Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Standard level
Paper 1

Wednesday 6 May 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]**.

2215 – 6010

12 pages

1. A frog jumped 80 times and each time the length of the jump was recorded. The mean length of the jumps was 38 cm with a standard deviation of 10 cm. What can be deduced from this information?

A. The frog did not jump more than 48 cm.

B. The number of jumps more than 38 cm is the same as the number less than 38 cm.

C. Approximately 32 % of the jumps were less than 28 cm.

D. Approximately 68 % of the jumps were between 28 and 48 cm.

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

A. Response, homeostasis, growth and photosynthesis

B. Metabolism, ventilation, reproduction and nutrition

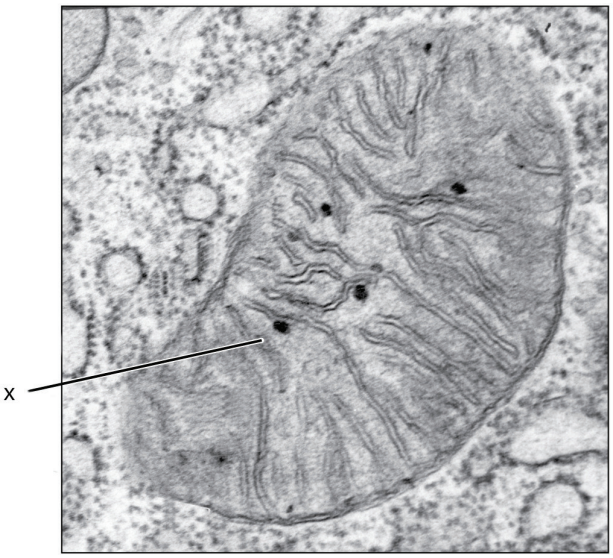
C. Response, homeostasis, metabolism and growth

D. Reproduction, ventilation, response and nutrition

3. A botanist measures a leaf and finds it is 24 cm long and 8 cm wide. His drawing of the leaf is 4 cm wide. Which was the magnification and length of his drawing, assuming that the proportions of the drawing were correct?

	Scale	Length / cm
A.	×2	48
B.	×2	12
C.	×0.5	48
D.	×0.5	12

4. What is the structure labeled X in the electron micrograph of a rat liver cell?



[Source: "0315 Mitochondrion new" by OpenStax College - Anatomy & Physiology, Connexions Web site. http://cnx.org/content/col11496/1.6/, Jun 19, 2013. Licensed under CC BY 3.0 via Wikimedia Commons - https://commons.wikimedia.org/wiki/File:0315_Mitochondrion_new.jpg#/media/File:0315_Mitochondrion_new.jpg]

A. Ribosome

B. Lysosome

C. Mitochondrion

D. Nucleus

5. What is a role of protein pumps in active transport?

A. To control whether specific substances enter the cell

B. To move substances across a concentration gradient

C. To produce ATP for energy

D. To provide protein for facilitated diffusion

6. Which events occur during both mitosis and meiosis?

A. Production of haploid cells from diploid cells

B. Crossing over

C. Separation of the chromatids from each chromosome

D. Production of genetically different cells

7. What property of water makes it suitable as a coolant?

A. It takes a lot of energy to increase the temperature of water.

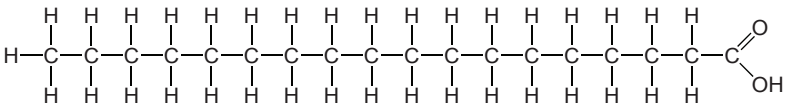
B. It takes a lot of energy for water to evaporate.

C. Water molecules are cohesive and stick to the skin.

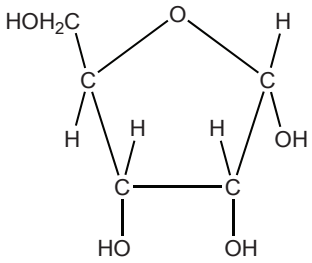
D. Water is a good solvent so it can transport heat from the body.

