

Biology
Standard level
Paper 1

Friday 4 November 2016 (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]**.

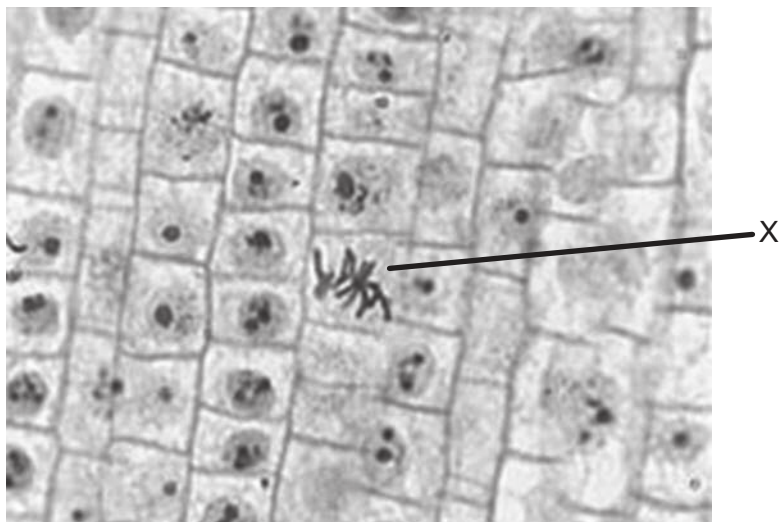
1. Which feature of striated muscle cells allows them to be considered as a possible exception to the cell theory?
 - A. They are found in multicellular organisms.
 - B. They contain more than one nucleus.
 - C. They are specialized for movement.
 - D. They do not carry out mitosis.

2. Which characteristic of stem cells makes them useful for treating Stargardt's disease?
 - A. They can differentiate into retinal cells.
 - B. They are readily available from especially created embryos.
 - C. They transport white blood cells to the eyes.
 - D. They divide by binary fission so provide sufficient cells.

3. The cell membrane model proposed by Davson–Danielli was a phospholipid bilayer sandwiched between two layers of globular protein. Which evidence led to the acceptance of the Singer–Nicolson model?
 - A. The orientation of the hydrophilic phospholipid heads towards the proteins
 - B. The formation of a hydrophobic region on the surface of the membrane
 - C. The placement of integral and peripheral proteins in the membrane
 - D. The interactions due to amphipathic properties of phospholipids

4. What provides evidence for the endosymbiotic theory?
 - A. Mitochondrial DNA in eukaryotic cells
 - B. 70S ribosomes in prokaryotic cells
 - C. Gene transfer from prokaryotic cells to eukaryotic cells using plasmids
 - D. Prokaryotic cells (*Escherichia coli*) in the large intestine digest proteins

5. Which mitotic phase is labelled X in the micrograph of an onion (*Allium cepa*) root tip?

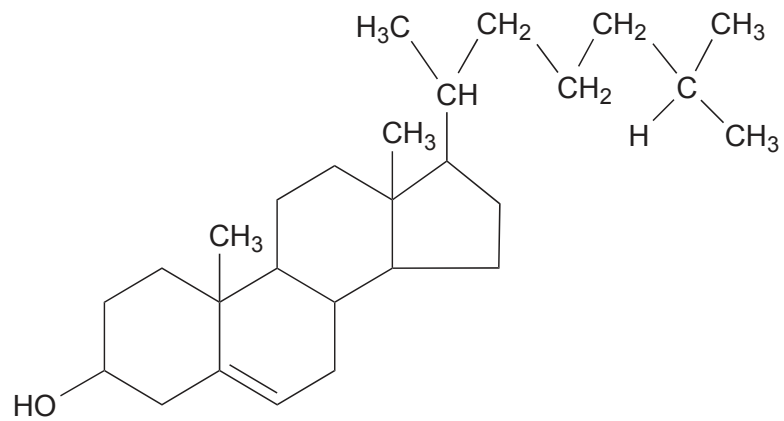


[Source: adapted from Microscope-microscope.org (www.microscope-microscope.org)]

- A. Prophase
 - B. Metaphase
 - C. Anaphase
 - D. Telophase
6. Which type of reaction is the breakdown of starch into sugars?
- A. Denaturation
 - B. Reduction
 - C. Catabolic
 - D. Condensation

Turn over

7. The diagram shows a molecular structure.



Which type of molecule is shown?

- A. Amino acid
 - B. Lipid
 - C. Carbohydrate
 - D. Nucleotide
8. Which properties explain the ability of water to dissolve solutes?
- I. Polarity of water molecules
 - II. High specific heat capacity of water
 - III. Hydrogen bonding
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

9. A fever in a normally healthy adult during an illness is not usually a problem and can be regarded as a defence mechanism. However, a fever higher than 41 °C might be dangerous. What is the cause of the possible damage due to a high fever?
- A. Loss of body mass
 - B. Muscle damage due to shivering
 - C. Overactive metabolic enzymes
 - D. Spread of infection
10. What is a similarity between DNA and RNA?
- A. Both are polymers of nucleotides.
 - B. Both are composed of antiparallel strands.
 - C. Both contain adenine, cytosine and thymine.
 - D. Both contain ribose sugar.
11. What enables bacteria to produce human growth hormone?
- A. DNA replication is semi-conservative.
 - B. The polymerase chain reaction can be used.
 - C. They need the hormone for growth.
 - D. The genetic code is universal.

