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BIOLOGY
STANDARD LEVEL
PAPER 1

Monday 13 May 2013 (afternoon)

45 minutes

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is *[30 marks]*.

1. A student investigated the growth of 100 cress seedlings in 2 normally distributed populations and carried out a *t*-test on the data. The calculated value of *t* was equivalent to a probability of between 0.15 and 0.25. What conclusion can be drawn from this?

A. The difference between the two populations is significant.

B. The difference between the two populations is not significant.

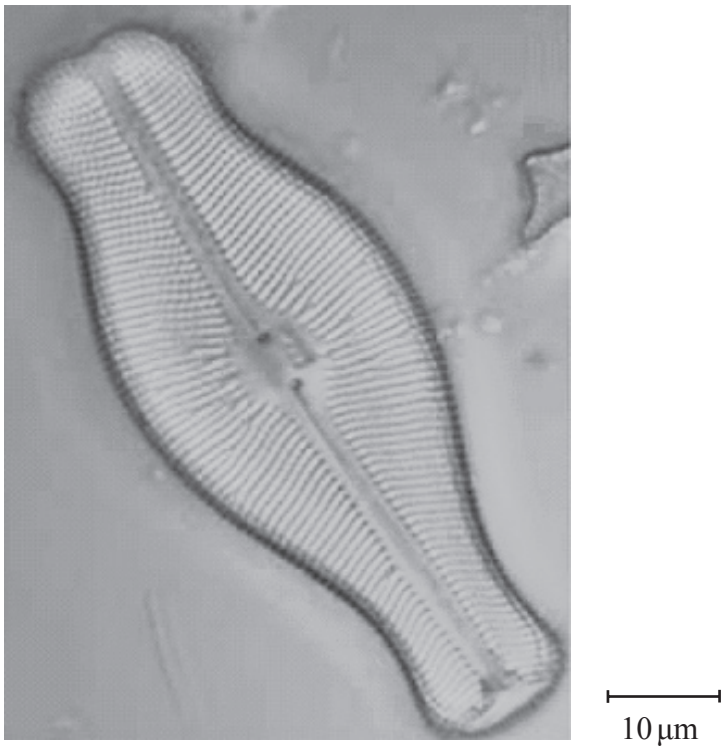
C. The data is positively correlated.

D. The data is negatively correlated.

2. Which functions of life are carried out by **all** unicellular organisms?

A.	photosynthesis	nutrition	homeostasis
B.	nutrition	reproduction	response
C.	metabolism	photosynthesis	growth
D.	growth	reproduction	photosynthesis

3. The diatom *Didymosphenia geminata* is a species of single-celled alga that lives in warm, shallow water. In the light microscope image below, the scale bar is equal to 10 micrometres (10 μm). What is the actual length of the cell?



[Source: United States Environmental Protection Agency
http://www.epa.gov/region8/water/didymosphenia/White%20Paper%20Jan%202007.pdf
EPA white paper]

A. 0.007 mm

B. 0.07 mm

C. 0.7 mm

D. 7.0 mm

4. What happens to the surface area to volume ratio as a cell grows?

A. It decreases.

B. It increases.

C. It doubles.

D. It does not change.

5. Water shows strong cohesive properties. Which of the following can occur because of the cohesive properties of water?

A. Water can be pulled up a plant through the xylem.

B. Enzymes can react with their substrates in cells.

C. Sweating cools the body on a hot day.

D. Salt can dissolve in sea water.

6. Which molecules are monosaccharides?

A. starch, glycogen, cellulose

B. sucrose, maltose, lactose

C. fructose, glucose, galactose

D. glucose, lactose, cellulose

7. What process occurs when fatty acids combine with glycerol to make a triglyceride?

A. Condensation

B. Decarboxylation

C. Denaturation

D. Hydrolysis

8. What are characteristics of eukaryotic cells?

	Nucleus	Mitochondria	Ribosomes
A.	present	present	80S
B.	present	absent	70S
C.	absent	present	80S
D.	absent	absent	70S

