**1.** Which is the structure of glycerol?



(Total 1 mark)

**2.** Aerobic respiration involves conversion of glucose into pyruvate and conversion of pyruvate into carbon dioxide and water. Where do these processes occur in a eukaryotic cell?

|  |  |  |
| --- | --- | --- |
|  | **Where glucose is broken down****into pyruvate** | **Where pyruvate is broken down****into carbon dioxide and water** |
| A. | Cytoplasm | Cytoplasm |
| B. | Cytoplasm | Mitochondrion |
| C. | Mitochondrion | Cytoplasm |
| D. | Mitochondrion | Mitochondrion |

(Total 1 mark)

**3.** If identical batches of plants are grown at different temperatures and then harvested to measure the increase in biomass, which graph shows the expected relationship between the temperature and the biomass?



(Total 1 mark)

**4.** Hemophilia is caused by an X-linked recessive allele. In the pedigree shown below which **two** individuals in the pedigree must be carriers of hemophilia?



A. I-1 and II-1

B. I-4 and II-2

C. II-1 and II-2

D. III-2 and III-3

(Total 1 mark)

**5.** A single gene in humans causes blood to be either rhesus positive (dominant allele) or rhesus negative (recessive allele). A woman with rhesus negative blood has already had a child with rhesus positive blood. There could be complications during pregnancy if she has another child with rhesus positive blood.

What is the probability of this, if the father is the same, and if his mother is known to have rhesus negative blood?

A. 25%

B. 50%

C. 75%

D. 100%

(Total 1 mark)

**6.** The diagram below is a simplified version of a food web from Chesapeake Bay. The arrows indicate the direction of energy flow and the numbers indicate species within the food web.



At which trophic level or levels does species II function?

A. 2nd and 3rd consumer

B. 3rd consumer

C. 3rd and 4th consumer

D. Producer

(Total 1 mark)

**7.** What is an advantage of estimating plant populations by random sampling using quadrats?

A. Accurate estimates can be obtained more quickly than if every plant in the population is counted.

B. Random samples can be taken from the most convenient parts of the habitat.

C. Numbers of plants in each quadrat can be estimated quickly.

D. Marking and recapture of plants is not necessary.

(Total 1 mark)

**8.** What sequence of organs do substances pass through, as they move through the human digestive system? ( = 🡪)

A. Mouth 🡪 stomach 🡪 pancreas 🡪 small intestine🡪 liver 🡪 large intestine 🡪 anus

B. Mouth  stomach  small intestine  pancreas  liver  large intestine  anus

C. Mouth  esophagus  stomach  small intestine  large intestine  anus

D. Mouth  esophagus  stomach  large intestine  small intestine  anus

(Total 1 mark)

**9.** How do skin and mucous membranes act as barriers to infection?

|  |  |  |
| --- | --- | --- |
|  | **Skin** | **Mucous membranes** |
| A. | Skin is tough and forms an effectivephysical barrier. | Mucous membranes are thick andelastic so pathogens are repelled. |
| B. | Phagocytes on the skin surface trappathogens. | Mucus is moved out of the bodyby the beating of hair-like cilia. |
| C. | Skin is tough and forms an effectivephysical barrier. | Pathogens are trapped by stickymucus. |
| D. | Phagocytes on the skin surface trappathogens. | The acidity of mucus kills harmfulbacteria. |

(Total 1 mark)

**10.** Arterioles in the skin contain muscle fibres which contract. What is the function of these fibres?

A. To move capillaries further from the skin when the body is too cold

B. To reduce blood flow to the skin when the body is too cold

C. To move capillaries closer to the skin when the body is too warm

D. To increase blood flow to the skin when the body is too warm

(Total 1 mark)

**11.** Which pair of characteristics are correct for the cellular processes of exocytosis and endocytosis?

|  |  |  |
| --- | --- | --- |
|  | **Exocytosis** | **Endocytosis** |
| A. | Secretion of cellular materials | Vesicles are moved away from theplasma membrane |
| B. | Cell membranes fuse | Vesicles are moved towards theplasma membrane |
| C. | Infolding of plasma membrane | Vesicles are moved away from theplasma membrane |
| D. | Vesicles moved towards the plasmamembrane | Plasma membrane increases in size |

(Total 1 mark)

**12.** In the structure of DNA what binds with cytosine?

A. Deoxyribose

B. Ribose

C. Thymine

D. Adenine

(Total 1 mark)

**13.** What would be the effect of increasing temperature on the rate of photosynthesis in a green plant?

A. It increases constantly.

B. It increases up to a point and then remains constant.

C. It increases up to a point and then decreases.

D. It remains constant.

(Total 1 mark)

**14.** What is a sex-linked gene?

A. A gene whose locus is on the X chromosome only.

B. A gene whose locus is on the X or Y chromosomes.

C. A gene whose locus is on the both X and Y chromosomes.

D. A gene whose locus is on the Y chromosome only.

(Total 1 mark)

