary producer | W | True |
| H | Edaphic | P | Producers; Autotrophs | X | True |

# 1.4.8 + 9 Nutrient Recycling and Human Impact

**KEYWORDS**

Acid rain

Aesthetic

Bacteria

Catalytic converter

Conservation

Crop rotation

Decomposer

Decomposition

Denitrification

Disease

Eutrophication

Extinction

Fertiliser run-off

Fossil fuel

Fungi

Landfill

Legumes

Lichen

Mineral depletion

Niche

Nitrification

Nitrogen fixation

Pollution

Recycle

Reduce

Reuse

Sewage

Scrubbers

Slurry

Sulfur dioxide

Toxin

Water pollution

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Conservation**: this is the protection, preservation and wise management of natural resources and the environment. | |
| **Decompose**: rot, decay and break down into simpler reusable substances. | |
| **Denitrification**: removal of nitrates and nitrites from the soil by converting them to ammonia and then nitrogen gas.  This is done by denitrifying bacteria, e.g. *Thiobacillus denitrificans*. | |
| **Niche**: position or place occupied by an organism **OR** the functional role of an organism in an ecosystem, e.g. how it feeds, what it feeds on, what feeds on it, etc. | |
| **Nitrification**: the conversion of ammonia to nitrites and/or nitrites to nitrates. | Description: Description: 04 |
| **Nitrogen fixation**: the conversion of atmospheric nitrogen into a form usable by plants i.e. nitrates. |
| **Pollution**: contamination or undesirable change in a habitat or environment, i.e. any human addition to the environment that leaves it less able to sustain life. | |

Nutrient Recycling and Human Impact 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Functional role of an organism |  |
| 2 | Converting ammonia into nitrites and/or nitrites to nitrates |  |
| 3 | Harmful addition to the environment (by humans) |  |
| 4 | Conversion of atmospheric nitrogen to nitrates by bacteria |  |
| 5 | Function of the nitrogen cycle |  |
| 6 | Protection and wise management of endangered species |  |
| 7 | Group of biomolecules that plants make from nitrates |  |
| 8 | Group of organisms involved in nitrogen fixation |  |
| 9 | Groups of soil microorganisms responsible for decomposition |  |
| 10 | Why elements are recycled in nature |  |
| 11 | Organisms that return nutrients to the environment by decay are ... |  |
| 12 | Activity that results in the pollution of air |  |
| 13 | Activity that results in the pollution of water |  |
| 14 | Conservation practice from agriculture |  |
| 15 | Conservation practice from fisheries |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Bacteria and Fungi | F | Control of net mesh size | K | Niche |
| B | Bacteria; Legumes; Lichens | G | Decomposers | L | Nitrification |
| C | Burning fossil fuels | H | Fertiliser run-off | M | Nitrogen fixation |
| D | Conservation | I | Limited supply | N | Pollution |
| E | Control of fertiliser usage | J | Make Nitrogen available for use by organisms | O | Proteins |

## Nutrient Recycling and Human Impact 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Conservation practice from forestry |  |
| 2 | Reasons for conserving wild species |  |
| 3 | Effects of fertiliser run-off |  |
| 4 | Problems associated with waste disposal |  |
| 5 | Ways of minimising waste |  |
| 6 | Decomposition is ... |  |
| 7 | Use of micro-organisms in waste management |  |
| 8 | Pollution caused by burning fossil fuels can be reduced by ... |  |
| 9 | Conservation practice in agriculture |  |
| 10 | Conservation practice in fisheries |  |
| 11 | Conservation practice in forestry |  |
| 12 | Example of domestic pollution |  |
| 13 | Example of industrial pollution |  |
| 14 | Example of agricultural pollution |  |
| 15 | Role of microorganisms in waste management |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Aesthetic; Possible sources of drugs; Prevent extinction | F | Eutrophication | K | Replanting |
| B | Catalytic converters; Scrubbers | G | Net size; Mesh size | L | Sewage treatment plants; Digesters; Compost heaps |
| C | Crop rotation; Prevent soil mineral depletion | H | Plant trees | M | Slurry and fertiliser washed from land |
| D | Decaying; Rotting | I | Plastic bags | N | Sulfur dioxide from burning fossil fuels |
| E | Disease; Toxins; Smell; Unsightly | J | Reduce; Recycle; Re-use | O | To consume waste |

## Nutrient Recycling and Human Impact 1 + 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Activity that results in the pollution of air |  |
| 2 | Activity that results in the pollution of water |  |
| 3 | Conservation practice in agriculture |  |
| 4 | Conservation practice in fisheries |  |
| 5 | Conservation practice in forestry |  |
| 6 | Conversion of atmospheric nitrogen to nitrates by bacteria |  |
| 7 | Converting ammonia into nitrites and/or nitrites to nitrates |  |
| 8 | Decomposition is ... |  |
| 9 | Effects of fertiliser run-off |  |
| 10 | Example of agricultural pollution |  |
| 11 | Example of domestic pollution |  |
| 12 | Example of industrial pollution |  |
| 13 | Function of the nitrogen cycle |  |
| 14 | Functional role of an organism |  |
| 15 | Group of biomolecules that plants make from nitrates |  |
| 16 | Group of organisms involved in nitrogen fixation |  |
| 17 | Groups of soil microorganisms responsible for decomposition |  |
| 18 | Harmful addition to the environment (by humans) |  |
| 19 | Organisms that return nutrients to the environment by decay are ... |  |
| 20 | Pollution caused by burning fossil fuels can be reduced by ... |  |
| 21 | Problems associated with waste disposal |  |
| 22 | Protection and wise management of endangered species |  |
| 23 | Reasons for conserving wild species |  |
| 24 | Role of microorganisms in waste management |  |
| 25 | Use of micro-organisms in waste management |  |
| 26 | Ways of minimising waste |  |
| 27 | Why elements are recycled in nature |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Aesthetic; Possible sources of drugs; Prevent extinction | J | Disease; Toxins; Smell; Unsightly | S | Plastic bags |
| B | Bacteria and Fungi | K | Eutrophication | T | Pollution |
| C | Bacteria; Legumes; Lichens | L | Fertiliser run-off | U | Proteins |
| D | Burning fossil fuels | M | Limited supply | V | Reduce; Recycle; Re-use |
| E | Catalytic converters; Scrubbers | N | Make Nitrogen available for use by organisms | W | Replanting |
| F | Conservation | O | Control of net or mesh size | X | Sewage treatment plants; Digesters; Compost heaps |
| G | Crop rotation; Prevent soil mineral depletion; Control fertiliser usage | P | Niche | Y | Slurry and fertiliser washed from land |
| H | Decaying; Rotting | Q | Nitrification | Z | Sulfur dioxide from burning fossil fuels |
| I | Decomposers | R | Nitrogen fixation | A2 | To consume waste |

# 1.4.11 Relationships and Population Dynamics

**KEYWORDS**

Adaptation

Birth control

Community

Competition

Contest competition

Contraception

Ecosystem

Migration

Mutualism

Parasitism

Pollution

Population

Predation

Predator

Prey

Reactant

Scramble competition

Social conditions

Solvent

Symbiosis

**EXPLANATIONS**

|  |
| --- |
| **Adaptation**: a process, change, method, characteristic or feature that an organism or species possesses, develops or evolves that suits/adjusts the organism to its environment to increase its chances of survival and reduce competition. |
| **Competition**: the struggle/rivalry/fight between organisms to obtain a sufficient supply of a resource of limited quantity.  Animals vie with each other for food, shelter and space, and plants vie for space, light, water and minerals. |
| **Contest competition**: involves an active physical confrontation between two organisms, e.g. two dogs fighting over a bone. One wins the bone. |
| **Parasitism**: a relationship between two organisms where one (parasite) benefits and the other (host) is harmed. |
| **Population**: a group of organisms of the one species living in part of an ecosystem. |
| **Predation**: the act, of some animals (predators), of capturing and killing other animals for food. |
| **Predator**: animal that hunts, captures and kills other animals (prey) for food. |
| **Prey**: an animal that is hunted and killed by another animal (predator) for food. |
| **Scramble competition**: a struggle between organisms where each organism tries to acquire as much of the resource as possible, e.g. an ivy plant and a pine tree may compete for light. The ivy uses adventitious roots to grip the pine tree and climb higher. |
| **Symbiosis**: a biological relationship between two organisms of different species living together, or one within the other, in such a way as to benefit one or both of the organisms.  There are different types of symbiotic relationships, e.g. mutualism, parasitism and commensalism. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | 1 | Functions of water in living organisms |  | | 2 | Relationship between two organisms where both benefit |  | | 3 | When two or more organisms fight for a resource in short supply |  | | 4 | Intraspecies competition is more intense than interspecies competition. True or False |  | | 5 | Relationship between two species where at least one benefits |  | | 6 | Competition where one organism loses the resource |  | | 7 | Competition where each organism gets some of the resource |  | | 8 | Factor that limits population growth |  | | 9 | Killing and eating another organism for food |  | | 10 | Consequences of population of prey declining |  | | 11 | Organism which kills and eats another organism |  | | 12 | Effect of contraception on human population |  | | 13 | Influences size of the human population |  | | 14 | Members of a species living in an area |  | | 15 | Community of organisms and their environment |  | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Competition | F | Famine; Birth control; War; Disease | K | Scramble competition |
| B | Contest competition | G | Mutualism | L | Solvent; Transport; Support; Reaction medium; Reactant |
| C | Decrease in population; Improved social conditions | H | Population | M | Starvation; Migration; Decline in population; Change food source |
| D | Disease; Parasitism; Food availability; Pollution | I | Predation | N | Symbiosis |
| E | Ecosystem | J | Predator | O | True |

# 1.5.3 Ecosystem Study

**KEYWORDS**

Abiotic

Adaptation

Anemometer

Bar chart

Beating tray

Camouflage

Cryptozoic trap

Fauna

Food chain

Food pyramid

Flora

Key (Ecology)

Pitfall trap

Pooter

Quadrat

Quadrat frame

Qualitative survey

Quantitative survey

Salinity

Slope

Sweep net

Transect

Trophic level

Tullgren funnel

**EXPLANATIONS**

|  |
| --- |
| **Food pyramid**: pyramid of five levels showing the correct number of servings of different foods to have a balanced diet.  Each level represents a different type of food. From the bottom up these are: cereals and starches (6+); fruit and vegetables (4+); dairy products (3); meat, fish, eggs, beans (2); sweets, chocolates, cakes (sparingly). The number in brackets represents the suggested minimum number of daily servings. |
| Description: Description: 29 |
| **Qualitative study**: a study determining the presence/absence of a substance or organism in a sample or habitat. |
| **Quantitative study**: a study determining the amount of a substance or number of an organism present in a sample or habitat. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Non-living feature |  |
| 2 | Survey indicating if a species is present or not |  |
| 3 | Guide to identification |  |
| 4 | Survey recording the numbers of a species |  |
| 5 | Square frame used for sampling |  |
| 6 | Fauna |  |
| 7 | Adaptation feature |  |
| 8 | Possible source of error in quantitative survey |  |
| 9 | Way to present results of ecological survey |  |
| 10 | Reason for using multiple quadrat samples |  |
| 11 | An omnivore |  |
| 12 | Flora |  |
| 13 | Apparatus used to collect animals from an ecosystem |  |
| 14 | Abiotic factors |  |
| 15 | Position of an organism in a food chain |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Abiotic factor | F | Key | K | Quadrat frame |
| B | Animals | G | More accurate; Reduce error | L | Qualitative |
| C | Bar chart; Table; Graph | H | Not enough samples taken | M | Quantitative |
| D | Colour for camouflage | I | Plants | N | Temperature; Water current; pH; Salinity |
| E | Human; Thrush; etc. | J | Pooter; Beating tray; Pitfall trap; Net | O | Trophic level |

# 2.1 Cell Structure and Microscopy

**KEYWORDS**

Cell

Cell wall

Cellulose

Chloroplast

Electron microscope

Enzyme

Eukaryotic

Eyepiece lens

Mitochondrion

Nucleus

Photosynthesis

Prokaryotic

Prokaryotic [bacteria]

Prokaryotic Cell

Protein synthesis

Ribosome

Sap

Selectively Permeable

Vacuole

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Cell**: basic/smallest structural unit of living things capable of functioning independently. Contains the living contents and organelles of the cell and is surrounded by a cell membrane. | |
| Description: Description: 07 | Description: Description: 07 |
| **Eukaryotic cell**: cell that has a membrane-bound (true) nucleus. It may also have other membrane-bound organelles, e.g. mitochondria and/or chloroplasts. | |
| **Prokaryotic cell**: cell that does not have a membrane-bound (true) nucleus or membrane-bound organelles, e.g. bacteria. | Description: Description: 21 |
| **Selectively permeable membrane**: also semi-permeable or partially permeable. This refers to the cell membrane. Allows certain molecules or ions to pass through but prevents others.  **Note**: the cell wall is fully permeable, i.e. it allows all molecules or ions to pass through. | |

## Cell Structure and Microscopy 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | A biological catalyst |  |
| 2 | Microscope: eyepiece X 10; objective lens X 30; total magnification is ... |  |
| 3 | Powerful microscope used to show cell ultrastructure |  |
| 4 | Objective lenses 40X, 10X, and 4X. Which is used first? |  |
| 5 | Purpose of a cover slip in microscopy |  |
| 6 | Lenses closest to the stage are the eyepiece lenses. True or False |  |
| 7 | Features of plant cells visible under a light microscope |  |
| 8 | Vacuole contents |  |
| 9 | Where phospholipids are found in cells |  |
| 10 | Function of ribosome |  |
| 11 | Function of cell membrane |  |
| 12 | Amoeba - prokaryotic or eukaryotic? |  |
| 13 | Selectively permeable (semi-permeable) membrane |  |
| 14 | Features of plant cells not associated with animal cells |  |
| 15 | Carbohydrate found in the cell wall |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 300 | F | Cellulose | K | Membranes |
| B | 4X | G | Electron microscope | L | Protein synthesis |
| C | Allows some molecules through | H | Enzyme | M | Sap (water, glucose) |
| D | Cell wall; Chloroplasts; Large vacuoles | I | Eukaryotic | N | Selectively permeable |
| E | Cell wall; Vacuole; Chloroplast; Definite shape | J | False | O | To reduce evaporation; Hold specimen in place |

## Cell Structure and Microscopy 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | The medium for chemical reactions in the cell is ... |  |
| 2 | Plant cells have chloroplasts. True or False. |  |
| 3 | Methylene blue is used to … |  |
| 4 | Cell structures that indicates plant cells |  |
| 5 | Cell membranes are semipermeable. True or False |  |
| 6 | Location of cell membrane in plant cells |  |
| 7 | Cells associated with membrane-bound organelles |  |
| 8 | Chromosomes are found in the nucleus. True or False |  |
| 9 | Feature that identifies a eukaryotic cell |  |
| 10 | Cells similar to bacterial cells |  |
| 11 | Chloroplasts contain DNA. True or False |  |
| 12 | Animal cells do not have membranes. True or False |  |
| 13 | Are fungi prokaryotic or eukaryotic? |  |
| 14 | Iodine is used to ... |  |
| 15 | Function of the chloroplast |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Cell Wall; Chloroplast; Large Vacuole | F | Nucleus | K | True |
| B | Eukaryotic | G | Prokaryotic | L | True |
| C | Eukaryotic | H | Site of photosynthesis | M | True |
| D | False | I | Stain animal cells for microscopic examination | N | True |
| E | Immediately inside the cell wall | J | Stain plant cells for microscopic examination | O | Water |

# 2.2.3 Enzymes

**KEYWORDS**

Amylase

Anabolism

ATP

Bioreactor

Buffer

Catabolism

Catalase

Enzyme

Hydrogen peroxide

Immobilisation

Immobilised Enzyme

Metabolism

Protease

Rate (of enzyme activity)

Sodium alginate

Specificity

Substrate

Water bath

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Anabolism**: a chemical reaction which joins small molecules to make larger, more complex ones using enzymes, e.g. photosynthesis, protein synthesis, etc. Anabolic reactions require (need) energy. | |
| **Bioreactor**: a container in which a living thing/cells/enzymes are used in the production of something useful, e.g. during fermentation using yeast, yogurt production using bacteria, etc. | Description: Description: 12 |
| **Catabolism**: a chemical reaction which breaks down a large molecule into simpler ones using enzymes, e.g. respiration, digestion. Catabolic reactions release (produce) energy. | |
| **Enzymes**: highly specific biological catalysts.  They are proteins with a definitive folded shape and are affected by heat (temperature), pH,. They control the rate of metabolic reactions such as respiration, photosynthesis, digestion and assimilation. | |
| **Immobilised enzyme**: enzyme which is fixed to an inert material by chemical or physical means, e.g. trapped in beads or gel so that it will react with, but not mix with, its substrate.  This makes it easy to recover the enzyme from the product and it is reusable. | Description: Description: 09 |
| **Metabolism**: all chemical processes in living cells.  Enzymes catalyse metabolic reactions. Includes anabolism and catabolism. | |
| **Rate** (of enzyme activity): the speed at which enzymes catalyse a reaction. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | All the chemical reactions in living cells |  |
| 2 | Adenosine Triphosphate |  |
| 3 | Group of molecules to which enzymes belong |  |
| 4 | How to vary pH |  |
| 5 | A vessel containing organisms producing useful products |  |
| 6 | Advantage of an immobilised enzyme |  |
| 7 | Biological protein catalyst |  |
| 8 | Catalase substrate |  |
| 9 | Influences the activity of an enzyme |  |
| 10 | Enzyme attached or fixed or trapped |  |
| 11 | Substance used to immobilise enzymes |  |
| 12 | Advantages of using immobilised enzymes |  |
| 13 | Joining small molecules to make larger ones |  |
| 14 | Used to vary temperature in experiments |  |
| 15 | Immobilised enzymes cannot act as catalysts. True or False |  |
| 16 | Is an enzyme lipid, protein or carbohydrate? |  |
| 17 | Substance acted upon by enzyme |  |
| 18 | Breakdown of large molecules into smaller ones |  |
| 19 | Iodine turns starch to a blue-black colour. True or False |  |
| 20 | A measure of the acidity or alkalinity of a solution |  |
| 21 | Enzymes are essential for metabolism. True or False |  |
| 22 | All enzymes contain C, H, O and ... |  |
| 24 | Enzyme, substrate and product |  |
| 24 | Sources of energy |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | A bioreactor | I | False | Q | Proteins |
| B | Anabolism | J | Hydrogen peroxide | R | Solar and cellular |
| C | ATP | K | Immobilised | S | Substrate |
| D | Calcium (or sodium) alginate | L | It can be recovered | T | Temperature or pH |
| E | Can be reused; Pure product; Cost effective | M | Metabolism | U | True |
| F | Catabolic | N | Nitrogen | V | True |
| G | Catalase; hydrogen peroxide; oxygen | O | pH | W | Use buffers |
| H | Enzyme | P | Protein | X | Water bath or ice or thermostat |

# 2.2.4 Photosynthesis

**KEYWORD**

Autotrophic

Chlorophyll

Chloroplast

Combustion

Data logger

Decomposition

Elodea

Light dependent stage

Light independent stage

Palisade layer

Photolysis

Photosynthesis

Reduction

Respiration

Stoma(ta)

**EXPLANATION**

|  |
| --- |
| **Photosynthesis**: the process in plants that makes food using light energy (carbon dioxide, water and chlorophyll).  light energy  6CO2 + 6H2O C6H12O6 + 6O2  chlorophyll  It occurs in the chloroplasts of green plants in which carbon dioxide and water, in the presence of light energy and chlorophyll, are converted into simple sugars and oxygen. The light energy is converted to chemical energy and is stored in the sugar molecule.  What happens to the products of photosynthesis? The simple sugars, e.g. glucose, are used in respiration, converted to starch and stored in the leaf, or transported in the phloem and stored elsewhere in the plant. The oxygen can be used in respiration or passed out to the atmosphere.  Chlorophyll (in chloroplasts) traps sunlight energy. This energy is used to split water (H2O, from the soil) into protons (2 x H+), oxygen (O) and electrons (2 x e-). The electrons (e-) are passed to chlorophyll. The protons (H+) enter a pool of protons. Electrons from chlorophyll together with protons from the pool of protons are joined to carbon dioxide, from the atmosphere, (i.e. CO2 is reduced) to form a carbohydrate Cx(H2O)y. |
| Description: Description: 11 |

## Photosynthesis 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Site of photosynthesis |  |
| 2 | Sources of carbon dioxide in the atmosphere |  |
| 3 | How to increase the rate of photosynthesis |  |
| 4 | As light intensity increases, the rate of photosynthesis ... |  |
| 5 | As light intensity decreases, the rate of photosynthesis ... |  |
| 6 | How to vary light intensity in an experiment |  |
| 7 | To measure the rate of photosynthesis |  |
| 8 | Equation for photosynthesis |  |
| 9 | Equation for aerobic respiration |  |
| 10 | Fate of water molecules |  |
| 11 | Sources of carbon dioxide in pond water |  |
| 12 | Primary role of chlorophyll in photosynthesis |  |
| 13 | During photosynthesis oxygen is produced from ... |  |
| 14 | Oxygen produced during this stage of photosynthesis |  |
| 15 | Fate of oxygen produced during photosynthesis |  |
| 16 | Gas used (needed) for photosynthesis |  |
| 17 | Gas produced during photosynthesis |  |
| 18 | Energy source for photosynthesis |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | C6H12O6 + 6O2 🡪 Energy + 6CO2 + 6H2O | G | Decreases | M | Respiration (plant, animal, bacterial); Decomposition; From air |
| B | 6CO2 + 6H2O + Light + Chlorophyll 🡪 C6H12O6 + 6O2 | H | Increase lighting, carbon dioxide or heating | N | Respiration; Combustion (burning) |
| C | Adjust lamp distance or bulb wattage | I | Increases | O | Respiration; Diffuses to atmosphere |
| D | Carbon dioxide | J | Light dependent stage | P | Sun or light |
| E | Chloroplast | K | Oxygen | Q | Trap or use light |
| F | Count no. of bubbles per minute or Use data logger | L | Photolysis or Split into Protons (H+), electrons and oxygen | R | Water |

