SULIT

SEKOLAH BERASRAMA PENUH

PENTAKSIRAN DIAGNOSTIK AKADEMIK SEKOLAH BERASRAMA PENUH 2016

PEPERIKSAAN PERCUBAAN SIJIL PELAJARAN MALAYSIA

BIOLOGY **4551/3**

Kertas 3

September 2016

1 ½ jam **Satu jam tiga puluh minit**

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

Arahan:

1. *Tulis* **nama** *dan* **tingkatan** *anda pada ruangan yang disediakan.*
2. *Kertas soalan ini adalah dalam dwibahasa.*
3. *Soalan dalam bahasa Inggeris mendahului soalan yang sepadan dalam bahasa Melayu.*
4. *Calon dibenarkan menjawab keseluruhan atau sebahagian soalan sama ada dalam bahasa Inggeris atau bahasa Melayu.*
5. *Calon dikehendaki membaca maklumat di halaman belakang kertas soalan ini.*

Untuk Kegunaan Pemeriksa		
Soalan	**Markah Penuh**	**Markah diperoleh**
1	33	
2	17	
Jumlah	**50**	

NAMA : _____

TINGKATAN : _____

Kertas soalan ini mengandungi 11 halaman bercetak.

[Lihat Halaman Sebelah

Answer **all** questions.
Jawab **semua** *soalan.*

Question 1
***Soalan* 1**

A zygote is formed when an ovum is fertilised by a sperm. The ovum and sperm carry one set of chromosomes each. Thus after random fertilisation, the zygote has two sets of chromosomes, the homologous chromosomes, that are the maternal and the paternal chromosomes. The homologous chromosomes carry pairs of alleles that determine each trait inherited by an organism.

Satu zigot terbentuk apabila satu ovum disenyawakan oleh satu sperma. Ovum dan sperma itu membawa satu set kromosom masing-masing. Maka selepas persenyawaan rawak, zigot mempunyai dua set kromosom, kromosom homolog, iaitu kromosom-kromosom maternal dan paternal. Kromosom homolog membawa pasangan alel yang menentukan sesuatu trait yang diwarisi oleh satu organisma.

A group of students carried out an experiment to determine the phenotypes of offsprings when two parents of the same genotype are crossed.

The investigation is on the inheritance of the fur colour in rabbits. Two black rabbits are crossed. The fur colour is a characteristic of rabbits, black and white are the traits inherited by the rabbits. B represents the dominant allele and b represents the recessive allele. The pair of alleles, BB, Bb, and bb are the genotypes that determine the phenotype, black fur and white fur.

Diagram 1.1 shows the buttons used to represent the alleles. Black button as allele B and white button as allele b.

- If two black buttons are picked, the genotype is BB and the phenotype is black.
- If one black button and one white button are picked, the genotype is Bb and the phenotype is also black.
- If two white buttons are picked, the genotype is bb and the phenotype is white.

Sekumpulan pelajar menjalankan satu eksperimen untuk menentukan fenotip anak-anak apabila dua induk dengan genotip yang sama dikacukkan.

Kajian ini adalah mengenai pewarisan warna bulu bagi arnab. Dua arnab hitam dikacukkan. Warna bulu merupakan satu ciri bagi arnab, hitam dan putih adalah trait yang diwarisi oleh arnab-arnab itu. B *mewakili alel dominan dan* b *mewakili alel resesif. Pasangan alel,* BB, Bb, *dan* bb *adalah genotip-genotip yang menentukan fenotip-fenotip, bulu hitam dan bulu putih.*

Rajah 1.1 *menunjukkan butang-butang yang digunakan untuk mewakili alel-alel. Butang hitam sebagai alel* B *dan butang putih sebagai alel* b.