**15.** What permits gel electrophoresis to separate fragments of DNA?

A. Differences in the sizes of DNA fragments only

B. The number of negative charges on the fragments only

C. The net charge (negative or positive) on the fragments only

D. The size and the net charge (positive or negative) on the fragments

(Total 1 mark)

**16.** In the binomial system of nomenclature which two names are used to identify a type of organism?

|  |  |  |
| --- | --- | --- |
| A. | Family | Species |
| B. | Genus | Species |
| C. | Family | Genus |
| D. | Genus | Order |

(Total 1 mark)

**17.** What conditions are necessary for air to be exhaled from the lungs?

A. Air pressure in the alveoli must become greater than the air pressure in the mouth.

B. Air pressure in the alveoli must become lower than the air pressure in the mouth.

C. Air pressure in the alveoli must become the same as the air pressure in the mouth.

D. There is no change in the air pressure of the alveoli or the mouth.

(Total 1 mark)

**18.** Under what conditions is glucagon secretion increased?

A. After fasting for a long period

B. While resting

C. After a meal rich in carbohydrates

D. When the temperature falls

(Total 1 mark)

**19.** Which two molecules are the principal components of membranes?

A. Glycogen and protein

B. Lipid and glycogen

C. Cellulose and protein

D. Protein and lipid

Total 1 mark)

**20.** The diagram below represents an animal cell.

Which processes occur in the locations labeled?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Transcription** | **Translation** | **Respiration** |
| A. | II | III | I |
| B. | III | II | I |
| C. | II | III | IV |
| D. | III | II | IV |

**21.** Which molecule is a monosaccharide?

A. Ribose

B. Glycogen

C. Amylase

D. Glycerol

(Total 1 mark)

**22.** What is always a difference between the alleles of a gene?

A. Their position on the chromosome

B. Their amino acid sequence

C. The number of codons that each contains

D. Their base sequence

(Total 1 mark)

**24.** A randomly selected group of organisms from a family would show more genetic variation than a randomly selected group from which level of classification?

A. Phylum

B. Genus

C. Order

D. Class

(Total 1 mark)

**25.** Which of the following terms describe(s) species X?

I. Heterotroph

II. Primary consumer

III. Secondary consumer

A. I and II only

B. I and III only

C. II only

D. I, II, and III

(Total 1 mark)

**23.** Hypophosphataemia is a disorder involving poor re-absorption of phosphate from glomerular filtrate in humans. It shows a sex-linked dominant pattern of inheritance as illustrated in the following pedigree.



 Which row in the table correctly identifies the genotypes of individuals 1 and 2?

|  |  |  |
| --- | --- | --- |
|  | **Individual 1** | **Individual 2** |
| A. | XHXh | XHY |
| B. | XhY | XHXH |
| C. | XhY | XHXh |
| D. | unaffected | affected |

(Total 1 mark)

**26.** Which organ secretes FSH (follicle-stimulating hormone)?

A. Ovary

B. Testis

C. Pituitary gland

D. Placenta

(Total 1 mark)

**27.** Which ratio limits the size of cells?

A. The rate of metabolism to mass

B. The surface area to volume

C. The mass to volume

D. The surface area to mass

(Total 1 mark)

**28.** Which statement is characteristic of tumours?

A. They occur only in certain animal cells.

B. They result from controlled cell division in only some organs.

C. They result from uncontrolled cell division and occur in any organ.

D. They result from partially controlled transcription.

(Total 1 mark)

**29.** Identify the atoms and ions from the table below.

|  |  |  |
| --- | --- | --- |
|  | **Atoms** | **Ions** |
| A. | H+ Na+ | OH– Cl– |
| B. | Fe K | CH3COO– H2O |
| C. | Fe H2O | Ca2+ N3 – |
| D. | Na C | I– NO3 – |

(Total 1 mark)

**30.** What is responsible for the conservation of the base sequence during DNA replication?

A. DNA polymerase working on one strand at the same time.

B. Unpaired bases always attracting their complementary nucleotides.

C. DNA helicase and polymerase are complementary.

D. Both strands are identical to each other.

(Total 1 mark)

**31.** Which graph shows the effect of increasing carbon dioxide concentration (CO2) on the rate of photosynthesis?

A.



B.



C.



D.



(Total 1 mark)

**32.** What is a karyotype?

A. Maternal and paternal autosomes arranged in pairs.

B. Chromosomes arranged in pairs according to the number of their genes.

C. Chromosomes arranged in pairs according to their size and shape.

D. Chromosomes arranged in pairs according to their size.

(Total 1 mark)

**33.** What is the relationship between Mendel’s law of segregation and meiosis?

A. Only one of a pair of alleles appears in a gamete.

B. The separation of “paternal” and “maternal” chromosomes shows no pattern.

C. Gametes contain all dominant or all recessive alleles.

D. Variation only results from two divisions.

(Total 1 mark)

**34.** What are the possible applications of DNA profiling?

I. Solving paternity suits

II. Aiding certain criminal investigations

III. Identifying people who died last century

A. I only

B. I and II only

C. II and III only

D. I, II and III

(Total 1 mark)

**35.** Consider the simple food web below.

Which organism could be a saprotroph?

