Question 1/ Soalan 1
[33 marks/ 33 markah]
Answer all questions/ *Jawab semua soalan*

The kidney is as an excretory organ and controls the osmoregulation process. Frequent urination lowers the water level in the blood, thus the soluble substances are more concentrated. This causes the blood osmosis pressure to increase. Information from the nervous system is sent to the pituitary gland to secrete more ADH which is transported by the bloodstream to the kidneys. The kidneys reabsorb more water and prevent water loss. Among the factors that affect the volume of urine produced are the volume of water intake, the type of activities performed, the surrounding temperature and the intake of salty food.

Ginjal adalah organ perkumuhan dan mengawal proses pengosmokawalaturan. Pembuangan air kencing yang kerap merendahkan aras air dalam darah, maka bahan larut menjadi lebih pekat. Ini menyebabkan tekanan osmosis darah meningkat. Maklumat dari sistem saraf dihantar ke kelenjar Pituitari untuk merembes lebih banyak ADH yang diangkut oleh aliran darah ke ginjal. Ginjal menyerap semula lebih banyak air dan menghalang kehilangan air. Antara faktor yang mempengaruhi isipadu air kencing yang dihasilkan adalah isipadu pengambilan air, jenis aktiviti yang dilakukan, suhu persekitaran dan pengambilan makanan bergaram.

An experiment was conducted to study the effect of different activities on the volume of urine produced.
Satu eksperimen dijalankan untuk mengkaji kesan aktiviti berbeza ke atas isipadu air kencing yang dihasilkan.

Langkah-langkah berikut telah dijalankan:
The following steps have been taken:

1. Students empty their bladder before the experiment is conducted.
   Murid-murid mengosongkan pundi kencing sebelum eksperimen dijalankan.

2. Six boys of the same age and body weight in the range of 55-56 kg were divided into groups A, B and C. Each group consists of two students.
   Enam orang murid lelaki yang berumur sama dan berat badan pada julat 55-56 kg dibahagikan kepada kumpulan A, B dan C. Setiap kumpulan terdiri daripada dua orang murid.

3. They were told to drink 1000ml of drinking water before carrying out the activity.
   Mereka diminta minum 1000ml air minuman sebelum menjalankan aktiviti.

4. They need to carry out the following activities for an hour :
Mereka perlu menjalankan aktiviti-aktiviti berikut selama satu jam:

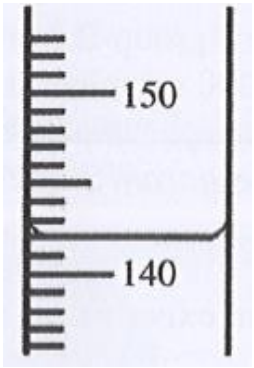
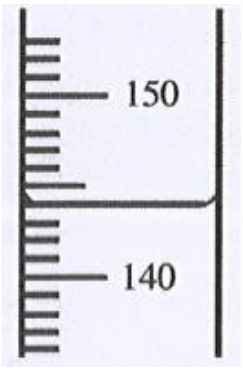
Group A: Reading books in the classroom. *Kumpulan A: Membaca buku di dalam kelas.* Group B: Arranging chairs and cleaning up the classroom. *Kumpulan B: Menyusun kerusi dan mengemaskan kelas.* Group C: Doing vigorous activities at the school field. *Kumpulan C: Menjalankan aktiviti cergas di padang sekolah.*

5. After completing the activities, each student needs to collect their own urine.
Selepas menjalankan aktiviti, setiap murid perlu mengumpulkan air kencing masing-masing.

6. The volume of urine produced is measured using a measuring cylinder.
Isipadu air kencing yang dihasilkan diukur dengan menggunakan silinder penyukat.

7. All data is recorded in Table 1.

Semua data direkod dalam Jadual 1.

