Jerry Jiang

HL Bio Final Exam Paper 1 *[60 marks]*

1. If cells of a multicellular organism have the same genes, how can there be many different cell types in a body? *[1 mark]*

   A. Some genes but not others are expressed in each cell type.

   B. Cells lose some genes as development occurs.

   C. Genes do not determine the structure of a cell.

   D. Cells must practice division of labour in order to survive.

2. How does mitosis produce two genetically identical nuclei? *[1 mark]*

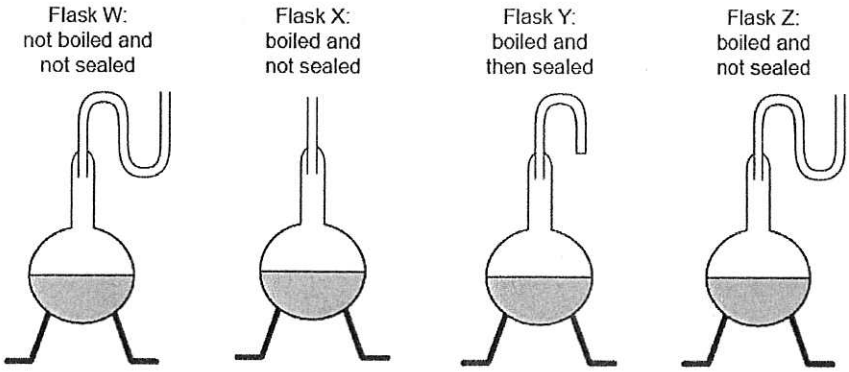
   A. By separation of homologous chromosomes

   B. By separation of sister chromatids

   C. By division of the cytoplasm into two equal cells

   D. By division of the nuclear membrane into two equal parts

3. In a copy of Louis Pasteur's famous experiment, broth was put into flasks as shown in the diagrams. *[1 mark]*



[Source: © International Baccalaureate Organization 2018]

What results would be expected with no spontaneous generation of life?

A. Decomposition of broth by microbes occurred only in Flask W.

B. Decomposition of broth by microbes occurred only in Flasks W and X.

C. Decomposition of broth by microbes occurred only in Flasks W, X and Y.

D. Decomposition of broth by microbes occurred only in Flasks W, X and Z.

ABD

4. The salt concentration inside an animal cell is 1.8 %. The salt concentration in the surrounding medium becomes 5 %. What will be the likely response? *[1 mark]*

A. The cell will gain water from the medium.

B. The cell will lose salt to the medium.

C. The cell will remain unchanged.

D. The cell will shrink from loss of water.

5. Which structure found in eukaryotes has a single membrane? *[1 mark]*

A. Nucleus

B. Lysosome

C. Chloroplast

D. Mitochondrion

6. Which organism has DNA located in three organelles? *[1 mark]*

A. A sponge

B. A fern

C. A flatworm

D. A bacterium

7. Which organelle is involved in generating vesicles destined for the cell membrane? *[1 mark]*

A. Golgi apparatus

B. Smooth endoplasmic reticulum

C. Rough endoplasmic reticulum

D. Lysosome

8. The giant alga *Acetabularia* has a feature that suggests it is an exception to the cell theory. What feature is this? *[1 mark]*

A. It lacks a nucleus.

B. It lacks a cell wall.

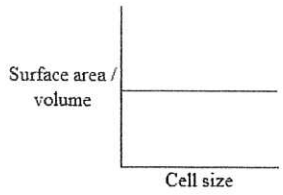
C. It has only one mitochondrion.

D. It lacks subdivision into separate cells.

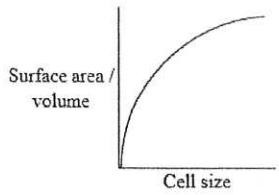
DBBAD

9. How does the surface area to volume ratio change with an increase in cell size? *[1 mark]*

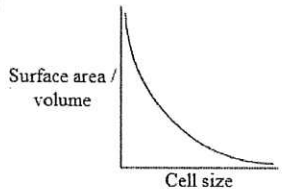
A.



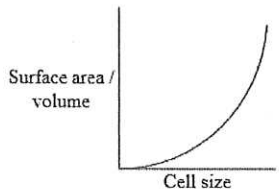
B.



C.



D.



10. What is a difference between a cell in the G_1 phase and a cell in the G_2 phase of the cell cycle? *[1 mark]*

A. A cell in the G_2 phase would be smaller than a cell in the G_1 phase.
B. A cell in the G_2 phase would have more mitochondria than a cell in the G_1 phase.
C. A cell in the G_1 phase would have more DNA in its chromosomes than a cell in the G_2 phase.
D. DNA replication occurs in the G_1 phase but not in the G_2 phase.

