

**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.

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PERSEKOLAHAN  
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CERTIFICATE)

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

**This question paper consists of 9 printed pages.**

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**Section A [15 marks]**

Answer **all** questions in this section.

- 1 Which of the following three taxons are lower than class?  
 A Kingdom, Phylum, Order  
 B Order, Family, Genus  
 C Phylum, Genus, Species  
 D Phylum, Order, Family

- 2 The table below shows four phyla and their examples.

Phylum	Example
I Fungi	(a) <i>Marchantia</i>
II Filicinophyta	(b) <i>Dryopteris</i>
III Bryophyta	(c) <i>Mucor</i>
IV Angiospermatophyta	(d) <i>Helianthus</i>

Which phyla correspond correctly with their respective examples?

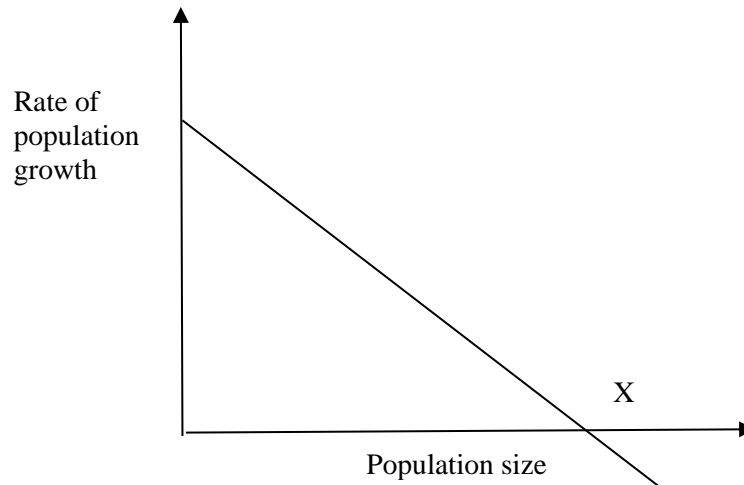
- I      II      III      IV  
 A (c)    (b)    (a)    (d)  
 B (a)    (b)    (c)    (d)  
 C (b)    (c)    (d)    (a)  
 D (c)    (d)    (a)    (b)
- 3 Which of the following are the examples of in situ conservation?  
 I Turtle Island Park  
 II Penang Botanical Garden  
 III Mulu National Park  
 IV Gene Bank  
 A I and II  
 B I and III  
 C I, II and III  
 D I, III and IV
- 4 A quadrat frame of size 50cm x 50cm was used to determine the density of a species Q in areas R and S .The results obtained are as follows:

<i>Quadrat number</i>	1	2	3	4	5	6	7	8	9	10
<i>Area R</i>	20	0	14	16	6	10	10	18	0	6
<i>Area S</i>	12	0	4	6	4	2	0	10	2	0

What is the density, in units per square meter, of species X in the two areas?

- R                  S  
 A 40              16  
 B 10              4  
 C 5                2  
 D 400            160

- 5 Carrying capacity of a population is
- the number of individuals in a population
  - the population size of a species which can be supported by resources available in a habitat
  - the population size when the natality rate is more than the mortality rate
  - the population size when the mortality rate is more than the natality rate
- 6 The graph below shows the rate of growth of an animal population against the population size.



- Which of the following is true of the population at point X?
- K-strategy action
  - Maximum rate of natality
  - Carrying capacity of the population
  - Minimum rate of mortality
- 7 Which is true of continuous variation?
- Its example is the skin colour in humans.
  - Its differences are discrete.
  - It is controlled by one gene.
  - It is not influenced by environmental factors.
- 8 A species of organism is separated into two populations by mountain range. Mating between individuals of the two populations produces sterile progeny. Which of the following explains this phenomenon?
- Speciation does not take place.
  - Genetic drift does not take place.
  - Allopatric speciation takes place.
  - Sympatric speciation takes place.
- 9 Which is **not** associated with speciation?
- Genetic drift
  - Isolation
  - Adaptive radiation
  - Inbreeding

10 In *Drosophila*, allele for short leg ( $p$ ) is recessive to the allele for normal leg ( $P$ ) and allele for hairy body ( $l$ ) is recessive to allele for normal body ( $L$ ). From the cross of  $PPLl \times Ppll$ , what is the expected ratio of the progeny that shows the normal phenotype for both traits?