A. P

B. Q

C. S

D. T

(Total 1 mark)

**36.** What is natural selection?

A. The mechanism that increases the chance of certain individuals reproducing.

B. The mechanism that leads to increasing variation within a population.

C. The cumulative change in the heritable characteristics of a population.

D. The mechanism that explains why populations produce more offspring than the environment can support.

(Total 1 mark)

**37.** Which types of enzyme are found in the human digestive system?

I. Amylases

II. Proteases

III. Lipases

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

(Total 1 mark)

**38.** What is a pathogen?

A. A virus that causes a disease.

B. Any organism or virus that causes a disease.

C. A disease caused by bacteria or viruses.

D. Any organism transmitted from humans to humans.

(Total 1 mark)

**39.** Which fluid is sampled to try to detect chromosomal abnormalities in a fetus?

A. Placental

B. Umbilical

C. Amniotic

D. Spinal

(Total 1 mark)

**40.** Which combination of features is found in most plant and animal cells?

A. Plasma membrane, lysosome, Golgi apparatus

B. Cytoplasm, mitochondria, ribosomes

C. Rough ER, nucleus, centrioles

D. Plastids, cytoplasm, nucleus

(Total 1 mark)

**41.** During endocytosis, what change will most likely occur in the plasma membrane of a cell?

A. It will form two phospholipid monolayers.

B. It will become electrically charged.

C. It will partially dissolve.

D. It will form vesicles.

(Total 1 mark)

**42.** Which of the following could be a function of a membrane protein?

A. Energy storage

B. Enzymatic activity

C. Oxygen uptake

D. Thermal insulation

(Total 1 mark)

**43.** During the process of replication, which bond(s) in the diagram of DNA below is/are broken?



A. 3

B. 4, 5

C. 1, 2, 6, 7

D. 1, 7, 4, 5

(Total 1 mark)

**44.** What is the maximum number of fatty acids that can be condensed with glycerol?

A. One

B. Two

C. Three

D. Four

(Total 1 mark)

**45.** Which row in the table describes the first stage of cellular respiration?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Substrate** | **Location** | **Product** | **Product** |
| A. | pyruvate | mitochondria | oxygen | water |
| B. | pyruvate | cytoplasm | carbon dioxide | ATP |
| C. | glucose | mitochondria | pyruvate | water |
| D. | glucose | cytoplasm | pyruvate | ATP |

(Total 1 mark)

**46.** Which of the following represents a test cross to determine if phenotype T is homozygous **or** heterozygous? (**Note**: allele T is dominant to allele t.)

A. Phenotype T crossed with another phenotype T

B. Phenotype T crossed with a phenotype T which is homozygous

C. Phenotype T crossed with a phenotype T which is heterozygous

D. Phenotype T crossed with phenotype t

(Total 1 mark)

**47.** Which of the following blood group phenotypes always has a homozygous genotype?

A. A

B. B

C. AB

D. O

(Total 1 mark)

**48.** In the pedigree shown below, the female, labelled I-2, is a carrier for colour blindness, however neither male (I-1 or II-1) is colour blind

What is the probability that offspring III-1 will be colour blind?

A. 50%

B. 25%

C. 12.5%

D. 0%

(Total 1 mark)

**49.** What happens to the unfertilized egg used in the cloning process of a differentiated cell?

A. It becomes fertilized.

B. Its nucleus is replaced by the nucleus of the differentiated cell.

C. Its nucleus is fused with the nucleus of the differentiated cell.

D. Its nucleus is exchanged with the nucleus of the sperm.

(Total 1 mark)

**50.** A tiny amount of DNA was obtained from a crime scene and amplified. Following digestion with restriction enzymes, which laboratory technique would be used to separate the fragments of DNA?

A. Karyotyping

B. Genetic screening

C. Gel electrophoresis

D. Polymerase chain reaction

(Total 1 mark)

**51.** What was the original goal of the Human Genome Project?

A. To determine the function of genes

B. To determine the nucleotide sequence of all human chromosomes

C. To determine how genes control biological processes

D. To understand the evolution of species

(Total 1 mark)

**52.** What is considered to be a characteristic of the members of a Genus?

A. They belong to a closed gene pool.

B. Members can interbreed freely under normal conditions.

C. They share a common ancestral species.

D. They are limited to certain geographic areas.

(Total 1 mark)

**53.** In ecology, what is meant by the term *community*?

A. A group of populations living and interacting in the same area

B. A group of organisms of the same species living and interacting in the same area

C. A group of organisms which can interbreed and produce fertile offspring

D. The environment in which a species normally lives

(Total 1 mark)

**54.** The capture-mark-release-recapture method was used to determine the number of Sandhill Cranes (*Grus canadensis nesiotes*), an endangered species of bird, living on an island.

The following data were obtained:

 number of Sandhill Cranes initially caught, marked and released = 22

 total number of Sandhill Cranes caught in second sample = 14

 number of marked Sandhill Cranes in the second sample = 2

What is the population size of the Sandhill Cranes on the island?