11. Which process requires channel proteins? *[1 mark]*

A. Simple diffusion
B. Facilitated diffusion
C. Binding of hormones
D. Exocytosis

12. What is proportional to a cell's surface area? *[1 mark]*

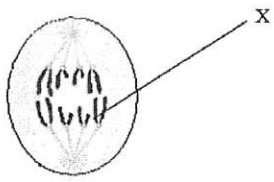
A. Rate of exchange of materials
B. Rate of heat production
C. Rate of waste production
D. Rate of oxygen consumption

13. Where in the cell do condensation reactions involving amino acids occur? *[1 mark]*

A. Nucleus
B. Golgi apparatus
C. Ribosomes
D. Lysosome

CBBAC

14. In which stage of mitosis is the cell labelled X? *[1 mark]*



A. Anaphase
B. Interphase
C. Metaphase
D. Prophase

15. Where can 70S ribosomes be found? *[1 mark]*

A. On membranes of the Golgi apparatus
B. In prokaryotic cells
C. On membranes of the rough endoplasmic reticulum
D. In nuclei

16. A red blood cell is 8 µm in diameter. If drawn 100 times larger than its actual size, what diameter will the drawing be in mm? *[1 mark]*

A. 0.08 mm
B. 0.8 mm
C. 8 mm
D. 80 mm

0.008mm.
0.8mm

17. A cell has cytoplasm, a cell wall, naked DNA and ribosomes. Based on this information, what type of cell could this be? *[1 mark]*

A. A cell from a pine tree
B. A grasshopper cell
C. A human red blood cell
D. A bacterium

18. Which of the following chemical elements are part of biochemical molecules in living organisms? *[1 mark]*

A. nitrogen, sulfur, phosphorus and iron
B. lead, oxygen, carbon and phosphorus
C. helium, carbon, sulfur and nitrogen
D. silicon, helium, oxygen and iron

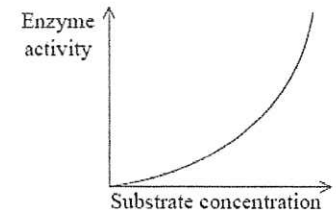
19. Which of the following is an organic compound made by all plants? *[1 mark]*

A. Carbon dioxide
B. DNA
C. Lactose
D. Oxygen

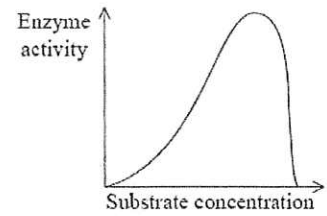
ABBDAB

20. Which of the following graphs shows the relationship between substrate concentration and enzyme activity with a fixed concentration of enzyme? *[1 mark]*

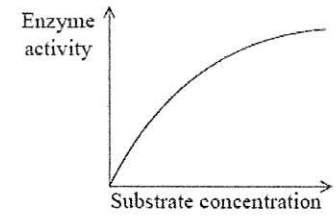
A.



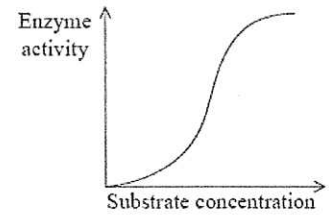
B.



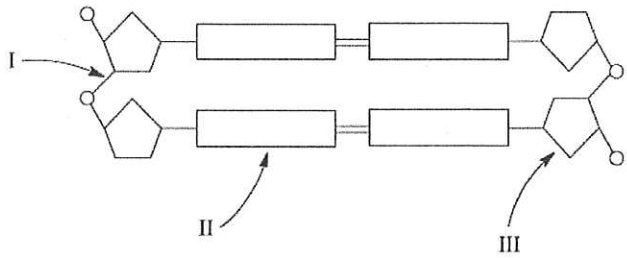
C.



D.



21. The diagram below represents part of the DNA molecule. *[1 mark]*



What are the parts labelled I, II and III?

	I	II	III
A.	hydrogen bond	base	deoxyribose
B.	hydrogen bond	deoxyribose	phosphate group
C.	covalent bond	base	deoxyribose
D.	covalent bond	deoxyribose	phosphate group

22. What principle is necessary to prevent mutation of DNA during replication? *[1 mark]*

A. Base pairing is complementary.
B. One gene codes for one polypeptide.
C. Substrates are specific to enzymes.
D. The genetic code is universal.

23. What happens during translation? *[1 mark]*

A. Copying of DNA to produce DNA
B. Copying of DNA to produce mRNA
C. Copying of DNA to produce tRNA
D. Polypeptide synthesis

CEAD

24. What happens as an enzyme becomes denatured? *[1 mark]*

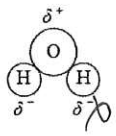
A. The enzyme works faster.
B. The enzyme works slower.
C. The enzyme can perform a new role.
D. The enzyme can make the reverse reaction proceed faster.

25. What is replicated by a semi-conservative process? *[1 mark]*

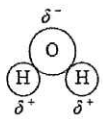
A. Messenger RNA (mRNA) only
B. Messenger RNA (mRNA) and transfer RNA (tRNA) only
C. Messenger RNA (mRNA), transfer RNA (tRNA) and DNA only
D. DNA only

26. Which diagram represents the polarity of a water molecule? *[1 mark]*

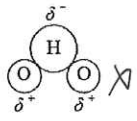
A.



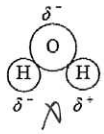
B.



