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 – 6016

1. Which molecule is a polysaccharide?

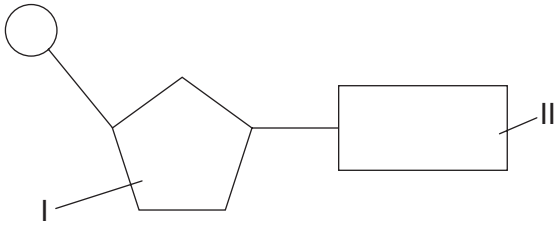
A. Cellulose

B. Fructose

C. Maltose

D. Sucrose

2. The image shows a DNA nucleotide.



Which correctly identifies the parts labelled I and II?

	I	II
A.	base	phosphate
B.	ribose	uracil
C.	deoxyribose	base
D.	ribose	adenine

3. Which sequence shows increasing relative size?

	Smallest ⟶		**Largest**
A.	membrane thickness	virus	bacterium
B.	molecule	virus	membrane thickness
C.	bacterium	virus	eukaryotic cell
D.	bacterium	organelle	virus

4. What is a function of the plant cell wall?

A. Formation of vesicles for transport of large molecules

B. Prevention of excessive water uptake

C. Communication with other cells by means of glycoproteins

D. Active transport of ions

5. Why do multicellular organisms have emergent properties?

A. They have more genes than unicellular organisms.

B. Properties of unicellular organisms are enhanced by having many cells.

C. All of their genes are expressed whereas unicellular organisms express only some.

D. They show properties that can only result from the interaction of many cells.

6. What distinguishes prokaryotic cells from eukaryotic cells?

	Prokaryotic cells	Eukaryotic cells
A.	no plasma membrane	plasma membrane
B.	80S ribosomes	70S ribosomes
C.	Golgi apparatus	mitochondria
D.	no internal membrane compartments	internal membrane compartments

7. What is osmosis?

A. The movement of water through a membrane from a low to a high solute concentration

B. The movement of solutes through a membrane from a high to a low water concentration

C. The movement of water through a membrane from a high to a low solute concentration

D. The movement of solutes through a membrane from a low to a high water concentration

8. What are the **most** frequently occurring elements in living organisms?

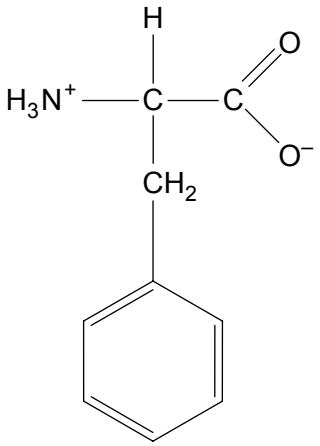
A. calcium, phosphorus, iron and sodium

B. calcium, sodium, nitrogen and phosphorus

C. carbon, phosphorus, oxygen and nitrogen

D. nitrogen, carbon, oxygen and hydrogen

9. The image shows the structural formula of a molecule.



What is this molecule?

A. Amino acid

B. Ribose

C. Deoxyribose

D. Lactose

10. How can the activity of a human amylase enzyme be increased during a laboratory experiment?

A. Adding sugar to the mixture

B. Decreasing the pH from 7 to 3

C. Increasing the temperature from 20 °C to 37 °C

D. Adding water to the mixture

11. How can the rate of photosynthesis be measured?

I. By the amount of oxygen produced
II. By the increase in biomass
III. By the amount of carbon dioxide produced

A. I only

B. I and II only

C. I and III only

D. I, II and III

12. If a man with blood group O and a woman with blood group AB have children, which blood group(s) could the children have?

A. Group O only

B. Groups A and B only

C. Group AB only

D. Groups O, A, B and AB

13. Which individuals are colour blind in this Punnett grid?

	X^B	Y
X^B	$X^B X^B$	$X^B Y$
X^b	$X^B X^b$	$X^b Y$

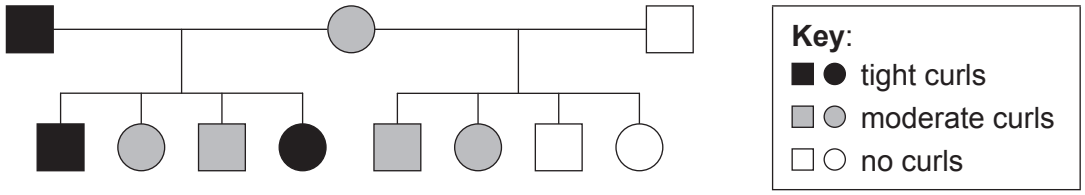
A. $X^B Y$

B. $X^B X^B$

C. $X^b Y$

D. $X^B X^b$

14. The curly hair of the coat of Selkirk Rex cats is due to the presence of the allele S^C. These cats can either have tight curls or be moderately curly, whereas the coat of other cats is usually made of straight hair with no curls because of the allele S^S. Circles indicate female cats and squares indicate males.