A. 77

B. 154

C. 308

D. 616

(Total 1 mark)

**55.** Which factors could be important for a species to evolve by natural selection?

I. Environmental change

II. Inbreeding

III. Variation

A. I only

B. I and II only

C. I and III only

D. I, II and III

(Total 1 mark)

**56.** In the graph below, what could be causing the population change in the region II  III?



A. Natality > mortality, immigration = emigration

B. Natality > mortality, immigration > emigration

C. Natality > mortality, immigration < emigration

D. Natality = mortality, immigration < emigration

(Total 1 mark)

**57.** Two cellular activities that support human life are absorption and assimilation. What is needed for assimilation but **not** for absorption?

A. Enzymes to synthesize new molecules

B. Blood capillaries

C. Dissolved nutrients

D. Microvilli

(Total 1 mark)

**58.** Which sequence of events correctly describes the destruction of pathogens in body tissues by phagocytic leucocytes?

A. Amoeboid motion  endocytosis  chemical recognition  enzymatic digestion

B. Chemical recognition  amoeboid motion  enzymatic digestion  endocytosis

C. Amoeboid motion  chemical recognition  enzymatic digestion  endocytosis

D. Chemical recognition  amoeboid motion  endocytosis  enzymatic digestion

(Total 1 mark)

**59.** What is happening in the heart when the semi-lunar valves are closed?

I. Blood is entering the aorta.

II. Blood is entering the pulmonary artery.

III. Blood is entering the ventricles.

IV. The ventricles are contracting.

A. I and II only

B. I and III only

C. III only

D. III and IV only

(Total 1 mark)

**60.** How many times does an oxygen molecule cross a plasma membrane when moving from inside an alveolus to the hemoglobin of a red blood cell?

A. Two

B. Three

C. Four

D. Five

(Total 1 mark)

**61.** Ducts connect the liver, gall bladder and pancreas to the alimentary canal. Which diagram shows the correct pattern of duct connections?



(Total 1 mark)

**62.** How does fertilization differ from copulation?

A. Fertilization always produces a zygote.

B. Only fertilization involves gametes.

C. Fertilization is a conscious event.

D. Fertilization can spread HIV.

(Total 1 mark)

**63.** Why is amniotic fluid collected during prenatal testing for abnormal chromosomes?

A. To obtain uterine cells

B. To obtain fetal cells

C. To obtain dissolved chemical by-products of fetal development

D. To replace it with fluid containing special growth hormones

(Total 1 mark)

**64.** Women should periodically have a Pap smear test performed to detect cervical cancer. Which letter indicates the cervix in the diagram below?



(Total 1 mark)

**65.** What is the product of mitosis in plant cells?

A. Four daughter cells with genetically different nuclei

B. Four daughter cells with genetically identical nuclei

C. Two daughter cells with genetically different nuclei

D. Two daughter cells with genetically identical nuclei

(Total 1 mark)

**66.** Which substance is a base found in RNA?

A. Ribose

B. Thymine

C. Adenosine

D. Uracil

(Total 1 mark)

**67.** What type of bond holds the complementary base pairs together in a double helix of DNA?

A. Covalent bonds

B. Peptide bonds

C. Glycosidic bonds

D. Hydrogen bonds

(Total 1 mark)

**68.** What does a karyotype show?

A. Gel electrophoresis bands from DNA

B. The number and appearance of chromosomes

C. A pair of alleles controlling a specific character

D. All the genes possessed by a living organism

(Total 1 mark)

**69.** A diploid cell in a gorilla has 48 chromosomes. How many chromosomes will be present in a haploid gorilla cell?

A. 96

B. 48

C. 24

D. 12

(Total 1 mark)

**70.** A woman has a heterozygous genotype for blood group B. She is expecting a baby with a man who is homozygous Group A. What are the possible blood groups for their baby?

I. Group O

II. Group A

III. Group AB

A. II and III only

B. I and II only

C. I and III only

D. I, II and III

(Total 1 mark)

**71.** What enzymes are used in gene transfer techniques?

A. Endonucleases and lipases

B. Ligases and amylases

C. Ligases and lipases

D. Restriction enzymes and ligases

(Total 1 mark)

**72.** What is an ecosystem?

A. A species and its abiotic environment

B. A community and its abiotic environment

C. The habitat where a species lives

D. A population of organisms in a specific habitat

(Total 1 mark)

**73.** Which of the following graphs shows the typical growth of a population?



(Total 1 mark)

**74.** Which of the following are functions of all mammalian arteries?

I. To carry oxygenated blood

II. To carry blood away from the heart

III. To carry blood under high pressure

A. I and III only

B. I, II and III

C. II and III only

D. I and II only

(Total 1 mark)

**75.** What does the body use to control the heartbeat?

I. Adrenalin

II. Pacemaker

III. Nerves from brain

A. II and III only

B. I and II only

C. I, II and III

D. I and III only

(Total 1 mark)

**76.** How do phagocytic leucocytes help to protect against disease?

A. They secrete bacterial toxins by exocytosis.

B. They ingest pathogens by endocytosis.

C. They produce antigens to destroy pathogens.

D. They produce antibodies to destroy pathogens.

(Total 1 mark)