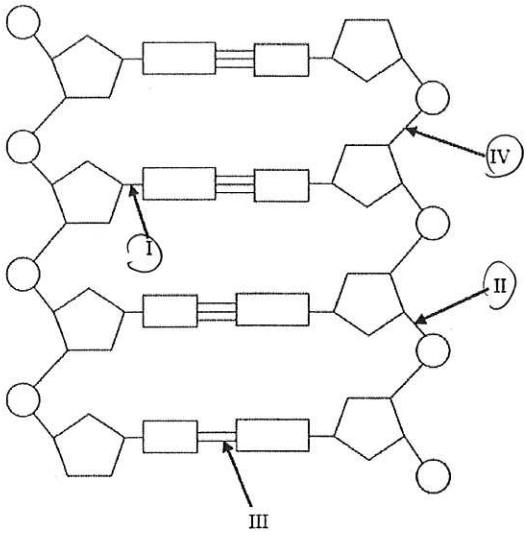
C.



D.



27. In the model of the DNA molecule shown below, which arrows point to covalent bonds? *[1 mark]*



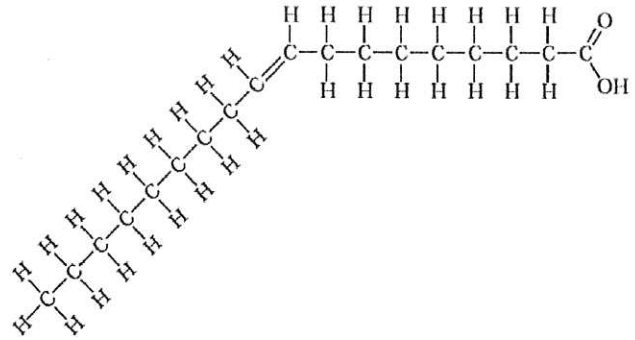
A. I, II and III only
B. II, III and IV only
C. I, III and IV only
D. I, II and IV only

B D B D

28. On which molecule is a codon found? *[1 mark]*

A. DNA
B. mRNA
C. tRNA
D. rRNA

29. Which chemical is shown in the diagram below? *[1 mark]*



A. Monosaccharide
B. Triglyceride
C. Fatty acid
D. Amino acid

30. Blood is a water-based transport medium. Which property of water makes it a good transport medium? *[1 mark]*

A. High specific heat
B. Transparency
C. Versatility as a solvent
D. It has its greatest density at 4 °C

31. The sequence of nucleotides in a section of RNA is: GCCAUACGAUCG *[1 mark]*

What is the base sequence of the DNA sense strand?

A. CGGUAUGCUAGC
B. GCCATACGATCG
C. CGGTATGCTAGC
D. GCCAUACGAUCG

32. Which best describes the tertiary structure of a protein? *[1 mark]*

A. The interaction of polypeptide subunits and prosthetic groups
B. Interactions forming hydrogen bonds between the amino acids
C. The sequence of amino acids in the polypeptide chain
D. The structure formed from interactions between the amino acid side groups

B C C B D

33. Which of the following chemicals is a component of eukaryotic chromosomes? *[1 mark]*

A. Protein
B. Triglyceride
C. Fatty acid
D. RNA

34. A collection of four animal specimens is observed and a dichotomous key is applied. Which specimen is an arthropod? *[1 mark]*

1. Non-segmented body .....go to 2
   Segmented body .....go to 3 ✓
2. Body is not symmetrical.....specimen A
   Body is symmetrical . . . . . specimen B
3. Jointed appendages present.....specimen C ✓
   Jointed appendages absent .....specimen D

A. Specimen A
B. Specimen B
C. Specimen C
D. Specimen D

35. Which of the following are used as evidence for evolution? *[1 mark]*

I. Homologous structures ✓
II. Selective breeding of domesticated animals ✓
III. Overproduction of offspring

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

36. An animal has radial symmetry, a sac-like body with only one opening and tentacles with stinging structures. To which phylum does this animal belong? *[1 mark]*

A. Annelida
B. Cnidaria
C. Mollusca
D. Porifera

37. Charles Darwin used domesticated animals to provide evidence for evolution by natural selection. What is this evidence? *[1 mark]*

A. Differences between breeds show that selection can cause species to change.
B. The ancestors of domesticated animals can be found in the fossil record.
C. Some domesticated animals die because the environment cannot support them all.
D. Variation in domesticated animals is due to sexual reproduction.

ACABA

38. Ants, bees and wasps are classified in the same order. What can be deduced about these animals? *[1 mark]*

A. They are classified in the same class.
B. They are classified in different phyla.
C. They are classified in the same family.
D. They are classified in different kingdoms.

D K P F O C G S
域 界 门 科 目 纲 属 种

39. *Pseudolarix amabilis* produces seeds but not flowers. *Physcomitrella patens* has leaves but not roots. To which groups do they belong? *[1 mark]*

	Pseudolarix amabilis	*Physcomitrella patens*
A.	coniferophyta	filicinophyta
B.	filicinophyta	angiospermophyta
C.	coniferophyta	bryophyta
D.	angiospermophyta	coniferophyta

40. What is the mechanism of natural selection? *[1 mark]*

A. Any individuals in a population can be selected entirely by chance.
B. After a change in the environment a species will evolve adaptations to the new conditions.
C. If an adaptation to the environment is useful, an individual will develop it and pass it on to its offspring.
D. Variations amongst individuals of a population are selected by a changing environment.