What are the phenotypes of cats with these genotypes?

	$S^S S^S$	$S^S S^C$
A.	no curls	moderate curls
B.	tight curls	no curls
C.	tight curls	moderate curls
D.	no curls	tight curls

15. What is a possible source of the chromosomes used for pre-natal karyotype diagnosis?

A. The mother's lymphocytes

B. The mother's cheek cells

C. The cells from chorionic villi

D. The fetal hair root cells

16. What was an aim of genetic modification of organisms?

A. To provide stem cells from embryos for medical use

B. To make crop plants resistant to herbicides

C. To provide sperm cells for *in vitro* fertilization (IVF)

D. To produce genetically identical sheep

17. Which statement describes the term species?

A. Members of the same ecological community

B. Organisms that reproduce together to produce fertile offspring

C. Organisms of the same type in a population

D. The first word in the binomial name of an organism

18. What causes the presence of three chromosomes 21 in Down syndrome?

A. Crossing over

B. Allele change

C. Non-disjunction

D. Gene mutation

19. The following statements refer to a pyramid of energy.

I. Some material is not assimilated by each trophic level.

II. Energy transformations are never 100 % efficient.

III. Heat is lost during photosynthesis.

Which of the statements give the reason why a pyramid of energy is narrower at the top than at the bottom?

A. I only

B. I and II only

C. II and III only

D. I, II and III

20. The table shows the monthly CO_2 concentrations in $mg\,L^{-1}$ taken at two monitoring stations.

Station \ Month	Jul 2011	Aug 2011	Sept 2011	Oct 2011	Nov 2011	Dec 2011	Jan 2012	Feb 2012	Mar 2012	Apr 2012	May 2012	Jun 2012
Cape Grim, Australia	388	389	389	389	389	389	389	389	389	389	389	390
Mauna Loa, Hawaii, USA	392	390	389	389	390	392	393	394	394	396	397	396

[Source: © International Baccalaureate Organization 2015]

What is directly indicated by the data?

A. CO_2 concentration in the atmosphere varies from place to place.

B. Cape Grim is less affected by global warming than Mauna Loa.

C. CO_2 creates a greenhouse effect at both locations.

D. The standard deviation for Cape Grim is higher than standard deviation for Mauna Loa.

21. What can limit a population from growing?

A. An increase in natality

B. A disease affecting predators

C. A decrease in mortality

D. A disease affecting the population

22. What is the biological definition of the term evolution?

A. The changes shown by fossils over millions of years

B. The transmission of favourable variations to offspring

C. The cumulative change in the heritable characteristics of a population

D. The promotion of variation in a species by sexual reproduction

23. Which example provides evidence of evolution?

A. White wings of a peppered moth turn black in industrial areas.

B. Antibiotic resistant bacteria replace non-resistant bacteria over time.

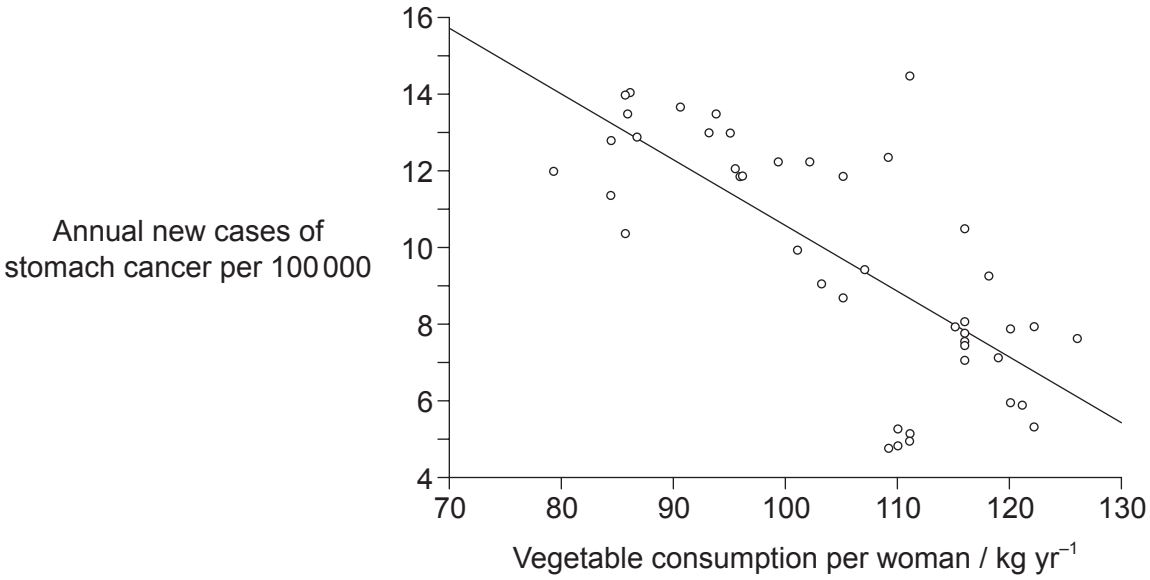
C. Some Galapagos finches' beaks become smaller during dry years.