**77.** What defines the terms *ventilation*, *gas exchange* and *cell respiration* in mammals?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Ventilation** | **Gas exchange** | **Cell respiration** |
| A. | providing fresh air | replacing oxygen with carbondioxide in blood in lungs | cellular energyproduction from glucose |
| B. | muscle movement to movefresh air into alveoli | replacing carbon dioxide withoxygen in blood in lungs | gases crossing the plasmamembrane of a cell |
| C. | muscle movement to movefresh air into alveoli | replacing carbon dioxide withoxygen in blood in lungs | cellular energyproduction from glucose |
| D. | providing fresh air | replacing oxygen with carbondioxide in blood in lungs | gases crossing the plasmamembrane of a cell |

(Total 1 mark)

**78.** Which pair of features is correct for both plant and prokaryotic cells?

|  |  |  |
| --- | --- | --- |
|  | **Plant cell** | **Prokaryotic cell** |
| A. | Able to change shape | Fixed shape |
| B. | Contains DNA associated with protein | Contains naked DNA |
| C. | DNA enclosed by membrane | DNA associated with protein |
| D. | Chloroplasts may be present | Chloroplasts may be present |

(Total 1 mark)

**79.** The diagram shows a model of a biological membrane. What do labels I, II, and III illustrate?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **I** | **II** | **III** |
| A. | Integral protein | Peripheral protein | Hydrophobic phosphate head |
| B. | Peripheral protein | Glycoprotein | Hydrophilic phosphate head |
| C. | Glycoprotein | Integral protein | Hydrophilic phosphate head |
| D. | Glycoprotein | Peripheral protein | Hydrophobic phosphate head |

(Total 1 mark)

**80.** What describes the functions of the following organelles?

|  |  |  |
| --- | --- | --- |
|  | **Golgi apparatus** | **Rough ER** |
| A. | Synthesis of proteins for cell secretion | ATP production |
| B. | ATP production | Synthesis of proteins for cell secretion |
| C. | Synthesis of proteins for cell secretion | Processing of proteins |
| D. | Processing of proteins | Synthesis of proteins for cell secretion |

(Total 1 mark)

**81.** What role does iron play in living organisms?

A. As a component in nucleic acids

B. As a component of lipids

C. As a component of carbohydrates

D. As a component of proteins

(Total 1 mark)

**82.** Which diagram correctly illustrates a dipeptide?



(Total 1 mark)

**83.** What are the components of a DNA nucleotide?

A. Deoxyribose, a phosphate and one of the bases: adenine, cytosine, guanine or thymine

B. Ribose, a phosphate and one of the bases: adenine, cytosine, guanine or uracil

C. Deoxyribose, a nitrate and one of the bases: adenine, cytosine, guanine or thymine

D. Ribose, a nitrate and one of the bases: adenine, cytosine, guanine or thymine

(Total 1 mark)

**84.** What is the correct sequence of chemicals produced in the anaerobic respiration pathway?

A. Lactate → pyruvate → ethanol

B. Ethanol → pyruvate → glucose

C. Glucose → lactate → pyruvate

D. Glucose → pyruvate → lactate

(Total 1 mark)

**85.** Why do leaves of plants look green?

A. Most of the green light is absorbed by chlorophyll and most of the red and blue light is reflected.

B. Most of the blue light is absorbed by chlorophyll and most of the red and green light is reflected.

C. Most of the red light is absorbed by chlorophyll and most of the green and blue light is reflected.

D. Most of the red and blue light is absorbed by chlorophyll and most of the green light is reflected.

**86.** How would the following DNA sequence, ACGTTGCATGGCA, be transcribed?

A. UGCAACGUACCGU

B. TGCAACGTACCGT

C. ACGTTGCATGGCA

D. ACGUUGCAUGGCA

(Total 1 mark)

**87.** What can be concluded on the basis of the following karyotype?



A. Female with a normal set of chromosomes

B. Male with Down syndrome

C. Female with Down syndrome

D. Male with a normal set of chromosomes

(Total 1 mark)

**88.** What are homologous chromosomes?

A. Two chromosomes with differing sets of genes, in the same sequence, with the same alleles

B. Two chromosomes with the same set of genes, in a different sequence, with the same alleles

C. Two chromosomes with a different set of genes, in the same sequence, with different alleles

D. Two chromosomes with the same set of genes, in the same sequence, sometimes with different alleles

(Total 1 mark)

**89.** Which features of DNA fragments are used to separate them in the process of gel electrophoresis?

A. Their charge and their size

B. Their charge and base composition

C. The sequence of their bases and their charge

D. Their base composition and their size

(Total 1 mark)

**90.** Which feature of a genetic pedigree chart demonstrates that a characteristic is sex linked?

A. Numbers of offspring carrying the characteristic decreased over several generations.

B. One gender is more commonly affected than the other.

C. Equal numbers of males and females inherit the characteristic.

D. Boys and girls only inherit the characteristic from their mothers.

(Total 1 mark)