41. Which of the organisms A–D, identified by the key below, represents an Annelid? *[1 mark]*

1. Shows bilateral symmetry Does not show bilateral symmetry	go to 2 Cnidaria
2. Has a segmented body Does not have a segmented body	go to 3 go to 4
3. Has jointed legs Does not have jointed legs	A arthro. B
4. Has a shell Does not have a shell	C D

42. What is accepted by scientists as evidence for evolution? *[1 mark]*

I. Similarities in bone structure between the wings of a bat and the fins of a porpoise
II. Changes in dog breeds caused by artificial selection
III. Extinction of dinosaurs

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

C C D B D

43. A biologist exploring an uninhabited island came across an unknown plant. She made the following notes: *[1 mark]*

- grows in a damp and shady corner of the island
- has large feathery leaves with spore cases (sporangia) arranged on the underside
- young leaves are tightly rolled up
- has roots.

In what phylum should she classify this plant?

A. Angiospermophyta
B. Bryophyta
C. Coniferophyta
D. Filicinophyta

44. The Atlantic cod (*Gadus callarias*) is a fish which lays about 5 000 000 eggs in its lifetime. On average, only two of these eggs survive to become adult cod. How does this promote evolution? *[1 mark]*

A. All offspring are genetically identical, so become better adapted.
B. Laying many eggs provides food for other species to survive and become better adapted.
C. Some young cod change to become adapted to the environment and survive and pass on their genes.
D. Offspring with favourable variations survive and pass on their genes.

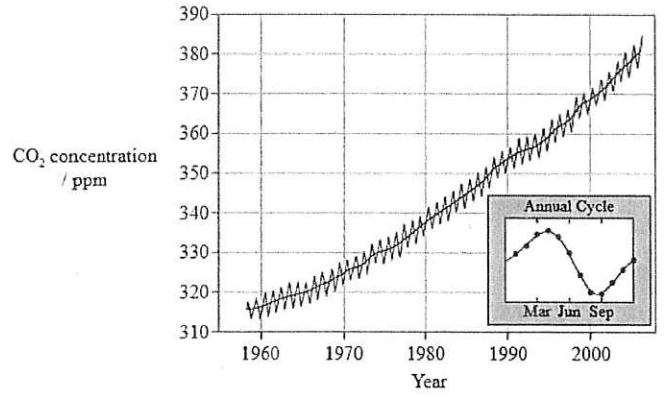
45. Based on binomial nomenclature, which two species are most closely related? *[1 mark]*

I. Common barberry (*Berberis vulgaris*)
II. Canadian bunchberry (*Cornus canadensis*)
III. Smooth blackberry (*Rubus canadensis*)
IV. Canadian barberry (*Berberis canadensis*)

A. I and IV
B. II and III
C. II and IV
D. III and IV

D DA

The following graph refers to questions 19 and 20. It shows variation in the concentration of CO_2 in the atmosphere as measured at Mauna Loa in Hawai'i. The small inset graph shows the variations in CO_2 during a one year period.



[Source: adapted from Dr P Tans, NOAA Earth System Research Laboratory]

46. Why does the amount of CO_2 fall between April and August? *[1 mark]*

A. Seasonal increase in the rate of photosynthesis in northern hemisphere forests
B. Seasonal decrease in the rate of photosynthesis in northern hemisphere forests
C. Seasonal decrease in the rate of fossil fuel consumption
D. Seasonal increase in the amount of CO_2 taken up by the oceans

47. The scarlet cup fungus (*Sarcoscypha coccinea*) obtains its nutrition from decaying wood by releasing digestive enzymes into the wood and absorbing the digested products. *[1 mark]*

Which of the following terms describe(s) the fungus?

I. Autotroph
II. Heterotroph
III. Saprotroph

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

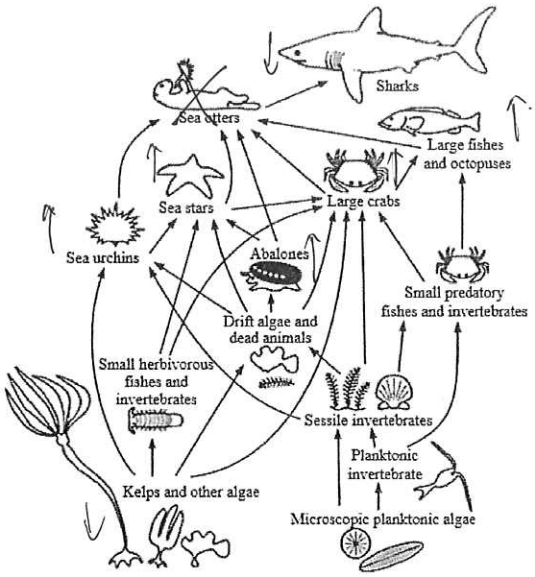
48. In a pond, two species of fish feed on insects and worms. The insects feed on the green plants that live in the water. What constitutes a population in this ecosystem? *[1 mark]*

A. All the living organisms
B. All the animals
C. All the fish
D. All the fish of one species

49. Which of the following ecological units includes abiotic factors? *[1 mark]*

A. A community
B. An ecosystem
C. A population
D. A trophic level

A A D B



[Source: http://cbc.amnh.org/crisis/foodweb.html]

50. What will happen to the food web above if the sea otter disappears? *[1 mark]*

A. Large fish increase and sea urchins decrease.
B. Abalones increase and sharks increase.
C. Sea urchins increase and kelps decrease.
D. Sea stars decrease and sharks increase.