9. Which movement occurs by osmosis?

A. Oxygen from alveoli into the blood

B. Water from a leaf into the atmosphere

C. Water from soil to root

D. Nitrate ions from soil to root

10. What links the pairs of complementary bases in a DNA double helix?

A. Covalent bonds

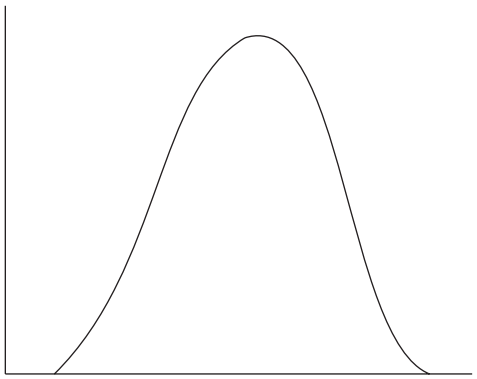
B. Hydrogen bonds

C. Ionic bonds

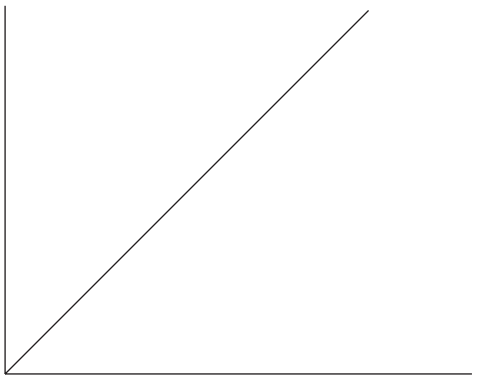
D. Peptide bonds

11. Which graph shows the effect of increasing substrate concentration on enzyme activity?

A.



B.



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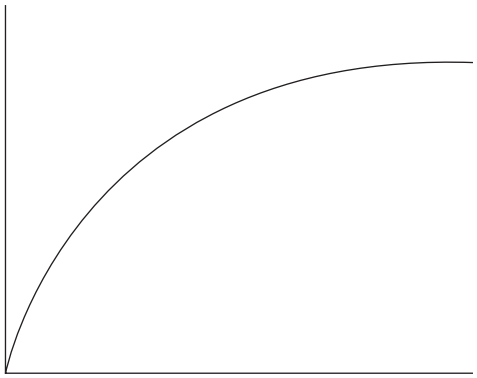

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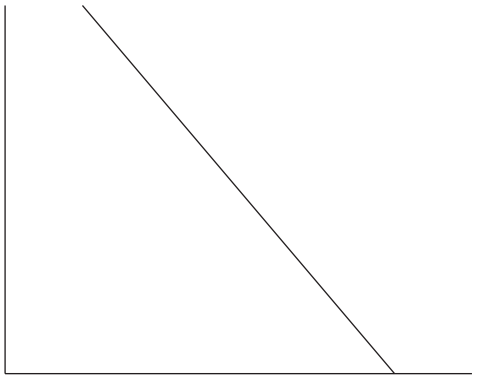


12. What substance is produced from glucose during anaerobic respiration in **all** organisms?

A. Carbon dioxide

B. Ethanol

C. Lactate

D. Pyruvate

13. What is the source of the oxygen released into the atmosphere in photosynthesis?

A. Glucose

B. Carbon dioxide

C. Chlorophyll

D. Water

14. A body cell of a goat has 60 chromosomes. What would be produced following meiosis in the testis of a male goat?

A. 2 cells each with 60 chromosomes

B. 4 cells each with 60 chromosomes

C. 2 cells each with 30 chromosomes

D. 4 cells each with 30 chromosomes

15. Which of the following involves meiosis?

A. Tissue repair

B. Production of gametes

C. Asexual reproduction

D. Growth

16. What information can be concluded from the karyotype?

[Source: http://en.wikipedia.org/wiki/File:NHGRI_human_male_karyotype.png]

A. The person is a normal male.

B. The person is a normal female.

C. The person is a male with Down syndrome.

D. The person is a female with Down syndrome.

17. In guinea pigs black coat colour is dominant to white. In a test cross between a black and a white guinea pig both black and white offspring were produced. What percentage of the offspring would be expected to be white?

A. 75 %

B. 50 %

C. 33.3 %

D. 25 %

18. Organisms can be genetically modified to produce the human blood clotting factor IX. What characteristic of the genetic code makes this possible?