## Photosynthesis 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Location of cells in leaf with most chlorophyll |  |
| 2 | Term describing the nutrition of plants |  |
| 3 | Organelle where chlorophyll is found |  |
| 4 | Fate of Protons (H+) from splitting of water |  |
| 5 | Fate of electrons from splitting of water |  |
| 6 | Where carbon dioxide enters a leaf |  |
| 7 | Part of the leaf where most photosynthesis occurs |  |
| 8 | Needed for photosynthesis - carbon dioxide and ... |  |
| 9 | Part of plant where most photosynthesis takes place |  |
| 10 | Importance of photosynthesis |  |
| 11 | Why cells in the palisade layer contain most chloroplasts |  |
| 12 | As light intensity increases, the rate of photosynthesis ... |  |
| 13 | As light intensity decreases, the rate of photosynthesis ... |  |
| 14 | Method by which plants make their own food |  |
| 15 | Role of chlorophyll in photosynthesis |  |
| 16 | To measure the rate of photosynthesis |  |
| 17 | Fate of water molecules |  |
| 18 | Why use *Elodea* in photosynthesis experiment? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Autotrophic | G | Near upper surface | M | Released into pool and combine with CO2 to form glucose |
| B | Chloroplast | H | Oxygen given off as bubbles; *Elodea* can survive under water | N | Stoma |
| C | Count no. of bubbles per minute; Use data logger | I | Palisade layer | O | Supplies O2 and food for other organisms |
| D | Decreases | J | Passed to chlorophyll | P | To absorb light |
| E | Increases | K | Photolysis; Split into Protons (H+), electrons and oxygen | Q | Usually closer to the light |
| F | Leaf | L | Photosynthesis | R | Water |

# 2.2.5 Respiration

**KEYWORDS**

Aerobic respiration

Alcohol

Anaerobic (conditions)

Anaerobic respiration

Cytoplasm

Cytosol

Ethanol

Fermentation

Glycolysis

Kreb’s cycle

Lactic acid

Lactate

Mitochondrion

Pyruvic acid

Pyruvate

Respiration

**EXPLANATIONS**

|  |
| --- |
| **Aerobic respiration**: the controlled release of energy from food within a cell using oxygen.  The process is controlled by enzymes and is very efficient, i.e. it releases a lot of energy.  C6H12O6 + 6O2 🡪 ENERGY + 6H2O + 6CO2 |
| **Anaerobic respiration**: the controlled release of energy from food in a cell in the absence of oxygen.  The process is controlled by enzymes and is inefficient, i.e. it releases very little energy. Oxygen may be present but it will not be used, e.g.  (i) in yeast cells (fermentation)  C6H12O6 🡪 Energy + 2C2H5OH + 2CO2  ethyl alcohol + carbon dioxide  or ethanol + carbon dioxide  (ii) in human muscle (results in cramp)  C6H12O6 🡪 Energy + 2CH3CH(OH)COOH  lactic acid |
| Description: Description: 12 |
| **Fermentation**: production of alcohol from starch and sugars contained in grain or fruit. (see anaerobic respiration above) |
| **Respiration**: the controlled release of energy from food, within the cell/cells of an organism.  It is a twenty-four hour process controlled by enzymes. It can occur with (aerobic respiration) or without (anaerobic respiration) the use of oxygen. It is also called internal respiration, tissue respiration or cellular respiration.  Aerobic respiration: C6H12O6 + 6O2 🡪 ENERGY + 6H2O + 6CO2  Anaerobic respiration: C6H12O6 🡪 Energy + 2C2H5OH + 2CO2  Respiration may occur as a one or a two-stage process. The first stage does not require oxygen, releases only a small amount of energy and occurs in the cytosol of the cell. The second stage does require oxygen, releases a large amount of energy and occurs in the mitochondrion. Anaerobic respiration is a first stage process. Aerobic respiration is a two-stage process. |

## Respiration 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Fermentation produces ... |  |
| 2 | The first stage process of respiration is called ... |  |
| 3 | In the first stage of respiration glucose is converted to ... |  |
| 4 | In yeast pyruvic acid is converted to ... |  |
| 5 | In anaerobic conditions in humans pyruvic acid is converted to ... |  |
| 6 | Converting pyruvic acid to acetyl Co-enzyme A releases a molecule of... |  |
| 7 | Acetyl co-enzyme A enters a cycle of reactions known as ... |  |
| 8 | Site of Kreb's Cycle in cell |  |
| 9 | Cytoplasm minus organelles or liquid part of cytoplasm |  |
| 10 | Amount of energy released during first stage of respiration |  |
| 11 | Respiration that produces alcohol |  |
| 12 | Amount of energy released during second stage of respiration |  |
| 13 | Site of second stage of aerobic respiration in cell |  |
| 14 | Substance essential for aerobic respiration |  |
| 15 | Lack of oxygen prevents which stage of respiration |  |
| 16 | Is fermentation affected by temperature? |  |
| 17 | Is oxygen required for the first stage of respiration? |  |
| 18 | Substance produced during aerobic respiration and not during fermentation |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Carbon dioxide | G | Kreb's Cycle | M | Oxygen |
| B | Cytosol | H | Lactic acid or lactate | N | Pyruvic acid or pyruvate |
| C | Ethanol | I | Large | O | Second stage |
| D | Ethanol and C02 | J | Mitochondrion | P | Small |
| E | Fermentation | K | Mitochondrion | Q | Water |
| F | Glycolysis | L | No | R | Yes |

## Respiration 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Substance that yeast can use to make ethanol |  |
| 2 | Substance, other than ethanol, produced during fermentation |  |
| 3 | Fermentation is finished |  |
| 4 | Use for potassium iodide and sodium hypochlorite |  |
| 5 | Substance produced during aerobic respiration and not during fermentation |  |
| 6 | Purpose of Alkaline pyrogallol or an anaerobic jar |  |
| 7 | Aerobic respiration |  |
| 8 | Anaerobic respiration |  |
| 9 | Site of the first stage of respiration |  |
| 10 | Final product of the first stage of respiration |  |
| 11 | Site of the second stage of respiration |  |
| 12 | In anaerobic conditions in a human cell pyruvic acid converted to ... |  |
| 13 | Is oxygen required for the first stage of respiration? |  |
| 14 | In the absence of oxygen pyruvic acid may be converted to ... |  |
| 15 | Industrial uses of anaerobic respiration of yeast |  |
| 16 | Aerobic respiration is the release of energy in the absence of oxygen. True or False |  |
| 17 | Acetyl co-enzyme A enters a cycle of reactions known as ... |  |
| 18 | Does the second stage of aerobic respiration require oxygen? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Baking; Brewing | G | Lactic acid | M | Requires oxygen |
| B | Carbon dioxide | H | Lactic acid or Ethanol + C02 | N | Sugar; Starch |
| C | Cytoplasm or Cytosol | I | Mitochondrion | O | To remove oxygen |
| D | Does not require oxygen | J | No | P | To test for alcohol |
| E | False | K | No more gas given off (no more bubbles) | Q | Water |
| F | Kreb's Cycle | L | Pyruvic acid or Pyruvate | R | Yes |

## Respiration 3

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Controlled release of energy from food |  |
| 2 | Energy release not requiring oxygen |  |
| 3 | Why living organisms need to respire |  |
| 4 | Type of respiration that releases most energy |  |
| 5 | Industrial uses of anaerobic respiration of yeast |  |
| 6 | Use of energy released in respiration |  |
| 7 | Carbon dioxide is produced during respiration. True or False |  |
| 8 | Some energy released in respiration is lost as heat. True or False |  |
| 9 | Stage 1 of respiration requires oxygen. True or False |  |
| 10 | Stage 1 of respiration takes place in the cytoplasm. True or False |  |
| 11 | Stage 2 of respiration takes place in the cytoplasm. True or False |  |
| 12 | Lactic acid is a product of anaerobic respiration. True or False |  |
| 13 | Stage 1 or Stage 2. Takes place in the mitochondria |  |
| 14 | Stage 1 or Stage 2. Large amount of energy produced |  |
| 15 | Stage 1 or Stage 2. Takes place in the cytoplasm |  |
| 16 | Stage 1 or Stage 2. Does not require oxygen. |  |
| 17 | Respiration involving Stage 1 only |  |
| 18 | Substance essential for aerobic respiration |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Aerobic | G | Muscular activity; Respiration | M | Stage 2 |
| B | Anaerobic or fermentation | H | Oxygen | N | To provide energy for metabolic activities |
| C | Anaerobic respiration | I | Respiration | O | True |
| D | Baking; brewing | J | Stage 1 | P | True |
| E | False | K | Stage 1 | Q | True |
| F | False | L | Stage 2 | R | True |

# 2.2.6 Movement through Membranes

**KEYWORDS**

Active transport

Chloroplast

Diffusion

Hypertonic

Hypotonic

Isotonic

Mitochondrion

Nucleus

Osmosis

Passive transport

Permeable

Sap

Selectively Permeable

Semi/selectively permeable

Turgor

Vacuole

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Diffusion**: the movement of solute (gas or liquid molecules) from a region of high solute concentration to a region of lower solute concentration.  No permeable or semi-permeable membrane is necessary for diffusion to occur. No energy used by the cell in diffusion, i.e. it is a passive process.  *Examples of diffusion*: gaseous exchange in alveoli; absorption through villi of small intestine. | |
| Description: Description: 13 | |
| **Osmosis**: a special case of diffusion. It is the movement of solvent (always water) from a region of high solvent concentration to a region of lower solvent concentration through a semi-permeable membrane, until both concentrations are equal.  No energy used by the cell for osmosis to take place, i.e. it is a passive process.  *Examples of osmosis*: water entering root hair cell; water moving from cell to cell in transpiration. | Description: Description: 13 |
| **Selectively permeable membrane**: also semi-permeable or partially permeable. This refers to the cell membrane. Allows certain molecules or ions to pass through but prevents others.  **Note**: the cell wall is fully permeable, i.e. it allows all molecules or ions to pass through. | |
| **Turgor**: state of a plant cell due to pressure built up in the cell; exerted outwards and caused by the cell taking in water by osmosis. | Description: Description: 13 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Movement of water along a gradient through a selectively permeable membrane |  |
| 2 | Allowing some substances to pass through |  |
| 3 | Pressure built up in cell by taking in water by osmosis |  |
| 4 | Locations in a cell with selectively permeable membranes |  |
| 5 | Movement of molecules along a concentration gradient |  |
| 6 | Having a lower solute concentration than the surrounding solution |  |
| 7 | How high sugar or salt concentrations preserve food |  |
| 8 | Water movement between cells or from soil to root |  |
| 9 | Having a higher solute concentration than the surrounding solution |  |
| 10 | Substance found in a plant cell vacuole |  |
| 11 | No energy required for movement of substances |  |
| 12 | Having the same solute concentration as another solution |  |
| 13 | Example of passive transport |  |
| 14 | Plant cell walls are fully permeable. True or False |  |
| 15 | Movement of molecules against a concentration gradient |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Active transport | F | Examples of osmosis in plants | K | Passive transport |
| B | Bacteria lose water by osmosis - inactivity or death | G | Hypertonic | L | Selectively permeable |
| C | Chloroplast; Mitochondrion; Nucleus; Vacuole | H | Hypotonic | M | True |
| D | Diffusion | I | Isotonic | N | Turgor |
| E | Diffusion | J | Osmosis | O | Water or Sugar or Sap or Salt(s) |

# 2.2.7 Enzymes Higher Level

**KEYWORDS**

Agar plate

Bioreactor

Denatured enzyme

Denaturation

Enzyme

Hydrogen peroxide

Immobilised

Optimum Conditions

Optimum pH

Salinity

Sodium alginate

Specificity

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Denaturation**: changes in the shape of an enzyme (protein) due to extreme conditions, such as high temperature, unsuitable pH, or the presence of certain chemicals. If these changes are permanent they destroy the activity of the enzyme and the enzyme is denatured. | Description: Description: 10 |
| **Optimum conditions**: best or most favourable conditions for growth, reproduction, enzyme activity, etc. | |
| **Specificity**: one enzyme will catalyse only one reaction.  The active site of an enzyme is not a fixed shape. It can change slightly to better fit the shape of the substrate when forming the enzyme-substrate complex. | |
| Description: Description: 10 | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | A vessel containing organisms producing useful products |  |
| 2 | Active Site |  |
| 3 | Group of molecules to which enzymes belong |  |
| 4 | Temperature at which human enzymes work best |  |
| 5 | Enzymes are not essential for metabolism. True or False |  |
| 6 | Shape of an enzyme |  |
| 7 | Loss of enzyme function or activity |  |
| 8 | Catalase |  |
| 9 | Enzyme's optimum pH |  |
| 10 | Enzyme attached or fixed or trapped |  |
| 11 | Specificity of an enzyme |  |
| 12 | Substance used to immobilise enzymes |  |
| 13 | How an enzyme may be denatured |  |
| 14 | Features of a denatured enzyme |  |
| 15 | Immobilised enzymes can act as catalysts. True or False |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 37 °C | F | Enzyme | K | Hydrogen peroxide |
| B | A bioreactor | G | Enzyme acts on only a particular substrate | L | Immobilised |
| C | Calcium (or sodium) alginate | H | False | M | pH at which enzyme works best |
| D | Changed structure; Loss of function | I | Folded | N | Proteins |
| E | Denatured enzyme | J | High temperature or Extreme pH or Agitation or High salinity | O | True |

# 2.2.9 Photosynthesis Higher Level

**KEYWORDS**

ATP

Carbohydrates

Chlorophyll

Chloroplast

Dark stage

Decomposition

Glucose

Light dependent stage

Light independent stage

Metabolic reactions

NADP

Protons

Respiration

**EXPLANATIONS**

|  |  |
| --- | --- |
| **ATP**: adenosine triphosphate. ATP is the source of energy in a cell – it traps and transfers energy for cell activities.  A compound composed of a molecule of adenine, one of ribose and three phosphate groups. The bonds between the phosphate groups are high-energy bonds.  When these bonds are broken, energy is released. ATP is formed in the mitochondria of a cell during respiration and in the chloroplast during photosynthesis. ATP converted to ADP with the release of energy and a phosphate group. | Description: Description: 10 |
| **ATP significance**: present in all cells and supplies energy (which has come from food or sunlight) for all processes that need it, e.g. protein synthesis, muscle contraction, nerve impulse transmission, etc. | |
| **NADP**: nicotinamide adenine dinucleotide phosphate. NADP traps and transfers hydrogen ions (H+) in cell activities. It is necessary in photosynthesis. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Sources of carbon dioxide in pond water |  |
| 2 | Role of carbon dioxide in photosynthesis |  |
| 3 | Role of water in photosynthesis |  |
| 4 | Light stage |  |
| 5 | Dark stage |  |
| 6 | ATP = ? |  |
| 7 | ATP formed during this stage of photosynthesis |  |
| 8 | Energised electron |  |
| 9 | Carbohydrate formed during this stage of photosynthesis |  |
| 10 | P ~ P bond found here |  |
| 11 | Fate of O2 produced in light stage |  |
| 12 | Fate of ATP produced in light stage |  |
| 13 | Gas essential for the dark stage of photosynthesis |  |
| 14 | Products of light stage vital for the dark stage |  |
| 15 | Group of biomolecules to which the products of the dark stage belong |  |
| 16 | From what substance is oxygen produced? |  |
| 17 | Stage of photosynthesis in which oxygen is produced |  |
| 18 | Location in plant cell where photosynthesis take place |  |
| 19 | Where energised electrons come from |  |
| 20 | Compound from which plant obtains the H used to make Cx(H20)y |  |
| 21 | Compound that supplies energy for the second stage reactions |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adenosine triphosphate | H | Dark stage | O | NADPH(2) and ATP |
| B | Adenosine triphosphate | I | Electron with extra energy from the sun | P | Respiration (plant, animal, bacterial); Decomposition; From air |
| C | ATP | J | For use in dark stage or Metabolic reactions | Q | Respired or Released (into atmosphere) |
| D | Carbohydrates | K | Light dependent stage (light necessary) | R | Supplies carbon for the formation of glucose |
| E | Carbon dioxide | L | Light (dependent) stage | S | Supplies protons (H+) and electrons or Photolysis |
| F | Chlorophyll | M | Light independent stage | T | Water |
| G | Chloroplast | N | Light stage | U | Water |

# 2.2.10 Respiration Higher Level

**KEYWORDS**

Acetyl Co-enzyme A

Anaerobic

ATP

Electron transport chain

Ethanol

Fermentation

Glycolysis

Kreb’s cycle

Lactic acid

Protons

Pyruvic acid

Pyruvate

**EXPLANATIONS**

|  |
| --- |
| **Glycolysis**: the first stage of respiration that involves the conversion of glucose (6-carbon compound) to pyruvic acid (3-carbon compound) in the cytosol (cytoplasm) with the release of a small amount of energy.  Energy is also required to start this process. |
| Description: Description: 12 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | In glycolysis glucose is converted to ... |  |
| 2 | Without oxygen yeast converts pyruvate to ... |  |
| 3 | Without oxygen muscle cells convert pyruvate to ... |  |
| 4 | Without oxygen Pyruvate converted to Acetyl Co-enzyme A with release of... |  |
| 5 | With oxygen Acetyl Co-enzyme A enters a cycle of reactions called ... |  |
| 6 | How oxygen debt is paid |  |
| 7 | Name given to the first stage of respiration |  |
| 8 | Respiration involving Stage 1 only |  |
| 9 | Without oxygen pyruvic acid converted to ... |  |
| 10 | Substance produced during aerobic respiration and not during fermentation |  |
| 11 | Kreb's cycle produces energy in the form of... |  |
| 12 | At the end of the transport chain electrons are given to ... |  |
| 13 | End products of anaerobic respiration |  |
| 14 | Molecule in which energy is stored in the cell |  |
| 15 | In mitochondria pyruvate converted to CO2 and a two-carbon compound called ... |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Acetyl Co-enzyme A | F | Ethanol + CO2 | K | Lactic acid |
| B | Anaerobic or Fermentation | G | Ethanol; Lactic acid; CO2 | L | Lactic acid or Ethanol + CO2 |
| C | ATP | H | Glycolysis | M | Oxygen or Protons (to form water) |
| D | ATP | I | Increased breathing rate | N | Pyruvic acid or Pyruvate |
| E | Carbon dioxide | J | Krebs cycle | O | Water |

# 2.3 Cell Continuity

**KEYWORDS**

Anaphase

Cancer

Carcinogen

Cell continuity

Cell cycle

Chromosome

Continuity of life

Diploid number

Egg

Gamete

Haploid number

Meiosis

Meristematic tissue

Metaphase

Mitosis

Mutation

Prophase

Radiation

Reproduction

Sperm

Spindle

Telophase

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Cancer**: a group of disorders caused by the abnormal and uncontrolled division of cells by mitosis.  This results from the loss of control over their rate of growth and cell division, and forms a tumour which then invades the surrounding tissues. | |
| **Cell continuity**: cells surviving, growing and dividing and being passed from one generation to the next. Cells can only be made from pre-existing cells. | |
| **Chromosome**: rod/thread-like structure composed of DNA and protein.  It contains the genetic information (genes) which is passed from one generation of cells or organisms to the next. Chromosomes occur in pairs (diploid) in most plant and animal cell nuclei. | |
| Description: Description: 14 | Description: Description: 14 |
| **Continuity of life**: the ability of organisms to exist from one generation to the next. | |
| **Diploid (2n)**: every organism has a fixed number of chromosomes. If they occur in pairs (homologous pairs) the organism is said to be diploid (2n), i.e. two sets of chromosomes – one set received from the father and one set from the mother at fertilisation, e.g. human 2n = 46, mouse 2n = 40, fruit fly 2n = 8. **OR** double the number of chromosomes found in gametes. | |
| **Gamete**: any haploid sex cell which must fuse with another sex cell in order to produce a new individual.  A haploid reproductive cell, i.e. it contains half the required genetic information for the formation of a new individual or half the somatic number of chromosomes (in humans = 23), e.g. sperm cell, egg. | Description: Description: 14 |
| **Haploid (n)**:  1. Having one of each of the pairs of chromosomes characteristic for a species. **OR**  2. Half the somatic number of chromosomes. **OR**  3. A single set of unpaired chromosomes. | |
| Description: Description: 14 | |
| **Meiosis**: a cell division of gamete or spore producing cells. The diploid nucleus divides to form four different haploid daughter nuclei.  • Can take place in diploid cells only.  • Produces four cells that may all be different genetically.  • Daughter cells have half the number of chromosomes as the parent cell.  • Meiosis helps to maintain the chromosome number of the parent by producing haploid gametes in sexual reproduction.  • It also introduces variations into a species by mixing the genetic material that passes on to the next generation. | |
| Description: Description: 14 | |
| **Mitosis**: cell division where one nucleus (haploid or diploid) divides to form two identical daughter nuclei, similar to the parent cell.  It is the usual method of cell division by cells not involved in the formation of gametes (somatic cells). It occurs in a series of stages: prophase, metaphase, anaphase, telophase and a resting or preparatory stage – interphase.   * It takes place in haploid and diploid cells. * Produces two daughter cells which are genetically identical and have the same number of chromosomes as the parent cell. * Daughter cells are smaller in size than the parent cell. * Is a method of reproduction in unicellular organisms but is mainly for growth and repair in multicellular organisms.   C:\Users\Windows User\Desktop\Untitled.jpg | |

## Cell Continuity 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Haploid human cell |  |
| 2 | Function of mitosis in a single-celled organism |  |
| 3 | Function of mitosis in a multicellular organism |  |
| 4 | How mitosis differs from meiosis |  |
| 5 | Function of meiosis |  |
| 6 | Stages of mitosis |  |
| 7 | Spindle fibres contract during ... |  |
| 8 | Diploid number |  |
| 9 | Group of disorders in which cells lose regulation of mitosis |  |
| 10 | Location of mitosis in flowering plants |  |
| 11 | Haploid number |  |
| 12 | Number of new cells produced by mitosis |  |
| 13 | Mitosis divides a nucleus into two identical nuclei. True or False |  |
| 14 | A sperm contains the diploid number of chromosomes. True or False |  |
| 15 | When chromosomes are located at the equator of the cell |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anaphase | F | Meristematic tissue | K | Reproduction |
| B | Cancer | G | Metaphase | L | Sperm or Egg |
| C | Chromosomes in pairs | H | No reduction in chromosome number | M | To produce gametes |
| D | False | I | One set of chromosomes | N | True |
| E | Growth; Repair | J | Prophase; Metaphase; Anaphase; Telophase | O | Two |