- A 1/16
- B 1/8
- C 3/16
- D 1/2

11 A cross between a pure-breed black rabbit and a pure-breed white rabbit gives rise to black, grey and white rabbits with the ratio of 1:2:1 respectively in the F1 generation. The alleles involved in the traits are probably

- A linked genes
- B incomplete dominance allele
- C lethal allele
- D homozygous allele

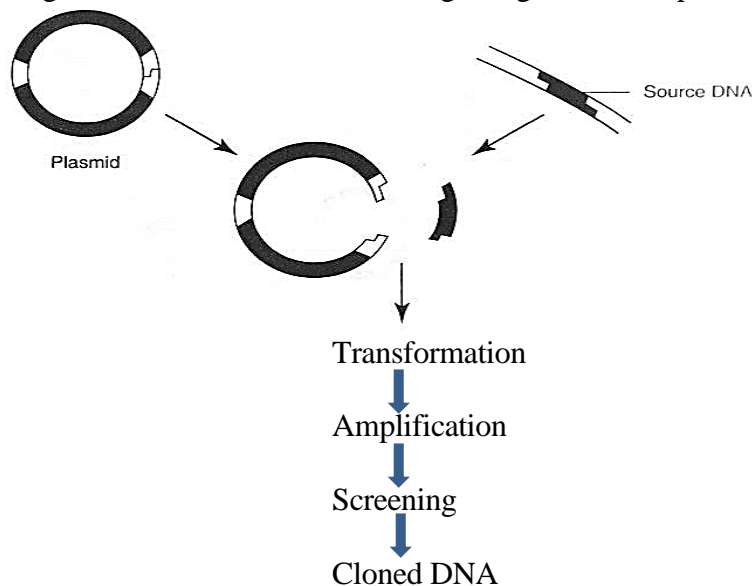
12 The table below shows the value of chromosome crossing over between linked genes.

Linked genes pair	PQ	PR	PS	QR	QS	RS
Value of chromosome crossing over (%)	60	10	20	70	40	30

The genes sequence on the chromosome is

- A P,Q,R,S
- B Q,R,S,P
- C Q,S,P,R
- D Q,S,R,P

13 The diagram below shows DNA cloning using a bacterial plasmid.



Why is it necessary to carry out screening?

- I. There are bacteria that are not transformed
  - II. There are bacteria that do not undergo amplification
  - III. There are bacteria that are transformed with non-recombinant plasmids
- A. I, II
  - B. I, II, III
  - C. II, III
  - D. I, II, III

- 14 The sticky end of a DNA molecule that has been treated with restriction enzymes are made up of
- A single-strand DNA with unpaired bases
  - B single-strand DNA with repeating base sequence
  - C double-strand DNA in which the hydrogen bond between complementary bases are broken
  - D double-strand DNA in which the bases of one strand have hybridized with a radioactive probe
- 15 Which biotechnology applications have been used to benefit human being?

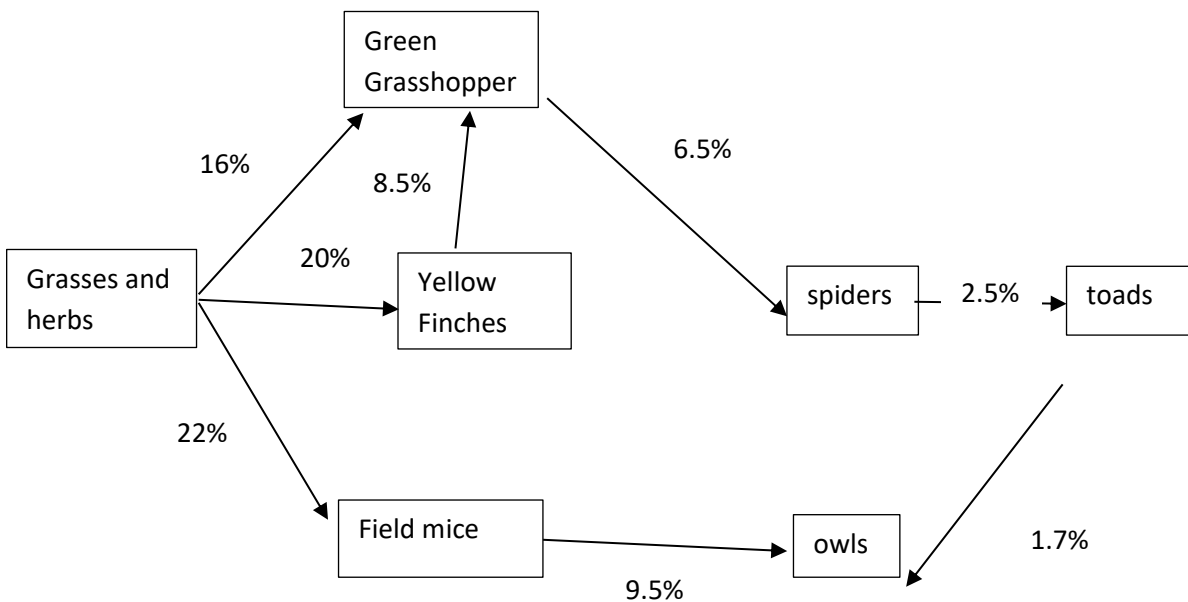
I	Introduction of cancer resistance genes into human gamete.
II	Production of cotton trees which are herbicide resistant.
III	Production of growth hormone by salmon fish to treat dwarfism.
IV	Production of $\alpha$ -1-antitrypsin by sheep to treat emphysema.

