

Nombor kad pengenalan..... Nombor pusat/angka giliran.....

964/3

TRIAL STPM 2020

BIOLOGY (BIOLOGI)

PAPER 3 (KERTAS 3)

One and a half hours(1 jam 30 minit)

Instructions to candidates:

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE ALLOWED TO DO SO

Answer all questions in Section A.

Answer all questions in Section B.

Answer two questions only in Section C.

All working should be shown. For numerical answers, unit should be quoted wherever appropriate.

Answer may be written in English or Malay.

**SIJIL TINGGI
PERSEKOLAHAN
MALAYSIA
(MALAYSIA HIGHER SCHOOL
CERTIFICATE)**

For Examiner usage	
<i>Section A</i>	
15 questions	
<i>Section B</i>	
16	
17	
<i>Section C</i>	
Total	

MARKING SCHEME

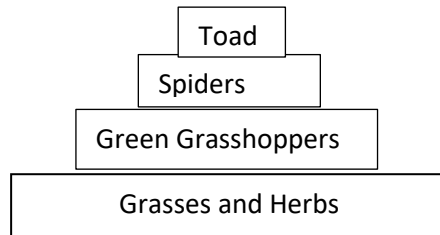
This question paper consists of 8 printed pages.

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1 B 2 A 3 B 4. A 5. B 6. C 7.A 8: C 9.D 10.D 11.B 12.C 13.B 14.A 15. D

No 16

(a)



(b)

- (i) The net primary production of energy in grasses and herbs = 180 kJ
- Only 16% of the energy from grasses and herbs is transferred to the green grasshopper
 - $180 \text{ kJ} \times 16/100 = 28.8 \text{ kJ}$
 - From the grasshopper to spiders, only 6.5% of energy is transferred
 - $28.8 \text{ kJ} \times 6.5/100 = 1.872 \text{ kJ}$
 - From the spiders to toads, only 2.5% of energy is transferred
 - $1.872 \text{ kJ} \times 2.5/100 = 0.0468 \text{ kJ}$
 - From toads to owls, only 1.7% of energy is transferred
 - $0.0468 \text{ kJ} \times 1.7/100 = 0.000796 \text{ kJ} / 7.96 \times 10^{-4} \text{ kJ}$
- (ii) From grasses and herbs to field mice, only 22% of energy is transferred
- $180 \text{ kJ} \times 22/100 = 39.6 \text{ kJ}$
 - From field mice to owl, only 9.5% of energy is transferred
 - $39.6 \text{ kJ} \times 9.5/100 = 3.76 \text{ kJ}$
- (iii) Because in the first food chain, the owls are in the fifth trophic level and more energy is lost with more trophic level whereas in second food chain the owls are in the third trophic level and less energy is lost because there are less trophic level.
- (c)
- (i) Grasses and herbs are the producers the food chain. When there are less grasses and herbs, there is less light energy absorbed and converted to chemical energy by producers. The amount of energy available for the food chain decreases. The number of owls will decrease as there is less energy available to sustain the food chain and eventually there will be less number owls in the chain.
- (ii) When the number of field mice decreases, the population size of owls remain the same, this is because even if the energy available in the food chain with field mice decreases, the owls will obtain the energy required from other alternative food chain in the food web

17.(a) X-linked trait passes from mother to the hemizygous son (XY) because male inherits his

X chromosome from his mother and Y chromosome from his father.

[2marks]

(b) R – $X^H X^h$
 S – $X^H X^h$
 T – $X^h Y$

[3marks]

(c)

Parent phenotype:

haemophilic father X carrier mother

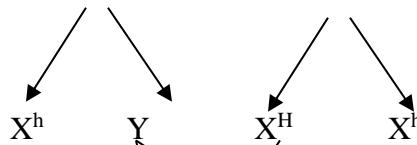
Parent genotype :

$X^h Y$ X $X^H X^h$

1m

Meiosis :

Gametes :



Random fertilization:

F₁ genotype :

$X^H X^h$ $X^H Y$ $X^h X^h$ $X^h Y$

F₁ phenotype :

Female carrier: Male normal: Female haemophilic: Male haemophilic

1m

Probability of having haemophilic daughter = 1/4

1m

18 (a) According to Linnaeus Binomial System :

- A scientific name consists of the genus name and specific name. (1 M)

- The genus name begins with a capital letter while species name begins with a small letter. (1 M)

- The two names must be presented in italic if typed and if written, the genus and species name must be underline separately. (1 M)

- All the scientific name are in Latin to ensure uniformity. (1 M)

TOTAL - 4 MARKS

18 (b) (i) Porifera

Example : *Sycon* sp./Sponge

(1 M)

Morphological characteristics ;

- Sponges are aquatic sessile animals with many pores in the body wall. These pore are also called ostium.
- Sponges are shaped like a hollow tube with a large opening called osculum at the top and have a single body cavity.
The body of the sponge frequently lacks symmetry.
- Sponges have no specialized tissues or organs but show some cellular differentiation.
- The body wall consists of two layers of cells separated by a gelatinous protein-rich region called the mesohyl.
- The outer layer is made up of epithelial or epidermal cells/Some epithelial cells are modified to form porocytes which control the size of pores and regulate water flow/The pores close when there are harmful substances in the environment.
- The inner layer is made up of specialized flagellated cells called choanocytes. The cells function in the feeding process.
- The mesohyl contains amebocytes which perform several functions such as digestion of food, transportation of digested food and secretion of fine needles of calcium carbonate or silica called spicules. The spicules form a supportive inner skeleton for the sponge.
- (a) Asexual reproduction is by budding or regeneration.
(b) Sponges are hermaphrodites. Sexual reproduction involves the development of both male and female gametes from amoeboid mesenchyme cells, usually at different times.
(c) Fertilisation occurs in the mesohyl/mesoglea and the zygotes develop into multicellular free-living larvae which will develop into new individuals eventually.