## Cell Continuity 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Number of new cells produced by meiosis |  |
| 2 | If the diploid number in a cell is 46, the haploid number is ... |  |
| 3 | The cells produced by meiosis are haploid.  True or False |  |
| 4 | The cells produced by mitosis are identical. True or False |  |
| 5 | Meiosis gives rise to variation. True or False |  |
| 6 | Mitosis always produces four new cells. True or False |  |
| 7 | Meiosis is never involved in gamete formation.  True or False |  |
| 8 | Single-celled organisms use mitosis for reproduction. True or False |  |
| 9 | Structures in nuclei responsible for biological inheritance |  |
| 10 | Genes are found on structures in the nucleus called ... |  |
| 11 | Function of spindle fibres during cell division |  |
| 12 | Type of cell division by which tissues grow |  |
| 13 | Possible causes of cancer |  |
| 14 | During metaphase chromosomes are attached to the ... |  |
| 15 | Type of cell in which a cell plate forms |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 23 | F | False | K | To contract and separate chromosomes |
| B | Carcinogen; Mutation; Radiation | G | Four | L | True |
| C | Chromosomes | H | Mitosis | M | True |
| D | Chromosomes | I | Plant cell | N | True |
| E | False | J | Spindle | O | True |

## Cell Continuity 1 and 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | A sperm contains the diploid number of chromosomes. True or False |  |
| 2 | Diploid number |  |
| 3 | During metaphase chromosomes are attached to the ... |  |
| 4 | Function of meiosis |  |
| 5 | Function of mitosis in a multicellular organism |  |
| 6 | Function of mitosis in a single-celled organism |  |
| 7 | Function of spindle fibres during cell division |  |
| 8 | Genes are found on structures in the nucleus called ... |  |
| 9 | Group of disorders in which cells lose regulation of mitosis |  |
| 10 | Haploid human cell |  |
| 11 | Haploid number |  |
| 12 | How mitosis differs from meiosis |  |
| 13 | If the diploid number in a cell is 46, the haploid number is ... |  |
| 14 | Location of mitosis in flowering plants |  |
| 15 | Meiosis gives rise to variation. True or False |  |
| 16 | Meiosis is never involved in gamete formation. True or False |  |
| 17 | Mitosis always produces four new cells. True or False |  |
| 18 | Mitosis divides a nucleus into two identical nuclei. True or False |  |
| 19 | Number of new cells produced by meiosis |  |
| 20 | Number of new cells produced by mitosis |  |
| 21 | Possible causes of cancer |  |
| 22 | Single-celled organisms use mitosis for reproduction. True or False |  |
| 23 | Spindle fibres contract during ... |  |
| 24 | Stages of mitosis |  |
| 25 | Structures in nuclei responsible for biological inheritance |  |
| 26 | The cells produced by meiosis are haploid. True or False |  |
| 27 | The cells produced by mitosis are identical. True or False |  |
| 28 | Type of cell division by which tissues grow |  |
| 29 | Type of cell in which a cell plate forms |  |
| 30 | When chromosomes are located at the equator of the cell |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 23 | K | Four | U | Sperm or Egg |
| B | Anaphase | L | Growth; Repair | V | Spindle |
| C | Cancer | M | Meristematic tissue | W | To contract and separate chromosomes |
| D | Carcinogen; Mutation; Radiation | N | Metaphase | X | To produce gametes |
| E | Chromosomes | O | Mitosis | Y | True |
| F | Chromosomes | P | No reduction in chromosome number | Z | True |
| G | Chromosomes in pairs | Q | One set of chromosomes | A2 | True |
| H | False | R | Plant cell | B2 | True |
| I | False | S | Prophase; Metaphase; Anaphase; Telophase | C2 | True |
| J | False | T | Reproduction | D2 | Two |

# 2.4 Cell Diversity

**KEYWORDS**

Connective tissue

Conserve

Epithelial tissue

Mitosis

Organ

Organ System

Phloem

Tissue

Tissue culture

Vascular tissue

Xylem

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Organ**: a structure containing a group of tissues with a common function(s).  e.g. plant organs: leaf, root, stem, flower; animal organs: stomach, ear, testis, ovary, etc. | Description: Description: 08 |
| **Organ systems**: a group of organs working together to carry out a function, e.g. digestive system. | |
| **Tissue**: group of cells with a similar function, e.g.  • plant tissues: meristematic tissue and vascular tissue;  • animal tissues: muscular tissue and nervous tissue. | |
| **Tissue culture**: a method for growing individual cells (outside an organism) in a container of sterile nutrient medium to which hormones and growth substances may have been added.  This process is used in cancer research and plant propagation. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Cells with common function |  |
| 2 | Vascular (plant) tissue function |  |
| 3 | Ground (plant) tissue function |  |
| 4 | Dermal (plant) tissue function |  |
| 5 | Animal tissue for movement |  |
| 6 | Animal protective tissue |  |
| 7 | Animal transport tissue |  |
| 8 | Animal communication tissue |  |
| 9 | Animal support tissue |  |
| 10 | Cells grown on medium outside organism |  |
| 11 | Application of tissue culture |  |
| 12 | Vascular tissues found in flowering plants |  |
| 13 | Gas needed to release energy to make a skin graft |  |
| 14 | Suitable temperature to make skin cells grow |  |
| 15 | Why sterile conditions are needed in tissue culture |  |
| 16 | Type of cell division involved in tissue culture |  |
| 17 | Group of tissues working together |  |
| 18 | Plant organs |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Body temperature | G | Nervous | M | Tissue culture |
| B | Connective | H | Organ | N | To conserve rare or Endangered plant species |
| C | Epithelial | I | Oxygen | O | To prevent bacterial growth |
| D | Leaf; Root; Stem; Bud; Tuber; Flower | J | Protection | P | Transport |
| E | Mitosis | K | Storage | Q | Vascular |
| F | Muscular | L | Tissue | R | Xylem; Phloem |

# 2.5.1 - 2 Variation, Heredity, etc.

**KEYWORDS**

Chromosomes

Expression

Gene

Gene Expression

Genetics

Heredity

Inheritance

Meiosis

Mutation

Nucleus

Sexual reproduction

Species

Variation

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Expression**: (of gene) how the genetic information in the gene shows itself in the phenotype and how it is influenced by the environment. | |
| **Gene expression**: the process of changing the information in a gene into a protein and the effect that protein has on the organism. | Description: Description: 16 |
| **Heredity**: offspring inherit various physical and mental traits of their parents or ancestors, i.e. certain traits, controlled by a genetic code within the chromosomes, are transmitted from one generation to the next. | |
| **Species**: group of animals or plants that can interbreed and produce viable, fertile offspring.  Members of a species share the same characteristics and differ only in minor details. Each member of a species is unique. | |
| **Variation**: differences between members of a species, group or population.  Only those variations (changes) that can be inherited or passed on are advantageous as they will accumulate over millions of years and give rise to new species. Variations are the 'functional units' of evolution. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Differences between individuals within a population |  |
| 2 | Interbreeding results in fertile offspring |  |
| 3 | Cause of genetic variation |  |
| 4 | Organisms of the same species usually produce fertile offspring. True or False |  |
| 5 | Genetics is the study of... |  |
| 6 | Chromosomes are made of DNA and lipid. True or False |  |
| 7 | Unit of heredity or code for protein |  |
| 8 | Where chromosomes are found in the cell |  |
| 9 | Structures containing genes |  |
| 10 | Part of DNA with information to make one protein |  |
| 11 | Example of an inherited human characteristic |  |
| 12 | Example of a non-inherited human characteristic |  |
| 13 | Changing the information in a gene into a protein |  |
| 14 | All individuals within a species are the same. True or False |  |
| 15 | Cloned individuals are exactly the same. True or False |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Ability to roller skate | F | Gene | K | Sexual reproduction; Meiosis; Mutation |
| B | Chromosomes | G | Gene | L | Species |
| C | Eye colour | H | Gene expression | M | True |
| D | False | I | In the nucleus | N | True |
| E | False | J | Inheritance | O | Variation |

# 2.5.4 DNA, Replication, etc.

**KEYWORDS**

Amino acids

Coding DNA

Complementary

Cytoplasm

DNA profiling

Gene

Genetic screening

Junk DNA

mRNA

Nitrogenous base

Non-coding DNA

Nucleic acid

Paternity

Protease

Replication (DNA)

Ribosomes

rRNA

Thymine

Transcription

Translation

Triplet

tRNA

Uracil

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Coding DNA**: the part of a chromosome which contains information to make a protein. | |
| **DNA profile**: a picture (auto radiograph) of the pieces of DNA produced when an organism’s DNA is broken up using specific enzymes and then sorted by size on a gel.  The stages involved are:  1. Cells are broken down to release DNA.  2. DNA strands are cut into fragments using restriction enzymes.  3. Fragments are separated on the basis of size using gel electrophoresis.  4. The pattern of fragment distribution is analysed. | Description: Description: 16 |
| **Gene**: unit of heredity found on a chromosome, and is an instruction to the cell to make a particular substance, a protein, which helps regulate a trait (characteristic) of an organism. | Description: Description: 15 |
| **Genetic screening**: tests to identify the presence of a specific gene or the presence or absence of changed or harmful genes possessed by an individual. | |
| **Non-coding DNA**: the part of a chromosome which does not contain information to make a protein. See diagram above. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Nitrogenous base of DNA |  |
| 2 | Ribosome |  |
| 3 | RNA |  |
| 4 | RNA involved in protein synthesis |  |
| 5 | Role of mRNA |  |
| 6 | Role of rRNA |  |
| 7 | Role of RNA |  |
| 8 | Why use a blender when extracting DNA? |  |
| 9 | Time the blender should be run when extracting DNA |  |
| 10 | Why use washing-up liquid when extracting DNA? |  |
| 11 | Why use salt when extracting DNA? |  |
| 12 | Breaks down protein |  |
| 13 | Why use a protease enzyme when extracting DNA? |  |
| 14 | Type of alcohol (ethanol) used when separating DNA |  |
| 15 | Genetic screening |  |
| 16 | DNA profiling |  |
| 17 | Applications of DNA profiling |  |
| 18 | Genetic code in DNA |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | A few seconds | G | Ice cold | M | Three bases in sequence code for one amino acid |
| B | Break cell walls to release cytoplasm | H | mRNA; rRNA; tRNA | N | Thymine |
| C | Carry complementary amino acids to ribosomes | I | Protease | O | To break down membranes |
| D | Digest proteins associated with DNA | J | Protein | P | Transcription |
| E | Examining DNA for a pattern for comparison | K | Separates protein from DNA | Q | Translation |
| F | Forensic science; Paternity; Medical | L | Testing for the presence of a specific gene | R | Uracil |

# 2.5.5+15 Protein synthesis

**KEYWORDS**

Amino acids

Codon

DNA

mRNA

Nucleus

Ribosomes

Transcription

Translation

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Transcription**: the making of mRNA from a single strand of DNA. | Description: Description: 16 |
| **Translation**: the making of a protein from an mRNA by translating the genetic information it contains to a sequence of amino acids. | Description: Description: 16 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Replication of DNA |  |
| 2 | Transcription |  |
| 3 | Role of rRNA |  |
| 4 | The letter 't' in tRNA |  |
| 5 | To make proteins, DNA is first transcribed as ... |  |
| 6 | Where enzymes are produced in cells |  |
| 7 | Where transcription occurs in a cell |  |
| 8 | Type of RNA involved in transcription |  |
| 9 | Where translation occurs in a cell |  |
| 10 | Biomolecules that are joined together to make a protein |  |
| 11 | A newly formed protein must ... before it can begin to work |  |
| 12 | Triplet |  |
| 13 | Role of a triplet |  |
| 14 | Role of tRNA |  |
| 15 | Translation |  |
| 16 | Number of bases in a codon |  |
| 17 | Types of mRNA codon |  |
| 18 | During translation attached to a tRNA molecule |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Amino acids | G | Making RNA from a single strand of DNA | M | Ribosome |
| B | Be folded into its functional shape | H | mRNA | N | Sequence of three nitrogenous bases of mRNA |
| C | Carry specific amino acids to the ribosomes | I | mRNA | O | Start; Add an amino acid; Stop |
| D | Codes for a specific amino acid | J | mRNA codon; An amino acid | P | Three |
| E | Making a copy | K | Nucleus | Q | Transfer |
| F | Making a protein using mRNA code | L | Ribosome | R | Translation |

# 2.5.6 Genetic Inheritance

**KEYWORDS**

Alleles

Chromosome

Dominance

Dominant

Fertilisation

Gamete

Gene

Genotype

Heterozygous

Homozygous

Incomplete dominance

Non-coding

Phenotype

Recessive

X chromosome

XX

XY

Y chromosome

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Allele**: alternative forms of a gene or a pair of genes found at the same locus/position on homologous chromosomes controlling the same trait, e.g. T and t; T is an allele of t. | |
| **Dominance**: (genetics) characteristic, trait or gene which expresses itself in offspring, even when the corresponding opposite one (recessive) is also inherited, e.g. Tt = tall, T is dominant or, simply, dominant gene = gene that is expressed in the heterozygous condition. | |
| **Fertilisation**: the union of a haploid male gamete nucleus with a haploid female gamete nucleus resulting in the formation of a diploid zygote.  In the human female this occurs about halfway along the fallopian tube. | Description: Description: 42 |
| **Gamete**: any haploid sex cell which must fuse with another sex cell in order to produce a new individual.  A haploid reproductive cell, i.e. it contains half the required genetic information for the formation of a new individual or half the somatic number of chromosomes (in humans = 23), e.g. sperm cell, egg. | Description: Description: 14 |
| **Genotype**: genetic makeup of an individual or the genes that they inherit, e.g. Tt. | |
| **Heterozygous**: possessing a pair of dissimilar genes (alleles) for a trait, e.g. Tt, i.e. the dominant and recessive genes. | |
| **Homozygous**: an organism that breeds true (true-breeding) for a particular trait, because it possesses a pair of similar genes for the trait, e.g. TT or tt. | |
| **Incomplete dominance**: in the heterozygous condition both alleles show complete dominance and an intermediate phenotype results, e.g. in shorthorn cattle red x white, F1 = Roan. It is also called co-dominance. | |
| **Phenotype**: physical appearance of an individual as a result of the interaction of the genotype with the environment. | |
| **Recessive** (allele): gene which can only be expressed when both alleles are the same, i.e. homozygous condition, e.g. tt = dwarf; t is recessive. **OR** The expression of the recessive allele is masked by a dominant allele. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Individual's genetic make up |  |
| 2 | Recessive |  |
| 3 | Alleles |  |
| 4 | Homozygous |  |
| 5 | Phenotype |  |
| 6 | Dominant |  |
| 7 | Heterozygous |  |
| 8 | If parent is Aa possible gametes that it can produce are ... |  |
| 9 | Incomplete dominance |  |
| 10 | If parent is AaBb possible gametes that it can produce are ... |  |
| 11 | Human male sex chromosomes |  |
| 12 | Human female sex chromosomes |  |
| 13 | What is 'junk' DNA? |  |
| 14 | When isolating DNA the first procedure was ... |  |
| 15 | When isolating DNA why did you use wash-up liquid? |  |
| 16 | Linkage |  |
| 17 | Why is a protease necessary when isolating DNA? |  |
| 18 | Sex-linkage |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| /A | A and a | G | Form of a gene | M | Non-coding |
| B | AB; Ab; aB; ab | H | Genes located on X or Y chromosome | N | Physical appearance of genotype |
| C | Allele that masks its recessive partner | I | Genes on the same chromosome | O | To disrupt membranes |
| D | Alleles different | J | Genotype | P | To separate DNA from protein |
| E | Chop | K | Identical alleles or genes | Q | XX |
| F | Expressed when homozygous only | L | Neither allele masks the expression of the other | R | XY |

# 2.5.7 - 8 Variation and Evolution

**KEYWORDS**

Anatomy

Carcinogens

Chromosome

Darwin

Down’s syndrome

Enzyme

Evolution

Expression

Gene

Hormone

Isolation

Meiosis

Mutation

Natural selection

Radiation

Restriction

Transformation

Virus

Wallace

**EXPLANATIONS**

|  |
| --- |
| **Evolution**: a possible explanation how inheritable changes in species have occurred in response to environmental changes by natural selection over long periods of time.  It is the survival of the fittest by adaptation, variation and over-reproduction. |
| Description: Description: 18 |
| **Mutation**: a spontaneous change in the sequence of nitrogenous bases in a gene or a chromosome. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Variation |  |
| 2 | Factors responsible for the differences of heights in humans |  |
| 3 | Mutation |  |
| 4 | Cause of mutations |  |
| 5 | Human condition resulting from a mutation |  |
| 6 | Causes of variation |  |
| 7 | Significance of inherited variation |  |
| 8 | A change in the structure of DNA |  |
| 9 | Types of mutation |  |
| 10 | Scientist(s) responsible for the Theory of Natural Selection |  |
| 11 | Evidence to support the theory of evolution |  |
| 12 | Evolution |  |
| 13 | Natural selection |  |
| 14 | Application of genetic engineering using a microorganism |  |
| 15 | Processes involved in genetic engineering |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Darwin; Wallace | F | Genetic; Environment; Age | K | Production of hormones, enzymes |
| B | Descent of organisms from previous types by natural selection over time | G | Isolation; Restriction; Transformation; Expression | L | Radiation; Viruses; Carcinogens |
| C | Down's syndrome; Cancer | H | Mutation | M | Sexual reproduction; Mutation; Meiosis |
| D | Fossils; Embryos; Anatomy; Genetics | I | Mutation | N | Spontaneous change in genetic makeup |
| E | Gene; Chromosome | J | Produces new genotypes; Allows natural selection | O | Survival of the fittest; Best adapted survive |

# 2.5.9 - 13.H Genetic Engineering and Mendelian

**KEYWORDS**

Chloroplast

Chromosome

Cutting (Restriction)

Diploid

Gamete

Gamete formation

Gene

Genetic engineering

Haemophilia

Herbicide

Independent assortment

Introduction of base sequence changes

Isolation

Law of Independent Assortment

Law of Segregation

Linkage

Mendel’s 1st Law [Segregation]

Mendel’s 2nd Law [Independent Assort]

Mitochondrion

Non-nuclear Inheritance

Red-green colour blindness

Segregation (Genetics)

Sex chromosome

Sex linkage

Transformation (ligation)

Transgenic animals

Variation

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Cutting (Restriction)**: This is slicing up DNA using an enzyme that recognises specific nucleotide sequences on the DNA molecules. It then cuts the DNA strands at those sites. Some bacterial enzymes cut DNA at a specific nucleotide sequence. This is a defence mechanism used by bacteria against viral DNA and is now used as an important tool in biotechnology. | |
| Description: Description: 16 | |
| **Genetic engineering**: modern techniques or processes used to artificially alter the genetic information in the chromosome of an organism.  The process involves the following:   1. isolation of gene 2. cutting (restriction) 3. transformation (ligation), introduction of base sequence changes 4. expression. | |
| **Introduction of base sequence changes**: this results in the order of bases in the host DNA being different | |
| **Isolation**: the process of locating or identifying or removal of a gene (or a piece of DNA or a plasmid) from a chromosome.  **Applications** **of genetic engineering**:   * Tomato plants: gene for producing the enzyme needed to soften the fruit on ripening has been altered and no longer functions. Fruit remains hard, easier to harvest, used to make tomato ketchup. * Sheep: have been given the human gene for factor VIII. Factor VIII is a substance needed for blood clotting. Persons with haemophilia (haemophiliacs) are missing this gene. It is hoped that the factor VIII can be extracted from the sheep’s milk. * Micro-organisms: the production of human insulin by bacteria. | Description: Description: 19 |
| **Law of independent assortment**: (Mendel’s 2nd Law) states that during gamete formation each member of a pair of genes may combine randomly with either of another pair. | Description: Description: 17 |
| **Law of Segregation**: (Mendel’s 1st Law) states that characters (traits) are controlled by pairs of genes (e.g. Tt) that separate (segregate) at gamete formation. Each gamete carries only one gene for the trait.  At fertilisation the new organism will have two genes for each trait – one received from each parent. | Description: Description: 17 |
| **Linkage**: genes located on the same chromosome that are not separated at gamete formation and are inherited together.  Complete linkage, i.e. genes never separating, seldom occurs. The closer the genes are on a chromosome the greater the degree of linkage; the further apart, the lesser the degree of linkage. In the diagram R and S are linked; as are r and s. | Description: Description: 17 |
| **Non-nuclear inheritance**: DNA is found in other organelles of the cell apart from the nucleus, e.g. mitochondrial DNA and chloroplast DNA that is passed on to the next generation.  These organelles play no part in sexual reproduction but are present in the female gametes (eggs). At fertilisation it is only the nucleus of the male gamete that fuses with the egg. All the mitochondrial DNA you possess you got from your mother, and she got hers from her mother, and so on. As a result there are very few different types of mitochondrial DNA. | Description: Description: 07 |
| **Sex-linkage**: genes carried on the sex chromosomes (i.e. X and Y chromosomes) are sex-linked.  Genes are transmitted with the chromosome so the phenotype is related to the sex of the individual. The genes carried on the part of the X chromosome and have no corresponding part on the Y chromosome (i.e. non-homologous part of X chromosome) are X-linked. Examples of such genes are those controlling haemophilia and red/green colour-blindness in humans. | |
| Description: Description: 17 | Description: Description: 17 |
| **Transformation (Ligation)**: the joining or uptake of DNA to a plasmid or chromosome. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Nucleus of a somatic (body) cell |  |
| 2 | Advantage of genetically identical animals |  |
| 3 | Disadvantage of genetically identical animals |  |
| 4 | Genetic engineering |  |
| 5 | Application of genetic engineering involving a plant |  |
| 6 | Application of genetic engineering involving an animal |  |
| 7 | Segregation |  |
| 8 | Products of segregation of Aa |  |
| 9 | Law of Independent Assortment |  |
| 10 | Linkage, sex linkage |  |
| 11 | Sex linked gene |  |
| 12 | Why linked genes do not assort independently |  |
| 13 | Example of a sex (X)-linked condition |  |
| 14 | Organelles in which DNA is found |  |
| 15 | Term used for alleles that lie on the same chromosome |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | A and a | F | Lack of variation; Prone to disease | K | Red-green colour blindness; Haemophilia |
| B | Diploid | G | Linked | L | Same quality wool, meat |
| C | During gamete formation any gene of a pair may combine with either of another pair | H | Manipulation of genes | M | Separation of a pair of genes so gametes get one of each |
| D | Gene on a sex (or X) chromosome | I | Mitochondrion; Chloroplast | N | Slow ripening tomatoes; Herbicide resistant plants |
| E | Genes on the same chromosome | J | Pharmaceuticals from transgenic animals | O | Transmitted together on the same chromosome |