51. Which gas will enhance the greenhouse effect if released into the atmosphere? *[1 mark]*

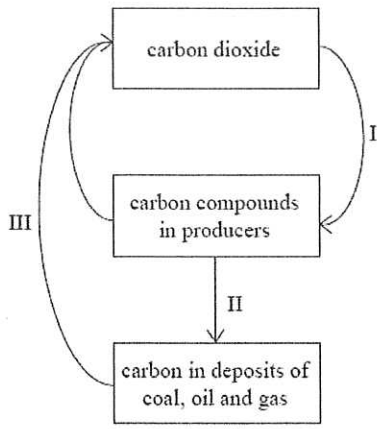
A. Hydrogen
B. Oxide of nitrogen
C. Oxygen
D. Nitrogen

52. *Zoophobas morio* is an insect. Its larvae feed on bat feces in caves in Guatemala. What type of organism is a *Zoophobas morio* larva? *[1 mark]*

A. Autotroph
B. Consumer
C. Detritivore
D. Saprotroph

CBC

53. The diagram below shows some of the links in the carbon cycle. *[1 mark]*



What processes are taking place at I, II and III?

	I	II	III
A.	photosynthesis	fossilization	combustion
B.	cell respiration	fossilization	greenhouse effect
C.	photosynthesis	decomposition	combustion
D.	cell respiration	decomposition	greenhouse effect

54. How is energy passed from one trophic level to the next? *[1 mark]*

I. Food
II. Light
III. Heat

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

55. In 1789 Gilbert White, a naturalist, observed eight breeding pairs of swifts (*Apus apus*) in the English village of Selborne. On average, each pair of swifts produces two offspring per year. This would allow the population to rise to 1030 swifts over 200 years. A bird survey carried out in 1983 revealed only 12 breeding pairs in this village. *[1 mark]*

What could have prevented the numbers rising to 1030?

I. The number of nesting sites remained the same.

II. The food supply of the swifts remained constant.

III. Predatory birds in the area were exterminated.

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

A A B

56. Which characteristic of water vapour classifies it as a greenhouse gas? *[1 mark]*

A. It absorbs and then re-emits some of the long wave radiation emitted by the Earth's surface.

B. It prevents short wave radiation from reaching the Earth's surface.

C. It absorbs UV radiation but does not re-emit it.

D. It absorbs infra-red radiation but does not re-emit it.

57. The image shows a transect through a stream and a field. *[1 mark]*

Which calculation would test for the association between two species of plants from quadrat data from section A and section B of the field?

A. Correlation coefficient

B. Random numbers sampling

C. Standard deviation

D. Chi-squared

58. What is the classification of an organism that is able to make organic compounds from inorganic nutrients? *[1 mark]*

A. Autotroph
B. Consumer
C. Detritivore
D. Saprotroph

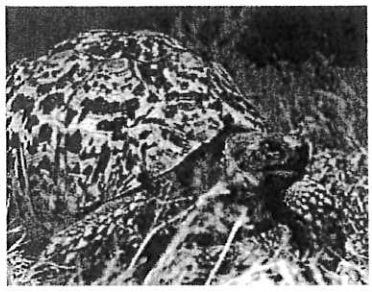
A AA

Image I shows a spotted hyena (Crocuta crocuta) and image II shows a leopard tortoise *(Geochelone pardalis*).

Image I

[Source: adapted from www.corbisimages.com]

Image II



[Source: adapted from http://mikeelliscb.edublogs.org]

59. Based on their diet, the feces of spotted hyenas appear white because of high calcium content. Leopard tortoises eat hyena feces. What would explain such tortoise behaviour? *[1 mark]*

A. They are saprotrophs.

B. They transform energy with 100 % efficiency.

C. They need to form bones and shell.

D. They only eat inorganic matter.

60. What is a consequence of a global temperature rise on arctic ecosystems? *[1 mark]*

A. Decrease in CO_2 released from decomposing detritus
B. Increase in the greenhouse effect
C. Decrease in ocean level
D. Increase in pest species

CB

INTERNATIONAL BACCALAUREATE
BACCALAUREAT INTERNATIONAL
BACHILLERATO INTERNACIONAL

SEE INSTRUCTIONS OVERLEAF
VOIR INSTRUCTIONS AU VERSO
VER AL DORSO PARA INSTRUCCIONES

1 DATE/FECHA:

2 SUBJECT/MATIERE/ASIGNATURA:

5 CAND. REF. NO.
NO. REF. CAND.

0	0	0	0		0	0	0
1	1	1	1		1	1	1
2	2	2	2		2	2	2
3	3	3	3		3	3	3
4	4	4	4		4	4	4
5	5	5	5		5	5	5
6	6	6	6		6	6	6
7	7	7	7		7	7	7
8	8	8	8		8	8	8
9	9	9	9		9	9	9

3 NAME/NOM/NOMBRE:

Jerry Jiang.