- ANY 4 - 4 marks
- TOTAL – 5 MARKS

(ii) Platyhelminthes

Example : *Taenia* sp.

(1 mark)

Morphological characteristics :

- Bodies are flattened dorsoventrally and have bilateral symmetry.
- Unsegmented body.
- Single gastrovascular cavity with a single opening that functions as the mouth and anus.

- They are acoelomates; mesoderm completely fills the space between the endoderm and ectoderm, no cavity surrounding the guts.
 - Excretory system consists of a network of tubules ending with 'flame cells' used for dialysis function.
 - They are hermaphrodites; testes and ovaries are numerous with many connecting tubes.
 - ANY 5 –(5 marks)
- TOTAL – 6 MARKS

19.a)

- are cycles that involve organisms(bio),environmental geology(geo) and chemical changes (chemical)
1m
- they enable chemical elements/nutrients to be recycled/circulate between the biotic and abiotic components
1m
- through changes in form in the atmosphere, hydrosphere and lithosphere
1m
- can be divided into two groups 1m
- a nutrient cycle in the form of deposit and reserve pools found in the atmosphere and hydrosphere 1m
- a nutrient cycle in the form of deposits and reserve pools found in the lithosphere 1m
- cyclic processes can take place fairly rapidly such as in gaseous nutrient cycle (involving the elements carbon, nitrogen and oxygen)
1m
- cyclic processes involving elements (such as phosphorus and iron/0 take place slowly and are considered to be incomplete
1m
- most of these elements are deposited and cannot be used for a long period of time until exposed again by weathering action
1m

max 5

19 b)

Biology

- Plants and other autotrophs make up carbon dioxide from the air (or from water , if they are aquatic) during photosynthesis
- The carbon dioxide is then fixed to form carbohydrate and other organic molecules
- The carbon is then passed along the food chain
- as an animal (herbivore) eats a plant, or as one animal (carnivore) eats another.
- When the organism die, they form food for decomposers
- Carbon is return to air or water mainly as carbon dioxide, by the respiration carried out by all organism max 5

Geology

- If the bodies of dead organism are not fully broken down, they will eventually be incorporated in sediments.
- Shell of dead protocists and mollusk, and vertebrate bones may add to the sediments, eventually forming coal, oil, natural gas (fossil fuels), chalk and limestone.
- Combustion of these fuels, volcanic activity and weathering of sedimentary rocks release carbon dioxide to the atmosphere. max 3

Chemical

- Carbon forms a part of all major biological molecules (carbohydrates, lipids, proteins and nucleic acids)
- Carbon dioxide gas in the atmosphere is the main source of carbon for organism on land
- For aquatic organism, the main source is hydrogencarbonate ions formed from dissolved carbon dioxides (and carbonate rock) max 2

20a) gene bank -a storage of genetic informaation of a species in a prefered environment for conservation purposes	1
genomic library -a collection of clones that consists of all the DNA sequences in the genome of a species	1
cDNA library -a collection of clones that contains only the coding regions/ exons of a genome// a collection of bacterial clones that have recombinant plasmids with cDNA fragments of a genome	1

20(b)		
cDNA only contains the sequence found in mRNA	Genomic library contains the sequences of the entire gene	1
cDNA smaller in size	Genomic library larger in size	1
cDNA only contain exons	Genomic library contain both coding and non coding region	1
cDNA is made from mRNA by using reverse transcriptase which then inserted into vector	Gene in genomic library are entire genetic sequence of organism which cut and inserted into a vector to be stored as genomic library	1
cDNA easier to express as it contain only the coding region	Genomic library more diffiucult to express as it has all the region.	1
		Max 4

20(c)

-mRNA from a specific human cell is isolated and used as a template to make DNA by reverse transcription	1
-reverse transcriptase enzyme catalyses the reverse transcription of complementary single strand DNA /cDNA from the mRNA	1
-mRNA is degraded with ribonuclease or an alkaline solution	1
-DNA polymerase is used to synthesise the complementary DNA strand	1
-the double-stranded cDNA produced is cut with restriction enzyme	1
-a cloning vector such as plasmid is cut with the same restriction enzyme	1
-both the cDNA fragments and the cloning vector are mixed together	1
-DNA ligase is added to join them forming recombinant DNA(rDNA)	1
-the rDNA produced are then introduced into host cells such as <i>E. coli</i> bacteria	1
-the bacteria cells with the rDNA are cultured in a medium containing antibiotics for screening	1
-the collection of colonies containing the coding regions/ exons of the genome forms a cDNA library	1
	Max 8