# 2.5.14 DNA, Replication, etc.

**KEYWORDS**

Adenine

Amino acids

Cytosine

DNA

Guanine

Hydrogen bonds

Nitrogenous base

Nucleotides

Nucleus

Purines

Pyrimidines

Ribosome

RNA

Thymine

Uracil

**EXPLANATIONS**

|  |
| --- |
| **Nucleotide**: one of four ‘building blocks’ of RNA and DNA.  A nucleotide is made up of:  1. a phosphate group  2. one five carbon sugar: deoxyribose (C5H10O4) or ribose (C5H10O5)  3. one nitrogen base: adenine (A), cytosine (C), guanine (G), thymine (T), uracil (U). |
| Description: Description: 16 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Non-coding DNA |  |
| 2 | Structural differences between DNA and RNA |  |
| 3 | Two main events in the replication of DNA |  |
| 4 | RNA is not found in ribosomes. True or False. |  |
| 5 | Bases found in DNA |  |
| 6 | Triplet code |  |
| 7 | Transcription |  |
| 8 | mRNA carries the code to the ... |  |
| 9 | Cell organelle containing most DNA |  |
| 10 | Instructions needed to make protein are called the ... code |  |
| 11 | In DNA profiling fragments are separated on the basis of... |  |
| 12 | Purpose of Freezer-cold alcohol |  |
| 13 | DNA is a double helical shape. True or False. |  |
| 14 | The base Uracil is found in DNA. True or False. |  |
| 15 | In DNA this base can link only to thymine |  |
| 16 | In DNA this base can link only to cytosine |  |
| 17 | How the DNA strands held together |  |
| 18 | Types of nitrogenous bases found in DNA |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adenine | G | False | M | Purines and pyrimidines |
| B | Adenine; Thymine; Guanine; Cytosine | H | Genetic | N | Ribosome |
| C | DNA contains thymine; RNA contains uracil | I | Guanine | O | Size |
| D | DNA unzips and new strands made | J | Hydrogen bonds | P | Three bases code for one amino acid |
| E | Does not code for a protein | K | Information (code) is copied to RNA molecule | Q | To bring DNA out of solution |
| F | False | L | Nucleus | R | True |

# 3.1.3 Monera

**KEYWORDS**

Antibiotic

Antibiotic resistance

Autotroph

Autotrophic [bacteria]

Autotrophic nutrition

Bacteria

Binary fission

Biotechnology

Capsule

Chemosynthesis

Chemosynthetic bacteria

Coccus

Endospores

Flagellum

Heterotroph

Heterotrophic [organism]

Heterotrophic nutrition

Host

Kingdom

Monera

Mucilage

Parasite

Parasitic

Pathogen

Pathogenic

Peristalsis

Photosynthetic bacteria

Plasmid

Prokaryotae

Prokaryotic bacteria

Rod

Saprophytic

Saprophytic nutrition

Spiral

Spores

Virus

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Antibiotic**: substance naturally produced by living micro-organisms (e.g. Penicillium notatum) which destroys or inhibits the growth or reproduction of other micro-organisms, especially bacteria or fungi, e.g. penicillin, streptomycin, tetracycline, etc.  The ability to make this substance is controlled by a gene, which can be passed on to other bacteria of the same or different species. Note: antibiotics have no effect on viruses. | |
| **Antibiotic resistance:** see antibiotic. If a patient is given an antibiotic it kills all bacteria (good and bad) except those that are naturally resistant to it – they may not be pathogens. These antibiotic resistant bacteria now flourish and increase in numbers. If a pathogen now attacks the patient it can pick up the resistance to the antibiotic from the non-pathogen, thus conferring resistance on itself.  The number of antibiotic resistant bacteria is on the increase, so the use of antibiotics should be minimised. | |
| **Autotrophic bacteria**: bacteria that are self-nourishing, i.e. capable of making (synthesising) their own food from inorganic compounds. | |
| **Chemosynthetic bacteria**: e.g. nitrifying bacteria. Autotrophic bacteria (organisms) make their food (get their energy) from the oxidation of inorganic compounds (e.g. nitrogen compounds) and not from light (photosynthesis). | |
| **Heterotrophic bacteria / organism**: bacteria or organism that cannot make their own food.  Depend on other organisms as sources of food, e.g. all animals. They may be saprophytic or parasitic. | |
| **Parasitic**: refers to an organism that lives in or on another organism (the host) from which it derives its nourishment and causes it harm. | |
| **Pathogen**: an organism that causes a disease, e.g. pathogenic bacteria are capable of causing a disease, e.g. diphtheria, whooping cough and tetanus (3 in 1 vaccination). | |
| **Photosynthetic bacteria**: e.g. autotrophic green sulfur bacteria get energy from sun. See summary chart. | Description: Description: 29 |
| **Prokaryotic cells**: cells that do not have a membrane-bound (true) nucleus or membrane-bound organelles, e.g. bacteria. | Description: Description: 21 |
| **Saprophytic**: a type of heterotrophic nutrition where an organism obtains its food from dead or decaying organic matter. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Bacteria belong to this kingdom |  |
| 2 | Ways in which bacterial cell differs from human cell |  |
| 3 | Bacterial response to adverse environmental conditions |  |
| 4 | Pathogenic bacteria |  |
| 5 | Antibiotics |  |
| 6 | Photosynthetic bacteria |  |
| 7 | Chemosynthetic bacteria |  |
| 8 | Forms of heterotrophic nutrition |  |
| 9 | Antibiotic resistance |  |
| 10 | Why antibiotics not prescribed for a viral infection |  |
| 11 | Term for asexual reproduction in bacteria |  |
| 12 | Layer outside cell wall of some bacteria |  |
| 13 | Function of capsule |  |
| 14 | Structure not found in all bacteria |  |
| 15 | Autotrophic nutrition |  |
| 16 | Heterotrophic nutrition |  |
| 17 | Saprophytic nutrition |  |
| 18 | Function of saprophytic bacteria |  |
| 19 | Chemosynthesis |  |
| 20 | Organism from which a parasite obtains its food |  |
| 21 | Diseases caused by bacteria |  |
| 22 | Function of flagella |  |
| 23 | Bacterial types (shapes) |  |
| 24 | Economic importance of bacteria |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Bacteria not killed by antibiotic | I | Flagellum; Plasmid | Q | Parasitic; Saprophytic |
| B | Binary fission | J | Have no effect on viruses | R | Produce (endo)spores |
| C | Capsule; Slime layer; Mucilage | K | Host | S | Protection |
| D | Cause disease; Biotechnology | L | Make food using a chemical reaction | T | Rod; Coccus; Spiral |
| E | Cell wall; Capsule; Flagellum; Plasmid | M | Makes own food | U | Substances produced by micro-organisms which inhibit bacteria |
| F | Decompose dead organisms | N | Monera or Prokaryotae | V | TB; Syphilis; Cholera; Tetanus |
| G | Disease-causing | O | Movement | W | Use light to make food |
| H | Feeds on dead matter | P | Obtaining energy from chemical reactions | X | Uses food already made by other organisms |

# 3.1.4 Fungi

**KEYWORDS**

Absorption

Asexual reproduction

Budding

Digestion

Filament

Fungi

Germination

Heterotrophic

Hypha

Meiosis

Mitosis

Mycelium

Natural selection

Rhizoids

Saprophytic

Sexual reproduction

Sporangium

Spores

Stolon

Yeast

Zygospore

**EXPLANATIONS**

|  |
| --- |
| Description: Description: 22 |
| Description: Description: 22 |

## Fungi 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Kingdom to which yeasts belong |  |
| 2 | Yeast beneficial to humans for ... |  |
| 3 | The nutrient medium on which you grew leaf yeast |  |
| 4 | Features of *Rhizopus* that shows it belongs to the kingdom Fungi |  |
| 5 | What happens when zygospore germinates |  |
| 6 | Eukaryotic organism |  |
| 7 | Saprophytic fungi |  |
| 8 | Role of saprophytic fungi |  |
| 9 | Role of parasitic fungi |  |
| 10 | Parasitic fungi |  |
| 11 | Example of a beneficial fungus |  |
| 12 | Example of a harmful fungus |  |
| 13 | Function of rhizoid |  |
| 14 | Function of sporangium |  |
| 15 | Function of gametangium |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anchors; Digestion; Absorption | F | Living in or on another organism causing harm | K | Produces Spores; Stores spores; Asexual reproduction |
| B | Baking; Brewing | G | Malt agar | L | Recycling of nutrients; Decay |
| C | Fungi | H | Meiosis, hypha grows, sporangium, produces spores, released, germinate | M | Ringworm; Athlete's foot; Potato blight |
| D | Keep populations under control; Natural selection | I | Possess nucleus and membrane-bound organelles | N | Stolon; rhizoids; mycelium; hyphae; sporangium |
| E | Live on dead organisms (matter) | J | Produces gametes; Sexual reproduction | O | Yeast for brewing or baking |

## Fungi 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Function of zygospore |  |
| 2 | Hypha |  |
| 3 | Mycelium |  |
| 4 | Role, other than anchorage, for rhizoids |  |
| 5 | Mode of nutrition of athlete's foot |  |
| 6 | Member of the Fungi kingdom that is of benefit to humans |  |
| 7 | Member of the Fungi kingdom that is harmful to humans |  |
| 8 | Type of nutrition in *Rhizopus* |  |
| 9 | Type of cell division is involved in reproduction in yeast |  |
| 10 | Anaerobic conditions |  |
| 11 | In anaerobic conditions yeast produces alcohol (ethanol) and ... |  |
| 12 | How *Rhizopus* gets its food |  |
| 13 | Type of heterotrophic nutrition in *Rhizopus* |  |
| 14 | Economically harmful members of the Fungi kingdom |  |
| 15 | Process of asexual reproduction in yeast |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Budding | F | Mass of hyphae | K | Parasitic |
| B | Carbon dioxide | G | Mitosis | L | Rhizopus; Mildew; Blight; Athlete's foot |
| C | Filament | H | Mushrooms – edible and medical | M | Saprophytic |
| D | Heterotrophic; Saprophytic | I | Mushrooms – poisonous | N | Secretes enzymes, onto bread, external digestion, absorbs products |
| E | Lack of oxygen or air | J | Nutritional – secretes enzymes, absorbs products | O | Survival; Dispersal |

## Fungi 1 and 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Anaerobic conditions |  |
| 2 | Economically harmful members of the Fungi kingdom |  |
| 3 | Eukaryotic organism |  |
| 4 | Example of a beneficial fungus |  |
| 5 | Example of a harmful fungus |  |
| 6 | Features of *Rhizopus* that shows it belongs to the kingdom Fungi |  |
| 7 | Function of gametangium |  |
| 8 | Function of rhizoid |  |
| 9 | Function of sporangium |  |
| 10 | Function of zygospore |  |
| 11 | How *Rhizopus* gets its food |  |
| 12 | Hypha |  |
| 13 | In anaerobic conditions yeast produces alcohol (ethanol) and ... |  |
| 14 | Kingdom to which yeasts belong |  |
| 15 | Member of the Fungi kingdom that is harmful to humans |  |
| 16 | Member of the Fungi kingdom that is of benefit to humans |  |
| 17 | Mode of nutrition of athlete’s foot |  |
| 18 | Mycelium |  |
| 19 | Parasitic fungi |  |
| 20 | Process of asexual reproduction in yeast |  |
| 21 | Role of parasitic fungi |  |
| 22 | Role of saprophytic fungi |  |
| 23 | Role, other than anchorage, for rhizoids |  |
| 24 | Saprophytic fungi |  |
| 25 | The nutrient medium on which you grew leaf yeast |  |
| 26 | Type of cell division is involved in reproduction in yeast |  |
| 27 | Type of heterotrophic nutrition in *Rhizopus* |  |
| 28 | Type of nutrition in *Rhizopus* |  |
| 29 | What happens when zygospore germinates |  |
| 30 | Yeast beneficial to humans for ... |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anchors; Digestion; Absorption | K | Living in or on another organism causing harm | U | Produces gametes; Sexual reproduction |
| B | Baking; Brewing | L | Malt agar | V | Produces spores; Stores spores; Asexual reproduction |
| C | Budding | M | Mass of hyphae | W | Recycling of nutrients; Decay |
| D | Carbon dioxide | N | Meiosis, hypha grows, sporangium, produces spores, released, germinate | X | Rhizopus; Mildew; Blight; Athlete's foot |
| E | Filament | O | Mitosis | Y | Ringworm; Athlete's foot; Potato blight |
| F | Fungi | P | Mushrooms – edible and medical | Z | Saprophytic |
| G | Heterotrophic; Saprophytic | Q | Mushrooms – poisonous | A2 | Secretes enzymes, onto bread, external digestion, absorbs products |
| H | Keep populations under control; Natural selection | R | Nutritional - secretes enzymes, absorbs products | B2 | Stolon; Rhizoids; Mycelium; Hyphae; Sporangium |
| I | Lack of oxygen or air | S | Parasitic | C2 | Survival; Dispersal |
| J | Live on dead organisms (matter) | T | Possess nucleus and membrane-bound organelles | D2 | Yeast for brewing or baking |

# 3.1.5, 6, 10 Lab, Protista, Growth Curves

**KEYWORDS**

Adapt

*Amoebae*

Asepsis

Autoclave

Batch (Flow) processing

Bioreactor

Chloroplast

Continuous (Flow) processing

Contractile vacuole

Exponential phase

Hypotonic

Lag phase

Log phase

Protista

Sterile

Sterility

Contractile vacuole

Pseudopod

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Asepsis**: or aseptic techniques. Methods used to prevent unwanted micro-organisms entering an area of an experiment. | |
| **Batch (bio) processing**: is a method used to manufacture an exact quantity of product, and then the process is repeated for the next ‘batch’. The organisms being grown are in a five phase growth curve. | |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\21.19.jpg | Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\21.20.jpg |
| **Continuous flow (bio) processing**: is a method used to manufacture a product without interruption. The organisms being grown are maintained in a particular phase of the growth curve, i.e. the log phase. | |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\21.21.jpg | Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\21.22.jpg |
| **Sterility**: the state of being sterile, i.e. free from all types of micro-organisms. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | How to dispose of used agar plates |  |
| 2 | Sterile |  |
| 3 | How to sterilise apparatus |  |
| 4 | Purpose of agar when growing bacteria |  |
| 5 | Kingdom to which *Amoeba* belongs |  |
| 6 | Function of pseudopods in *Amoeba* |  |
| 7 | First part of a growth curve |  |
| 8 | Why contractile vacuole more active in freshwater amoebae |  |
| 9 | What is happening during the lag phase? |  |
| 10 | Second part of a growth curve |  |
| 11 | Structure in *Amoeba* that gets rid of excess water |  |
| 12 | Batch processing |  |
| 13 | Found in plant cell but not in *Amoeba* |  |
| 14 | What is happening during log or exponential phase? |  |
| 15 | Continuous flow processing |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adapting to environment | F | Feeding; Movement | K | Log or Exponential phase |
| B | Autoclave at 121 °C for 15 minutes | G | Fixed amount of nutrients added at beginning | L | Nutrient medium |
| C | Autoclave in disposal bag | H | Free from (micro-) organisms | M | Nutrients constantly fed into bioreactor |
| D | Cell wall; Chloroplast | I | Freshwater *Amoebae* more hypotonic | N | Protista |
| E | Contractile vacuole | J | Lag phase | O | Reproducing rapidly |

# 3.2.1 Plant Structure

**KEYWORDS**

Bud

Companion cells

Cotyledon

Dermal tissue

Dicotyledonous

Diffusion

Embryonic

Ground tissue

Lignin

Lumen

Meristem

Meristematic tissue

Mid-rib

Mitosis

Perennation

Phloem

Phloem sieve tube

Photosynthesis

Stomata

Transpiration

Transverse section

Vascular bundle

Vascular tissue

Vein

Xylem

Xylem tracheids

Xylem vessel

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Companion cells:** cells in phloem associated with sieve tube cells. The nucleus of the companion cell also controls the activities of the phloem sieve tube cells. | E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\24.09.jpg |
| **Phloem sieve tube:** long cells, thin side walls, thick perforated end walls (sieve) allow passage of cytoplasm between cells. No nucleus when mature. |
| **Meristem**: tip of shoots and roots of plants. Area of active cell division (mitosis) which produces ‘simple’ cells.  These new cells will later undergo elongation and differentiation to give rise to the various plant tissues, e.g. xylem, phloem, etc. | Description: Description: 24 |
| **Xylem tracheids:** long, relatively narrow, dead cells, containing lignin for support. Tapered at both ends, pits in the walls to allow sideways movement from cell to cell of water and minerals. | E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\24.08.B.jpg |
| **Xylem vessel:** short, wide, dead cells arranged end to end, no end walls. Form continuous tube, larger diameter cells than xylem tracheids. Have lignin, in spiral bands for thickening, and numerous pits. They transport water and minerals upwards from root to stem. |

## Plant Structure 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Lenticels serve the same function as stomata. True or False |  |
| 2 | The walls of xylem vessels are reinforced with ... |  |
| 3 | Where xylem tissue is found in the stem of a dicotyledonous plant |  |
| 4 | Vascular tissue in plants, other than xylem |  |
| 5 | Location where mitosis occurs in flowering plants |  |
| 6 | In a TS of a dicotyledonous stem, tissues that are not vascular tissues include ... |  |
| 7 | Monocotyledonous plants have parallel leaf veins. True or False |  |
| 8 | Function of phloem |  |
| 9 | Function of xylem |  |
| 10 | Why a dicotyledonous (dicot) plant is so called |  |
| 11 | A dicotyledonous plant |  |
| 12 | Phloem transports water in plants. True or False |  |
| 13 | How xylem is adapted for water transport |  |
| 14 | Vascular tissue in which sugars are mainly transported |  |
| 15 | Function of dermal tissue |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Dermal; Ground; Meristematic | F | Phloem | K | True |
| B | False | G | Phloem | L | True |
| C | Lignin | H | Protection against water loss, infection | M | Tubular lumen; Lignified walls; Narrow bore |
| D | Meristematic tissue | I | Transport of food, minerals, auxins | N | Two embryonic (seed) leaves |
| E | Oak; Ash; Elm; Horse chestnut | J | Transport of water, minerals; Support | O | Vascular bundle |

## Plant Structure 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | How a TS through a monocot stem differs from a dicot |  |
| 2 | Functions of a root |  |
| 3 | Meristem in a root found here |  |
| 4 | Function of vascular tissue |  |
| 5 | Where xylem and phloem are found in a leaf |  |
| 6 | Found in the walls of xylem cells but not in phloem cells |  |
| 7 | Function of ground tissue |  |
| 8 | Meristem |  |
| 9 | Location of a meristem in a winter twig |  |
| 10 | Functions of a stem |  |
| 11 | Tissue type to which xylem and phloem belong |  |
| 12 | Another function of xylem in addition to transport |  |
| 13 | Where in a young root xylem and phloem tissues are found |  |
| 14 | Main function of leaf |  |
| 15 | How xylem is adapted for water transport |  |
| 16 | Tube-like tissue in the stem through which water moves |  |
| 17 | Ground tissue |  |
| 18 | Function of guard cells |  |
| 19 | Gases exchanged by the leaf |  |
| 20 | Process by which the gases move in or out of the leaf |  |
| 21 | Vascular tissue in plants, other than xylem |  |
| 22 | Direction of water transport |  |
| 23 | Monocotyledonous |  |
| 24 | How veins arranged in the leaves of monocots |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anchorage; Absorption; Storage | I | Found between dermal and vascular tissue | Q | Transport; Support; Perennation |
| B | At the tip | J | Having one cotyledon and parallel venation | R | Transports substances |
| C | Bud; Stem tip | K | Lignin | S | Tubular lumen (Continuous; Hollow); Lignified walls; Narrow bore |
| D | Carbon dioxide; Oxygen | L | Phloem | T | Upwards |
| E | Centre | M | Photosynthesis; Transpiration; Gas exchange | U | Vascular |
| F | Control stomatal size and passage of gases | N | Region of mitosis in plants | V | Vascular bundles scattered |
| G | Diffusion | O | Scattered | W | Vein; Mid rib; Vascular bundle |
| H | Food storage; Support; Photosynthesis; Strength | P | Support | X | Xylem or vascular tissue |

