Biology HL P1 TZ1

2007 May

School Level 12th IB Diploma

Programme

Board Exam

International Baccalaureate (IB

Board)

Solved

IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

M07/4/BIOLO/HPM/ENG/TZ1/XX+

22076007

BIOLOGY
HIGHER LEVEL
PAPER 1

Monday 14 May 2007 (afternoon)

1 hour

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.

1. Which combination of features is found in most plant and animal cells?

A. plasma membrane, lysosome, Golgi apparatus

B. cytoplasm, mitochondria, ribosomes

C. rough ER, nucleus, centrioles

D. plastids, cytoplasm, nucleus

2. What is the size range for the diameters of most plant and animal cells?

A. 100 nm to 1 μm

B. 1 μm to 10 μm

C. 10 μm to 100 μm

D. 100 μm to 1 mm

3. Which of the following could be a function of a membrane protein?

A. Energy storage

B. Enzymatic activity

C. Oxygen uptake

D. Thermal insulation

4. In which compounds would a double bond link carbon to oxygen (C=O)?

I. Amino acid

II. Fatty acid

III. Glycerol

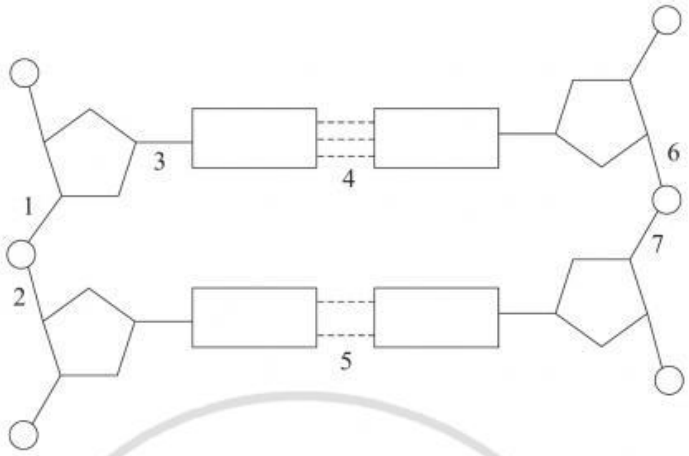
A. I and II only

B. II and III only

C. I and III only

D. I, II and III

5. During the process of replication, which bond(s) in the diagram of DNA below is/are broken?



A. 3

B. 4, 5

C. 1, 2, 6, 7

D. 1, 7, 4, 5

6. Why is the genetic code described as degenerate?

A. Some codons can cause translation to stop.

B. More than one codon can represent one amino acid.

C. The genetic code is the same in all organisms.

D. Codons can change through mutation.

7. What is the maximum number of fatty acids that can be condensed with glycerol?

A. One

B. Two

C. Three

D. Four

8. Which row in the table describes the first stage of cellular respiration?

	Substrate	Location	Product	Product
A.	pyruvate	mitochondria	oxygen	water
B.	pyruvate	cytoplasm	carbon dioxide	ATP
C.	glucose	mitochondria	pyruvate	water
D.	glucose	cytoplasm	pyruvate	ATP

9. What procedure is used to determine whether a chromosome is in excess or missing in an organism?

A. X-ray

B. Karyotyping

C. Centrifugation

D. DNA fingerprinting

10. What feature demonstrates codominance in the inheritance of ABO blood groups?

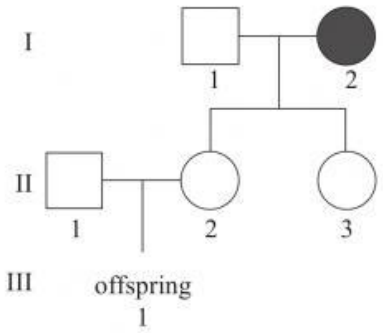
A. When A antigens and B antigens are present on red blood cells.

B. When A antibodies and B antibodies are present in blood serum.

C. When I^A and i alleles are expressed in homozygotes.

D. When I^A and i alleles are expressed in heterozygotes.

11. In the pedigree shown below, the female, labelled I-2, is a carrier for colour blindness, however neither male (I-1 or II-1) is colour blind.



