Diploma Programme
Programme du diplôme
Programa del Diploma

Biology
Standard level
Paper 1

Wednesday 4 May 2016 (morning)

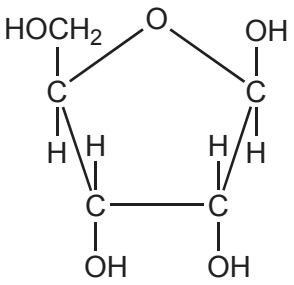
45 minutes

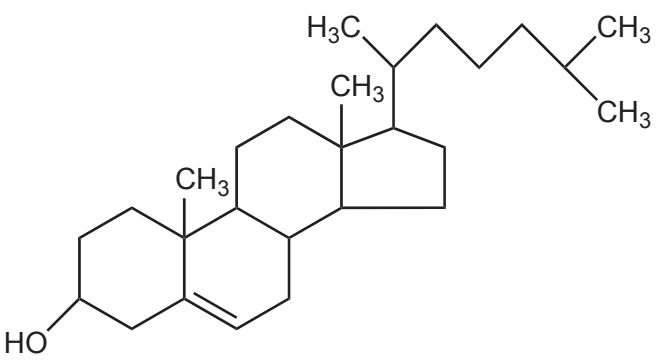
Instructions to candidates

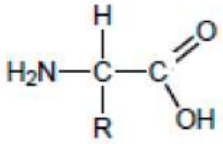
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is **[30 marks]**.

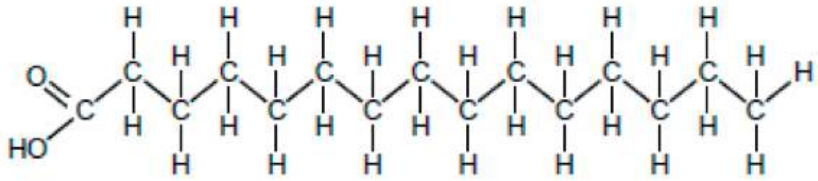
2216 – 6004

1. Which molecule is a sugar?

A. 

B. 

C. 

D. 

2. Why is sweat a good coolant for the body?

A. The arterioles that transfer water to sweat move closer to the skin surface when it is hot.

B. Breaking H bonds between water molecules in sweat requires energy from body heat.

C. Sweat contains minerals such as sodium chloride.

D. Sweat is non-polar.

3. Which is an effect of protein denaturation?

A. The order of amino acids is changed when the protein overheats.

B. The bonds between amino acids are broken by condensation.

C. Parts of the protein become linked together by hydrolysis.

D. The three-dimensional structure of the protein is altered.

4. What usually distinguishes DNA from RNA?

	DNA	RNA
A.	strands are symmetrical	strands are antiparallel
B.	contains adenine	contains cytosine
C.	pentoses linked to phosphates	pentoses linked to bases
D.	double stranded	single stranded

5. Research has shown that the genetic code is not entirely universal. Which research finding has shown this?

A. Some amino acids are coded for by more than one codon.

B. There are differences between the base sequences of genes in different species.

C. In some organisms the genetic code for mitochondria differs from the genetic code for the nucleus.

D. Some codons code for the addition of an amino acid and some code for the termination of translation.

6. This is a sequence of nucleotides from a section of mRNA.

AUGAAACGCACGCAG

From which DNA sequence has it been transcribed?

A. ATGAAACGCACGCAG

B. UACUUUGCGUGCGAC

C. TACUUUGCGTGCGTC

D. TACTTTGCGTGCGTC

7. Which gas produces most of the bubbles in bread dough?

A. Oxygen

B. Methane

C. Carbon dioxide

D. Water vapour

8. What is the process shown in this image?

[Source: http://www.slideshare.net/sciencepowerpointcom/bacterial-reproduction-biology-lesson-powerpoint-binary-fission]

A. Binary fission of a prokaryotic cell

B. Telophase II in a eukaryotic cell

C. End of mitosis in a prokaryotic cell

D. Cytokinesis of a eukaryotic cell

9. What distinguishes prokaryotic cells and eukaryotic cells?

	Prokaryotic cells	Eukaryotic cells
A.	cell wall	plasma membrane
B.	cell structure not compartmentalized	cell structure compartmentalized
C.	smooth endoplasmic reticulum	rough endoplasmic reticulum
D.	no ribosomes	ribosomes present

10. What can be deduced about a striated muscle fibre from both of these statements?

> "A eukaryotic cell has one nucleus."
> "A striated muscle fibre has many nuclei."