Turn over

12. Which pair of molecules are products of aerobic and anaerobic cell respiration in some organisms?

	Aerobic cell respiration	Anaerobic cell respiration
A.	oxygen	pyruvate
B.	lactate	adenosine triphosphate
C.	carbon dioxide	glucose
D.	adenosine triphosphate	carbon dioxide

13. What is produced by somatic-cell nuclear transfer?

- A. Adult sheep
- B. Cloned embryos
- C. Rooted stem-cuttings
- D. Genetically modified food

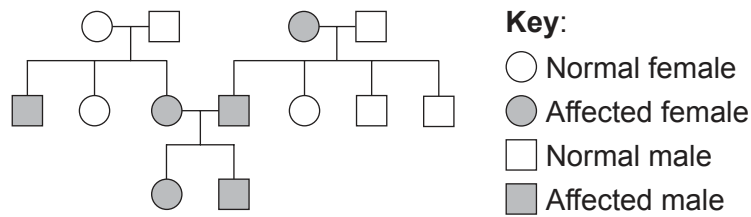
14. The diploid number of chromosomes in humans (*Homo sapiens*) is 46 and the diploid number of chromosomes in rice (*Oryza sativa*) is 24. What does this indicate about diploid chromosome numbers?

- A. Plant species have a lower diploid number of chromosomes than animals.
- B. Members of a species have the same diploid number of chromosomes.
- C. The evolutionary progress of species is determined by the diploid number of chromosomes.
- D. The complexity of the organisms is correlated to the diploid number of chromosomes.

15. Which is a valid comparison between prokaryotic and eukaryotic DNA?

	Prokaryotic DNA	Eukaryotic DNA
A.	one circular chromosome	one linear chromosome
B.	plasmids present	plasmids absent
C.	contains uracil	contains thymine
D.	associated with histones	associated with proteins

16. The diagram shows a pedigree chart.



What does it reveal about the inheritance of the blood disorder beta-thalassaemia?

- A. The allele is autosomal recessive.
 - B. The allele is autosomal dominant.
 - C. The allele is sex-linked.
 - D. The allele is co-dominant.
17. What is the classification of an organism that is able to make organic compounds from inorganic nutrients?
- A. Autotroph
 - B. Consumer
 - C. Detritivore
 - D. Saprotroph
18. What restricts the length of a food chain?
- A. Energy losses between the trophic levels
 - B. A greater biomass at the higher trophic levels
 - C. The number of species in the food web
 - D. The consumption of waste by detritivores

Turn over

19. Lichens are returning to the forests of the industrial areas of the United Kingdom due to strict pollution control.



[Source: adapted from www.the-scientist.com]

What is the expected outcome in the population of peppered moths (*Biston betularia*)?

- A. Increased numbers of light-coloured peppered moths
 - B. Increased industrial melanism in peppered moths
 - C. Increased predation of peppered moths
 - D. Increased speciation of peppered moths
20. Which evidence for evolution do the common features in the bone structure of vertebrate limbs provide?
- A. Adaptive radiation
 - B. Divergent radiation
 - C. Convergent evolution
 - D. Discontinuous variation
21. What is the major contributor to the increase in antibiotic resistance in bacteria?
- A. Sexual reproduction
 - B. Mutation
 - C. Natural selection
 - D. New antibiotics

22. In which domain are bryophyta found?

- A. Plantae
- B. Archaea
- C. Eubacteria
- D. Eukaryote

23. The scientific name of the Wakatobi flowerpecker is *Dicaeum kuehni*.



[Source: By Seán B. A. Kelly, David J. Kelly, Natalie Cooper, Andi Bahrun, Kangkuso Analuddin, Nicola M. Marples - Edit of File:Dicaeum_celebicum_compared_to_Dicaeum_kuehni_(realigned).jpg, CC BY 4.0, <https://commons.wikimedia.org/w/index.php?curid=33618785>]

Which species is most closely related?

- A. *Amerila kuehni*
 - B. Wakatobi white-eye
 - C. *Kuehneon duchyense*
 - D. *Dicaeum celebicum*
24. What is the main method of transport of monosaccharides such as fructose across the intestinal epithelium?
- A. Osmosis
 - B. Facilitated diffusion
 - C. Endocytosis
 - D. Active transport

Turn over

25. What is the position of heart valves when blood pressure is highest in the aorta?

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

26. Why is penicillin **not** used in the treatment of human immunodeficiency virus (HIV)?

- A. HIV patients may be allergic to penicillin.
- B. Penicillin does not affect viruses.
- C. Penicillin affects helper T-cell metabolism.
- D. Penicillin causes antibiotic resistance.

27. What is the purpose of pulmonary surfactant?

- A. Promotes capillary growth
- B. Decreases surface tension
- C. Adheres alveoli and capillaries
- D. Stretches the inside surface of the alveoli

28. Which conditions are correct for inspiration?

	Muscles contracted	Pressure in thorax
A.	external intercostal	decreases
B.	internal intercostal	increases
C.	diaphragm	increases
D.	abdominal	decreases

29. Which hormone controls circadian rhythms?
- A. Thyroxin
 - B. Melatonin
 - C. Leptin
 - D. Glucagon
30. Which is a negative feedback mechanism in the menstrual cycle?
- A. Follicle stimulating hormone inhibits estrogen
 - B. Estrogen inhibits luteinizing hormone
 - C. Estrogen inhibits follicle stimulating hormone
 - D. Progesterone inhibits estrogen
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