A. It is conservative.

B. It is degenerate.

C. It is complementary.

D. It is universal.

19. What is an ecosystem?

A. An environment in which an organism normally lives

B. A group of organisms of the same species inhabiting an area

C. A group of populations living and interacting with each other in an area

D. A community and its abiotic environment

20. In ecosystems the amount of energy that passes from one trophic level to the next is called the conversion efficiency. What is the average conversion efficiency from primary to secondary consumers in most ecosystems?

A. 1%

B. 10%

C. 50%

D. 90%

21. Global warming caused by the enhanced greenhouse effect is likely to have major consequences for arctic ecosystems. Which of the following are likely to occur in the arctic if the Earth's surface temperature rises?

I. Decreased rates of decomposition of detritus

II. Increased range of predators from temperate regions

III. Increase in numbers of pest species and pathogens

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

22. The long-term exposure of bacteria to antibiotics has led to the spread of resistant strains (for example, of *Clostridium difficile*). What is this an example of?

A. Convergent evolution

B. Immunity

C. Natural selection

D. Dominance

23. *Ranunculus repens* and *Hypericum repens* both have yellow flowers. Which statement is true?

A. They are angiospermophytes.

B. They are coniferophytes.

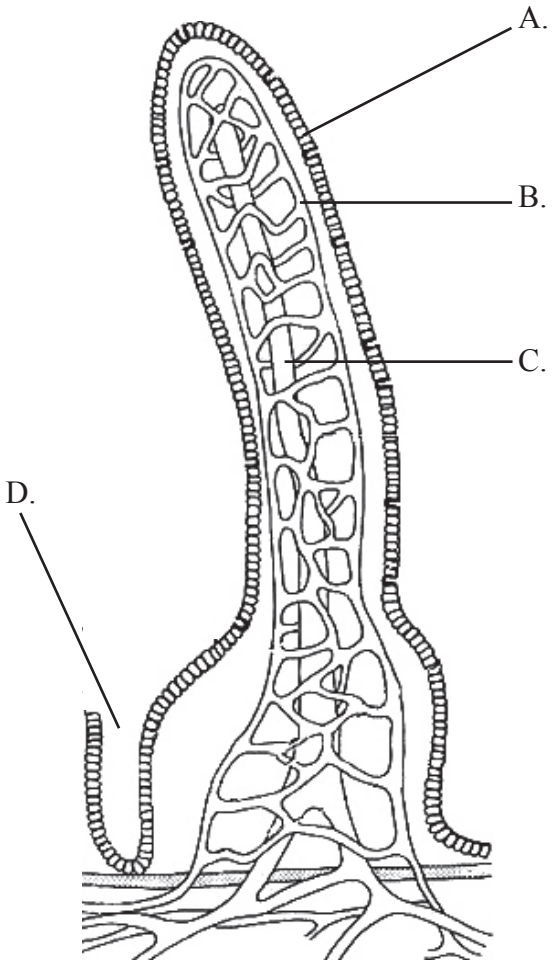
C. They are members of the same species.

D. They are members of the same genus.

24. Which enzyme is amylase?

	Source	Substrate	Product(s)
A.	pancreas	starch	maltose
B.	stomach	protein	peptides
C.	pancreas	peptides	amino acids
D.	small intestine	maltose	glucose

25. Which label represents the lacteal?



26. What is the state of the atrio-ventricular and semilunar valves when the left ventricle contracts?

	Atrio-ventricular valves	Semilunar valves
A.	open	closed
B.	open	open
C.	closed	closed
D.	closed	open

27. Immediately after an action potential, which event causes the neuron membrane to repolarize?

A. Voltage-gated sodium channels open.

B. Voltage-gated potassium channels open.

C. Voltage-gated calcium channels close.

D. Voltage-gated potassium channels close.

28. What changes occur in the thorax of a mammal when the external intercostal muscles and diaphragm muscles contract?

A. Pressure increases and volume decreases.

B. Pressure and volume both increase.

C. Pressure and volume both decrease.

D. Pressure decreases and volume increases.

29. How does the body respond to an increase in body temperature?

I. Vasoconstriction of skin arterioles

II. Shivering

III. Vasodilation of skin arterioles

A. I only

B. I and II only

C. II and III only

D. III only

30. Oral contraceptives taken by women contain the hormone progesterone. How does this prevent pregnancy?

A. It stops menstruation.

B. It inhibits the secretion of FSH.

C. It blocks the fallopian tubes (oviducts).

D. It stimulates the production of estrogen.