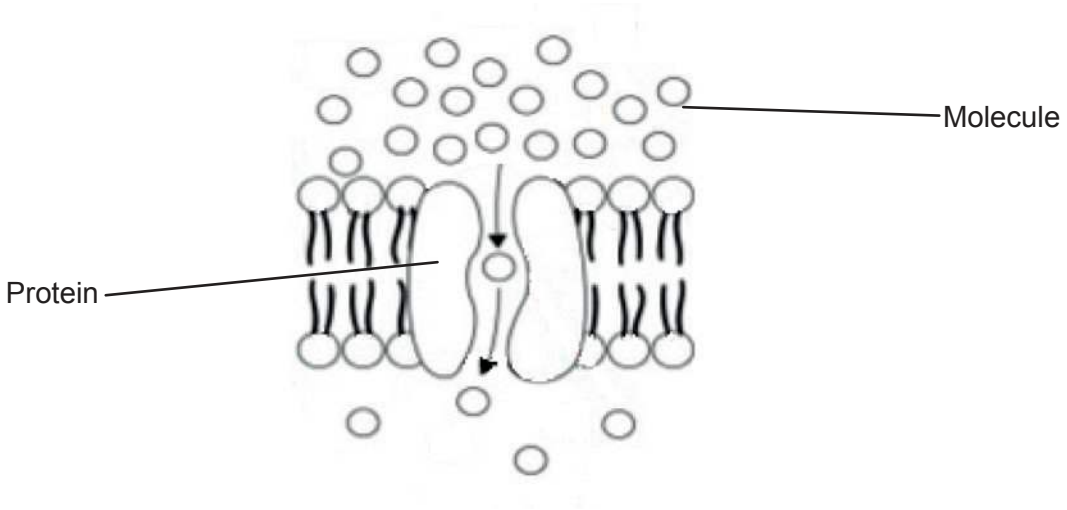
A. It is prokaryotic.

B. It is an exception to cell theory.

C. It consists of aseptate hyphae.

D. It is preparing to divide.

11. The diagram is a model of one type of movement across a membrane.



[Source: CAMPBELL, NEIL A.; REECE, JANE B., *BIOLOGY*, 7th, ©2005, p. 134. Reprinted by permission of Pearson Education, Inc., New York, New York.]

What is this type of movement?

A. Simple diffusion

B. Facilitated diffusion

C. Osmosis

D. Active transport

12. The statement relates to Pasteur's experiments.

> In his experiments, Louis Pasteur demonstrated that:
> - if broth was boiled to kill all organisms and was then kept in swan-necked flasks, preventing the entry of organisms, no organisms grew in the broth
> - if the swan-necked flask was broken, mold soon started to grow in the broth.

What did this statement suggest?

A. Mold evolved by endosymbiosis.

B. Oxygen is required for anaerobic respiration.

C. Cells can only be formed by division of pre-existing cells.

D. Nutrients are a requirement for mold growth.

13. What event occurs only in meiosis?

A. Fusion of gametes to promote genetic variation

B. Random separation of chromatids

C. Random separation of homologous chromosomes

D. Replication of chromosomes

14. It is possible for two parents to have children with each of the four ABO blood groups. What blood groups would the parents have?

	Mother	Father
A.	O	O
B.	AB	O
C.	AB	AB
D.	A	B

15. What is the effect of dominant alleles?

I. They mask the effect of recessive alleles.
II. They become more frequent than recessive alleles in a population.
III. They have a joint effect with recessive alleles when characteristics are co-dominant.