- *Jika dua butang hitam dipilih, genotip ialah* BB *dan fenotip ialah hitam.*
- *Jika satu butang hitam dan satu butang putih dipilih, genotip ialah* Bb *dan fenotip ialah hitam juga.*
- *Jika dua butang putih dipilih, genotip ialah* bb *dan fenotip ialah putih.*

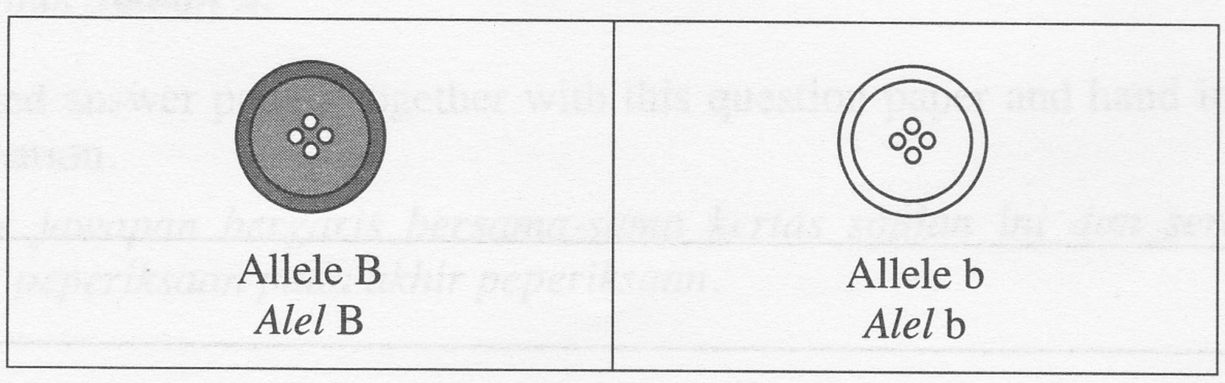
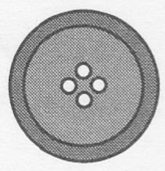
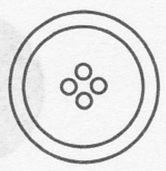
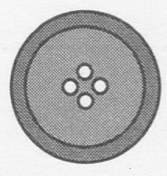
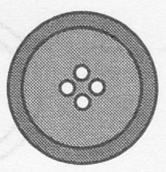
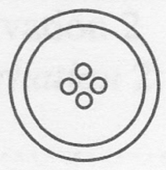
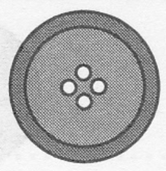
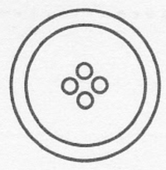
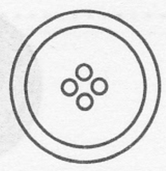
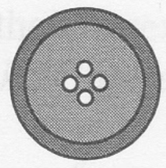
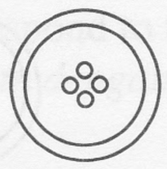
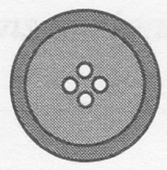
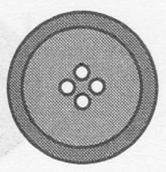


Diagram 1.1
Rajah 1.1

Two rabbits black parents, both with genotype Bb are crossed.
Dua ekor arnab induk hitam, kedua-dua dengan genotip Bb *dikacuk*.

Parents phenotype / *Fenotip induk* : Hitam Hitam
Parents genotype / *Genotip induk* : Bb X Bb

Table 1.2 shows the alleles inherited by offsprings from both parents and the offsprings phenotype.
Jadual 1.2 *menunjukkan alel-alel yang diwarisi oleh anak daripada kedua-dua induk dan fenotip anak*.

Offspring *Anak*	Maternal allele *Alel maternal*	Paternal allele *Alel paternal*	Genotype *Genotip*	Phenotype *Fenotip*
1				
2				
3				
4				
5				
6				
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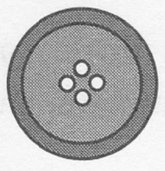
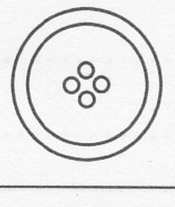
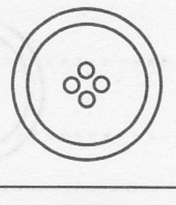
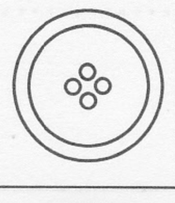
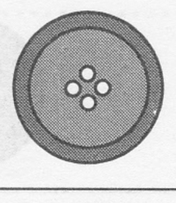
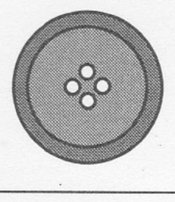
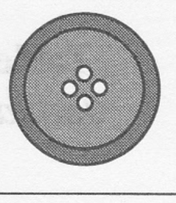
8				
9				
10				
11				