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

**Section B [15 marks]**

Answer **all** questions in this section.

- 16 The food web below shows the percentage of energy transferred among the organism in small part of grassland ecosystem.



- (a) Draw and label an ecological pyramid for the green grasshopper, grasses and herbs, spiders and toads. [2 marks]

(b) Assuming that the grasses and herbs contain 180 kJ of energy, calculate the net energy obtained by owls in the following food chains:

(i) Grasses and herbs → grasshopper → spiders → toad → owl  
[1 mark]

(ii) Grasses and herbs → Field mice → owls  
[1 mark]

(iii) Why do the owls in b(i) receive less energy compared to the owls in b(ii)?  
[1 mark]

.....

(c) What is the effect on the population of the owls if the number of the following organisms decrease?

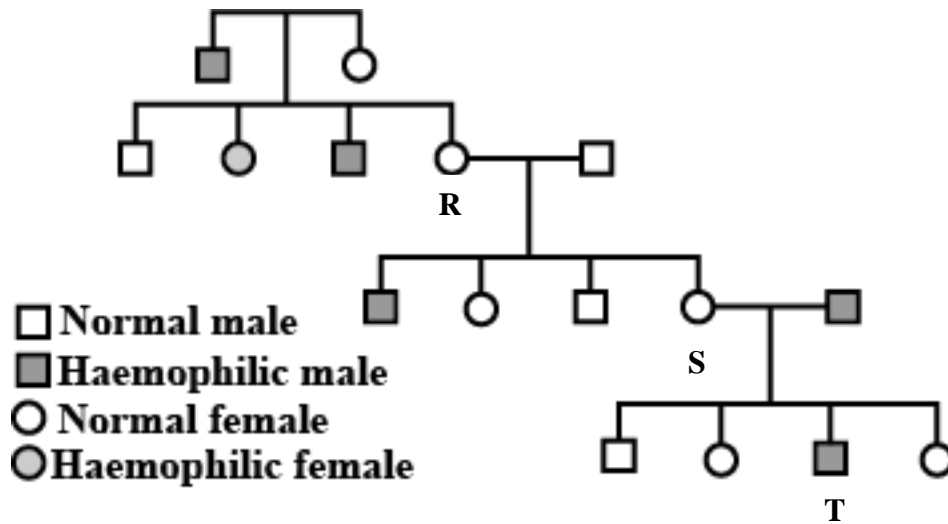
(i) Grasses and herbs [ 1 mark ]

.....

(ii) Field mice [ 1 mark ]

.....

17 The pedigree below shows the inheritance of haemophilia. Haemophilia is a sex-linked recessive condition. The gene for haemophilia is carried on the X chromosome.



(a) Why a son has higher chance to haemophilia trait compare to a daughter when their mother is a haemophilic female? [2 marks]

.....  
 .....

(b) Assuming that the alleles  $H$  and  $h$  control the expression of the trait, state the genotype of the following individuals labeled **R,S,T**. [3 marks]

**R**:.....

**S**:.....

**T**:.....

(c) By means of a genetic diagram, what is the probability of a haemophilic father and a carrier mother having haemophilic daughter? [3 marks]

**Section C [30 marks]**

Answer **two** questions only in this section.

- 18 a) Biologist name organisms using the Binomial system of nomenclature. Describe briefly the Binomial nomenclature [4 marks]
- b) By using named examples, describe morphological characteristics of each of the following phylum
- i) Porifera [5 marks]
- ii) Platyhelminthes [6 marks]
- 19 a) Explain what is meant by biogeochemical cycle [5 marks]
- b) Describe the components in the biogeochemical cycle by referring to carbon cycle [10 marks]
- 20 a) Explain what is meant by gene bank, genomic library and cDNA library. [3 marks]
- b) Differentiate between cDNA and genomic DNA libraries [4 marks]
- c) Explain how cDNA library for humans is prepared [8 marks]