4 LEVEL OPTION NIVEL

ECONOMICS	ECONOMIE	ECONOMICA	H S
BIOLOGY	BIOLOGIE	BIOLOGIA	H S
CHEMISTRY	CHIMIE	QUIMICA	H S
PHYSICS	PHYSIQUE	FISICA	H S
ENV. SYSTEMS	SYS. D'ENVIRON	SIST. AMB	S
DESIGN TECHNOLOGY	TECHNO. DES	TECHNO. DISEÑO	H S
ITGS	TISG	TISG	S

6 ABSENT(E)
AUSENTE

54/60

1	✓	B	C	D	✓
2	A	✓	C	D	✓
3	A	B	C	✓	B
4	A	B	C	✓	✓
5	A	✓	C	D	✓
6	A	✓	C	D	✓
7	✓	B	C	D	✓
8	A	B	C	✓	✓
9	A	B	✓	D	✓
10	A	✓	C	D	✓
11	A	✓	C	D	✓
12	✓	B	C	D	✓
13	A	B	✓	D	✓
14	✓	B	C	D	✓
15	A	✓	C	D	✓
16	A	✓	C	D	✓
17	A	B	C	✓	✓
18	✓	B	C	D	✓
19	A	✓	C	D	✓
20	A	B	✓	D	✓

21	A	B	✓	D	✓
22	✓	B	C	D	✓
23	A	B	C	✓	✓
24	A	✓	C	D	✓
25	A	B	C	✓	✓
26	A	✓	C	D	✓
27	A	B	C	✓	✓
28	A	✓	C	D	✓
29	A	B	✓	D	✓
30	A	B	✓	D	✓
31	A	✓	C	D	✓
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36	A	✓	C	D	✓
37	✓	B	C	D	✓
38	A	B	✓	D	A
39	A	B	✓	D	✓
40	A	B	C	✓	✓

41	A	✓	C	D	✓
42	A	B	C	✓	B
43	A	B	C	✓	✓
44	A	B	C	✓	✓
45	✓	B	C	D	✓
46	✓	B	C	D	✓
47	✓	B	C	D	B
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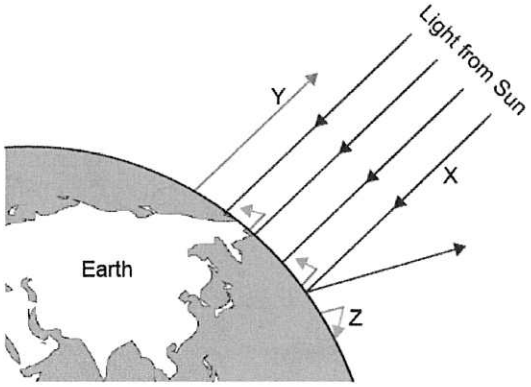
55	A	✓	C	D	✓
56	✓	B	C	D	✓
57	✓	B	C	D	D
58	✓	B	C	D	✓
59	A	B	✓	D	✓
60	A	✓	C	D	D

Jerry Jiang 93% 38

HL Bio Final Exam Paper 2 *[44 marks]*

The diagram shows the greenhouse effect.



[Source: © International Baccalaureate Organization 2017]

1a. State the type of wavelength of the radiation labelled X and Y. *[2 marks]*

X:

Y:

X: all kinds of wavelength. (including short and long). ✓

Y: short wavelength radiation. ✗ long wavelength

1

1b. Outline reasons for the change occurring at Z. *[2 marks]*

- Z is long wavelength (infare red) radiation.
- green house gas can ~~also~~ absorb this ~~kind of~~ radiation and re-emit them ~~back~~.

2

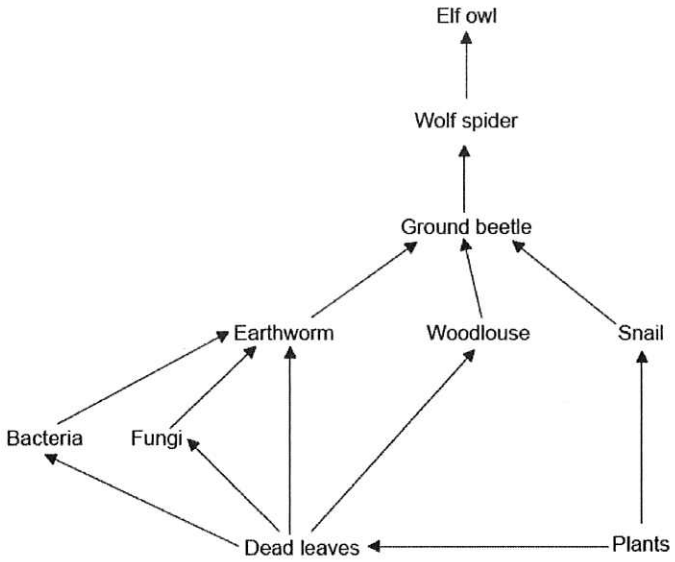
1c. The short-tailed albatross (*Phoebastria albatrus*) nests and breeds on remote low-lying coral islands in the Pacific Ocean. Predict how global warming may threaten the survival of such an ocean bird. *[1 mark]*

global warming melts the ice in Arctica and Antarctica, so the sea level rises. Over time, this island might be completely underwater, and albatross will loose their habitats.