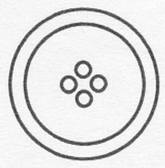
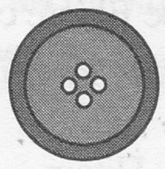
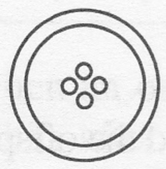
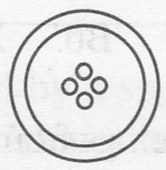
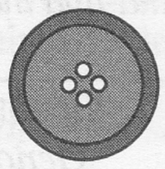
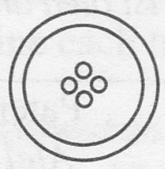
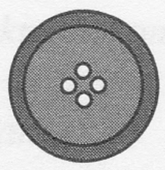
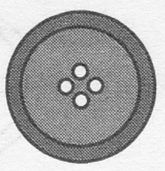
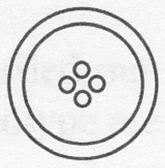
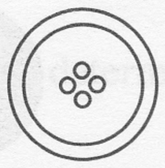
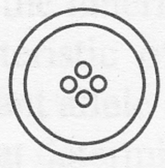
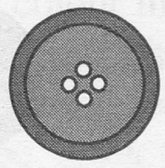
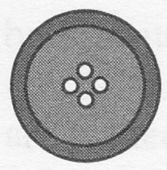
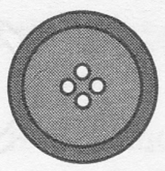
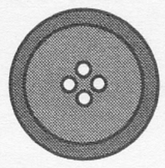
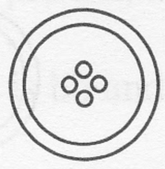
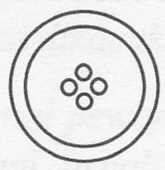
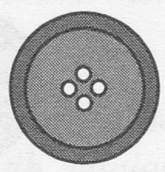
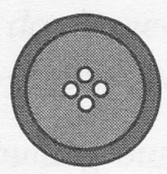
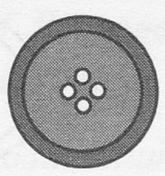
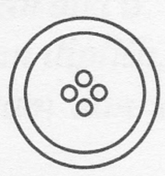
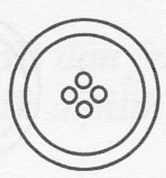
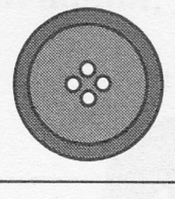
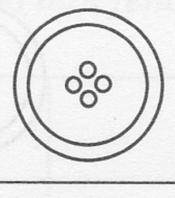
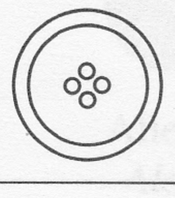
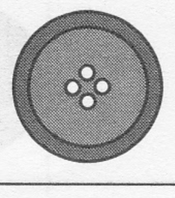
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Table 1.2
Jadual 1.2

For Examiner's Use

(a) Complete Table 1.2 by stating the genotype as BB, Bb, or bb, and stating the phenotype as Black or White, for each random pairing of alleles in the offsprings.

Lengkapkan Jadual 1.2 *dengan menyatakan genotip sebagai* BB, Bb, *atau* bb, *dan menyatakan fenotip sebagai Hitam atau Putih, bagi setiap pemasangan rawak alel-alel dalam anak-anak.*

[3 marks]
[3 *markah*]

3

(b) (i) Based on Table 1.2, state two different observations.
Berdasarkan Jadual 1.2, *nyatakan dua pemerhatian yang berbeza.*

Observation 1
Pemerhatian 1:

.....

.....

Observation 2
Pemerhatian 2:

.....

.....