D. Polar bears are found in warmer latitudes following global warming.

24. What are functions of the stomach, small intestine and large intestine?

	Stomach	Small intestine	Large intestine
A.	digest proteins	absorb glucose	absorb water
B.	digest starch	digest proteins	digest lipids
C.	digest proteins	assimilate glucose	excrete cellulose
D.	assimilate alcohol	digest starch	absorb water

25. The graph shows a correlation between the number of new cases of stomach cancer and vegetable consumption for women in Poland.



[Source: "Impact of diet on long-term decline in gastric cancer incidence in Poland", Miroslaw Jarosz, Wlodzimierz Sekula, Ewa Rychlik and Katarzyna Figurska. *World J Gastroenterol*, **17**(1): 89–97. Figure 4. Published online 2011 January 07. doi:10.3748/wjg.v17.i1.89.]

What can be stated from the graph?

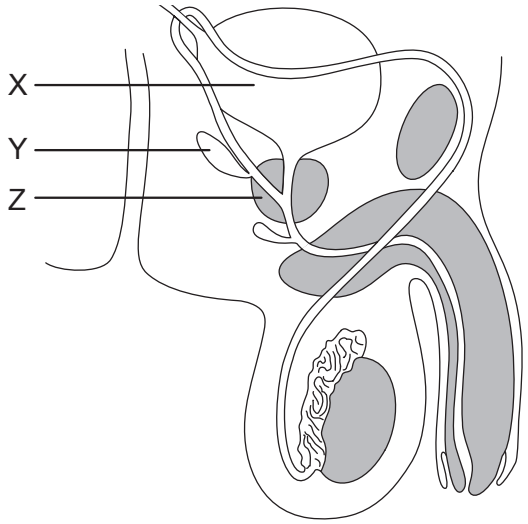
A. Vegetable consumption causes stomach cancer

B. 68 % of the data are gathered around the trend line

C. Causality cannot be stated from the graph alone

D. Only that the correlation is positive

26. The image shows the male reproduction system.



[Source: © International Baccalaureate Organization 2015]

Where is prostate cancer likely to start developing?

A. In X only

B. In Y and Z only

C. In Z only

D. In X, Y and Z

27. What is a role of the coronary arteries?

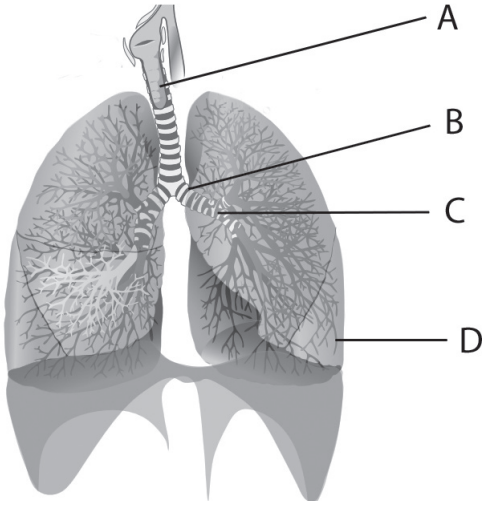
A. To supply information about blood temperature to the hypothalamus

B. To supply the heart muscle with oxygen and nutrients

C. To carry blood away from the heart

D. To monitor blood pH

28. The image shows a section of the human respiratory system. Which letter identifies a bronchiole?



[Source: "Respiratory system complete no labels" by Bibi Saint-Pol – en.wikipedia.org/wiki/File:Respiratory_system_complete_en.svg. Licensed under CC BY-SA 3.0 via Wikimedia Commons – https://commons.wikimedia.org/wiki/File:Respiratory_system_complete_no_labels.svg#/media/File:Respiratory_system_complete_no_labels.svg]

29. What characterizes type I diabetes?

A. It can be controlled by diet alone.

B. Risk factors such as obesity increase its frequency.

C. The alpha cells of the pancreas are destroyed, usually during adulthood.

D. The beta cells of the pancreas are destroyed, usually during childhood.

30. What happens when human body temperature rises during exercise?

A. The arterioles move closer to the skin.

B. The hypothalamus decreases cell respiration.

C. The skin capillaries close up.

D. The water from sweat evaporates to cool the body.