Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Standard level
Paper 1

Thursday 5 November 2015 (morning)

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]**.

8815 – 6004

1. Two populations of the same fish species were fed different diets to investigate the effect of differing nutrition on their growth. What is an appropriate method to determine the significance of a resulting difference?

A. Calculate the mean for each population

B. Calculate the standard deviation for each population

C. Graph the results

D. Perform a *t*-test

2. Which shows the order of size from smallest to largest?

A. Viruses → cell membrane thickness → eukaryotic cells → prokaryotic cells

B. Cell membrane thickness → prokaryotic cells → viruses → eukaryotic cells

C. Cell membrane thickness → viruses → prokaryotic cells → eukaryotic cells

D. Viruses → cell membrane thickness → prokaryotic cells → eukaryotic cells

3. Animal cells often secrete glycoproteins as extracellular components. What is a role of these glycoproteins?

A. Adhesion

B. Additional energy reserve

C. Membrane fluidity

D. Water uptake

4. During which stage does the cell surface area to volume ratio decrease?

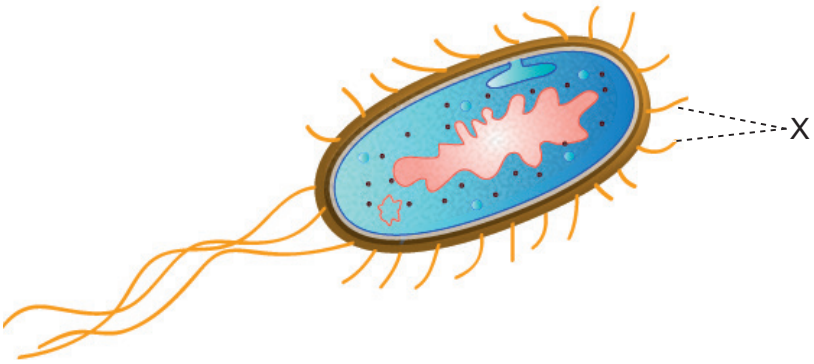
A. Interphase

B. Metaphase

C. Telophase

D. Cytokinesis

5. The image represents an *Escherichia coli*.



[Source: https://upload.wikimedia.org/wikipedia/commons/8/84/Escherichia_coli_by_togopic.png]

What is the function of structure X?

A. Active transport

B. Attachment

C. Binary fission

D. Cell respiration

6. Which always contains carbon, hydrogen and oxygen?

I. Carbohydrate
II. Protein
III. Fat

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

7. Which molecule can be hydrolyzed?

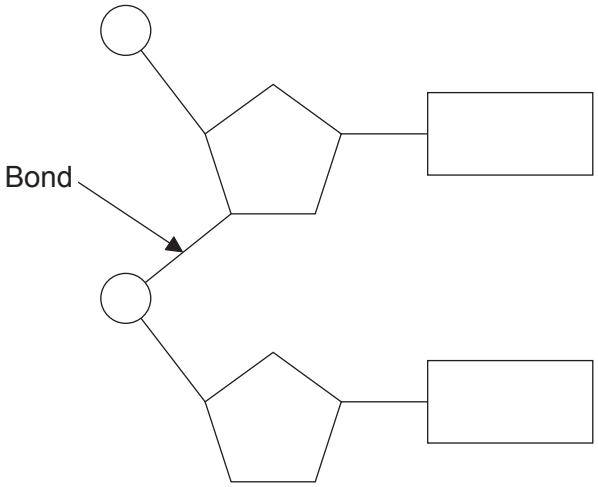
A. Glycerol

B. Maltose

C. Fructose

D. Galactose

8. The diagram shows a dinucleotide.



Which type of bond is identified by the arrow?

