

**Biology**  
**Standard level**  
**Paper 1**

Wednesday 6 May 2015 (morning)

45 minutes

---

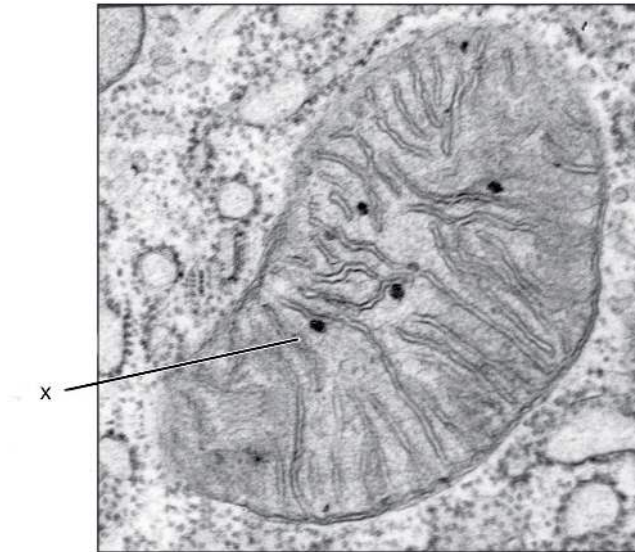
**Instructions to candidates**

- 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]**.

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](https://commons.wikimedia.org/wiki/File:0315_Mitochondrion_new.jpg#/media/File:0315_Mitochondrion_new.jpg)]

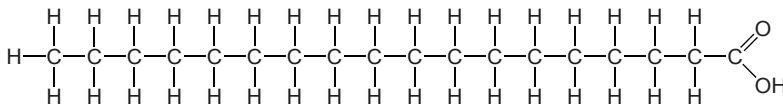
- A. Ribosome
  - B. Lysosome
  - C. Mitochondrion
  - D. Nucleus
5. What is a role of protein pumps in active transport?
- A. To control whether specific substances enter the cell
  - B. To move substances across a concentration gradient
  - C. To produce ATP for energy
  - D. To provide protein for 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

Turn over

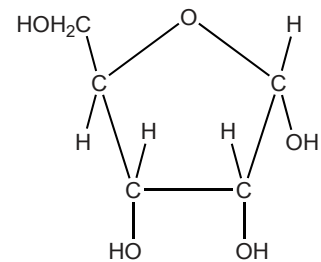
7. What property of water makes it suitable as a coolant?
- A. It takes a lot of energy to increase the temperature of water.
  - B. It takes a lot of energy for water to evaporate.
  - C. Water molecules are cohesive and stick to the skin.
  - D. Water is a good solvent so it can transport heat from 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 100g 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?

	<b>Translation</b>	<b>Transcription</b>
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

Turn over

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.  $tt \times tt$
  - B.  $TT \times Tt$
  - C.  $Tt \times tt$
  - D.  $Tt \times Tt$
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*).

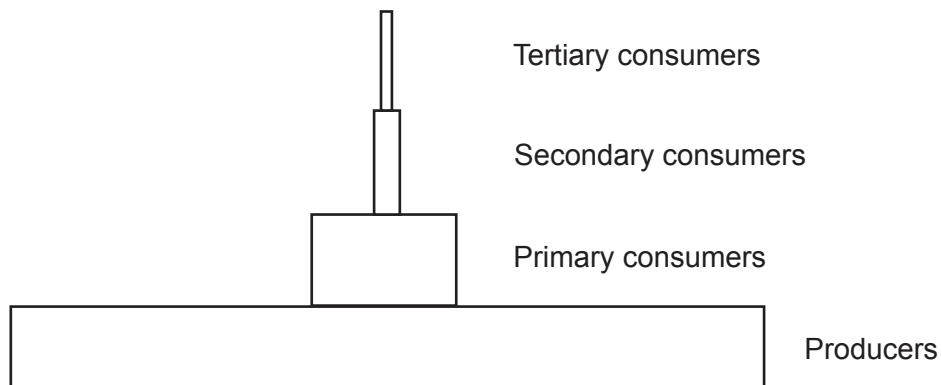
How many populations and communities did she see in the pool?

	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.

Turn over

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

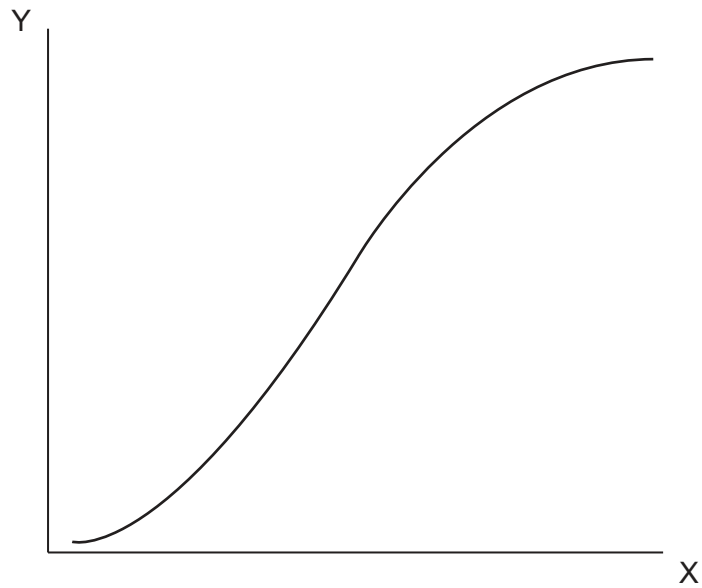


What conclusion can be drawn from the pyramid?

- A. The number of organisms drops by 90% in each trophic level.
  - B. Suitable units are  $\text{Kg m}^{-2} \text{yr}^{-1}$ .
  - 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?

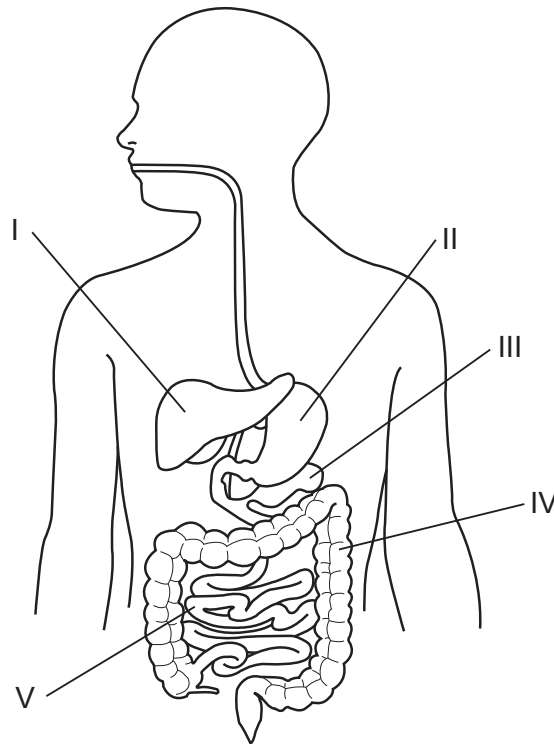
	X	Y
A.	number of rabbits	time
B.	time	birth rate of rabbits
C.	birth rate of rabbits	time
D.	time	number of rabbits

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

Turn over

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?

	<b>Atrio-ventricular</b>	<b>Semilunar</b>
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  $\alpha$  cells
- B. Secretion of glucagon from  $\beta$  cells
- C. Secretion of insulin from  $\alpha$  cells
- D. Secretion of insulin from  $\beta$  cells

Turn over

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

	<b>External Intercostal Muscles</b>	<b>Pressure</b>
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
-