[3 marks]
[3 *markah*]

3

(ii) State the inference which correspond to the observations made in (b) (i).
Nyatakan inferens yang sepadan dengan setiap pemerhatian dibuat dalam (b) (i).

Inference from observation 1
Inferens daripada pemerhatian 1:

.....

.....

.....

.....

Inference from observation 2
Inferens daripada pemerhatian 2:

.....

.....

.....

.....

[3 marks]
[3 *markah*]

3

3

(c) Complete Table 1.3 based on the experiment.
Lengkapkan Jadual 1.3 *berdasarkan eksperimen ini*.

[3 marks]
[3 *markah*]

Variables *Pembolehubah*	Method to handle the variable *Cara mengendali pembolehubah*
Manipulated variable *Pembolehubah dimanipulasikan*	....
Responding variable *Pembolehubah bergerak balas*	....
Controlled variable *Pembolehubah dimalarkan*	....

Table 1.3
Jadual 1.3

(d) State the hypothesis for this experiment.
Nyatakan hipotesis bagi eksperimen ini.

.....

.....

.....

3

[3 marks]
[3 *markah*]

For Examiner's Use

(e) (i) Based Table 1.2, construct **one or two** tables and record the results of the experiment which include the following aspects:

Berdasarkan Jadual 1.2, *bina* ***satu atau dua*** *jadual dan rekod keputusan eksperimen ini yang meliputi aspek-aspek berikut:*

- Genotype and Phenotype of Parents
  Genotip dan Fenotip Induk
- Genotype and Phenotype of Offspring (Number)
  Genotip dan Fenotip Anak (Bilangan)
- Genotype and Phenotype of Offspring (Percentage)
  Genotip dan Fenotip Anak (Peratus)

[3 marks]
[3 *markah*]

3

(ii) Draw a bar chart of the percentage of offspring against the phenotype of fur colour in rabbits on the graph paper provided in page 9.

Lukiskan satu carta bar peratus anak melawan fenotip warna bulu bagi arnab di atas kertas graf yang disediakan di halaman 9.

[3 marks]
[3 *markah*]

3

(iii) Based on the bar chart drawn in (e) (ii), state the phenotypic ratio of fur colour among the rabbit offsprings.
Explain the inheritance of fur colour based on the phenotypic ratio.

Berdasarkan carta bar yang dilukis dalam (e) (ii), *nyatakan nisbah fenotip bagi warna bulu dalam kalangan anak arnab.*
Terangkan pewarisan warna bulu berdasarkan nisbah fenotip itu.

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.....

[3 marks]
[3 *markah*]

Total
3

[Lihat Halaman Sebelah

(f) Based on the experiment, describe the term phenotype.
Berdasarkan eksperimen ini, huraikan istilah fenotip.

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[3 marks]
[3 *markah*]

3

(g) The experiment is repeated by crossing the same parents in a surounding with more food supply. Predict the number and the phenotypic ratio of the offsprings. Explain your answer.
Eksperimen ini diulang dengan mengacuk induk-induk yang sama dalam persekitaran dengan bekalan makanan yang lebih banyak.
Ramalkan bilangan anak dan nisbah fenotip anak. Terangkan jawapan anda.

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.....

[3 marks]
[3 *markah*]

3

(h) The following list are some characteristics and traits in human.
Senarai berikut adalah beberapa ciri dan trait pada manusia.

Blood group A *Kumpulan darah* A	Tall *Tinggi*	Short *Rendah*	Height *Ketinggian*
Blood group O *Kumpulan darah* O	Blue iris *Iris warna biru*	Curly hair *Rambut kerinting*	Type of hair *Jenis rambut*
Blood group *Kumpulan darah*	Brown iris *Iris warna perang*	Eye iris colour *Warna iris mata*	Straight hair *Rambut lurus*

Classify the characteristics and traits according to the categories in the following table.
Kelaskan ciri dan trait berdasarkan kategori dalam jadual berikut.