1

4

The image shows a food web.



[Source: © International Baccalaureate Organization, 2017]

2a. Using the food web, identify a detritivore. *[1 mark]*

Earthworm. ✓

2b. Using the food web, identify a saprotroph. *[1 mark]*

Fungi. ✓

2c. State the name of the domain to which birds, such as the Elf owl, belong. *[1 mark]*

Eukaryote. ✓

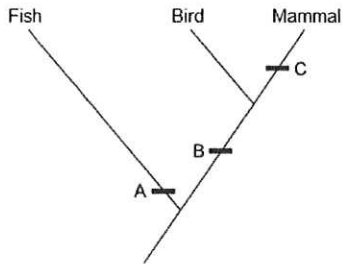
3

2d. Outline the energy flow through this food web. *[3 marks]*

Autotrophs (producers) absorb energy from the sun from photosynthesis. Then they're eaten by primary consumers: snails, and then they're eaten by secondary ~~consumers~~ plants. As they're being eaten, energy are passed on to the next level with around 90% loss due to egestion, death, etc. heat! When ~~they~~ plants die, saprotroph absorb the nutrients from them, then they pass the energy to detritivore, they're then consumed by ~~other~~ consumer in the ecosystem.

2

The image shows part of a cladogram.



3a. Using the cladogram, identify **one** diagnostic feature that characterizes the given groups of vertebrates at A, B and C. *[3 marks]*

A: ability to move with fins ✓

B: use lungs to breath ✓

C: ~~fuctle~~ fur on body made of ~~keratin~~ ✓

3

3b. State the name of the domain to which these organisms belong. *[1 mark]*

Eukaryote. ✓

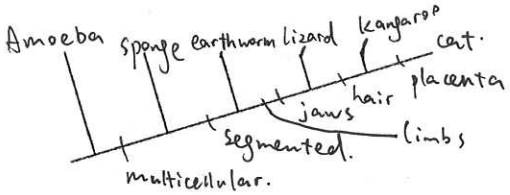
1

6

4a. The table shows certain characteristics present (+) or absent (–) in six organisms. *[3 marks]*

	Segmented	Jaws	Hair	Placenta	Multicellular	Limbs
Amoeba	–	–	–	–	–	–
Cat	+	+	+	+	+	+
Earthworm	+	–	–	–	+	–
Kangaroo	+	+	+	–	+	+
Lizard	+	+	–	–	+	+
Sponge	–	–	–	–	+	–

Using the data, label the cladogram with the names of the organisms.



3

4b. A species is often defined as a group of similar individuals that interbreed in nature and produce fertile offspring. Discuss some problems with the use of this definition. *[2 marks]*

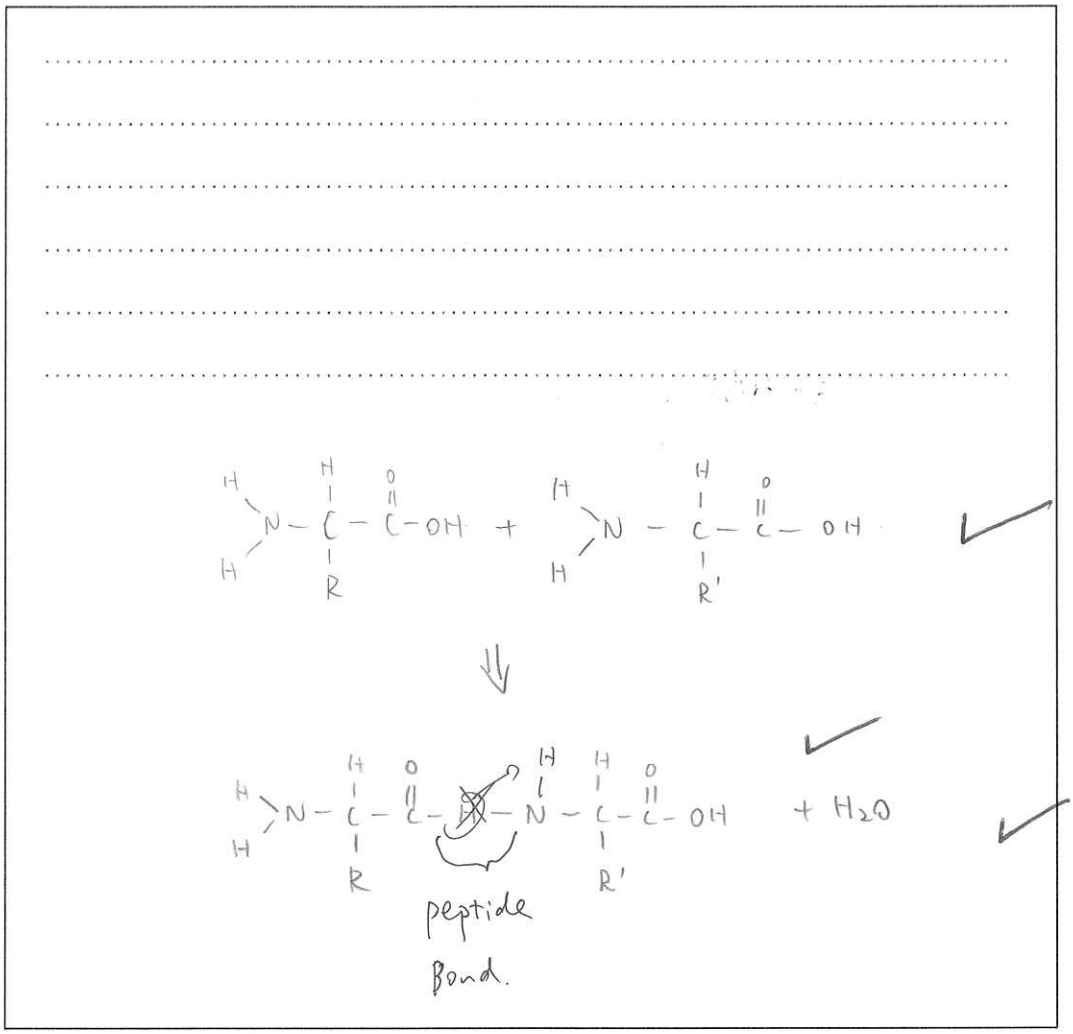
① individual of the same species might live in different places, though they don't interbreed, they still are the same species.