What is the probability that offspring III-1 will be colour blind?

A. 50%

B. 25%

C. 12.5%

D. 0%

12. What happens to the unfertilized egg used in the cloning process of a differentiated cell?

A. It becomes fertilized.

B. Its nucleus is replaced by the nucleus of the differentiated cell.

C. Its nucleus is fused with the nucleus of the differentiated cell.

D. Its nucleus is exchanged with the nucleus of the sperm.

13. What is considered to be a characteristic of the members of a Genus?

A. They belong to a closed gene pool.

B. Members can interbreed freely under normal conditions.

C. They share a common ancestral species.

D. They are limited to certain geographic areas.

14. If 2 000 000 kJ m^{-2} yr^{-1} is available from producers in an ecosystem, how much energy (in kJ m^{-2} yr^{-1}) is usually available to the tertiary consumers?

A. 200 000

B. 20 000

C. 2000

D. 200

15. The capture-mark-release-recapture method was used to determine the number of Sandhill Cranes (*Grus canadensis nesiotes*), an endangered species of bird, living on an island.

The following data were obtained:

- number of Sandhill Cranes initially caught, marked and released = 22
- total number of Sandhill Cranes caught in second sample = 14
- number of marked Sandhill Cranes in the second sample = 2

What is the population size of the Sandhill Cranes on the island?

A. 77

B. 154

C. 308

D. 616

16. Which factors could be important for a species to evolve by natural selection?

I. Environmental change

II. Inbreeding

III. Variation

A. I only

B. I and II only

C. I and III only

D. I, II and III

17. Two cellular activities that support human life are absorption and assimilation. What is needed for assimilation but **not** for absorption?

A. Enzymes to synthesize new molecules

B. Blood capillaries

C. Dissolved nutrients

D. Microvilli

18. Which sequence of events correctly describes the destruction of pathogens in body tissues by phagocytic leucocytes?

A. amoeboid motion → endocytosis → chemical recognition → enzymatic digestion

B. chemical recognition → amoeboid motion → enzymatic digestion → endocytosis

C. amoeboid motion → chemical recognition → enzymatic digestion → endocytosis

D. chemical recognition → amoeboid motion → endocytosis → enzymatic digestion

19. How many times does an oxygen molecule cross a plasma membrane when moving from inside an alveolus to the hemoglobin of a red blood cell?

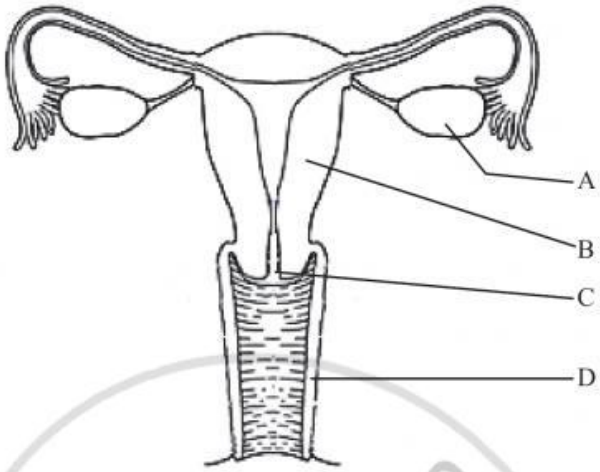
A. Two

B. Three

C. Four

D. Five

20. Women should periodically have a Pap smear test performed to detect cervical cancer. Which letter indicates the cervix in the diagram below?



21. In human embryo development, what is the approximate time span between fertilization and implantation of the blastocyst?