Students' group *Kumpulan murid-murid*	Activities carried out by students *Aktiviti yang dijalankan oleh murid*	Volume of urine collected after 1 hour (ml) *Isipadu air kencing yang dikumpulkan selepas 1 jam (ml)*	
		Student 1 *Murid 1*	Student 2 *Murid 2*
A	Reading books in the classroom. *Membaca buku di dalam kelas.*		

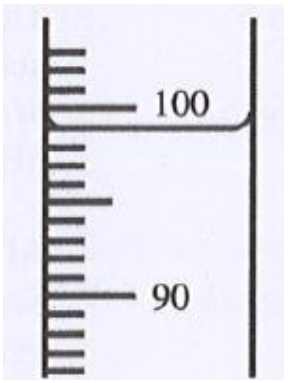
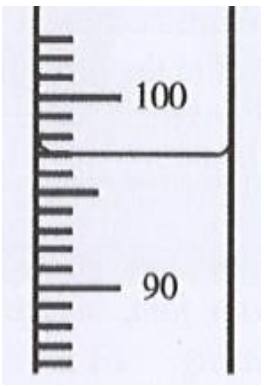
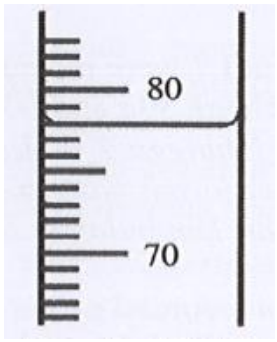
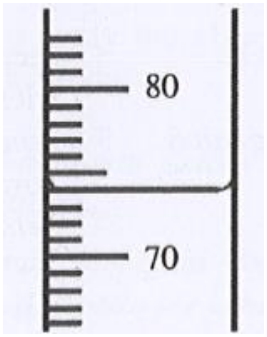
B	Arranging chairs and cleaning up the classroom. *Menyusun kerusi dan mengemas kelas.*		
C	Doing vigorous activities at the school field. *Menjalankan aktiviti cergas di padang sekolah.*		

Table 1/ *Jadual 1*

(a) Record the volume of urine collected after 1 hour in Table 1.
Rekodkan isipadu air kencing yang dikumpulkan selepas 1 jam dalam Jadual 1.

[3 marks / 3 *markah*] (a)

(b)(i) Based on Table 1, state two different observations.
Berdasarkan Jadual 1, nyatakan dua pemerhatian yang berbeza.

Observation 1 / *Pemerhatian 1*:

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Observation 2 / *Pemerhatian 2*:

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[3 marks / 3 *markah*]

(b)(i)

(b) (ii) State two inferences from the observations in 1(b)(i).
Nyatakan dua inferens daripada pemerhatian-pemerhatian dalam 1(b)(i).

Inference from observation 1 / *Inferens daripada pemerhatian 1*:

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Inference from observation 2 / *Inferens daripada pemerhatian 2*:

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[3 marks / 3 *markah*]

(b)(ii)

(c) Complete Table 2 based on this experiment.
Lengkapkan Jadual 2 berdasarkan eksperimen ini.

Variables *Pemboleh ubah*	Method to handle the variables *Cara mengendalikan pembolehubah*
Manipulated variable: *Pembolehubah dimanipulasikan*: …… …… ……	…… …… …… ……
Responding variable: *Pembolehubah bergerak balas*: …… …… ……	…… …… …… ……
Constant variable: *Pembolehubah dimalarkan*: …… …… ……	…… …… …… ……

(c)

Table 2 / *Jadual 2*

[3 marks / 3 *markah*]

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

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[3 marks / 3 *markah*]

(e)(i) Construct a table and record all the data collected in this experiment based on the following:
Bina satu jadual untuk merekodkan semua data yang dikumpul dalam eksperimen ini berdasarkan yang berikut:

- Group / *Kumpulan*
- Type of activities carried out by students/ *Jenis aktiviti yang dijalankan oleh murid*
- Volume of urine collected / *Isipadu air kencing dikumpul*
- Average volume of urine collected / *Purata isipadu air kencing yang dikumpul*
- Level of blood osmotic pressure based on the following scale:
  Tahap *tekanan osmosis darah berdasarkan skala berikut:*
  1 - Lowest / *Sangat rendah*
  2 - Low / *Rendah*
  3 - Tinggi / *High*

(e)(i)