A. I only
B. I and II only
C. I and III only
D. I, II and III

16. Which technique separates proteins according to size?

A. Treatment with restriction endonucleases
B. PCR
C. Gel electrophoresis
D. DNA profiling

17. Which category of organisms is correctly described by its method of nutrition and site of digestion?

	Category of organism	Method of nutrition	Site of digestion
A.	consumer	heterotrophic	internal
B.	saprotroph	autotrophic	external
C.	producer	autotrophic	internal
D.	detritivore	heterotrophic	external

18. What limits the length of food chains in an ecosystem?

A. The size of individual organisms
B. Competition between organisms
C. The loss of energy between trophic levels
D. Natural selection

19. How can molluscs and platyhelminthes be distinguished?

A. Molluscs are unsegmented but platyhelminthes are segmented.

B. Molluscs have a mouth and an anus but platyhelminthes do not.

C. Molluscs are smooth but platyhelminthes have bristles.

D. Molluscs remain attached to rock but platyhelminthes move around in water.

20. What is a feature of shorter wavelength visible radiation?

A. It includes violet light.

B. It has less energy per photon than longer wavelengths.

C. It is absorbed by greenhouse gases.

D. It is reflected by chlorophyll.

21. Which is a coniferophyte?

A. *Adansonia digitata*, an African baobab tree with white flowers

B. *Cyathea australis*, an Australian tree fern producing spores

C. *Hypnum plumaeforme*, a green plant with no vascular tissue grown in Japanese gardens

D. *Pinus strobus*, a North American tree with ovules on scales not enclosed in an ovary

22. Which process promotes variation in a population?

A. Mutation

B. Mitosis

C. Ageing in a population

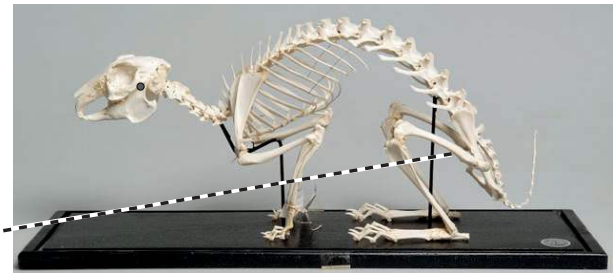
D. Asexual reproduction

23. The pictures show skeletons of a frog (*Conraua goliath*) and of a domestic rabbit (*Oryctolagus cuniculus*).

Frog

[Source: © Bone Clones, www.boneclones.com]

Rabbit



[Source: © CSG CIC Glasgow Museums and Libraries Collections]

What is the evolutionary relationship between X and Y?

A. They are analogous.

B. X is analogous and Y is homologous.

C. They are homologous.

D. They are neither homologous nor analogous.

24. What happens to starch in the small intestine?

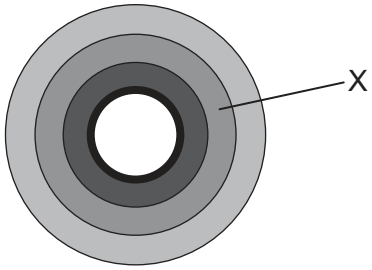
A. Endopeptidase secreted by the liver digests starch to enable absorption by the villi.

B. Contraction of intestinal muscle mixes starch with enzymes to accelerate its conversion into amylose.

C. Glycogen secreted by the pancreas hydrolyses starch into glucose, which is eventually transported to the liver.

D. Amylase secreted by the pancreas digests starch to enable absorption by the villi.

25. The diagram shows the layers of the tissues in a transverse section of the human small intestine.



Which is the layer labelled with the letter X?