A. Phosphate

B. Hydrogen

C. Covalent

D. Peptide

9. What is required to replicate DNA?

A. Temperature of 37 °C

B. Free nucleotides carrying A, C, G and T bases

C. Plasmids

D. Endonuclease

10. How is the information in the genetic code used?

A. To predict the genotype of gametes

B. To distinguish prokaryotic genomes from eukaryotic genomes

C. To deduce phenotypes in pedigree charts

D. To translate mRNA into polypeptides

11. What describes anaerobic cell respiration?

A. Glucose break down to pyruvate

B. Carbon dioxide fixation

C. No ATP formation

D. Occurs in the mitochondrion

12. In a person who is heterozygous for sickle-cell anemia, where is the mutation found?

A. In every gamete produced

B. Only in gametes carrying an X chromosome

C. In all brain cells

D. In blood plasma

13. During which stage of meiosis does crossing over usually occur?

A. Prophase I

B. Metaphase I

C. Prophase II

D. Metaphase II

14. What is the chromosome number in a human gamete with non-disjunction?

A. 46

B. 45

C. 24

D. 23

15. In a human with type A blood, what determines the blood group?

A. Sex chromosomes

B. One or two alleles

C. Multiple alleles

D. Codominant alleles

16. A colour blind man and a woman carrier for colour blindness have a son. What is the probability that their son will be colour blind?

A. 25 %

B. 50 %

C. 75 %

D. 100 %

17. Laboratory analysis of DNA from a 40 000 year old woolly mammoth used the polymerase chain reaction (PCR). What role did the PCR have in the analysis?

A. DNA denaturation

B. DNA comparison

C. DNA separation

D. DNA amplification

18. The image shows a female Golden Orb-weaving spider (*Nephila plumipes*). They can grow as large as 4 cm and build webs strong enough to trap small birds for food.

[Source: © Mark Crocker. Used with permission.]

Which of the following describe(s) this spider?

I. Primary consumer
II. Heterotroph
III. Arthropod

A. I only

B. I and II only

C. II and III only

D. I, II and III

19. Image I shows a spotted hyena (*Crocuta crocuta*) and image II shows a leopard tortoise (*Geochelone pardalis*).

Image I

[Source: DesertUSA.Com]

Image II

[Source: "Geochelone pardalis bw 01" by Berthold Werner - Own work. Licensed under CC BY-SA 3.0 via Commons - https://commons.wikimedia.org/wiki/File:Geochelone_pardalis_bw_01.jpg#/media/File:Geochelone_pardalis_bw_01.jpg]

Based on their diet, the feces of spotted hyenas appear white because of high calcium content. Leopard tortoises eat hyena feces. What would explain such tortoise behaviour?

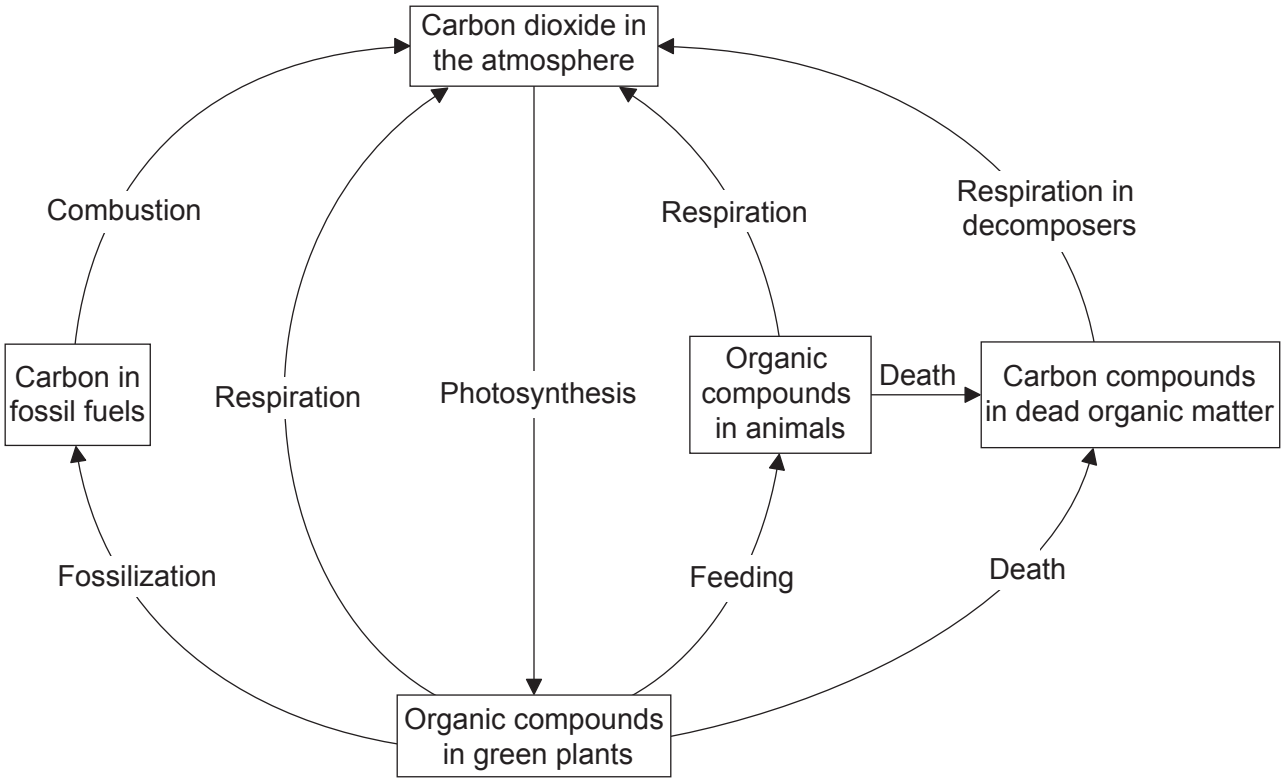
A. They are saprotrophs.