8. What are these molecules?

I



II



	I	II
A.	amino acid	glucose
B.	amino acid	ribose
C.	fatty acid	glucose
D.	fatty acid	ribose

9. Molecules A and B are amino acids and C is a dipeptide. Which reaction represents a condensation reaction?

A. $A + B + H_2O \rightarrow C$

B. $A + B \rightarrow C + H_2O$

C. $C + H_2O \rightarrow A + B$

D. $C \rightarrow A + B + H_2O$

10. What is a difference between carbohydrates and lipids in energy storage?

A. Carbohydrates are used for long term storage and lipids for short term storage.

B. Carbohydrates contain more energy per 100 g than lipids.

C. Carbohydrates are more easily transported to where energy is required than lipids.

D. Carbohydrates store food only in plants whereas lipids store food in plants and animals.

11. Which molecules are formed as a direct result of translation and transcription?

	Translation	Transcription
A.	protein	mRNA
B.	DNA	tRNA
C.	tRNA	DNA
D.	mRNA	protein

12. Why does exposure to high temperatures cause an enzyme to lose its biological properties?

A. The substrate blocks the active site at high temperatures.

B. The three dimensional structure of the enzyme becomes changed.

C. Chemical reactions cannot take place at high temperatures.

D. High temperatures increase the activation energy of reactions.

13. The feather colour of a certain breed of chicken is controlled by codominant alleles. A cross between a homozygous black-feathered chicken and a homozygous white-feathered chicken produces all speckled chickens. What phenotypic ratios would be expected from a cross between two speckled chickens?

A. All speckled

B. 1 black feathers : 1 white feathers

C. Speckled, black feathers and white feathers in equal numbers

D. 1 black feathers : 2 speckled feathers : 1 white feathers

14. The presence of freckles is a characteristic controlled by a dominant gene. Two parents who are heterozygous for the characteristic have three children, all of whom have freckles. Which statement is true if they have a fourth child?

A. There is a 100 % chance that their next child will have freckles.

B. There is a 75 % chance that their next child will have freckles.

C. There is a 50 % chance that their next child will have freckles.

D. The next child will have no freckles as the ratio is 3 with freckles to 1 without freckles.

15. What maximum number of different genotypes and phenotypes are possible among the children of a mother with blood group A and a father with blood group B?

	Genotypes	Phenotypes
A.	2	2
B.	2	4
C.	4	4
D.	4	2

16. The allele for tall T is dominant to the allele for dwarf t. Which of the following represents a test cross?

A. tt × tt

B. TT × Tt

C. Tt × tt

D. Tt × Tt

17. Which is the best definition of a *clone*?

A. Two organisms sharing the same parents

B. Groups of phenotypically identical organisms

C. Cells derived by mitosis from a single parent cell

D. Multiple gamete cells produced by an individual

18. In a rock pool a student observes four different species of animal. She sees 43 flat periwinkles (*Littorina littoralis*), ten rough periwinkles (*Littorina saxatilis*), three shore crabs (*Carcinus maenas*) and one common goby (*Pomatoschistus microps*).

How many populations and communities did she see in the pool?

	Populations	Communities
A.	1	4
B.	2	3
C.	3	2
D.	4	1

19. What is a principle of food webs?

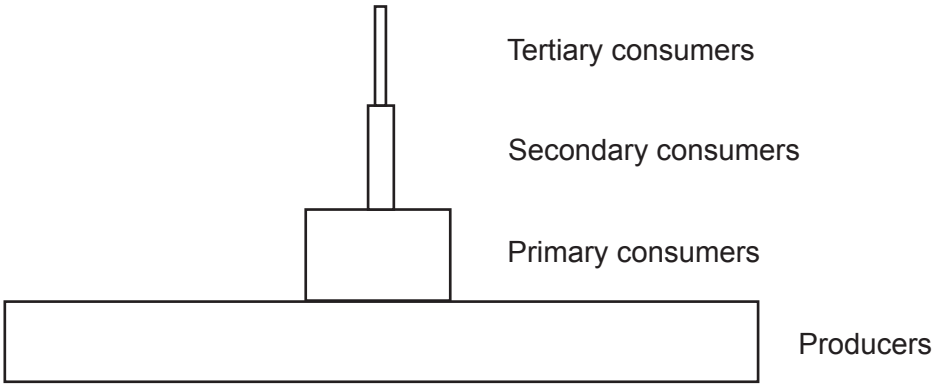
A. All carnivores eat herbivores.

B. Plants are heterotrophs.

C. Primary consumers eat only plants.

D. Organisms can only occupy one trophic level.

20. The diagram shows a pyramid of energy for a forest ecosystem.



What conclusion can be drawn from the pyramid?