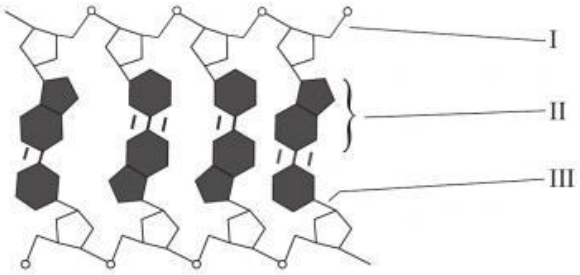
A. 12 days

B. 7 days

C. 72 hours

D. 36 hours

22. The drawing below shows a short section of a DNA molecule. What is labelled by I, II and III?



	I	II	III
A.	3′ end	purine	hydrogen bond
B.	5′ end	pyrimidine	covalent bond
C.	3′ end	pyrimidine	hydrogen bond
D.	5′ end	purine	covalent bond

23. Which cellular component includes nucleic acid with structural protein?

A. tRNA

B. DNA polymerase

C. Ribosome

D. mRNA

24. In the lac operon model for lactose metabolism in prokaryotes, what is active when the operon is turned off?

A. Regulator gene

B. RNA polymerase

C. Promoter region

D. Structural genes

25. Which combination of changes describes biological oxidation?

	Electrons	Oxygen	Hydrogen
A.	loss	gain	loss
B.	loss	loss	gain
C.	gain	loss	gain
D.	gain	gain	loss

26. Within the mitochondria, what compound is produced through oxidation of fatty acids?

A. Acetyl-CoA

B. Acetylcholine

C. Oxaloacetate

D. Pyruvate

27. Which of the following features is/are present in mitochondria but **not** in chloroplasts?

I. DNA and ribosomes

II. Outer and inner membranes

III. Cristae

A. I only

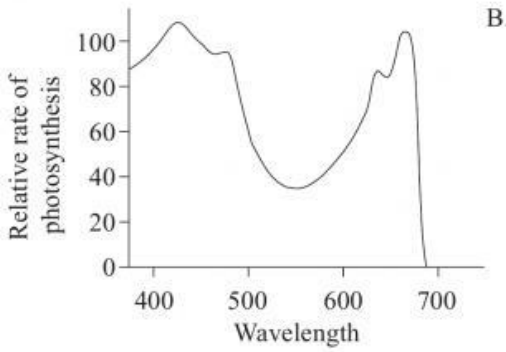
B. II only

C. III only

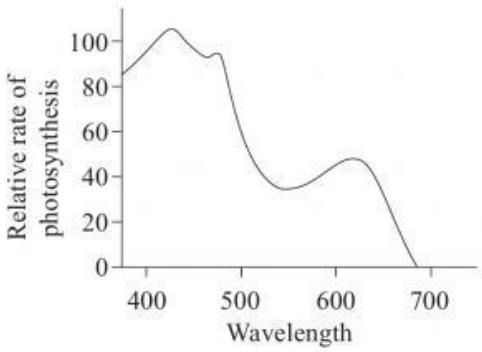
D. I and III only

28. Which diagram represents the action spectrum of photosynthesis?

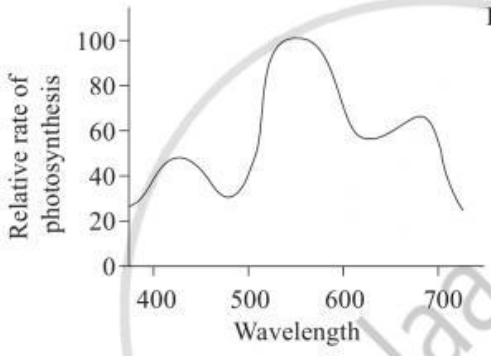
A.



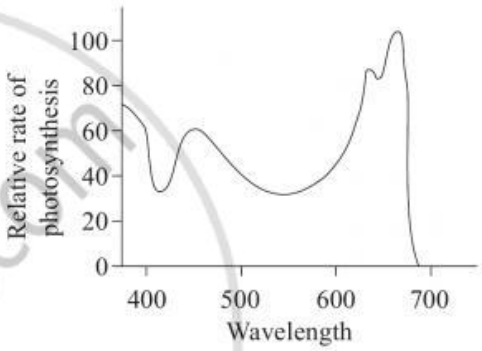
B.



C.



D.



29. Which event occurs first in meiosis?

A. Centromere appearance

B. Chiasmata formation

C. Crossing over

D. Synapsis

30. Allele S and T are both dominant. In the theoretical cross ttSs × Ttss, which of the following offspring would show recombination?