B. They transform energy with 100 % efficiency.

C. They need to form bones and shell.

D. They only eat inorganic matter.

20. The diagram represents the carbon cycle.



[Source: adapted from http://content.answcdn.com]

Which process has the greatest relative role in transferring carbon?

A. Decomposition

B. Combustion

C. Photosynthesis

D. Cell respiration

21. What contributes to the enhanced greenhouse effect?

A. Ozone from violent thunderstorms

B. Carbon particles in diesel engine exhaust

C. Methane from agricultural sources

D. Carbon dioxide from active volcanoes around the world

22. The image shows an *Acacia tortilis* tree which is one of 13 species of *Acacia*. All such flowering trees are examples of Fabaceae.

[Source: "Eat267". Licensed under CC BY-SA 3.0 via Commons - https://commons.wikimedia.org/wiki/File:Eat267.jpg#/media/File:Eat267.jpg]

What is the highest level of taxa for *Acacia tortilis*?

A. *Acacia*

B. *Tortilis*

C. Fabaceae

D. Angiospermophyta

23. Darwin described evolution as "descent with modification". What would make evolution less probable?

A. Stable environment

B. Migration

C. Variation in offspring

D. Random mutation

24. What structures in the small intestine transport most fats?

A. Collecting ducts

B. Capillaries

C. Veins

D. Lacteals

25. What causes heart ventricles to fill with blood?

I. Atrial contraction
II. Closing of atrioventricular valves
III. Opening of semilunar valves

A. I only

B. I and II only

C. II and III only

D. III only

26. Which is the correct statement concerning HIV and AIDS?

A. All HIV patients have AIDS.

B. HIV and AIDS are transmitted on the sex chromosomes.

C. All AIDS patients have HIV.

D. HIV and AIDS neutralize antibodies.

27. How does the hypothalamus respond to a very high body temperature?

A. Increases muscle contraction

B. Stops receiving sensory input

C. Causes dilation of skin arterioles

D. Slows the heart rate

28. What is a characteristic of type II diabetes?

A. Insufficient insulin

B. Insulin insensitivity

C. Excess glucagon

D. Low white blood cell count

29. Which two hormones promote thickening of the endometrium?

A. FSH and LH

B. Estrogen and FSH

C. LH and estrogen

D. Progesterone and estrogen

30. When the left ventricle is relaxed, what is the state of the valves?

	Atrioventricular valve	Semilunar valve
A.	closed	closed
B.	closed	open
C.	open	closed
D.	open	open