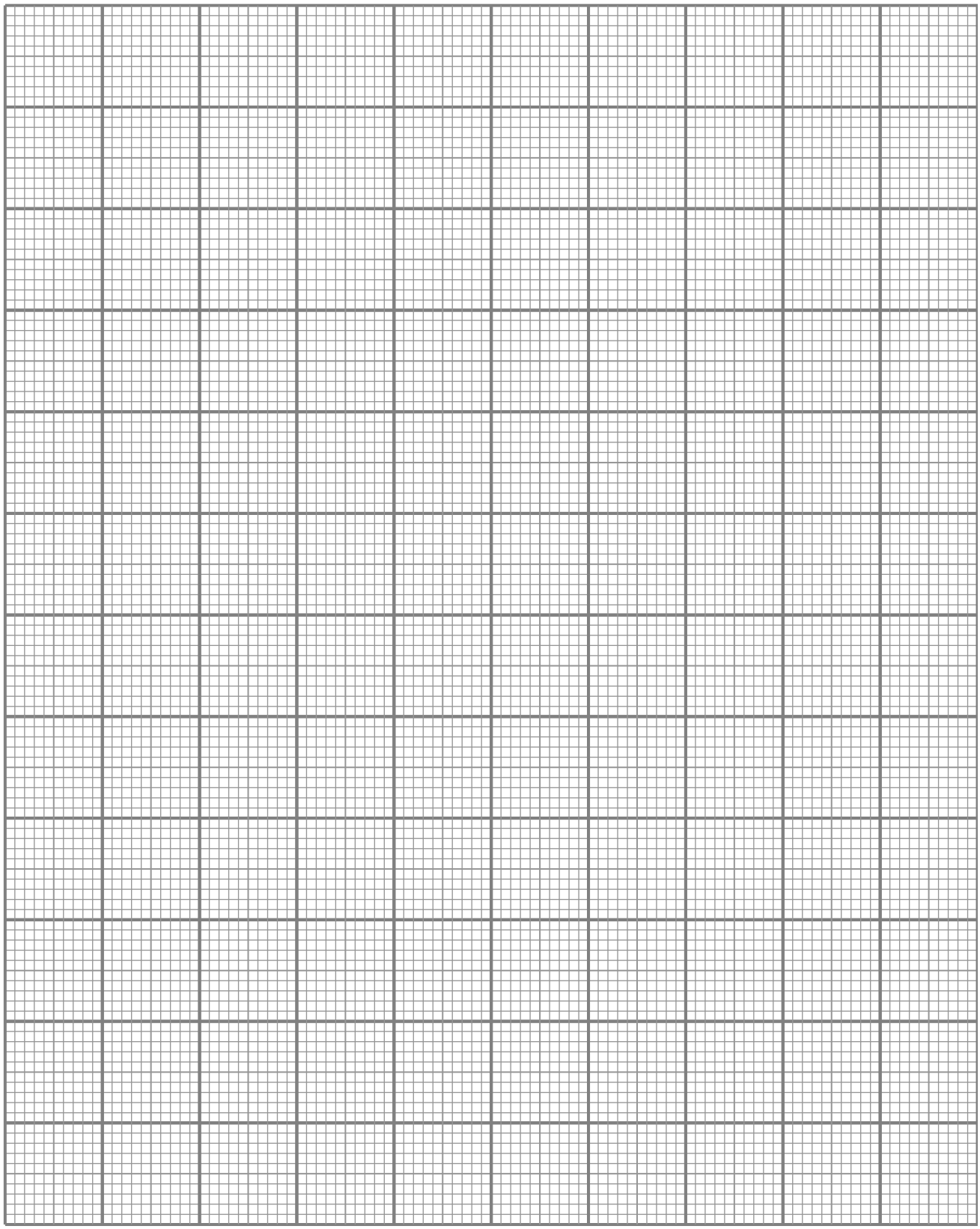
(e)(ii) Use the graph paper provided on page 9 to answer this question.
Using the data in 1(e)(i), draw **a bar chart** of the average volume of urine collected against the types of activities carried out by students.
Gunakan kertas graf yang disediakan di halaman 9 *untuk menjawab soalan ini. Menggunakan data di 1(e)(i), lukiskan* ***satu carta bar*** *bagi purata isipadu air kencing yang dikumpul melawan jenis aktiviti yang dijalankan oleh murid.*

(e)(ii)

[3 marks/ 3 *markah*]

Bar chart of average volume of urine collected against the types of activities carried out by students

Carta bar bagi purata isipadu air kencing yang dikumpul melawan jenis aktiviti yang dijalankan oleh murid



(f) Based on the graph drawn in (e)(ii), state the relationship between the type of activities carried out by the students and the average volume of urine collected. Explain your answer.
Berdasarkan graf yang dilukis di 1(e)(ii), nyatakan hubungan di antara aktiviti yang dijalankan oleh murid dengan isipadu air kencing yang dikumpul. Terangkan jawapan anda.