**91.** What does the genotype XH Xh indicate?

A. A co-dominant female

B. A heterozygous male

C. A heterozygous female

D. A co-dominant male

(Total 1 mark)

**92.** If a purple flowered (Pp) and a white flowered pea plant (pp) are crossed, what will the offspring be?

A. 1 : 1 ratio of purple and white flowers

B. 3 : 1 ratio of purple to white flowers

C. 1 : 3 ratio of purple to white flowers

D. All purple flowers

(Total 1 mark)

**93.** What is a *community*?

A. A group of producers and consumers living and interacting in an area.

B. A group of species living and interacting in an area.

C. A group of organisms living and interacting in an area.

D. A group of populations living and interacting in an area.

(Total 1 mark)

**94.** What are the main sources of carbon dioxide on earth?

A. Cellular respiration of consumers, producers and combustion of fossil fuels

B. Photosynthesis and cellular respiration of consumers

C. Cellular respiration of producers and combustion of fossil fuels

D. Photosynthesis and combustion of fossil fuels

(Total 1 mark)

**95.** The average leaf length of one plant is 2.5 cm with a standard deviation of 0.5 cm. What does this indicate?

A. 95% of all leaves fall within the ranges of 2.0 to 3.0 cm

B. 68% of all leaves fall within the ranges of 1.5 to 3.5 cm

C. 68% of all leaves fall within the ranges of 2.5 to 3.0 cm

D. 95% of all leaves fall within the ranges of 1.5 to 3.5 cm

(Total 1 mark)

**96.** What are *Allium sativa* and *Allium cepa*?

A. Two different species of the same genus

B. The same species of the same genus

C. The same species but of a different genus

D. Two different species of a different genus

(Total 1 mark)

**97.** This diagram represents a simple food chain. In which ways is energy lost between the trophic levels?



 I. Heat loss through cell respiration
II. Material not consumed
III. Material not assimilated

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

(Total 1 mark)

**98.** In the digestive system, enzyme A has an optimum pH of 1.5 and enzyme B an optimum pH of 7.
What are the possible substrates of these enzymes?

|  |  |  |
| --- | --- | --- |
|  | **Enzyme A** | **Enzyme B** |
| A. | proteins | amino acids |
| B. | lipids | proteins |
| C. | carbohydrates | lipids |
| D. | proteins | lipids |

(Total 1 mark)

**99.** Which processes are represented by the labels in the diagram below?



|  |  |  |
| --- | --- | --- |
|  | **I** | **II** |
| A. | A phagocyte ingesting a microbe by exocytosis. | Digestion of the microbe with the help of the Golgi apparatus. |
| B. | A phagocyte ingesting a microbe by endocytosis. | Digestion of the microbe with the help of a lysosome. |
| C. | A phagocyte ingesting a microbe by exocytosis. | Digestion of the microbe with the help of a lysosome. |
| D. | A phagocyte ingesting a microbe by endocytosis. | Digestion of the microbe with the help of the Golgi apparatus. |

(Total 1 mark)

**100.** The diagram below shows the human male reproductive system and associated organs.



 Which of the labelled structures indicate the bladder, prostate and urethra?

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Bladder** | **Prostate** | **Urethra** |
| A. | Y | X | Z |
| B. | X | Y | Z |
| C. | Z | X | Y |
| D. | X | Z | Y |

(Total 1 mark)

**101.** What happens during inhalation?

A. Both the external intercostal muscles and the diaphragm contract.

B. The internal intercostal muscles contract and the diaphragm relaxes.

C. The external intercostal muscles relax and the diaphragm contracts.

D. Both the internal intercostal muscles and the diaphragm relax.

(Total 1 mark)

**102.** Which of the following best describes the composition of human blood?

A. Erythrocytes, leucocytes and platelets

B. Erythrocytes, phagocytes and platelets

C. Erythrocytes, lymphocytes and platelets

D. Erythrocytes, antigens and platelets

(Total 1 mark)

**103.** Which of the following best describes antibodies?

A. Made by phagocytes and specific to one antigen

B. Made by lymphocytes and specific to one antigen

C. Made by leucocytes and non-specific

D. Made by phagocytes and non-specific

(Total 1 mark)

**104.** Which play a role in controlling body temperature?

 I. Blood
II. Skin arterioles
III. Body hair

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

(Total 1 mark)

**105.** In a human diet, what effect does a high intake of both protein and salt have on urea and salt concentrations of urine?

|  |  |  |
| --- | --- | --- |
|  | **Urea Concentration** | **Salt Concentration** |
| A. | High | Low |
| B. | Low | High |
| C. | High | High |
| D. | Low | Low |

(Total 1 mark)

**106.** A student observes and draws an Amoeba, using the high power lens of a microscope. The diameter of the drawing is 100 mm. The actual diameter of the Amoeba is 100 *µ*m. What is the magnification of the drawing?