② some species can ~~reeder~~ technically interbreed and produce fertile offspring. but they don't actually do that even if they live together.

2

5

5. Outline the production of a dipeptide by a condensation reaction, showing the structure of a generalized dipeptide. *[4 marks]*



3

6a. Explain how sexual reproduction can eventually lead to evolution in offspring. *[8 marks]*

① evolution is the change in herritable traits in the population over time. ✓

- variation is a very important process in speeding up evolution. ✓
- when species under go asexual reproduction, they are identical in Genes, so evolution is unlikely or very slow.
- when species have sexual reproduction, either conjugation or meiosis help mixing up the genetic material and produce varied offspring.
- when some mutations / new traits in the offspring can help them, they're likely to survive and pass that trait on. ✓
- overtime, the number of ~~species~~ individuals in the population with that trait increase, and that evolution. ✓

② Example: Finches on Daphne Major Island.

- when two finch sexual reproduce, there will be a ~~~~ diversified traits in their offspring, including some with longer beaks and some with shorter beaks.
- As there's a drought, finch with long beak has better ability to find food, and thus survive.
- They pass down this trait and eventual most finch will have longer beaks.
- This is how sexual reproduction help finches evolve long beaks in environment with drought.

- change in gene pool
- variation is heritable.
- more offspring → selective pressure.
- assortment of allele contribute to variation.

5

6b. Using simple external recognition features, distinguish between the plant phyla bryophyta and angiospermophyta. *[4 marks]*

Bryophyta	Angiospermophyta
spore ✓	seeds
no waxy cutile	have protective waxy cutile
no flower ✓	can have flower
no vascularization ✓	have vascularization
relatively simple ✓	relatively complex
no roots ✓	have roots
shoot the spores out to spread	varied ways to spread seed: insect, wind, etc.
Example: moss	Example: Daisy

4

7. Explain the methods and aims of DNA profiling. *[8 marks]*

① First we need to produce more DNA sample so that the fingerprinting is easier to observe. We use polymerase chain reaction (PCR). ✓

- a lot of nucleotide, enzyme, and the DNA sample we want to duplicate is put into a beaker.
- enzyme produce some copies of that DNA sample.

② Now we gather the different samples of DNA that have all been amplified by PCR.

- by using a certain type of restriction enzyme, we cut the DNA samples where ever there's the recognition sequence of the restriction enzyme in the DNA.
- different DNA will be cut into different piece length, while the same DNA sample will be cut into same length pieces.
- Now we run gel electrophoresis. Since there's a negative charge on the phosphate backbone, DNA are pulled towards the positive electrode.
- As they're travelling, gel stops them down to different extent: small piece travels faster, long piece travels slower.
- when this process stops, there will be a difference in distance ~~between~~ pieces of DNA can travel through the gel.

- so if two sample contains the same DNA, the distribution pattern will be similar; vice versa. This works because the pattern, especially parts like tandem repeats, is very hard to be identical unless ~~you~~ the source of DNA are from 1 organism or between 1 organism and its offspring.

8 excellent

③ The use of DNA finger printing can be: crime ~~sol~~ solving (finger-printing the genetic material left at crime scene as suspects); and finding out the possibility that a person is the parent of another person. (I don't know the english of this, but it's like "Blood relationship identification" between parents & children.