A. TS, tS

B. TS, Ts

C. tS, Ts

D. TS, ts

31. What is the origin and role of luteinizing hormone (LH) in spermatogenesis?

	Origin	Role
A.	Interstitial cells of testes	triggers first meiotic division
B.	Pituitary gland	stimulates testosterone production
C.	Pituitary gland	triggers first meiotic division
D.	Interstitial cells of testes	stimulates testosterone production

32. Why is human chorionic gonadotropin (HCG) important in early pregnancy?

A. It is required for equal cell divisions in the growing embryo.

B. It stimulates the ovary to continue production of estrogen and progesterone.

C. It increases the rate of cell division in the embryo.

D. It promotes growth of the inner cell mass within the embryo.

33. Which sequence will result in the formation of a blood clot?

A. damaged cells → clotting factors → thrombin → fibrin

B. damaged cells → red blood cells → clotting factors → fibrinogen

C. red blood cells → clotting factors → damaged cells → fibrinogen

D. red blood cells → clotting factors → thrombin → fibrinogen

34. What is the role of ligaments in the elbow joint?

A. Attach biceps to radius

B. Reduce friction between humerus, ulna and radius

C. Hold humerus, ulna and radius in proper alignment

D. Secrete synovial fluid

35. Which division describes the central nervous system?

A. Peripheral and central

B. Voluntary and involuntary nerves

C. Brain and spinal cord

D. Sensory and motor nerves

36. Which process in the human body produces nitrogenous wastes?

A. Osmoregulation

B. Degradation of amino acids

C. Cellular respiration

D. Ultrafiltration

37. What process do the kidney and kidney dialysis machines have in common?

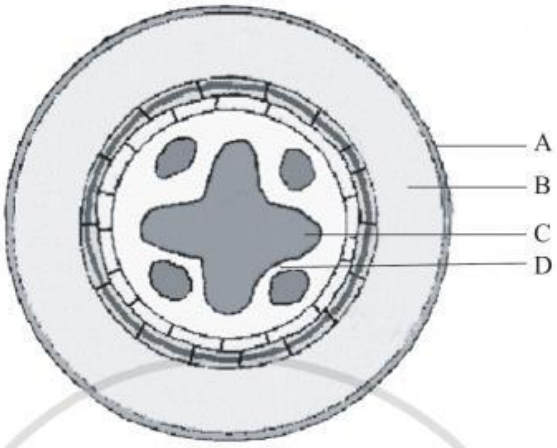
A. Endocytosis

B. Active transport

C. Diffusion

D. Exocytosis

38. In the cross-sectional diagram of a dicotolydenous root below, which letter indicates the location of cambium?



[Source: Biology Department, University of Arkansas at Little Rock (2004), Biology 2402 – *Introduction to Botany Cross Section of a Typical Dicot Root*, www.ualr.edu/~botany/root_diagram.gif]

39. How do non-woody terrestrial plants support themselves?

A. Phloem

B. Root pressure

C. Cell turgor

D. Cortex

40. In flowering plants, which of the following helps seed dispersal?

A. Bees

B. Pollen

C. Mammals

D. Germination

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MARKSCHEME

May 2007

BIOLOGY

Higher Level

Paper 1

2 pages

1.	B	16.	C/D	31.	B	46.	–
2.	C	17.	A	32.	B	47.	–
3.	B	18.	D	33.	D	48.	–
4.	A	19.	D	34.	C	49.	–
5.	B	20.	C	35.	C	50.	–
6.	B	21.	A/B	36.	B	51.	–
7.	C	22.	D	37.	C	52.	–
8.	D	23.	C	38.	D	53.	–
9.	B	24.	A	39.	C	54.	–
10.	A	25.	A	40.	C	55.	–
11.	C	26.	A	41.	–	56.	–
12.	B	27.	C	42.	–	57.	–
13.	C	28.	A	43.	–	58.	–
14.	C	29.	A/D	44.	–	59.	–
15.	B	30.	D	45.	–	60.	–