# 3.2.2 Blood and Circulation

**KEYWORDS**

Abdomen

ABO

Antibodies

Aorta

Artery

Atrium

Auricle

Bicuspid valve

Blood plasma

Blood pressure

Capillary

Cardiac

Closed circulatory system

Collagen

Coronary

Diaphragm

Diet

Endothelium

Foetus

Glucose

Hepatic portal vein

Hormones

Insulin

Long bones

Marrow

Mitral valve

Node

Non-elastic fibres

Open circulatory system

Plasma

Portal Blood System

Pulmonary

Pulmonary artery

Pulmonary vein

Pulse

Red blood cell

Renal

Rhesus

Semi-lunar valve

Systemic

Thoracic

Transfusion

Tricuspid valve

Vein

Ventricle

White blood cell

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Artery**: thick-walled blood vessel that carries blood away from heart rapidly at high pressure.  Blood flows in pulses. Arteries have no valves. They have a small lumen and a three-layered wall:   * *outer layer*: non-elastic fibres – collagen * *middle layer*: elastic fibres and muscles (thick layer) * *inner layer*: endothelium – one cell thick.. | Description: Description: 27 |
| **Capillary**: blood vessel that link arterioles and venules.  Walls one cell thick (endothelium). Substances diffuse from the capillaries into the fluid in the spaces between the body cells (tissue fluid or extra-cellular fluid) and from there diffuse into the cells. Waste products in the cell diffuse in the reverse direction, i.e. into lymphatic vessels or blood capillaries. | |
| Description: Description: 27 | Description: Description: 27 |
| **Closed circulation**: refers to a transport system that confines the blood to, or maintains it in, a collection of tubules (blood vessels). | Description: Description: 27 |
| **Open circulation**: refers to a transport system that does not confine the blood to a collection of tubules, e.g. insects.  The blood leaves the tubules and flows among the body cells. | Description: Description: 27 |
| **Portal blood system**: circulatory system in which capillaries drain into a vein that opens into another capillary network, i.e. it begins and ends in capillaries, e.g. hepatic portal system | |
| **Vein**: thin-walled blood vessel that carries blood to the heart slowly, at low pressure.  Has a large lumen. Also a three-layered wall:   * *outer layer*: non-elastic fibres * *middle layer*: elastic fibres and muscles (thin layer) * *inner layer*: endothelium, one cell thick. * has valves, which prevent blood flowing backwards. Blood flows steadily. No pulse. See diagram above. | |

## Blood and Circulation 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Tissues present in the walls of arteries and veins |  |
| 2 | Function of collagen |  |
| 3 | Function of muscles in arteries and veins |  |
| 4 | Function of endothelium |  |
| 5 | Function of the valves |  |
| 6 | Heart chamber with the thickest muscular wall |  |
| 7 | How to expose a semilunar valve |  |
| 8 | Function of a semilunar valve |  |
| 9 | Origin of the coronary artery |  |
| 10 | Location of liver in the human body |  |
| 11 | Where red blood cells are made |  |
| 12 | Blood vessel that returns blood to the heart from the lungs |  |
| 13 | Circuits of the circulatory system |  |
| 14 | Left ventricle pumps blood into this circuit |  |
| 15 | Expansion and contraction of artery wall |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Aorta (near semilunar valve) | F | Lining of blood vessels | K | Pulmonary; Systemic |
| B | Collagen; Muscles; Endothelium | G | Marrow of long bones | L | Pulse |
| C | Cut aorta or Pulmonary artery | H | Non-elastic fibres prevent over expansion of vessel | M | Stops back flow of blood into ventricle from artery |
| D | Help in moving blood along vessels | I | Prevent backflow of blood | N | Systemic |
| E | Left ventricle | J | Pulmonary vein | O | Upper abdomen, under diaphragm |

## Blood and Circulation 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Force exerted by blood |  |
| 2 | Body cavity in which the heart and lungs are located |  |
| 3 | How heart muscle differs from other muscles |  |
| 4 | Average resting rate of the human heart (bpm) |  |
| 5 | Factor that decreases heart rate |  |
| 6 | Factor that increases heart rate |  |
| 7 | Pulmonary artery brings blood to ... |  |
| 8 | Function of bicuspid valve |  |
| 9 | Artery that supplies the heart muscle with blood |  |
| 10 | Liquid part of blood |  |
| 11 | Substances dissolved in plasma |  |
| 12 | Function of the liquid part of blood |  |
| 13 | Function of red cells |  |
| 14 | Function of white cells |  |
| 15 | Blood-grouping systems |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 72 | F | Fear (fright); Exercise; Drugs; Infection | K | Prevent backflow of blood from left ventricle to auricle |
| B | ABO and Rhesus | G | Glucose; Carbon dioxide; Insulin; Antibodies | L | Protection against disease |
| C | Blood pressure | H | Hold 'cells' and dissolved substances | M | Sleep; Drugs (sedatives) |
| D | Coronary artery | I | Lungs | N | Thoracic or Chest |
| E | Doesn't tire | J | Plasma | O | Transport oxygen |

## Blood and Circulation 3

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | The hepatic portal vein carries blood from the intestines to the ... |  |
| 2 | Effect of smoking on the pulse resting rate |  |
| 3 | Blood vessel that carries blood from the heart to the lungs |  |
| 4 | Blood vessel that carries blood from the lungs to the heart |  |
| 5 | Function of valves in veins |  |
| 6 | Why valves are not needed in arteries |  |
| 7 | Which has the bigger lumen, an artery or a vein? |  |
| 8 | Advantage of capillary wall one cell thick |  |
| 9 | How a portal vein differs from other veins |  |
| 10 | Blood vessels from the aorta to the kidneys |  |
| 11 | Blood vessels that supply the heart's muscle with blood |  |
| 12 | Chamber of heart that receives blood from the lungs |  |
| 13 | Substances dissolved in plasma |  |
| 14 | Blood in the Aorta – oxygenated or deoxygenated? |  |
| 15 | Why wall of left ventricle is thicker than wall of right ventricle |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Blood is under pressure | F | Liver | K | Raises rate |
| B | Capillaries at both ends | G | Oxygenated | L | Renal arteries |
| C | Coronary or Cardiac arteries | H | Pulmonary artery | M | Substances can diffuse in and out of blood easily |
| D | Glucose; Carbon dioxide; Insulin; Antibodies | I | Pulmonary vein | N | To prevent back flow of blood |
| E | Left atrium (auricle) | J | Pumps blood further | O | Vein |

## Blood and Circulation 4

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Blood without cells, watery liquid part of blood |  |
| 2 | Role for blood plasma |  |
| 3 | Types of cell found in the blood |  |
| 4 | The four ABO blood groups |  |
| 5 | Importance of knowing a person's blood group |  |
| 6 | The artery connected to the kidneys |  |
| 7 | The vein that joins the intestine to the liver |  |
| 8 | Location of heart in the human body |  |
| 9 | Structure(s) protecting the heart |  |
| 10 | Upper chambers of the heart |  |
| 11 | Heart valve between chambers on the left-hand side |  |
| 12 | Factors that affect the health of our circulatory system |  |
| 13 | Blood vessel that brings blood from the heart to the body |  |
| 14 | Lymphatic system composed of... |  |
| 15 | Functions of the lymphatic system |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | A; B; AB; 0 | F | Diet; Exercise; Age | K | Renal artery |
| B | Aorta | G | Hepatic Portal vein | L | Rib cage |
| C | Atria or Auricles | H | Nodes and vessels | M | Thorax |
| D | Bicuspid (mitral) valve | I | Plasma | N | Transfusion; To prevent loss of foetus |
| E | Carries dissolved substances; Waste; Hormones; Antibodies | J | Red blood cell; white blood cell | O | Transport of fats; Nodes filter bacteria; Produce antibodies |

# 3.2.3 + 4 Blood Cells and Heartbeat

**KEYWORDS**

Atrium

Deoxygenated

Haemoglobin

Lymphocytes

Marrow

Mitochondria

Monocytes

Plasma

Tricuspid valve

Ventricle

**EXPLANATIONS**

|  |
| --- |
| Description: Description: 38 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | How red blood cells differ from cheek cells |  |
| 2 | Function of valves in veins |  |
| 3 | Red blood cells have no nucleus. True or False |  |
| 4 | Location in body where red blood cells are made |  |
| 5 | White blood cells, other than lymphocytes |  |
| 6 | Contractile tissue |  |
| 7 | Blood in the Vena Cava – oxygenated or deoxygenated? |  |
| 8 | The pacemaker is on the left side of the heart. True or False. |  |
| 9 | Factor that decreases heart rate |  |
| 10 | Role of the SA (sinoatrial) node |  |
| 11 | Liquid part of blood |  |
| 12 | Location of SA node in the heart |  |
| 13 | Function of white cells |  |
| 14 | Role of the AV (atrioventricular) node |  |
| 15 | Location of AV node in the heart |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Between atrium and ventricle; Near tricuspid valve | F | In wall of right atrium | K | Plasma |
| B | Deoxygenated | G | It can shorten | L | Protection against disease |
| C | False | H | Marrow of long bones | M | Sleep; Drugs (sedatives) |
| D | Impulse generation; Causing contraction (of heart muscle) | I | Monocytes | N | To prevent back flow of blood |
| E | Impulse generation; Causing contraction (of heart muscle) | J | No nucleus; Haemoglobin; No mitochondria | O | True |

# 3.3.1 + 2 Nutrition and Storage in Plants

**KEYWORDS**

Active transport

Adhesion

Autotrophic (organism)

Bulb

Capillarity

Cohesion

Corm

Lenticels

Lignin

Modified leaf

Modified root

Modified stem

Osmosis

Photosynthesis

Rhizome

Root hairs

Root Pressure

Stoma(ta)

Transpiration

Tuber

Xylem

**EXPLANATIONS**

|  |
| --- |
| **Autotrophic bacteria/organism**: bacteria that are self-nourishing, i.e. capable of making (synthesising) their own food from inorganic compounds. |
| **Root pressure**: the force which can push water up a stem from the root and cause it to exude from a cut stump of a plant.  The movement of water into the xylem, by osmosis, causes this. |
| **Transpiration**: the loss of water vapour from the surface of a plant. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Where water enters a plant |  |
| 2 | Process responsible for water entry to plant |  |
| 3 | Osmosis is responsible for uptake of minerals. True or False |  |
| 4 | Water ascends through this plant tissue |  |
| 5 | Adaptation of xylem for water transport |  |
| 6 | Autotrophic organisms |  |
| 7 | Function of stomata |  |
| 8 | Factor that influences stomatal diameter |  |
| 9 | Openings in stems equivalent to stomata |  |
| 10 | Openings in the leaf which allow entry of CO2 |  |
| 11 | How minerals (nitrates) enter the root of a plant |  |
| 12 | Gas that exits the leaf at the stomata |  |
| 13 | Processes that cause water to move upwards in a plant |  |
| 14 | Why less water moves through plant at night |  |
| 15 | Plant with leaves modified for food storage |  |
| 16 | Carbohydrate found in modified leaves |  |
| 17 | Modified stems for food storage |  |
| 18 | Tuber |  |
| 19 | Bulb |  |
| 20 | A potato is a modified stem. True or False |  |
| 21 | Root modified for food storage |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Active transport | H | Modified leaf | O | Root hairs |
| B | Carrot; Turnip; Parsnip | I | Modified stem or Root | P | Root pressure; Cohesion; Adhesion; Capillarity; Transpiration |
| C | CO2 concentration; Light intensity; K+ ions | J | No photosynthesis; Stomata closed; Night-time cooler | Q | Starch |
| D | False | K | Onion; Tulip; Daffodil; Cabbage | R | Stomata |
| E | Grass; Seaweed; Fern; Moss | L | Osmosis | S | To allow exchange of gases |
| F | Has lignin for strength and support | M | Oxygen; Water vapour; Carbon dioxide; Nitrogen | T | True |
| G | Lenticels | N | Rhizome; Corm; Tuber | U | Xylem |

# 3.3.3 + 4 Human Nutrition and Digestion

**KEYWORDS**

Absorption

Amino acids

Amylase

Autotrophic nutrition

Bile

Bile salts

Carnivore

Chemical digestion

Colon

Constipation

Diffusion

Digestion

Duodenum

Egestion

Emulsification

Enzymes

Fatty acids

Fibre

Gall bladder

Glycerol

Herbivore

Heterotrophic (organism)

Hydrochloric acid

Ileum

Immune system

Ingestion

Insulin

Lipase

Liver

Lymph

Maltase

Maltose

Mechanical digestion

Molar teeth

NaHCO3

Neutralisation

Omnivore

Pancreas

Pathogens

Peristalsis

Protein

Rectum

Stomach

Symbiotic bacteria

Villi

Vitamins

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Absorption**: the taking in of nutrients (small molecules) by a cell, through its membrane.  In digestion, the taking in, by the blood and lymph systems (lacteals), of the end products of digestion (monosaccharides, amino acids, fatty acids, glycerol, etc.). | |
| **Bile salts**: Are chemicals produced by the liver and stored in the gall bladder.  Bile aids digestion by:  • changing the pH of the stomach contents from acid to alkaline,  • emulsifying fats to fat droplets,  • activating pancreatic lipase. | |
| **Carnivore**: an animal or plant that feeds exclusively or mainly on animal flesh, e.g. fox, dog, ladybird, Venus fly-trap. | |
| **Chemical digestion**: enzyme or acidic action breaking down food into simpler compounds.   * Carbohydrates are broken down to simple sugars, e.g. glucose * Fats are broken down to fatty acids and glycerol * Proteins are broken down to amino acids   Chemical digestion begins in the mouth where salivary amylase (ptyalin) begins digesting starch. Most chemical digestion takes place in the small intestine. | |
| **Digestion**: the physical (chewing = mastication) and chemical process by which large particles and molecules of food are broken down into simpler, soluble, absorbable, usable forms. | |
| **Egestion**: elimination of faeces (unabsorbed material) from the body.  This is not excretion. | |
| **Herbivore**: an animal that feeds exclusively or mainly on plants, e.g. rabbit. | |
| **Heterotrophic bacteria / organism**: bacteria or organism that cannot make their own food.  Depend on other organisms as sources of food, e.g. all animals. They may be saprophytic or parasitic. | |
| **Ingestion**: the process of taking food into the body through the mouth | |
| **Mechanical digestion**: the physical process of grinding or cutting or churning or chewing or emulsifying food.  The purpose of mechanical digestion is to make the ‘lumps’ of food smaller, thus increasing the surface area for chemical digestion by enzymes. | |
| **Omnivore**: an animal that feeds on plants and animal flesh, e.g. human. | |
| **Peristalsis:** method of moving substances (e.g. food) through tubes (e.g. intestines) by waves of rhythmic contractions and relaxations of muscles. | **E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\29.05.jpg** |

## Human Nutrition and Digestion 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Herbivore |  |
| 2 | Omnivore |  |
| 3 | Carnivore |  |
| 4 | Absorption |  |
| 5 | Autotrophic nutrition |  |
| 6 | Heterotrophic nutrition |  |
| 7 | Digestion |  |
| 8 | Peristalsis |  |
| 9 | Why a low pH is important in the stomach |  |
| 10 | Why fibre is important |  |
| 11 | Enzyme involved in digestion of fat |  |
| 12 | Products of fat digestion |  |
| 13 | Role of bile in fat digestion |  |
| 14 | Role of beneficial bacteria in alimentary canal |  |
| 15 | How villi are adapted for absorption |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | An animal that eats both animals and plants | F | Fatty acids and glycerol | K | Movement across membrane into blood or lymph |
| B | Animal that feeds on animals only | G | Kills germs; Optimum pH for enzymes | L | Muscular contractions to move food |
| C | Animal that feeds on plants only | H | Large surface area; Rich blood supply; Thin-walled | M | Peristalsis; Prevent constipation |
| D | Breaking down food | I | Lipase | N | Production of vitamins; Inhibition of pathogens |
| E | Emulsification | J | Makes own food | O | Uses food already made by other organisms |

## Human Nutrition and Digestion 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Protease enzyme |  |
| 2 | Products of protein digestion |  |
| 3 | Carbohydrate-digesting enzyme |  |
| 4 | Site of action of amylase |  |
| 5 | Product(s) produced by amylase digestion |  |
| 6 | Mechanical digestion |  |
| 7 | Chemical digestion |  |
| 8 | Structure, other than teeth, involved in mechanical digestion |  |
| 9 | Functions of bile in digestive system |  |
| 10 | Where lipase is secreted |  |
| 11 | Site of action of lipase |  |
| 12 | Optimum pH for lipase |  |
| 13 | Activities of symbiotic bacteria in digestive system |  |
| 14 | Optimum pH for amylase |  |
| 15 | Where products of digestion are absorbed into the blood |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Amino acids | F | Duodenum; Small intestine | K | Mouth; Small intestine |
| B | Amylase | G | Emulsification; Neutralisation | L | Pancreas |
| C | Between 7 and 9 | H | Enzyme action | M | Production of vitamins; Benefit immune system |
| D | Between 7 and 9 | I | Grinding; Cutting or Chewing | N | Stomach; Small intestine |
| E | Breaks down protein | J | Maltose | O | Villi or Ileum |

## Human Nutrition and Digestion 3

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Process involved in absorption of digested products |  |
| 2 | Adaptations of ileum for the absorption |  |
| 3 | How wholegrain cereal helps prevent constipation |  |
| 4 | Human dental formula |  |
| 5 | Function of incisor |  |
| 6 | Function of canine |  |
| 7 | Function of premolar |  |
| 8 | Function of molar |  |
| 9 | Symbiotic bacteria |  |
| 10 | Part of digestive system where water is absorbed |  |
| 11 | An organ for churning of food to chyme |  |
| 12 | Waves of contractions passing through the gut |  |
| 13 | An enzyme that turns fats to fatty acids and glycerol |  |
| 14 | Emulsify fats |  |
| 15 | Where bile is produced |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adds fibre; Absorbs water; Peristalsis encouraged; Faster movement | F | Cutting | K | Live in or on another organism, involving benefit |
| B | Bile salts | G | Diffusion | L | Liver |
| C | Colon; Stomach; Duodenum; Ileum | H | i 2/2; c 1/1; pm 2/2; m 3/3 | M | Peristalsis |
| D | Crushing | I | Large surface area; Good blood and lymph supply; Lining one cell thick; Long; Villi | N | Stomach |
| E | Crushing | J | Lipase | O | Tearing |

## Human Nutrition and Digestion 4

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Where bile is stored |  |
| 2 | Where bile acts in the alimentary canal |  |
| 3 | Role of peristalsis in digestion |  |
| 4 | Are stomach contents acidic, neutral or alkaline? |  |
| 5 | Are contents of small intestine acidic, neutral or alkaline? |  |
| 6 | Substrate and product of amylase |  |
| 7 | Egestion |  |
| 8 | Egestion occurs from the ... |  |
| 9 | pH of stomach contents |  |
| 10 | On leaving the stomach food goes into the ... |  |
| 11 | Role of the pancreas in digestion |  |
| 12 | Why digestion is necessary |  |
| 13 | Organ from which bile duct leaves |  |
| 14 | Glands that secrete into the small intestine |  |
| 15 | Non-digestive function of pancreas |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Acidic | F | For solubility; For absorption; For transport | K | Makes enzymes; Makes NaHCO3 |
| B | Alkaline | G | Gall bladder | L | Produce insulin |
| C | Between 1 and 2 | H | Gall bladder | M | Push food along gut; Prevents constipation |
| D | Duodenum | I | Gall bladder and Pancreas | N | Rectum |
| E | Duodenum; Ileum | J | Getting rid of undigested food waste | O | Starch and maltose |

# 3.3.5 Blood Transport of Nutrients

**KEYWORDS**

Amino acids

Bile

Chyme

Deamination

Diffusion

Emulsify

Fatty acids

Gall bladder

Glucose

Glycerol

Hepatic artery

Hepatic portal vein

Ileum

Lacteal

Liver

Minerals

Neutralise

Villus

Vitamins

**EXPLANATIONS**

|  |
| --- |
| Description: Description: 29 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Urea is formed in the kidneys. True or False |  |
| 2 | Process by which digested foods are absorbed |  |
| 3 | Type of food absorbed into lacteal of villi |  |
| 4 | Role of liver in digestion |  |
| 5 | Substance transported to liver in hepatic portal vein |  |
| 6 | Blood vessel that brings oxygenated blood to the liver |  |
| 7 | Where bile is stored after it has been made in the liver |  |
| 8 | Role of bile salts in digestion |  |
| 9 | Functions of the liver |  |
| 10 | Bile is secreted by the ... |  |
| 11 | Hepatic portal vein carries blood from intestines to ... |  |
| 12 | Where products of digestion are absorbed |  |
| 13 | Blood vessel that carries digested food to the liver |  |
| 14 | The liver produces bile. True or False |  |
| 15 | Balanced diet |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Contains all the food types in correct proportions | F | Gall bladder | K | Liver |
| B | Diffusion | G | Glucose; Amino acids; Minerals; Vitamins | L | Make bile; Store vitamins; Deamination; Heat generation |
| C | Emulsify fats; Neutralise acidic chyme | H | Hepatic artery | M | Produces bile; Produces sodium hydrogen carbonate |
| D | False | I | Hepatic Portal Vein | N | Small intestine (ileum) |
| E | Fatty acids; Glycerol | J | Liver | O | True |

# 3.3.7 + 3.4.1 Cohesion-Tension and Homeostasis

**KEYWORDS**

Adhesion

Amino acids

Balanced diet

Cohesion

Dixon and Joly

Food Pyramid

Homeostasis

Tension

Transpiration

Urea

Vascular tissue

Xylem

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Adhesion**: the ability of molecules of one substance to stick to (attract) a different substance, e.g. water molecules and the walls of the xylem vessels. | |
| **Balanced diet**: one that contains the correct proportions of each of the following: carbohydrate, fat, protein, minerals, vitamins, water and roughage.  A balanced diet for an individual will depend on his/her sex, age and level of physical activity. | |
| **Cohesion**: force with which molecules of the same substance stick to each other, e.g. force of attraction between water molecules. | |
| **Food pyramid**: pyramid of five levels showing the correct number of servings of different foods to have a balanced diet.  Each level represents a different type of food. From the bottom up these are: cereals and starches (6+); fruit and vegetables (4+); dairy products (3); meat, fish, eggs, beans (2); sweets, chocolates, cakes (sparingly). The number in brackets represents the suggested minimum number of daily servings. | Description: Description: 29 |
| **Homeostasis**: the maintaining of a constant internal environment (i.e. concentrations of water, salt, turgidity, temperature, etc.) of a cell or organism or the processes involved with this.  Usually achieved by diffusion and the respiratory and excretory systems. | |
| **Tension**: being stretched **OR** the pressure exerted by a gas expanding. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Forces of attraction between water molecules |  |
| 2 | Cohesion-tension model explains water movement against ... |  |
| 3 | Ability of water molecules to stick to surfaces (xylem) |  |
| 4 | Scientists associated with cohesion-tension model of transport |  |
| 5 | Homeostasis |  |
| 6 | Cause of tension |  |
| 7 | Why homeostasis is important |  |
| 8 | How liver contributes to homeostasis |  |
| 9 | How lungs contribute to homeostasis |  |
| 10 | How nephrons of kidneys contribute to homeostasis |  |
| 11 | Water conducting vascular tissue |  |
| 12 | Pulling force exerted by upward moving water |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adhesion | E | Gravity | I | Prevent a build-up of urea |
| B | Cohesion | F | Keeps temperature suitable for enzyme reactions | J | Tension |
| C | Convert excess amino acids to urea | G | Maintain levels of O2 and CO2 | K | Transpiration |
| D | Dixon and Joly | H | Maintaining a constant internal environment | L | Xylem |