Characteristic *Ciri*	Dominant trait *Trait dominan*	Recessive trait *Trait resesif*

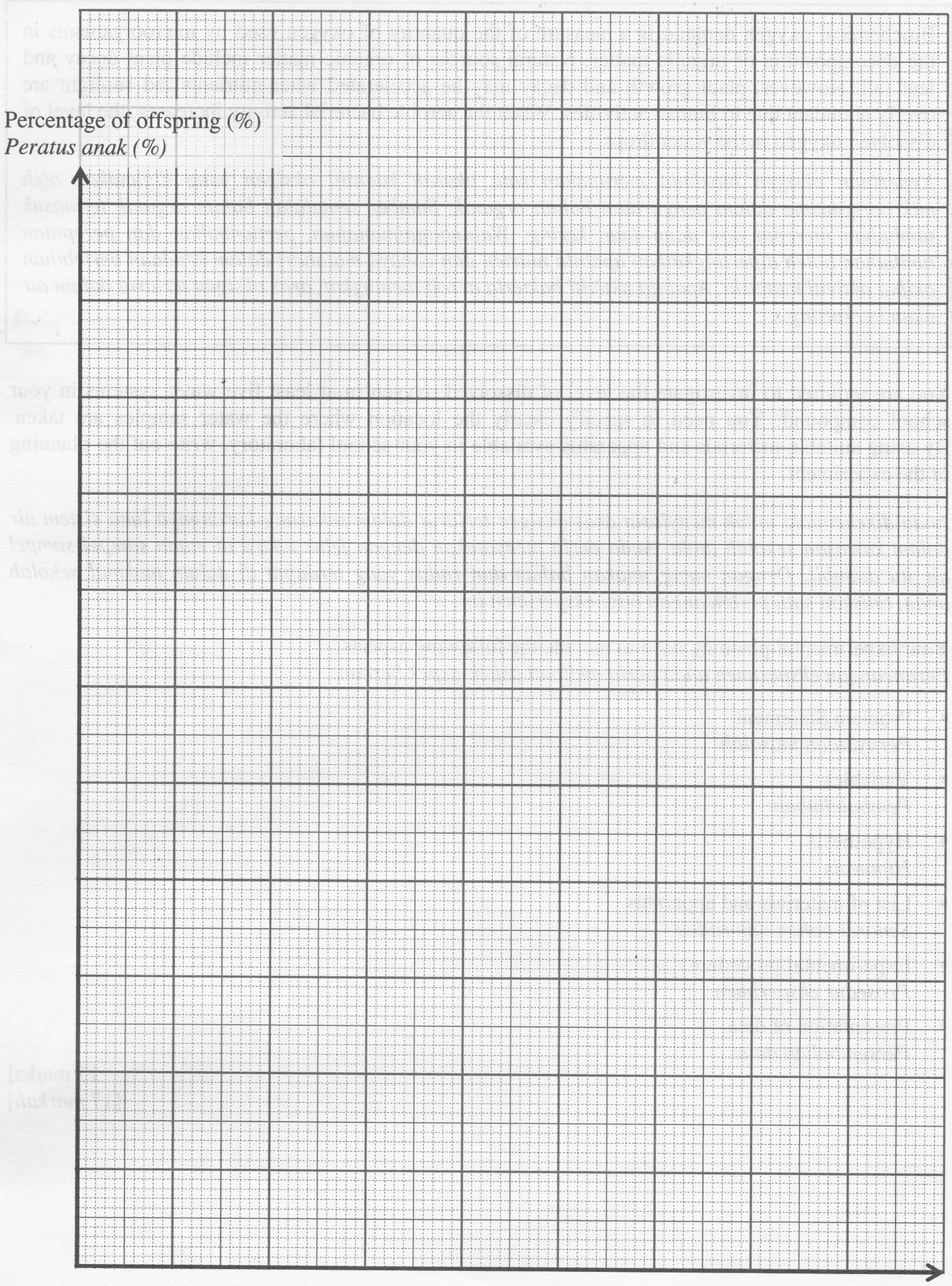
[3 marks]
[3 *markah*]

3

Total

33

Bar chart of percentage of offspring against the phenotype of fur colour in rabbits
Carta bar peratus anak melawan fenotip warna bulu bagi arnab



Question 2
Soalan 2

Biochemical oxygen demand is a measure of the quantity of oxygen used by microorganisms in the decomposition of organic matter. Natural sources of organic matter include plant decay and leaf fall. However, plant growth and decay may be accelerated when nutrients and sunlight are overly abundant due to human activities. When the aerobic bacterial activity increases, the level of dissolved oxygen in the water drops.