A. The number of organisms drops by 90 % in each trophic level.

B. Suitable units are $Kg\,m^{-2}\,yr^{-1}$.

C. The biggest energy loss is between producers and primary consumers.

D. The energy is recycled.

21. What is the best definition of the greenhouse effect in the Earth's atmosphere?

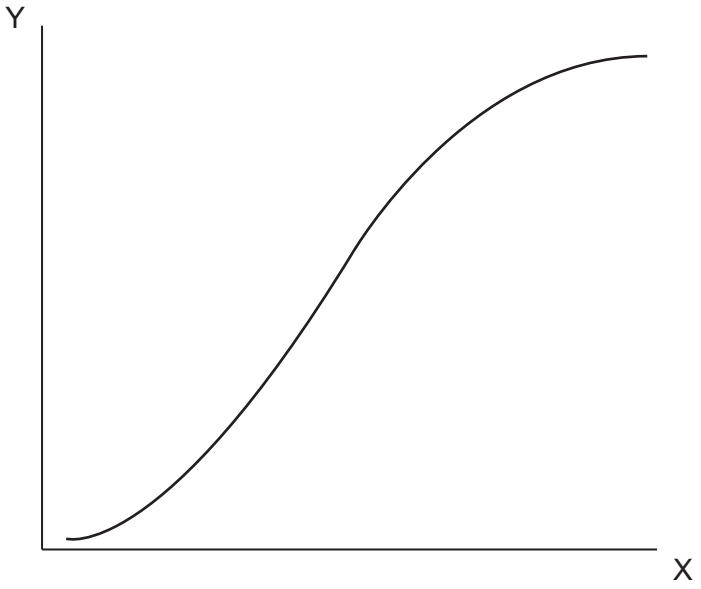
A. A naturally occurring effect by which shorter wavelength radiation is trapped

B. A naturally occurring effect by which longer wavelength radiation is trapped

C. An effect of pollution by which shorter wavelength radiation is trapped

D. An effect of pollution by which longer wavelength radiation is trapped

22. The graph shows the growth of a population of rabbits inhabiting a new area.



What would be suitable labels for the axes X and Y?

	X	Y
A.	number of rabbits	time
B.	time	birth rate of rabbits
C.	birth rate of rabbits	time
D.	time	number of rabbits

23. What are homologous structures in animals?

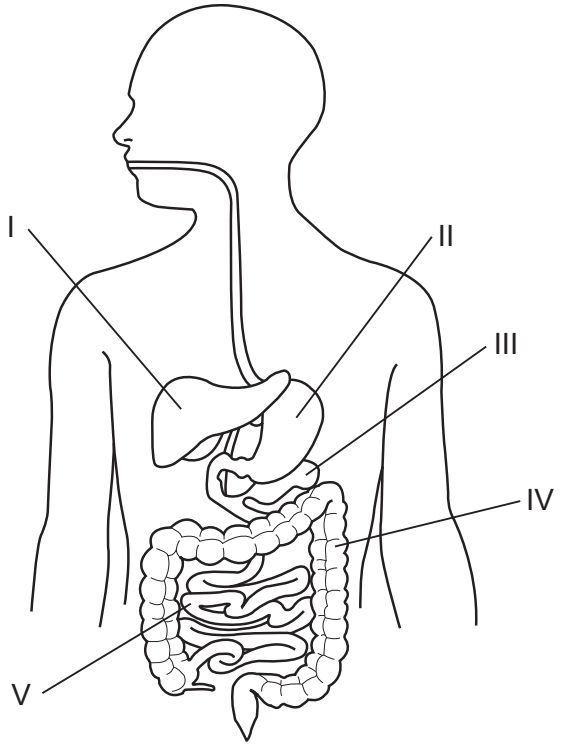
A. Body parts in different animals produced by the same gene

B. Structures that have a similar function but a different origin

C. A modification of the same structure in different animals

D. Structures found as part of the fossil record

Questions 24 and 25 refer to the following diagram of a human digestive system.



[Source: © International Baccalaureate Organization 2015]

24. Where would an enzyme that digests lipids be produced?

A. I

B. II

C. III

D. IV

25. In which region is most glucose absorbed through the villi?

A. I

B. II

C. IV

D. V

26. In what position are the atrio-ventricular and semilunar valves when the ventricles are relaxing?

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

27. How do neurotransmitters cross a synapse to reach the postsynaptic membrane?

A. Carried in vesicles

B. Diffusion

C. Active transport

D. Facilitated diffusion

28. Which describes the secretion of hormones in the pancreas in response to low levels of glucose in the blood?

A. Secretion of glucagon from α cells

B. Secretion of glucagon from β cells

C. Secretion of insulin from α cells

D. Secretion of insulin from β cells

29. What changes take place in the thorax during inhalation?

	External Intercostal Muscles	Pressure
A.	contract	increases
B.	contract	decreases
C.	relax	increases
D.	relax	decreases

30. Which hormone shows the greatest fall in blood concentration just before menstruation?

A. FSH (follicle stimulating hormone)

B. LH (luteinizing hormone)

C. Progesterone

D. Estrogen