# 3.4.3 Plant Exchange System

**KEYWORDS**

Chloroplasts

Diffusion

Guard cells

Lenticels

Mitochondria

Stomata

Transpiration

**EXPLANATIONS**

|  |
| --- |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\25.12.jpg |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\25.16.jpg |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Function of stomata of leaf |  |
| 2 | Factor that influences stomatal diameter |  |
| 3 | Apertures in stems equivalent to stomata |  |
| 4 | Gas that exits the leaf at the stoma |  |
| 5 | Structures in plant cells in which photosynthesis occurs |  |
| 6 | Structures in plant cells in which aerobic respiration occurs |  |
| 7 | Function of guard cells |  |
| 8 | Gases that enter the leaf at the stoma |  |
| 9 | Process by which gases move in or out of leaf |  |
| 10 | Gas that diffuses throughout mesophyll of leaf |  |
| 11 | Cells responsible for controlling size of stomatal opening |  |
| 12 | Openings in leaf that allow gaseous exchange |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Carbon dioxide | E | Diffusion | I | Mitochondria |
| B | Carbon dioxide; Oxygen; Nitrogen; Water vapour | F | Exchange of gases and transpiration | J | Oxygen; Water vapour; Carbon dioxide; Nitrogen |
| C | Chloroplasts | G | Guard cells | K | Stomata |
| D | Control stomatal size | H | Lenticels | L | Water vapour; Oxygen; Nitrogen; Carbon dioxide |

# 3.4.4 Breathing System

**KEYWORDS**

Allergic response

Alveoli

Antibiotic

Bacteria

Breathing

Bronchioles

Capillary

Diaphragm

Infection

Intercostals

Oesophagus

Oxyhaemoglobin

Steroids

Trachea

Thorax

**EXPLANATIONS**

|  |
| --- |
| Description: Description: 31 |

## Breathing System 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Average breathing rate at rest |  |
| 2 | Effect of smoking on resting breathing rate |  |
| 3 | Where cilia occur in the breathing system |  |
| 4 | Function of cilia |  |
| 5 | Takes place in the alveoli |  |
| 6 | How alveoli are adapted for their purpose |  |
| 7 | Effect of exercise on the breathing rate |  |
| 8 | Possible cause of asthma |  |
| 9 | Possible cause of bronchitis |  |
| 10 | Treatment for asthma |  |
| 11 | Treatment for bronchitis |  |
| 12 | Gas transported in pulmonary vein |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | 16 bpm | E | Carry dirt particles and bacteria upwards | I | Infection; Narrowing of bronchi |
| B | Allergic response; Smoking; Narrowing of bronchioles; Infection; Anxiety | F | Exchange of gases | J | Oxygen |
| C | Antibiotics | G | Increases | K | Trachea |
| D | Capillary network; Moist surface; Thin walled; Large surface area; One cell thick | H | Increases | L | Use of inhaler; Steroids |

## Breathing System 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | How oxygen is transported in the blood |  |
| 2 | Function of epiglottis |  |
| 3 | Function of larynx |  |
| 4 | Role of the diaphragm muscles in inhalation |  |
| 5 | Role of the intercostal muscles in inhalation |  |
| 6 | Process involved in passage of gas between alveolus and blood |  |
| 7 | Function of cartilage in trachea |  |
| 8 | Where is the epiglottis? |  |
| 9 | Muscles used in breathing |  |
| 10 | Humans receive oxygen from air they inhale. True or False |  |
| 11 | Role of alveoli in the lungs |  |
| 12 | Location of diaphragm |  |
| 13 | Location of intercostal muscles |  |
| 14 | How water is lost from the body |  |
| 15 | Structures in lungs in which gaseous exchange takes place |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Alveoli | F | Diaphragm; Intercostal | K | To close off trachea |
| B | As oxyhaemoglobin | G | Diffusion | L | To keep it open |
| C | Between ribs | H | Dividing the thorax and abdomen | M | To make sound |
| D | Contract; Raise rib cage | I | Exchange gases | N | Top of oesophagus |
| E | Contracts; Lowers | J | Sweating; Breathing out water vapour | O | True |

# 3.4.6 Excretory System

**KEYWORDS**

Abdomen

Adipose tissue

Amino acids

Aorta

Bile

Bladder

Bowman’s capsule

Carbohydrate

Constrict

Cortex

Dialysis

Diffusion

Dilate

Ectotherm

Endotherm

Excretion

Fat

Fatty acids

Glucose

Hormone

Kidney

Loop of Henle

Medulla

Metabolism

Nephron

Osmoregulation

Piloerection

Plasma

Protein

Reabsorption

Renal artery

Respiration

Transpiration

Ureter

Urethra

Urine

Vasoconstriction

Vasodilation

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Ectotherm**: animal whose temperature changes with that of its surroundings, i.e. a cold-blooded animal, e.g. fish, frog, reptile.  It gains heat by moving into a warmer area and loses heat by moving into a colder area. | |
| **Endotherm**: animal whose body temperature is maintained usually at a higher level than that of its surroundings, i.e. a warm-blooded animal, e.g. human.  The source of this heat is from its own metabolism. | |
| **Excretion:** is the elimination of the waste products of [metabolism](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\M.doc#Metabolism) from a [cell](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\C.doc#Cell), [tissue](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\T.doc#Tissue) or [organ](file:///C:\Documents%20and%20Settings\Users\Windows%20User\AppData\Roaming\AppData\Roaming\AppData\Roaming\Microsoft\Word\O.doc#Organ). | |  |  | | --- | --- | | ORGAN | EXCRETORY PRODUCTS | | Skin | Sweat = Water (95%), Salt (2%), Carbon dioxide (3%), Urea (tiny%) | | Lungs | Carbon dioxide and Water vapour | | Kidneys | Water, Urea, Uric acid, Na, Cl, K | | Stomata (in plants) | Oxygen, water vapour | |  |  | |
| **Reabsorption**: taking in again, e.g. in the nephron of the kidney: glucose, amino acids, etc. are taken back into the blood in the proximal convoluted tubule after being removed from it in the glomerulus | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\32.06.jpg |
| **Ureter**: duct (tube) that brings urine from the kidney to the bladder. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\32.02.jpg |
| **Urethra**: duct (tube) which delivers urine from the bladder to the outside; also, in the male it deposits sperm in the vagina. |

### Excretory System 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Excretion |  |
| 2 | Method of excretion in flowering plants |  |
| 3 | Role of the kidneys in homeostasis |  |
| 4 | Ureter |  |
| 5 | Urethra |  |
| 6 | Plasma |  |
| 7 | Glomerular filtrate |  |
| 8 | Why red blood cells are absent from glomerular filtrate |  |
| 9 | Concentration of glucose in plasma same as glomerular filtrate. Why? |  |
| 10 | Why glucose is normally absent from urine |  |
| 11 | Substance from which urea is derived |  |
| 12 | Substance from which carbon dioxide is derived |  |
| 13 | The ureter links kidney to ... |  |
| 14 | Where filtration occurs in the kidney |  |
| 15 | Substances not lost from the body during urine formation |  |
| 16 | Treatment for a person whose kidneys are malfunctioning |  |
| 17 | Organs of excretion other than kidney |  |
| 18 | Where reabsorption occurs in the kidney |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Bladder | G | Elimination of waste products of metabolism | M | Maintaining salt and water balance; Osmoregulation |
| B | Carbohydrate; Fat; Fatty acids | H | From bladder to outside | N | Plasma that has entered Bowman's capsule |
| C | Cortex; Bowman's capsule | I | From kidney to bladder | O | Protein; Amino acid |
| D | Cortex; Medulla; Nephron; Loop of Henle | J | Glucose small, can pass into Bowman's capsule | P | Proteins; Glucose |
| E | Dialysis | K | It is reabsorbed | Q | Skin; Lungs; Liver |
| F | Diffusion; transpiration | L | Liquid part of blood | R | Too big to pass into Bowman's capsule |

### Excretory System 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Excretory substance present in urine |  |
| 2 | Endotherm |  |
| 3 | Main source of body heat in endotherms |  |
| 4 | Arterioles in the skin ... when external temperature drops |  |
| 5 | Products excreted by human |  |
| 6 | Osmoregulation |  |
| 7 | Arterioles in the skin ... when external temperature rises |  |
| 8 | Main blood vessel to which renal artery links the kidney |  |
| 9 | Fluid present in ureter |  |
| 10 | Occurs in the proximal convoluted tubule |  |
| 11 | Blood vessel that supplies blood to a kidney |  |
| 12 | Cavity of the body where kidneys are located |  |
| 13 | Feature of kidney which indicates it is an exocrine gland |  |
| 14 | Substance excreted by the skin |  |
| 15 | Functions of the skin other than excretion |  |
| 16 | Responses when body temperature begins to drop |  |
| 17 | How the body is insulated against loss of heat |  |
| 18 | Responses when body temperature begins to rise |  |
| 19 | Substances found in sweat |  |
| 20 | Animals which are not endotherms |  |
| 21 | Advantage of being an endotherm |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Abdomen | H | Ectotherms | O | Temperature always suitable for enzyme activity |
| B | Adipose tissue; Hair | I | Has constant body temperature | P | Temperature regulation; Protection |
| C | Aorta | J | Has ducts; Does not produce hormones | Q | Urea; Water; Salt |
| D | Balancing salt/water concentration | K | Piloerection; Increased metabolic rate; Vasoconstriction | R | Urine |
| E | Carbon dioxide; Urine; Water; Sweat; Bile; Salt | L | Reabsorption | S | Vasodilation; Sweat; Hairs lie flat |
| F | Constrict | M | Renal artery | T | Water; Salt |
| G | Dilate | N | Respiration | U | Water; Urea; Salt |

# 3.4.7 + 8 Excretion

**KEYWORDS**

Absorption

Active transport

ADH

Bowman’s capsule

Cortex

Distal convoluted tubule

Glomerular filtrate

Permeable

Perspiration

Pituitary

Plasma

Protein

Proximal convoluted tubule

Renal artery

Respiration

Vasopressin

**EXPLANATIONS**

|  |
| --- |
| **Active transport**: the movement of substances (solutes or ions) from a region of low concentration (hypotonic) to a region of higher concentration (hypertonic) against the concentration gradient through a semi-permeable membrane (cell membrane).  It requires the use of energy (in the form of ATP) by the cell. ATP is a product of respiration. Respiration usually requires oxygen and occurs in the mitochondria. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Breathing |  |
| 2 | Respiration |  |
| 3 | Breathing rate controlled by concentration of... in the blood |  |
| 4 | Factor that influences the diameter of the stoma(ta) |  |
| 5 | Gas in blood that triggers deeper or faster breathing |  |
| 6 | Plasma |  |
| 7 | Glomerular filtrate |  |
| 8 | Why red blood cells are absent from glomerular filtrate |  |
| 9 | Blood vessel from which afferent arteriole is derived |  |
| 10 | Where Bowman's capsule is located in kidney |  |
| 11 | Where filtration takes place in kidney |  |
| 12 | Where reabsorption of amino acids takes place in kidney |  |
| 13 | Features of nephron that aid filtration |  |
| 14 | Biomolecules too large to pass into the glomerular filtrate |  |
| 15 | Situations which result in a drop in water content of blood |  |
| 16 | Hormone released when water content of blood drops |  |
| 17 | Endocrine gland which secretes ADH (vasopressin) |  |
| 18 | Target area for ADH (vasopressin) |  |
| 19 | How ADH (vasopressin) reaches its target area |  |
| 20 | Role of ADH when water content of blood is low |  |
| 21 | Hormone which changes permeability of collecting ducts |  |
| 22 | Is it normal for urine to contain protein? |  |
| 23 | Is it normal for urine to contain glucose? |  |
| 24 | Is it normal for urine to contain salts? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | ADH (vasopressin) | I | Distal convoluted tubule; Collecting duct | Q | Pituitary |
| B | Anti-diuretic hormone; Vasopressin | J | In the blood | R | Plasma that has entered Bowman's capsule |
| C | Bowman's capsule or glomerulus | K | Infection; Perspiration; High salt intake; Low water intake | S | Process of taking in 02 and giving out of CO2 and H2O vapour to the air |
| D | Carbon dioxide | L | Large surface area; Porous capillary walls; Lining one cell thick | T | Proteins |
| E | Carbon dioxide | M | Liquid part of blood | U | Proximal convoluted tubule |
| F | CO2; Light; K+ ions; Water | N | Makes walls more permeable; More absorption of water | V | Renal artery (arteriole) |
| G | Controlled release of energy from food, within the cell(s) of an organism | O | No | W | Too big to pass into Bowman's capsule |
| H | Cortex | P | No | X | Yes |

# 3.5.2 Plant Responses

**KEYWORDS**

Abscisic acid

Adverse environmental stimulus

Adverse external environment

Apical meristems

Auxin

Chemotropism

Ethylene (ethene)

Geotropism

Growth Regulator

Hydrotropism

IAA

NAA

Phloem

Phototropism

Photosynthesis

Plant growth regulator

Positively phototropic

Serial dilution

Thigmotropism

Tropism

Vascular

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Chemotropism**: the growth response of a plant to chemicals, e.g. fertilisers.  Responsible for roots growing downwards. | |
| **Geotropism**: the growth response of a plant to gravity. | |
| **Growth regulators**: chemicals produced in the meristematic regions and transported through the vascular system of plants. They affect the rate of growth (cell division) or development of plants when they are in very low concentrations.  Some external factors also regulate the growth of plants, e.g. light intensity, amount of daylight, temperature and gravity. | |
| **Hydrotropism**: the growth response of a plant to water. | |
| **Phototropism**: the growth response of a plant to light.  Caused by the higher concentration of the plant growth regulator IAA (indoleacetic acid, an auxin) on the darker side of the plant shoot. This promotes cell elongation on that side and the shoot grows towards the light as a result. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\33.04.jpg |
| **Thigmotropism**: the growth response of a plant to touch, e.g. tendrils. | |
| **Tropism**: the growth response of part of a plant to an external unidirectional stimulus.   * positive tropism: plant grows towards stimulus * negative tropism: plant grows away from stimulus | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Where in flowering plants growth regulator is secreted |  |
| 2 | Uses of synthetic growth regulator |  |
| 3 | Making solutions of different concentrations from a stock solution |  |
| 4 | Auxin |  |
| 5 | A site of auxin secretion |  |
| 6 | Similarity between auxin and hormone action |  |
| 7 | Tropism |  |
| 8 | Types of tropism |  |
| 9 | Methods used by plants to protect themselves |  |
| 10 | Role of auxin in phototropism |  |
| 11 | Thigmotropism |  |
| 12 | Chemotropism |  |
| 13 | Growth regulator that promotes growth |  |
| 14 | Growth regulator that inhibits growth |  |
| 15 | Growth response of roots growing towards water |  |
| 16 | Growth response of shoots growing towards light |  |
| 17 | Benefit to a plant of phototropism |  |
| 18 | Phototropism is the growth response of a plant to ... |  |
| 19 | Substances that control tropic responses |  |
| 20 | Tissue through which growth regulators are transported |  |
| 21 | The growth response of a plant to chemicals is geotropism. True or False |  |
| 22 | Adverse external environment |  |
| 23 | The growth response of a plant to light is phototropism. True or False |  |
| 24 | Growth regulator used when investigating plant growth |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Apical meristems of shoots | I | Hydrotropism | Q | Rooting powder; Weed killer; Ripening of fruit; Seedless fruits |
| B | Causes response; Slow acting; Long lasting | J | IAA | R | Serial dilution |
| C | False | K | IAA; NAA; Abscisic acid; Ethylene (ethene) | S | Surroundings that are harmful to organism(s) |
| D | Growth regulator in plants | L | IAA; NAA; Ethylene (ethene) | T | Thigmo-; Photo-; Geo-; Hydro-; Chemo- |
| E | Growth regulators | M | Light | U | Thorns; Stings; Bad taste; Poison |
| F | Growth response of plant to a stimulus | N | Phloem; Vascular | V | Tip of shoot; Buds; Meristem |
| G | Growth response to chemicals | O | Photosynthesis | W | True |
| H | Growth response to touch | P | Phototropism | X | Unequal distribution, caused by light, unequal growth, results in bending |

# 3.5.3 + 7 Defence System

**KEYWORDS**

Active immunity

Antibody

Antigen

B–cells

Bactericidal agent

Helper T-cells

Immunity

Induced Immunity

Killer T-cells

Lymph node

Memory T-cells

Passive immunity

Pathogen

Serum

Spleen

Suppressor T-cells

T-cells

Thymus

Vaccination

Vaccine

Virus

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Active immunity**: long-term immunity resulting from the production of antibodies.  This can be achieved by:   1. inoculation (the injection) of vaccine containing a weakened strain of a pathogen or its toxin, or 2. an infection by a pathogen.   The body produces an antibody in response to the presence of either of these and retains the ability to produce it again if attacked by the pathogen at some later stage, i.e. it is long-term immunity. | |
| **Antibody**:protein substances produced by lymphocytes (white blood cells) to attack and destroy or counteract specific antigens (micro-organisms or their products). | |
| **Antigen**:a substance (micro-organism or it’s waste products) that the immune system of the body recognises as ‘foreign’.  As a result the immune system will produce antibodies that will react with the antigen and neutralise or destroy it. | |
| **Immunity**: the ability of the body to resist infection. | |
| **Induced immunity**: to give the body the ability to fight infections using antibodies that are produced by (a) suffering the illness or (b) by vaccination.  Induced immunity can be active or passive. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\38.12.jpg |
| **Passive immunity**: recipient receives antiserum, containing antibodies, from an already immunised individual. This confers short-term immunity on that individual, e.g. tetanus and new-born babies. | |
| **Vaccination**: process of injecting a vaccine (which acts as an antigen) into a person in order to induce immunity. This results in the production of antibodies against the antigen. | |
| **Vaccine**:a suspension of living, dead or attenuated pathogens which act as an antigen causing the body to produce antibodies that render the body immune to infection by the specific pathogens. | |
| **Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\38.09.jpg** | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Immunity |  |
| 2 | Active immunity |  |
| 3 | Passive immunity |  |
| 4 | How skin defends body against pathogens |  |
| 5 | Specific defence system |  |
| 6 | Purpose of vaccination |  |
| 7 | Antigen |  |
| 8 | Antibody |  |
| 9 | Vaccination gives rise to active immunity. True or False |  |
| 10 | Vaccination |  |
| 11 | Antibiotic |  |
| 12 | Long-term immunity |  |
| 13 | Short-term immunity |  |
| 14 | General defence system |  |
| 15 | Phagocytic white blood cells |  |
| 16 | Group of blood cells to which lymphocytes belong |  |
| 17 | Types of lymphocyte |  |
| 18 | Role of B-cells |  |
| 19 | Role of T-cells |  |
| 20 | Role of Helper T-cells |  |
| 21 | Role of Killer T-cells |  |
| 22 | Role of Suppressor T-cells |  |
| 23 | Role of Memory T-cells |  |
| 24 | Lymphocytes and monocytes respond to ... |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Ability of body to resist infection | I | Memorise antigen | Q | Spleen; Thymus and Lymph nodes |
| B | Act as Helper; Killer; Suppressor or Memory cells | J | Passive immunity | R | Stimulate B cells or Killer T cells; Recognise antigens |
| C | Active immunity | K | Produce antibodies | S | Substance produced one micro-organisms that kills another |
| D | Antigens | L | Produced in response to antigen, destroys antigen | T | Switch off immune system |
| E | Continuous unbroken covering; Contains bactericidal agent | M | Production of antibodies | U | T-cells; B-cells |
| F | Destroy infected or damaged cells | N | Receives serum from immune individual | V | To induce immunity |
| G | Engulf bacteria and viruses | O | 'Safe dose' of a pathogen, causing antibody production | W | True |
| H | Foreign substance, causes antibody production | P | Skin and mucous linings of Respiratory, Digestive and Reproductive tracts | X | White blood cells |

# 3.5.3 Endocrine System

**KEYWORDS**

Adrenaline

Contraception

Diabetes

*Diabetes Mellitus*

Ductless gland

Endocrine

Endocrine gland

Exocrine

Exocrine gland

Feedback

Glucagon

Hormone

Insulin

Pancreas

Pituitary

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Endocrine gland**: ductless gland. Secretions (hormones) delivered directly into bloodstream by the following glands.  e.g. pituitary, thyroid, parathyroid, pancreas, adrenal, ovary and testis. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\36.01.jpg |
| **Exocrine gland**: a gland which delivers its secretion through a tube or duct.  Does not depend on bloodstream, e.g. liver, pancreas, sweat glands and salivary glands. | |
| **Hormone**: a substance (chemical message) produced by an endocrine gland secreted directly into and transported by the bloodstream to other parts (target organs) of the body where it brings about a response.  Hormones regulate metabolic activity. A hormonal response generally works slowly over a longer period of time compared with a nervous response. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Hormone |  |
| 2 | Gland producing growth hormone |  |
| 3 | Function of growth hormone |  |
| 4 | Growth hormone deficiency symptom |  |
| 5 | How hormone action differs from nerve action |  |
| 6 | Exocrine gland |  |
| 7 | How endocrine gland differs from exocrine gland |  |
| 8 | Endocrine gland |  |
| 9 | Product of the endocrine portion of the pancreas |  |
| 10 | Function of insulin or glucagon |  |
| 11 | Fight or flight hormone |  |
| 12 | Symptom of insulin deficiency |  |
| 13 | Glands that secrete hormones |  |
| 14 | Where Islets of Langerhans are found |  |
| 15 | Hormone secreted by Islets of Langerhans |  |
| 16 | Hormone that controls the rate of metabolism |  |
| 17 | Use of hormone supplements |  |
| 18 | How hormones are similar to plant growth regulators |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Adrenaline | G | Gland with a duct | M | Produced in one location, acts in different location; Prolonged effect |
| B | Chemical secreted by ductless gland causing a response | H | Insulin | N | Regulates blood sugar level |
| C | Control rate of growth | I | Insulin or Glucagon | O | Secretes into blood stream |
| D | Diabetes mellitus | J | Pancreas | P | Slower to act; More sustained; Chemical |
| E | Ductless or Hormone producing gland | K | Pituitary | Q | Thyroxine |
| F | Endocrine or Ductless | L | Pituitary dwarfism | R | Treatment of diabetes; Contraception |