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……. [3 marks/ 3 *markah*]

(f)

(g) Based on the result of this experiment, state the operational definition for high blood osmotic pressure.
Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi bagi tekanan osmosis darah yang tinggi.

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……. [3 marks / 3 *markah*]

(h)

(h) Students of group C repeated the same experiment the next day but were given 500ml of drink as shown in Diagram 1 that is ideal for endurance sports.
Murid-murid dalam kumpulan C mengulangi eksperimen yang sama pada keesokan harinya, tetapi diberi 500ml minuman seperti dalam Rajah 1, yang sesuai untuk sukan lasak.

Diagram 1*/ Rajah 1*

Predict the average volume of urine collected after 1 hour.
Explain your answer.
Ramalkan isipadu urin yang dihasilkan selepas 1 jam.
Terangkan jawapan anda.

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[3 marks / 3 *markah*]

(i)

(i) Another experiment was carried out to study the effect of different occupations on the percentage of water reabsorption into blood capillarries of four men P, Q, R and S as shown in Table 3.
Satu eksperimen lain dijalankan untuk mengkaji kesan pekerjaan berbeza ke atas peratus penyerapan semula air ke dalam kapilari darah pada empat lelaki P, Q,R and S seperti yang ditunjukkan dalamJadual 3..

P - A 100m sprinter
Seorang pelari pecut 100m
Q- A teacher teaching in the classroom
Seorang guru yang mengajar di dalam bilik darjah
R- A labourer working in a construction site
Seorang buruh yang bekerja di tapak pembinaan bangunan
S- An executive working in an air-conditioned room
Seorang eksekutif yang bekerja di dalam bilik berhawa dingin.

Table 3*/ Jadual 3*

Arrange the percentage of water reabsorption into the blood capillaries in ascending order.
Susun kedudukan peratus penyerapan semula air ke dalam kapilari darah dalam tertib menaik.

[ ] - [ ] - [ ] - [ ]

[3 marks / 3 *markah*]

(i)

Question 2/ Soalan 2
[17 marks/ 17 markah]
Answer all questions/ *Jawab semua soalan*

En Ali an agricultural officer, wants to help the fruit orchard farmers in Kampung A to eradicate the grasshoppers there as the grasshoppers have become pests to their crops. To ensure that all the grasshoppers are completely killed, En. Ali plans to use pesticide as he finds that is the most effective method. The number of grasshoppers in a particular location in Kampung A must be estimated before buying the pesticide.

En Ali seorang pegawai pertanian berhasrat membantu pekebun buah-buahan di Kampung A bagi menghapuskan belalang di sana kerana belalang menjadi perosak kepada tanaman mereka. Bagi memastikan kesemua belalang dihapuskan sepenuhnya, En Ali bercadang menggunakan pestisid kerana dia mendapati ianya kaedah paling berkesan. Bilangan belalang di lokasi tertentu di Kampung A mesti dianggarkan sebelum pestisid dibeli .

Based on the information above, plan a laboratory experiment to estimate the population of grasshoppers at several locations in Kampung A, which are in Rambutan orchard, Mustard green orchard and Chilly orchard.

Berdasarkan maklumat di atas, rancang satu eksperimen makmal untuk menganggarkan populasi belalang di beberapa lokasi dalam Kampung A iaitu di Kebun Rambutan, Kebun Sawi dan Kebun Cili.

The planning of your experiment should include the following aspects:
Perancangan eksperimen anda hendaklah meliputi aspek-aspek berikut:

- Problem statement
  Pernyataan masalah
- Hypothesis
  Hipotesis
- Variables
  Pembolehubah
- List of apparatus and materials
  Senarai radas dan bahan
- Procedure of the experiment
  Prosedur eksperimen
- Presentation of data
  Persembahan data [17 marks/ 17 markah]

-END OF QUESTIONS-