A. 0.001

B. 100

C. 400

D. 1000

(Total 1 mark)

**107.** What ensures that mitosis produces two genetically identical nuclei?

A. One of each of the twenty-three types of chromosome is pulled to each pole of the cell by spindle microtubules.

B. Half of the chromosomes are pulled to each centriole by mesosomes.

C. Identical chromatids are pulled to opposite poles by spindle microtubules.

D. DNA molecules are moved to the equator of the cell where they are replicated.

(Total 1 mark)

**108.** What causes water to have a relatively high boiling point?

A. Hydrogen bonds between water molecules

B. Hydrogen bonds between hydrogen and oxygen within water molecules

C. Cohesion between water molecules and the container in which the water is boiled

D. Covalent bonds between hydrogen and oxygen within water molecules

(Total 1 mark)

**109.** Which of the following substances are organic?

 I. Lipids
II. Water
III. Carbon dioxide

A. I only

B. II and III only

C. I and II only

D. I, II and III

(Total 1 mark)

**110.** The diagram below represents DNA replication. Some of the bases are indicated.



 In which direction is the replication fork moving and which bases would be needed to replicate the section of DNA shown?

|  |  |  |
| --- | --- | --- |
|  | **Direction of movement of replication fork** | **Bases needed** |
| A. | Left to right | U, G and C |
| B. | Right to left | U, G and C |
| C. | Left to right | T, G and C |
| D. | Right to left | T, G and C |

(Total 1 mark)

**111.** Where in eukaryotic cells is glucose broken into pyruvate, to release energy for use in the cell?

A. Chloroplast

B. Cytoplasm

C. Mitochondrion

D. Nucleus

(Total 1 mark)

**112.** In what way are eukaryotic chromosomes different from prokaryotic chromosomes?

|  |  |  |
| --- | --- | --- |
|  | **Eukaryotic chromosomes** | **Prokaryotic chromosomes** |
| A. | Protein is present | Protein is absent |
| B. | DNA is present | DNA is absent |
| C. | RNA is present | RNA is absent |
| D. | RNA is absent | RNA is present |

(Total 1 mark)

**113.** Which processes result in the greatest amount of genetic variation in a population?

A. Natural selection and meiosis

B. Meiosis and mutation

C. Mutation and mitosis

D. Mitosis and natural selection

(Total 1 mark)

**114.** Hemophilia is sex-linked and is caused by a recessive allele. A woman’s father has hemophilia, but her husband does not.

 What is the probability of the women and her husband having a child with hemophilia?

|  |  |  |
| --- | --- | --- |
|  | **Probability of a son having hemophilia** | **Probability of a daughter having hemophilia** |
| A. | 50% | 0% |
| B. | 0% | 0% |
| C. | 100% | 0% |
| D. | 0% | 50% |

(Total 1 mark)

**115.** Brachydactyly, abnormal shortness of the fingers, was the first human genetic disorder found to be caused by a dominant allele. The pedigree below shows a family with affected males ■, unaffected males □, affected females ● and unaffected females ○.



 What are the genotypes of the father and mother in the first generation, using the symbol B for the dominant alleles and symbol b for recessive allele?

A. bb and BB

B. bb and Bb

C. Bb and BB

D. BB or Bb and bb

(Total 1 mark)

**116.** There are many different views on the ethics of reproductive cloning in humans. Which is a valid argument **against** cloning in humans?

A. It involves the use of donor sperm which is unethical.

B. It happens naturally when identical twins are conceived.

C. Only females can be cloned.

D. The life expectancy of children produced by cloning might be lower than normal.

(Total 1 mark)

**117.** What components are needed to make an ecosystem?

A. A community and its abiotic environment

B. A community and its source of energy and nutrients

C. Producers and consumers only

D. Producers, consumers and decomposers only

(Total 1 mark)

**118.** What is the ecological role of saprotrophic bacteria?

A. To recycle energy in dead organic matter

B. To digest dead organic matter and release nutrients from it

C. To ingest dead organic matter and prevent it from accumulating

D. To produce dead organic matter by killing organisms

(Total 1 mark)

**119.** Which equation should be used to calculate the mean of a set of values?

A. lowest value + 

B.   68%

C. 

D.  × 100%

(Total 1 mark)

**120.** According to Darwin’s theory of evolution, what causes the struggle for survival in populations?

A. Overproduction of offspring

B. Favourable heritable variations

C. Natural selection

D. Competition between the fittest individuals in the population

(Total 1 mark)

**121.** What is a factor that increases the greenhouse effect and what is a consequence of it?

|  |  |  |
| --- | --- | --- |
|  | **Factor contributing to increases in the greenhouse effect** | **Consequence of the increasedgreenhouse effect** |
| A. | Increasing global temperatures | Rising sea levels |
| B. | Rising sea levels | Increasing global temperatures |
| C. | Increasing global temperatures | Burning fossil fuels to run air conditioning |
| D. | Increases in air travel | Increasing global temperatures |

(Total 1 mark)

**122.** Where is the gall bladder located?

A. Surrounded by the liver

B. Surrounded by the pancreas

C. Behind the intestines in the abdomen

D. Below the stomach in the abdomen

(Total 1 mark)