# 3.5.3 Eye and Ear

**KEYWORDS**

Cochlea

Cones

Eustachian tube

Hammer

Iris

Lens

Optic nerve

Pharynx (throat)

Pupil

Retina

Rods

Semi-circular canals

Suspensory ligaments

**EXPLANATIONS**

|  |
| --- |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\35.04.jpg |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\35.08.jpg |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Function of lens |  |
| 2 | Function of retina |  |
| 3 | Role of suspensory ligaments in vision |  |
| 4 | Role of cones in vision |  |
| 5 | Role of optic nerve in vision |  |
| 6 | Role of brain in vision |  |
| 7 | Function of iris |  |
| 8 | Why two eyes are better than one |  |
| 9 | The hammer is a very small bone located in the ... |  |
| 10 | Connected to the middle ear by the Eustachian tube |  |
| 11 | Present in the middle ear |  |
| 12 | Function of cochlea |  |
| 13 | Part of eye where rods and cones are found |  |
| 14 | Function of rods |  |
| 15 | Where in the eye is the retina located? |  |
| 16 | Types of cells that receive light in the retina |  |
| 17 | Function of the Eustachian tube |  |
| 18 | Function of semi-circular canals |  |
| 19 | Part of the ear where nerve impulses are generated |  |
| 20 | Coloured part of the eye |  |
| 21 | Function of pupil |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Back of the eye | H | Equalise pressure on the eardrum | O | Pharynx (throat) |
| B | Black and white vision; Vision in poor light | I | Gas/Air | P | Posture; Balance |
| C | Brings impulses from retina to brain | J | Hearing | Q | Retina |
| D | Cochlea or Semi-circular canals | K | Holds lens in place | R | Rods; Cones |
| E | Controls amount of light entering eye | L | Increased visual field; To judge distance | S | To allow light in |
| F | Detects colour | M | Interprets information received from retina | T | To convert light into nerve impulses |
| G | Ear | N | Iris | U | To focus light onto the retina |

# 3.5.3 Musculoskeletal System

**KEYWORDS**

Antagonistic muscle pair

Appendicular skeleton

Arthritis

Axial skeleton

Ball and socket

Biceps

Cartilage

Cervical

Compact bone

Contractile (tissue)

Femur

Hinge

Humerus

Joint

Ligament

Lumbar

Medullary cavity

Osteoblast

Osteoporosis

Radius

Spinal cord

Spongy bone

Tendon

Triceps

Ulna

Vertebrae

Vertebral column

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Appendicular skeleton**: all bones in the skeleton excluding the axial skeleton (skull, vertebral column, sternum and ribs).  These include wings, legs, and arms or fins and the pelvic girdle and pectoral girdle that join the appendages to the rest of the skeleton. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\37.01.jpg |
| **Axial skeleton**: this is composed of the skull, vertebral column, sternum and ribs. |
| **Joint**: the place where two bones meet.  The function of joints is to allow movement. Types of joints include immovable joints, slightly movable joints, freely moving and synovial joints. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\37.11.jpg |
| **Ligament**:an elastic connective tissue that joins bone to bone. | Description: Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\37.12.jpg |
| **Tendon**:a non-elastic connective tissue that joins muscle to bone. |
| **Osteoblast**: bone-forming cell found lining the outer surface of all bones.  Also present inside most bone cavities. These cells secrete a very strong bone matrix made mainly of collagen fibres, which provide bone with its strength. They replace cartilage with bone when the body is growing. | |

## Musculoskeletal System 1

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Disorders of the musculoskeletal system |  |
| 2 | Function of cartilage |  |
| 3 | Function of synovial fluid |  |
| 4 | Function of ligament |  |
| 5 | Roles of the skeleton |  |
| 6 | Axial skeleton |  |
| 7 | Function of red marrow |  |
| 8 | Function of tendon |  |
| 9 | Antagonistic muscle pair |  |
| 10 | Where are the discs in human backbone? |  |
| 11 | Function of intervertebral discs |  |
| 12 | Role of yellow bone marrow |  |
| 13 | Bones are joined to other bones by ... |  |
| 14 | Vertebrae found in the neck |  |
| 15 | Vertebrae found in small of back |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Absorbs shock; Reduces wear and friction; Protection | F | Formation of blood cells | K | Lumbar |
| B | Arthritis; osteoporosis | G | Friction-free movement; Absorbs shock | L | Pair of muscles that have opposite effects |
| C | Between the vertebrae | H | Hold bones together | M | Shock absorption; Friction-free movement |
| D | Cervical | I | Joins muscle to bone | N | Support; Movement; Protection |
| E | Fat storage | J | Ligaments | O | Vertebral column, skull and rib cage |

## Musculoskeletal System 2

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Vertebrae found in the neck |  |
| 2 | Function of synovial fluid |  |
| 3 | Bones are joined to other bones by ligaments. True or False |  |
| 4 | Part of CNS that runs through the vertebrae |  |
| 5 | Bones that form human arm |  |
| 6 | Structures that attach muscle to bone |  |
| 7 | Upper arm muscle that contracts to raise arm |  |
| 8 | Upper arm muscle that contracts to lower arm |  |
| 9 | Type of joint at the elbow |  |
| 10 | Type of joint at the hip |  |
| 11 | Why the bones of birds are almost hollow |  |
| 12 | Tendons attach bone to bone. True or False |  |
| 13 | A long bone |  |
| 14 | State a function of spongy bone. |  |
| 15 | State a function of compact bone. |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Ball and socket | F | Hinge | K | Red blood cell formation |
| B | Biceps | G | Humerus; Femur | L | Spinal cord |
| C | Cervical | H | Humerus; Radius; Ulna | M | Tendons |
| D | False | I | Light for flight | N | Triceps |
| E | Friction-free movement; Absorbs shock | J | Protection; Support | O | True |

# 3.5.3 Nervous System

**KEYWORDS**

Axon

Central nervous system (CNS)

Cerebellum

Cerebrum

Dendrites

Grey matter

Homeostasis

Hypothalamus

Impulse

Inter-(Association) neurons

Interneuron

Involuntary muscle activity

Medulla oblongata

Motor neuron

Myelin sheath

Neuron

Neurotransmitter

Osmoregulation

Paralysis

Parkinson's disease

Peripheral nervous system (PNS)

Reflex action

Response

Sensory neuron

Spinal cord

Stimulus

Synapse

Synaptic cleft

Voluntary muscle activity

White matter

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Interneurons**: neurons that carry messages from one or more sensory neurons to motor neurons.  They are found within the central nervous system. | |
| Description: 34 | Description: 34 |

|  |  |
| --- | --- |
| **Motor neuron**: efferent neuron. Carries messages from the central nervous system (CNS) to an effector.  Cell body located at end of axon, inside CNS. | Description: 34 |
| **Sensory neuron:** afferent neuron. Pick up and carry messages from sense organs (receptors) to the central nervous system (CNS).  Cell body at end of a short branch to one side of the axon, outside CNS. |
| **Response:** the ability of living organisms to react to changes in their internal and external environments.  It is a form of defence that allows the organisms survive. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Motor neurons conduct impulses away from the CNS. True or False |  |
| 2 | A neuron is a ... |  |
| 3 | Sensory neurons |  |
| 4 | Motor neurons |  |
| 5 | Interneurons (association neurons) |  |
| 6 | Role of neurotransmitter substances |  |
| 7 | Function of Schwann cells |  |
| 8 | Function of Myelin sheath |  |
| 9 | Function of dendrites |  |
| 10 | Small gaps between neurons |  |
| 11 | Reflex action |  |
| 12 | Importance of reflex actions |  |
| 13 | A motor neuron carries impulses to the brain. True or False |  |
| 14 | Central nervous system is made up of... |  |
| 15 | Disorders of the nervous system |  |
| 16 | Peripheral nervous system is made up of... |  |
| 17 | Function of Cerebrum |  |
| 18 | Function of Hypothalamus |  |
| 19 | Function of Cerebellum |  |
| 20 | Function of Medulla oblongata |  |
| 21 | Grey matter |  |
| 22 | White matter |  |
| 23 | Area where one neuron ends and another begins |  |
| 24 | Chemical that carries messages between two neurons |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | All nerves except brain and spinal cord | I | Co-ordinates voluntary muscle activity; Balance | Q | Rapid response; Defence against injury |
| B | Automatic response to a stimulus | J | False | R | Receive impulse and carry it to cell body |
| C | Brain and spinal cord | K | Insulation; Speeds up impulse | S | Responsible for involuntary muscle activities |
| D | Carry impulse across synaptic cleft; Trigger impulse in next neuron | L | Link two neurons | T | Responsible for movement; Memory; Intelligence; Emotions |
| E | Carry impulses from CNS to effector | M | Nerve cell | U | Responsible for Osmoregulation; Body temperature; Homeostasis |
| F | Carry impulses towards CNS from receptor | N | Neurotransmitter | V | Synaptic cleft or Synapse |
| G | Consists of axons of neurons | O | Parkinson's; Paralysis | W | Synaptic cleft or Synapse |
| H | Consists of nerve cell bodies and dendrites | P | Produces myelin sheath | X | True |

# 3.5.4 Viruses

**KEYWORDS**

Antigen

Disease

DNA

Host

Immune system

Non-cellular

Nucleic acid

Protein

RNA

Specific

Virus

**EXPLANATIONS**

|  |
| --- |
| **Virus**: (plural = viruses) non-cellular micro-organisms, made up of a protein coat and one type of nucleic acid (DNA or RNA).  They are obligate parasites, i.e. they can only multiply (reproduce) inside a living cell. Three types of virus: spheres, rods and bacteriophages. Cause disease, e.g. foot and mouth, rabies, polio, influenza, common cold, AIDS, etc. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Virus |  |
| 2 | Main chemical components of virus |  |
| 3 | How is HIV transmitted |  |
| 4 | How HIV affects the human body |  |
| 5 | How spread of HIV controlled |  |
| 6 | Human diseases caused by viruses |  |
| 7 | Beneficial application of a virus |  |
| 8 | Antibiotic |  |
| 9 | Antibiotics not prescribed for viral infections. Why? |  |
| 10 | Advantage of biological control |  |
| 11 | Disadvantage of biological control |  |
| 12 | Economic importance of viruses |  |
| 13 | Medical importance of viruses |  |
| 14 | HIV/AIDS has orphaned many children in sub-Saharan Africa. True or False |  |
| 15 | Antibody |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Crop damage; Animal and human disease | F | Human disease cost; Used in medical research | K | Smallpox; Chicken pox; Measles; Mumps; Rubella; Polio; 'Flu; Common cold |
| B | Destroys the immune system | G | Non-cellular, one nucleic acid, reproduce in host cell | L | Substance produced one micro-organisms that kills another |
| C | DNA or RNA; Protein | H | One faithful sexual partner; Not sharing needles | M | True |
| D | Environmentally friendly; specific | I | Produced in response to antigen; Destroys antigen | N | Upsets balance of nature |
| E | Have no effect on viruses | J | Sexual contact | O | Used in genetic engineering; vaccine production |

# 3.6.1 Asexual Reproduction

**KEYWORDS**

Asexual reproduction

Budding

Bulb

Clone

Corm

Cutting

Grafting

Layering

Pollination

Rhizome

Runner

Seed

Sexual reproduction

Tissue culturing

Tuber

Variation

Vegetative propagation

**EXPLANATIONS**

|  |  |
| --- | --- |
| Description: 41 | Description: 41 |
| Description: 41 | Description: 41 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Vegetative propagation |  |
| 2 | Genetically identical individuals |  |
| 3 | Examples of natural vegetative propagation involving a stem |  |
| 4 | The products of vegetative propagation are clones. True or False |  |
| 5 | Examples of natural vegetative propagation involving a root |  |
| 6 | Benefit of artificial propagation |  |
| 7 | Examples of natural vegetative propagation involving a bud |  |
| 8 | Techniques of artificial vegetative propagation used for flowering plants |  |
| 9 | How vegetative propagation differs from sexual reproduction |  |
| 10 | Disadvantage of artificial propagation |  |
| 11 | Main types of reproduction |  |
| 12 | Strawberries reproduce asexually using … |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Bulbs | E | Offspring identical; Fast; Preserves desirable features | I | Runners |
| B | Clones | F | One parent; Less variation; No pollination | J | Sexual; Asexual |
| C | Cuttings; Layering; Grafting; Budding; Tissue culturing | G | Reproduction that does not involve seed production | K | True |
| D | Lack of variation; Disease susceptibility | H | Rhizomes; Corms; Tubers | L | Tubers |

# 3.6.1 + 3 Flower Structure and Gamete Formation

**KEYWORDS**

Anther

Embryo

Embryo sac

Endosperm nucleus

Fertilised egg

Fruit

Gametes

Haploid

Meiosis

Mitosis

Ovary

Petal

Photosynthesis

Polar nuclei

Pollen

Stamen

Stigma

Triploid

Tube nucleus

**EXPLANATIONS**

|  |  |
| --- | --- |
| Description: 40 | Description: 40 |
| Description: 40 | Description: 40 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Role of sepal |  |
| 2 | Role of anther |  |
| 3 | Role of stigma |  |
| 4 | Role of ovary |  |
| 5 | Generative nucleus divides by ... to form male gametes. |  |
| 6 | Part of flower where pollen is produced |  |
| 7 | Function of petal |  |
| 8 | Part of flower from which fruit develops |  |
| 9 | Where pollen is produced in the stamen |  |
| 10 | Adaptations of petal for its function |  |
| 11 | Pollen mother cells divide by ... |  |
| 12 | With what does each male gamete fuse in the embryo sac? |  |
| 13 | Male gamete fuses with egg cell to form ... |  |
| 14 | Male gamete fuses with polar nuclei to form ... |  |
| 15 | Mature pollen grain |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anther | F | Fertilised egg | K | Produces female gametes; Becomes fruit |
| B | Anther of the stamen | G | Meiosis | L | Protection; Photosynthesis |
| C | Attract insects | H | Mitosis | M | Receives pollen |
| D | Colour; Scent; Size; Shape | I | Ovary | N | Triploid endosperm nucleus |
| E | Egg cell; Polar nuclei | J | Pollen production | O | Tube nucleus and two haploid male gamete nuclei |

# 3.6.1 Pollination and Fertilisation

**KEYWORDS**

Anther

Carpel

Cotyledon

Cross-pollination

Embryo sac

Endosperm

Endosperm nucleus

Endospermic seed

Fertilisation

Fruit

Fusion

Gamete

Generative nucleus

Monocotyledonous

Nectary

Non-endospermic seed

Ovule

Petals

Polar nuclei

Pollen tube

Pollination

Radicle

Seed

Self-pollination

Stamen

Stigma

Style

Triploid

Variations

Zygote

**EXPLANATIONS**

|  |  |
| --- | --- |
| **Fertilisation**: the union of a haploid male gamete nucleus with a haploid female gamete nucleus resulting in the formation of a diploid zygote.  In the human female this occurs about halfway along the fallopian tube. | Description: 40 |
| **Pollination:** the transfer of pollen from the anther of the stamen of one flower, to the stigma of the carpel of (a) the same flower or another flower on the same plant (self-pollination) or (b) another flower on a different plant of the same species (cross- pollination).  Wind and insects are agents of pollination. | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | What happens to the two polar nuclei? |  |
| 2 | What happens to the ovary after fertilisation? |  |
| 3 | Endosperm is a food reserve in some seeds. True or False |  |
| 4 | Pollination |  |
| 5 | Structure in seed from which root develops |  |
| 6 | Adaptations of wind-pollinated flowers |  |
| 7 | What happens to the ovule after fertilisation? |  |
| 8 | Fertilisation |  |
| 9 | How are flowers with nectaries pollinated? |  |
| 10 | Why cross-pollination is preferable to self-pollination |  |
| 11 | To which part of a flower is pollen carried? |  |
| 12 | Cross-pollination |  |
| 13 | Location in seed in which food is stored |  |
| 14 | Methods of cross-pollination |  |
| 15 | Carbohydrate present in food store of a seed |  |
| 16 | Forms in the ovary after pollination and fertilization |  |
| 17 | Adaptations of an insect-pollinated flower |  |
| 18 | Process that follows pollination in plant life cycle |  |
| 19 | Part of the flower where fertilisation occurs |  |
| 20 | Structure through which pollen tube grows in order to reach the embryo sac |  |
| 21 | Where pollen is produced in the stamen |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Anther | H | Fertilisation | O | Starch |
| B | Becomes the fruit | I | Fuse with male gamete to form triploid endosperm nucleus | P | Stigma of the carpel |
| C | Becomes the seed | J | Fusion of gametes; Formation of zygote | Q | Style |
| D | Brightly coloured petals; Anthers within petals; Nectaries | K | Increases variation | R | Transfer of pollen from anther to carpel |
| E | By insects | L | Long stamens; Feathery stigmas; Large numbers of smooth light pollen grains | S | Transfer of pollen from one flower to another on a different plant of same species |
| F | Embryo sac; Ovule | M | Radicle | T | True |
| G | Endosperm; Cotyledon | N | Seed; Zygote | U | Wind; Animal |

# 3.6.1 Fruit Formation and Dispersal

**KEYWORDS**

Colonisation

Competition

Cotyledon

Dicotyledon

Dispersal

Embryo

Endosperm

Endospermic seed

Fruit

Growth regulator

Monocotyledon

Non-endospermic seed

Ovary

Ovule

Plumule

Radicle

Seedless fruit

Shoot

**EXPLANATIONS**

|  |  |
| --- | --- |
| Description: 40 | Description: 40 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Role of fruit |  |
| 2 | From what a seed develops |  |
| 3 | Endospermic seed |  |
| 4 | Non-endospermic seed |  |
| 5 | Method used to produce seedless fruits |  |
| 6 | Locations in seed where food may be stored |  |
| 7 | Parts of embryo plant in seed |  |
| 8 | Role of radicle |  |
| 9 | Role of plumule |  |
| 10 | Methods of seed dispersal |  |
| 11 | Advantages of dispersal to the plant |  |
| 12 | What is a cotyledon? |  |
| 13 | Name a monocotyledon |  |
| 14 | Name a dicotyledon |  |
| 15 | Part of flower that develops into a fruit |  |
| 16 | Plant that uses wind to disperse seed |  |
| 17 | Plant that uses animals to disperse seed |  |
| 18 | What is an embryo? |  |
| 19 | What is dispersal? |  |
| 20 | How are the seeds of blackberries dispersed? |  |
| 21 | By which method are Sycamore fruits dispersed? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Blackberry; Burdock | H | Develops into shoot | O | Ovule |
| B | Broad bean; Pea | I | First leaf that develops in embryo; A food store | P | Part of seed that becomes the new plant |
| C | By animals | J | Grass; Maize | Q | Radicle; Plumule |
| D | Colonisation; Reduces competition | K | Growth regulator; Selective propagation | R | Reproduction; seed dispersal |
| E | Cotyledon; Endosperm | L | Main food store in cotyledons | S | Spreading of seeds |
| F | Dandelion; Sycamore | M | Main food store in endosperm | T | Wind |
| G | Develops into root | N | Ovary | U | Wind; Animal; Self; Water |

# 3.6.1 Dormancy and Germination

**KEYWORDS**

Anaerobic jar

Dormancy

Embryo

Enzyme

Germination

Metabolism

Optimum enzyme activity

Plumule

Radicle

Respiration

Substrate

Testa

Water bath

**EXPLANATIONS**

|  |
| --- |
| **Dormancy**: a period of rest, inactivity or non-vegetative state before growth, during which the rate of metabolism is reduced, e.g. in buds, seeds and spores.  Seeds will not germinate during this time, even if given ideal conditions, because other requirements may be necessary before germination can occur. For example:   * seed coat (testa) too hard, must wait for it to be softened by nature * cold conditions necessary. Ensures springtime germination and maximises the growing season for the new seedling * desert plants have chemical inhibitors in seed that must be washed out by heavy rain. Ensures water for further growth * embryo not mature. Seed not 'ripe' so must wait. |
| **Germination**: is the beginning of the growth of seeds, spores or pollen grains after a period of dormancy.  Certain conditions must be available, i.e. **W**ater, **O**xygen and a suitable temperature (**W**armth) – **WOW**. |

|  |  |
| --- | --- |
| Description: 40 | Description: 40 |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Light is essential for the germination of seeds. True or False |  |
| 2 | Experiment you used starch or skimmed milk agar plates |  |
| 3 | Purpose for use of starch or skimmed milk agar plates |  |
| 4 | What is dormancy? |  |
| 5 | Advantages of dormancy |  |
| 6 | Germination |  |
| 7 | Part of seed from which shoot develops |  |
| 8 | Why digestion is needed in a germinating seed |  |
| 9 | How dormancy is useful to farmers and gardeners |  |
| 10 | Needed for the germination of seeds |  |
| 11 | Function of water in germination |  |
| 12 | Function of oxygen in germination |  |
| 13 | Necessity of suitable temperature for germination |  |
| 14 | Seeds remain inactive for a period before germination |  |
| 15 | Stage in the plant's life cycle that follows dormancy |  |
| 16 | Use for a water bath in experiments |  |
| 17 | Purpose of an anaerobic jar in experiments |  |
| 18 | Part of seed from which root develops |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Aerobic respiration | G | Germination or Growth | M | Period of reduced metabolism; No growth |
| B | Dormancy | H | Growth of seed or embryo | N | Plumule |
| C | Enzyme action; Solvent; Bursting testa | I | Keep temperature constant | O | Radicle |
| D | Enzyme digestive activity | J | Makes food soluble and transportable | P | Substrate or Nutrient medium |
| E | False | K | Optimum enzyme activity | Q | To see if oxygen is necessary for germination |
| F | Germination at suitable time; Survival of unfavourable conditions | L | Optimum sowing, ploughing time; Maximise growing season | R | Water; Oxygen; Suitable temperature |