A. Mucosa

B. Circular muscle

C. Epithelium

D. Longitudinal muscle

26. Which discovery was an indication that the heart pumps blood to the body through arteries?

A. The amount of blood pumped exceeds that of blood produced

B. Blood could easily be pushed up a limb vein, but not down

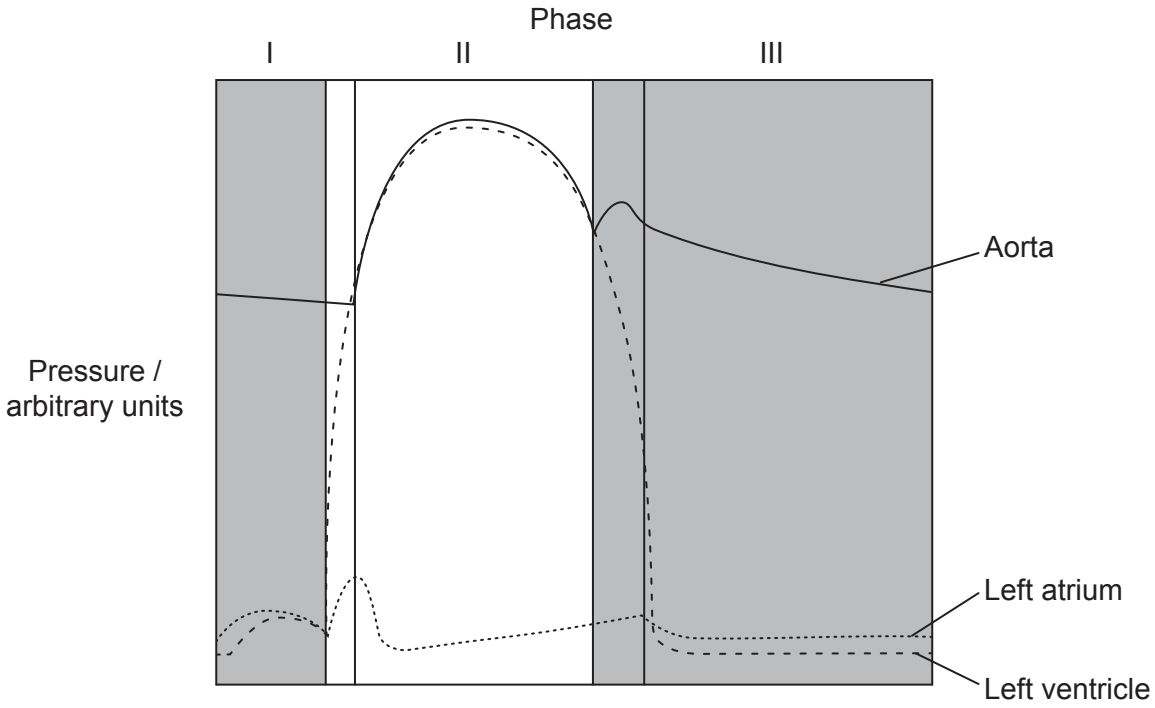
C. The observation that there were pores between the right and left atria

D. The heart swelled up when the arteries were tied in an animal experiment

27. Which is a valid comparison between arteries and veins?

	Arteries	Veins
A.	carry oxygenated blood	carry deoxygenated blood
B.	return blood to the atria of the heart	blood flows from ventricles to body tissues
C.	blood flows at high pressure	blood flows at low pressure
D.	have thick walls	have permeable walls

28. The diagram shows changes of pressure during the cardiac cycle.



[Source: adapted from G J Tortora, J Parent, S Reynolds, (1994), *Principes d'anatomie et de physiologie*, Centre Éducatif et Culturel, Montréal, page 640]

Which is an explanation of the processes happening?

A. During phase I, pressure in the left ventricle decreases while it increases in the aorta during contraction of the left atrium.

B. In phase II, pressure rises in the aorta because the left ventricle is contracting.

C. In phase III, pressure decreases in the aorta because the left atrium is relaxing.

D. In phase III, there is a constant increase of pressure in the aorta as both left atrium and ventricle are at rest.

29. Which statement is true for the antibiotic penicillin?

A. Watson and Crick developed the usage of penicillin.

B. Penicillin blocks processes unique to eukaryotic cells.

C. Viruses lack metabolism and penicillin has no effect on them.

D. Florey and Chain sequenced the genome of *Penicillium notatum*.

30. How can knowledge about the pineal gland function be applied?

A. To restore sleep time by the use of melatonin

B. To trigger ovulation during an IVF treatment

C. To reduce sperm production in male contraception

D. To regulate blood sugar in type I diabetes