**123.** Why are antibiotics ineffective against viruses?

A. Viruses do not have metabolic pathways for the antibiotic to target.

B. Viruses have developed resistance to antibiotics.

C. Viruses destroy T-lymphocytes before the antibiotic can work.

D. Viruses mutate quickly when challenged by an antibiotic.

(Total 1 mark)

**124.** What substance is released into the blood by the pancreas when blood glucose levels are low?

A. Glucose

B. Glucagon

C. Glycogen

D. Insulin

(Total 1 mark)

**125.** Do the levels of progesterone and FSH increase or remain low during the first few days of the menstrual cycle?

A. Progesterone and FSH both remain low.

B. Progesterone remains low but FSH increases.

C. Progesterone increases but FSH remains low.

D. Progesterone and FSH both increase.

(Total 1 mark)

**126.** The DNA of a particular cell is damaged, so that the cell continues to divide uncontrollably. What is the possible result?

A. Coronary heart disease

B. AIDS

C. Tumour formation

D. Down syndrome

(Total 1 mark)

**127.** What is produced as a result of mitosis?

A. Two cells, each containing half the number of chromosomes of the original cell

B. Two cells, each containing the same number of chromosomes as the original cell

C. Four cells, each containing the same number of chromosomes as the original cell

D. Four cells, each containing half the number of chromosomes of the original cell

(Total 1 mark)

**128.** Carbon, hydrogen, nitrogen and sulphur are elements found in living cells. Which is the least common?

A. Carbon

B. Hydrogen

C. Nitrogen

D. Sulphur

(Total 1 mark)

**129.** Which of the following terms correctly describe the molecule below?

I. Monosaccharide

II. Ribose

III. Carbohydrate

A. I only

B. I and III only

C. II and III only

D. I, II and III

(Total 1 mark)

**130.** A certain gene in a bacterium codes for a polypeptide that is 120 amino acids long. How many nucleotides are needed in the mRNA to code for this polypeptide?

A. 30

B. 40

C. 360

D. 480

(Total 1 mark)

**131.** What enzyme is used in transcription but **not** in translation?

A. DNA polymerase

B. Helicase

C. Protease

D. RNA polymerase

(Total 1 mark)

**132.** Which two colours of light does chlorophyll absorb most?

A. Red and yellow

B. Green and blue

C. Red and green

D. Red and blue

(Total 1 mark)

**133.** The diagram below shows the cell of an organism going through the first division of meiosis.

 

How many different combinations are possible for these chromosomes in the haploid cells formed by meiosis?

A. 2

B. 6

C. 8

D. 9

(Total 1 mark)

**134.** If the amount of DNA in a haploid gamete is represented by N, what is the net quantity of DNA in a cell from the same organism at the start of meiosis?

A. 0.5 N

B. N

C. 2 N

D. 4 N

(Total 1 mark)

**135.** If a man has blood group O and a woman has blood group AB, what is the probability that their child will be blood group O?

A. 0%

B. 25%

C. 50%

D. 100%

(Total 1 mark)

**136.** According to the precautionary principle, what should happen if there are fears that eating a food might cause a health problem?

A. People should be warned about the possible health problem.

B. The company producing the food should be warned about the possible health problem.

C. People who have fears about the food should test it to see if it causes a real health problem.

D. The company producing the food should test the food to prove that it does not cause a health problem.

(Total 1 mark)

**137.** If natality is slightly larger than mortality, and immigration is much larger than emigration, what will happen to the size of a population?

A. It will increase

B. It will decrease

C. It will fluctuate up and down

D. It will remain constant

(Total 1 mark)

**138.** Which process has the greatest effect in determining which members of a population are most likely to survive until reproductive age?

A. Evolution

B. Natural selection

C. Meiosis

D. Hybridization

(Total 1 mark)

**139.** In the hierarchy of taxa, what is in a family?

A. A group of classes

B. A group of genera

C. A group of orders

D. A group of phyla

(Total 1 mark)

**140.** What does the digestion of starch by amylase produce?

A. Lactose

B. Sucrose

C. Galactose

D. Maltose

(Total 1 mark)

**141.** Which factors related to mucous membranes protect the body against microbes?

I. Production of lysozyme

II. Secretion of alkaline solutions

III. Trapping of microbes

A. I and II only

B. II and III only

C. I and III only

D. I, II and III

(Total 1 mark)

**142.** Capillaries surround the alveoli in the lungs. Which pair of statements correctly describes the concentrations of oxygen and carbon dioxide in the lungs?

|  |  |  |
| --- | --- | --- |
|  | **Oxygen** | **Carbon dioxide** |
| A. | Higher in the capillaries | Higher in the alveoli |
| B. | Lower in the capillaries | Higher in the alveoli |
| C. | Lower in the alveoli | Higher in the capillaries |
| D. | Higher in the alveoli | Higher in the capillaries |

(Total 1 mark)

**143.** What are the levels of the hormones estrogen, progesterone, LH and FSH during the menstrual cycle at the time of ovulation?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Estrogen** | **Progesterone** | **LH** | **FSH** |
| A. | High | Low | High | High |
| B. | High | High | Low | High |
| C. | Low | High | High | Low |
| D. | Low | Low | Low | Low |