# 3.6.2 Reproductive Structures and Hormones

**KEYWORDS**

Chromosome

Cowper’s gland

Epididymis

Meiosis

Menstrual cycle

Ova (eggs)

Ovary

Ovulation

Primary sexual characteristics

Penis

Primary sexual characteristics

Prostate

Puberty

Secondary sexual characteristics

Semen

Seminal fluid

Seminal vesicles

Sperm

Sperm duct

Testis

Testosterone

Urethra

**EXPLANATIONS**

|  |
| --- |
| **Primary sexual characteristics**: physical characteristics or features that distinguish males and females at their birth, i.e. the sex organs. |
| **Secondary sexual characteristics**: the physical characteristics that appear during puberty and adolescence.  In the male they include the broadening of the shoulders, growth and enlargement of the penis, deepening of the voice, body and facial hair, etc. In the female they include enlargement and growth of the breasts, growth of body hair under arms and pubic regions. |

|  |  |
| --- | --- |
| Description: 42 | Description: 42  / |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Where testosterone is secreted |  |
| 2 | Role of testosterone |  |
| 3 | Where sperm are produced |  |
| 4 | Glands that secrete seminal fluid |  |
| 5 | Function of seminal fluid |  |
| 6 | Where meiosis occurs in male reproductive system |  |
| 7 | Where sperm are stored in male reproductive system |  |
| 8 | What is semen? |  |
| 9 | Where maturing of sperm cells occurs |  |
| 10 | Where mixing of fluid with sperm cells occurs |  |
| 11 | Part of male reproductive system that transports semen |  |
| 12 | Male secondary sexual characteristics |  |
| 13 | Function of prostate gland |  |
| 14 | Function of sperm duct |  |
| 15 | Function of midpiece of sperm |  |
| 16 | How sperm differs from ova (eggs) |  |
| 17 | What are secondary sexual characteristics? |  |
| 18 | Female secondary sexual characteristics |  |
| 19 | What is the menstrual cycle? |  |
| 20 | Where is the ovum (egg) formed? |  |
| 21 | Ovulation |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Allows sperm to swim; Provides nutrients | H | Epididymis | O | Sperm cells and seminal fluid |
| B | Body hair; Breast development; Hips widen | I | Features developing at puberty for sexual attraction | P | Sperm duct or Prostate gland |
| C | Broken voice; body hair; Enlargement of testes and penis | J | Monthly cycle in female | Q | Supply energy for movement |
| D | Carry sperm | K | Ovary | R | Testis |
| E | Cowper's; Seminal vesicles; Prostate | L | Release of egg from ovary | S | Testis |
| F | Develop secondary sexual characteristics | M | Seminal fluid production; Nutrition of sperm | T | Testis |
| G | Epididymis | N | Size; Shape; Motile; Chromosomal difference | U | Urethra; Sperm duct |

# 3.6.2 Pregnancy, Birth and Breastfeeding

**KEYWORDS**

Embryo

Fallopian tube

Fertilisation

Gametes

Haploid

Hormones

Immunity

Ovary

Ovulation

Placenta

Plasma proteins

Progesterone

Uterus

**EXPLANATIONS**

|  |  |
| --- | --- |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\42.12.jpg | Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\42.13.jpg |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\42.17.jpg | |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\42.20.jpg | |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | The process of fertilisation is complete when ... |  |
| 2 | Where fertilisation occurs |  |
| 3 | Role of ATP in cells |  |
| 4 | What is fertilisation? |  |
| 5 | Hormone associated with maintenance of the placenta |  |
| 6 | Example of gene mutation |  |
| 7 | Biological benefits of breastfeeding |  |
| 8 | Survival time for sperm |  |
| 9 | Chromosome mutation |  |
| 10 | The placenta is formed from ... |  |
| 11 | Functions of the placenta |  |
| 12 | Nucleus of an egg cell |  |
| 13 | Where meiosis occurs in female reproductive system |  |
| 14 | Where implantation occurs in female reproductive system |  |
| 15 | Survival times for ova |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Change in the number of chromosomes of an organism | F | Immunity; Correct nutrients; Easier to digest; Delayed ovulation | K | Store or provides energy |
| B | Embryonic and uterine tissues | G | Ovary | L | The male and female nuclei have fused |
| C | Fusion of gametes | H | Produces hormones; Transfers material; Barrier for plasma proteins | M | Up to 2 days |
| D | Half way along Fallopian tube | I | Progesterone | N | Up to 7 days |
| E | Haploid | J | Sickle-cell anaemia | O | Uterus |

# 3.6.2 Infertility and Birth Control

**KEYWORDS**

Birth control

Conceive

Conception

Condom

Contraception

Copulation

Diaphragm

Fertilisation

Gametes

Implantation

Implants

Intercourse

In vitro fertilisation

In vivo

Infertility

IUD

Ovulation

Pill

Pregnancy

Rhythm method

Sperm count

Spermicide

STIs

Uterus

Vasectomy

**EXPLANATIONS**

|  |
| --- |
| **Birth control**: limiting the number of children born. |
| **Contraception**: the act of preventing the fertilisation of an egg or implantation or pregnancy.  Different methods of birth control include:   * *natural*: abstaining from sexual intercourse during the fertile period * *mechanical*: use of a barrier, e.g. condom, to prevent sperm and egg meeting or use of an IUD to prevent implantation * *chemical*: use of the pill to prevent ovulation * *surgical*: tubal ligation in females and vasectomy in males. |
| **Copulation**: a process of introducing sperm into the female’s reproductive system. |
| **Implantation**: process by which the blastocyst attaches itself to, and becomes embedded in, the lining of the uterus (endometrium).  This process may be attempted artificially as part of in-vitro fertilisation for the treatment of infertility. |
| **In-vitro fertilisation**: a method used to treat infertility and help a woman conceive. It involves the union of the male gamete nucleus with the female gamete nucleus outside the woman’s body (in a ‘test tube’ or other laboratory environment). |
| **In-vivo**: an event or process occurring inside a living organism, e.g. fertilisation. |
| **Infertility**: the inability to produce sufficient gametes and conceive or produce children.  May be caused by a low sperm count or low sperm mobility in males, blocked fallopian tubes in females or endocrine gland failure in either or both. |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | Cause of infertility in female |  |
| 2 | Cause of infertility in male |  |
| 3 | 'In vitro' fertilisation |  |
| 4 | Contraception |  |
| 5 | How surgical methods of contraception work |  |
| 6 | Surgical method of male contraception |  |
| 7 | Advantage of vasectomy |  |
| 8 | Disadvantage of vasectomy |  |
| 9 | Where implantation occurs in female reproductive system |  |
| 10 | Non-surgical methods of contraception |  |
| 11 | Infertility |  |
| 12 | How mechanical methods of contraception work |  |
| 13 | How chemical methods of contraception work |  |
| 14 | How natural methods of contraception work |  |
| 15 | The next step for an embryo developed from in vitro fertilisation? |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Condom; Pill; IUD; Diaphragm; Spermicide; Rhythm; Implants | F | Intercourse takes place avoiding ovulation | K | Prevents contact between sperm and egg |
| B | Fertilisation outside the body | G | Low sperm count; Hormonal | L | Prevents ovulation; Normone levels changed |
| C | Hormonal; Blockage; Failure to ovulate | H | Not easily reversed; No protection against STIs | M | Simple operation; Effective; Single procedure |
| D | Implantation or Frozen | I | Prevention of fertilisation, implantation or pregnancy | N | Uterus |
| E | Inability to produce or fertilise gametes; Inability to conceive | J | Prevents contact between sperm and egg | O | Vasectomy |

# 3.6.4 + 5 Embryo Development and Menstrual Cycle

**KEYWORDS**

Amnion

Blastocyst

Blastula

Ectoderm

Embryo

Endoderm

Endometrium

Fertilisation

Follicle

FSH

Germ layer(s)

LH

Mesoderm

Morula

Oestrogen

Organ system

Ovary

Pituitary

Testis

Tissue

**EXPLANATIONS**

|  |
| --- |
| Description: E:\Home\Declan\07 - Dictionaries\Biology Dictionary\Coming to terms with Biology\Biology Dictionary CD 3.0\Biology Dictionary 3.0\Diagrams\42.07.jpg |

**Insert the correct answer from the lower grid into the correct position in the right hand column**

|  |  |  |
| --- | --- | --- |
| 1 | What is meant by germ layers? |  |
| 2 | Name the germ layers |  |
| 3 | Tissue that develops from ectoderm |  |
| 4 | Tissue that develops from endoderm |  |
| 5 | Tissue that develops from mesoderm |  |
| 6 | What is a placenta? |  |
| 7 | Functions of the placenta |  |
| 8 | What is the amnion? |  |
| 9 | Role of amnion |  |
| 10 | Morula |  |
| 11 | Blastocyst |  |
| 12 | Menstruation |  |
| 13 | Where is FSH produced? |  |
| 14 | Function of FSH |  |
| 15 | Part of female reproductive system influenced by FSH and LH |  |
| 16 | Role of oestrogen in menstrual cycle |  |
| 17 | Role of progesterone in menstrual cycle |  |
| 18 | Where testosterone is secreted |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Ectoderm; Endoderm; Mesoderm | G | Ovary or Follicle | M | Shedding of endometrium in absence of fertilisation |
| B | Fluid-filled, hollow ball of cells | H | Pituitary | N | Skin; Nails; Hair; Nervous system |
| C | Holds or Produces fluid; Protects embryo | I | Produces hormones; Allows passage of material; Acts as a barrier | O | Solid ball of cells |
| D | Layer of cells in the blastula; Potential to give rise to tissues | J | Production of follicle; Stimulate oestrogen production | P | Structure in womb of pregnant mammals; Helps nourish foetus and discharge waste |
| E | Lining of gut; Liver; Pancreas | K | Repairs endometrium; Inhibits FSH; Stimulates LH | Q | Testis |
| F | Muscles; Skeleton; Excretory; Respiratory and Circulatory systems | L | Sac or Membrane surrounding embryo | R | Thickening endometrium; Inhibits FSH and LH production |

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# Answers

Page 5 1.1.3 Scientific Method and Experimentation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | L | J | K | A | G | M | D | H | C | O | N | I | F | E |

Page 8 1.2.3 Characteristics of Life and Food

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| I | J | F | L | E | K | M | G | N | O | A | B | C | H | D |

Page 10 1.3.3 Biomolecules 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| j | l | i | h | a | b | o | d | c | k | m | g | e | f | n |

Page 11 1.3.3 Biomolecules 2

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| R | S | U | I | G | Q | F | H | P | M | J | O |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| W | N | L | B | C | E | D | T | V | K | A | X |

Page 14 1.3.4 Biomolecular Components

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| G | C | J | N | M | E | H | P | Q | F | R | O | A | K | I | L | B | D |

Page 16 1.3.6 Role of Biomolecules

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| D | O | N | E | A | B | J | K | P | M | C | G | F | L | I | H | Q | R |

Page 18 1.3.8 Biomolecules and Minerals

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| R | B | A | P | M | Q | O | N | D | E | I | F | H | G | K | J | C | L |

Page 22 1.4.2 - 1.4.6 Ecology

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| C | K | D | T | J | H | Q | V | O | G | R | A |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| F | N | S | P | L | M | E | B | I | W | U | X |

Page 25 1.4.8 + 9 Nutrient Recycling and Human Impact 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| K | L | N | M | J | D | O | B | A | I | G | C | H | E | F |

Page 26 1.4.8 + 9 Nutrient Recycling and Human Impact 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| H | A | F | E | J | D | L | B | C | G | K | I | N | M | O |

Page 27 1.4.8 + 9 Nutrient Recycling and Human Impact 1 + 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| D | N | G | H | U | I | Q | Z | T | S | J | M | B2 | V | C2 |
| **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| P | R | X | C | B | W | K | E | L | F | A | D2 | A2 | Y | O |

Page 30 1.4.11 Relationships and Population Dynamics

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| L | G | A | O | N | B | K | D | I | M | J | C | F | H | E |

Page 32 1.5.3 Ecosystem Study

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| a | l | f | m | k | b | d | h | c | g | e | i | j | n | o |

Page 34 2.1 Cell Structure and Microscopy 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| H | A | G | B | O | J | D | M | K | L | N | I | C | E | F |

Page 35 2.1 Cell Structure and Microscopy 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| o | k | i | a | l | e | b | m | f | g | n | d | c | j | h |

Page 38 2.2.3 Enzymes

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| M | C | Q | W | A | L | H | J | T | K | D | E |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| B | X | I | P | S | F | U | O | V | N | G | R |

Page 41 2.2.4 Photosynthesis 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| E | N | H | I | G | C | F | B | A | L | M | Q | R | J | O | D | K | P |

Page 43 2.2.4 Photosynthesis 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| G | A | B | M | J | N | I | R | F | O | Q | E | D | L | P | C | K | H |

Page 47 2.2.5 Respiration 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| C | F | N | D | H | A | G | J | B | P | E | I | K | M | O | R | L | Q |

Page 49 2.2.5 Respiration 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| N | B | K | P | Q | O | M | D | C | L | I | G | J | H | A | E | F | R |

Page 51 2.2.5 Respiration 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| I | C | N | A | D | G | O | P | E | Q | F | R | L | M | J | K | B | H |

Page 55 2.2.6 Movement through Membranes

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| J | L | N | C | D | H | B | F | G | O | K | I | E | M | A |

Page 57 2.2.7 Enzymes Higher Level

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | F | N | A | H | I | E | K | M | L | G | C | J | D | O |

Page 59 2.2.9 Photosynthesis Higher Level

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** |
| P | R | S | K | M | A | N | I | H | B | Q | J | E | O | D | T | L | G | F | U | C |

Page 62 2.2.10 Respiration Higher Level

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| n | f | k | e | j | i | h | b | l | o | c | m | g | d | A |

Page 66 2.3 Cell Continuity 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| L | K | E | H | M | J | A | C | B | F | I | O | N | D | G |

Page 67 2.3 Cell Continuity 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| g | a | l | m | n | e | f | o | c | d | k | h | b | j | i |

Page 68 2.3 Cell Continuity 1 and 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| h | g | v | x | l | T | W | F | C | U | Q | P | A | M | B2 |
| **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| J | I | Y | K | D2 | D | C2 | B | S | E | Z | A2 | O | R | N |

Page 71 2.4 Cell Diversity

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| l | p | k | j | f | c | q | g | b | m | n | r | i | a | o | e | h | d |

Page 73 2.5.1 - 2 Variation, Heredity, etc.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| o | l | k | m | j | d | f | i | b | g | c | a | h | e | N |

Page 75 2.5.4 DNA, Replication, etc.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| N | J | R | H | P | Q | C | B | A | O | K | I | D | G | L | E | F | M |

Page 77 2.5.5+15 Protein synthesis

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| E | G | R | Q | H | L | K | I | M | A | B | N | D | C | F | P | O | J |

Page 80 2.5.6 Genetic Inheritance

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| j | f | G | K | N | C | D | A | L | B | R | Q | M | E | O | I | P | H |

Page 82 2.5.7 - 8 Variation and Evolution

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| H | F | N | L | C | M | J | I | E | A | D | B | O | K | G |

Page 86 2.5.9 - 13.H Genetic Engineering and Mendelian

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | L | F | H | N | J | M | A | C | E | D | O | K | I | G |

Page 88 2.5.14 DNA, Replication, etc.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| E | C | D | F | B | P | K | N | L | H | O | Q | R | G | A | I | J | M |

Page 91 3.1.3 Monera

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| N | E | R | G | U | W | L | Q | A | J | B | C |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| S | I | M | X | H | F | P | K | V | O | T | D |

Page 94 3.1.4 Fungi 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| C | B | G | N | H | I | E | L | D | F | O | M | A | K | J |

Page 95 3.1.4 Fungi 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| O | C | F | J | K | H | I | D | G | E | B | N | M | L | A |

Page 96 3.1.4 Fungi 1 and 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| I | X | T | D2 | Y | B2 | U | A | V | C2 | A2 | E | D | F | Q |
| **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| P | S | M | K | C | H | W | R | J | L | O | Z | G | N | B |

Page 100 3.1.5, 6, 10 Lab, Protista, Growth Curves

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| C | H | B | L | N | F | J | I | A | K | E | G | D | O | M |

Page 103 3.2.1 Plant Structure 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| K | C | O | F | D | A | L | I | J | N | E | B | M | G | H |

Page 104 3.2.1 Plant Structure 2

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| V | A | B | R | W | K | H | N | C | Q | U | P |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| E | M | S | X | I | F | D | G | L | T | J | O |

Page 108 3.2.2 Blood and Circulation 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | H | D | F | I | E | C | M | A | O | G | J | K | N | L |

Page 109 3.2.2 Blood and Circulation 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| C | N | E | A | M | F | I | K | D | J | G | H | O | L | B |

Page 110 3.2.2 Blood and Circulation 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| F | K | H | I | N | A | O | M | B | L | C | E | D | G | J |

Page 111 3.2.2 Blood and Circulation 4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| I | E | J | A | N | K | G | M | L | C | D | F | B | H | O |

Page 113 3.2.3 + 4 Blood Cells and Heartbeat

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| J | N | C | H | I | G | B | O | M | D | K | F | L | E | A |

Page 115 3.3.1 + 2 Nutrition and Storage in Plants

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** |
| O | L | D | U | F | E | S | C | G | R | A | M | P | J | K | Q | N | I | H | T | B |

Page 119 3.3.3 + 4 Human Nutrition and Digestion 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| C | A | B | K | J | O | D | L | G | M | I | F | E | N | H |

Page 120 3.3.3 + 4 Human Nutrition and Digestion 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| E | A | B | K | J | I | H | N | G | L | F | C | M | D | O |

Page 121 3.3.3 + 4 Human Nutrition and Digestion 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| G | I | A | H | F | O | D | E | K | C | N | M | J | B | L |

Page 122 3.3.3 + 4 Human Nutrition and Digestion 4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| G | E | M | A | B | O | J | N | C | D | K | F | H | I | L |

Page 124 3.3.5 Blood Transport of Nutrients

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| D | B | E | M | G | H | F | C | L | J | K | N | I | O | A |

Page 126 3.3.7 + 3.4.1 Cohesion-Tension and Homeostasis

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| B | E | A | D | H | K | F | C | G | I | L | J |

Page 128 3.4.3 Plant Exchange System

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| F | A | H | J | C | I | D | B | E | L | G | K |

Page 130 3.4.4 Breathing System 1

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| A | G | K | E | F | D | H | B | I | L | C | J |

Page 131 3.4.4 Breathing System 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | K | M | E | D | G | L | N | F | O | I | H | C | J | A |

Page 134 3.4.6 Excretory System 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| G | F | M | I | H | L | N | R | J | K | O | B | A | C | P | E | Q | D |

Page 136 3.4.6 Excretory System 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** |
| Q | I | N | F | E | D | G | C | R | L | M | A | J | T | P | K | B | S | U | H | O |

Page 139 3.4.7 + 8 Excretion

|  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| S | G | D | F | E | M | R | W | V | H | C | U |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| L | T | K | A | Q | I | J | N | B | O | P | X |

Page 142 3.5.2 Plant Responses

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| A | Q | R | D | V | B | F | T | U | X | H | G |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| L | K | I | P | O | M | E | N | C | S | W | J |

Page 146 3.5.3 + 7 Defence System

|  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| A | M | N | E | Q | V | H | L | W | O | S | C |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| J | P | G | X | U | K | B | R | F | T | I | D |

Page 149 3.5.3 Endocrine System

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| B | K | C | L | P | G | O | E | I | N | A | D | F | J | H | Q | R | M |

Page 151 3.5.3 Eye and Ear

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** |
| U | T | K | F | C | M | E | L | G | O | I | J | Q | B | A | R | H | P | D | N | S |

Page 155 3.5.3 Musculoskeletal System 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| B | A | G | H | N | O | F | I | L | C | M | E | J | D | K |

Page 156 3.5.3 Musculoskeletal System 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| C | E | O | L | H | M | B | N | F | A | I | D | G | K | J |

Page 159 3.5.3 Nervous System

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| X | M | F | E | L | D | P | K | R | V | B | Q |
| **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** |
| J | C | O | A | T | U | I | S | H | G | W | N |

Page 162 3.5.4 Viruses

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| G | C | J | B | H | K | O | L | E | D | N | A | F | M | I |

Page 164 3.6.1 Asexual Reproduction

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| G | B | H | K | L | E | A | C | F | D | J | I |

Page 166 3.6.1 + 3 Flower Structure and Gamete Formation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| L | J | M | K | H | B | C | I | A | D | G | E | F | N | O |

Page 168 3.6.1 Pollination and Fertilisation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** | **21** |
| I | B | T | R | M | L | C | J | E | K | P | S | G | U | O | N | D | H | F | Q | A |

Page 171 3.6.1 Fruit Formation and Dispersal

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| R | O | M | L | K | E | Q | G | H | U | D | I | J | B | N | F | A | P | S | C | T |

Page 174 3.6.1 Dormancy and Germination

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| E | D | P | M | F | H | N | J | L | R | C | A | K | B | G | I | Q | O |

Page 177 3.6.2 Reproductive Structures and Hormones

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| R | F | S | E | A | T | G | O | H | P | U | C | M | D | Q | N | I | B | J | K | L |

Page 180 3.6.2 Pregnancy, Birth and Breastfeeding

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| L | D | K | C | I | J | F | N | A | B | H | E | G | O | M |

Page 182 3.6.2 Infertility and Birth Control

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Page 184 3.6.4 + 5 Embryo Development and Menstrual Cycle

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| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** |
| D | A | N | E | F | P | I | L | C | O | B | M | H | J | G | K | R | Q |