Keperluan oksigen biokimia merupakan satu ukuran kuantiti oksigen yang digunakan oleh mikroorganisma dalam penguraian bahan organik. Sumber semulalaji bahan organik termasuk tumbuhan mereput dan daun-daun kering. Walaubagaimanapun, pertumbuhan dan pereputan tumbuhan boleh dipertingkatkan apabila nutrien dan cahaya matahari dalam keadaan berlebihan akibat aktiviti manusia. Apabila aktiviti bakteria aerob meningkat, aras oksigen terlarut dalam air akan berkurang.

You are required to investigate the level of dissolved oxygen in at least five water systems in your school compound. You need to specify clearly the location where the water samples are taken. By using suitable materials and apparatus available in your school laboratory, write out the planning of the experiment.

Anda dikehendaki untuk menyiasat aras oksigen terlarut dalam sekurang-kurangnya lima sistem air dalam kawasan sekolah anda. Anda perlu menyatakan dengan jelas lokasi di mana sampel-sampel air itu diambil. Dengan menggunakan bahan dan radas yang terdapat di dalam makmal sekolah anda, tuliskan satu perancangan bagi eksperimen ini.

Your experimental planning need to include the following aspects:
Perancangan eksperimen anda perlu meliputi aspek-aspek berikut:

- Problem Statement
  Pernyataan masalah
- Variables
  Pembolehubah
- Hypothesis
  Hipotesis
- List of materials and apparatus
  Senarai bahan dan radas
- Experimental procedures
  Prosedur eksperimen
- Presentation of data
  Persembahan data

17 marks]
[17 *markah*]

END OF QUESTION PAPER
KERTAS SOALAN TAMAT

INFORMATION FOR CANDIDATES
MAKLUMAT UNTUK CALON

1. This question paper consists of two questions: **Question l** and **Question 2**.
   Kertas soalan ini mengandungi dua soalan: ***Soalan* I** *dan* ***Soalan* 2**.

2. Answer **all** questions. Write your answers for **Question 1** in the spaces provided in this question paper.
   Jawab **semua** *soalan. Jawapan anda bagi* ***Soalan* I** *hendaklah ditulis pada ruang yang disediakan dalam kertas soalan ini.*

3. Write your answers for **Question 2** on the lined answer papers provided. You may use equations, diagrams, tables, graphs and other suitable methods to explain your answers.
   Tulis jawapan anda bagi ***Soalan* 2** *dalam kertas jawapan bergaris yang dibekalkan. Anda boleh menggunakan persamaan, rajah, jadual, graf dan cara lain yang sesuai untuk menjelaskan jawapan anda.*

4. Show your working, it may help you to get marks.
   Tunjukkan kerja mengira, ini membantu anda mendapatkan markah.

5. The diagrams in the questions are not drawn to scale unless stated.
   Rajah yang mengiringi soalan tidak dilukis mengikut skala kecuali dinyatakan.

6. The marks allocated for each question or sub-part of a question are shown in brackets.
   Markah yang diperuntukkan bagi setiap soalan atau ceraian soalan ditunjukkan dalam kurungan.

7. If you wish to change your answer, cross out the answer that you have done. Then write down the new answer.
   Jika anda hendak menukar jawapan, batalkan jawapan yang telah dibuat. Kemudian tulis jawapan yang baharu.

8. You may use a scientific calculator.
   Anda dibenarkan menggunakan kalkulator saintffik.

9. You are advised to spend **45** minutes to answer **Question I** and **45** minutes **Question 2**.
   Anda dinasihati supaya mengambil masa **45** *minit untuk menjawab* ***Soalan* I** *dan* **45** *minit untuk* ***Soalan* 2**.

10. Tie the lined answer papers together with this question paper and hand in at the end of the examination.
    Ikat kertas jawapan bergaris bersama-sama kertas soalan ini dan serahkan kepada pengawas peperiksaan pada akhir peperiksaan.

Usaha sama:
Majlis Pengetua SBP (MPSBP)