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

1.

When an individual sweats or performs active activity, his blood osmosis pressure will increase. The kidneys will carry out osmoregulation process that regulates the balance of water causing more water and a little salt is re-absorbed from the tubule into the blood capillary. The urine produced is slightly and concentrated

Apabila seseorang individu berpeluh atau menjalankan aktiviti cergas, tekanan osmosis darahnya akan meningkat. Ginjal akan menjalankan proses pengosmokawalaturan yang mengawal atur keseimbangan air menyebabkan lebih banyak air dan sedikit garam diserap semula dari tubul ke dalam kapilari darah. Air kencing yang dihasilkan adalah sedikit dan pekat.

An experiment to study osmoregulation in human was carried out by relating the physical activities to the volume of urine produced. Three groups of students which are group R, group S and group T were given same volume of plain water to drink, 200 ml. They run three different activities:

- Group S - practicing yoga
- Group T – cycling
- Group U – playing volley ball

After one hour, each student in the group urinated and collected their urine in a measuring cylinder. The volume of urine produced is recorded in Table 1.

Satu eksperimen untuk mengkaji pengosmokawalaturan dalam manusia telah dijalankan dengan menghubungkaitkan aktiviti fizikal dengan isipadu air kencing yang dihasilkan. Tiga kumpulan murid iaitu kumpulan R, kumpulan S dan kumpulan T telah diberi air kosong yang sama isipadunya untuk diminum, 200 ml. Mereka menjalani tiga aktiviti berbeza:

- *Kumpulan S – menjalani latihan yoga*
- *Kumpulan T – berbasikal*
- *Kumpulan U – bermain bola tampar*

Selepas satu jam setiap murid dalam kumpulan membuang air kecil dan mengumpulkan air kencing mereka di dalam silinder penyukat. Isipadu air kencing yang dihasilkan direkod dalam Jadual 1.

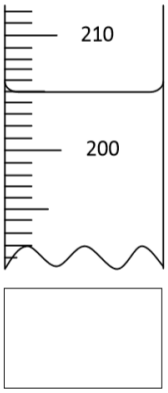
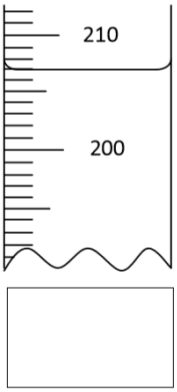
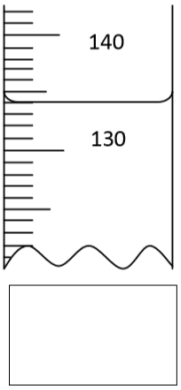
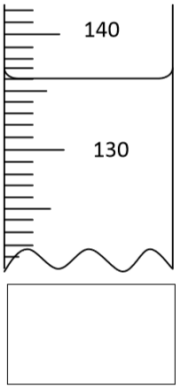
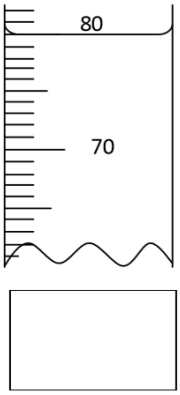
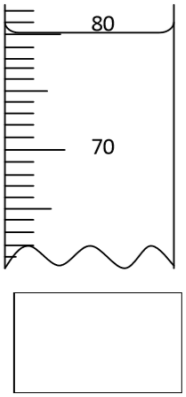
Group *Kumpulan*	Physical activity *Aktiviti fizikal*	Volume of urine collected after 1 hour (ml) *Isipadu air kencing dikumpulkan selepas 1 jam (ml)*	
		Reading 1 *Bacaan 1*	Reading 2 *Bacaan 2*
S	Practicing yoga *Menjalani latihan yoga*		
T	Cycling *Berbasikal*		
U	Playing volley ball *Bermain bola tampar*		

Table 1 / *Jadual 1*

(a) Record the volume of the urine produced in group S, T and U in the spaces provided in Table 1.
Rekodkan isipadu air kencing yang dihasilkan oleh setiap pelajar dalam kumpulan S, T dan U di dalam ruang yang disediakan di Jadual 1.

[3 *marks/markah*]

(b) (i) State two different observations made from Table 1.
Nyatakan dua pemerhatian berlainan dibuat daripada Jadual 1

Observation 1:
Pemerhatian 1:

.....

.....

.....

Observation 2:
Pemerhatian 2:

.....

.....

.....

[3 *marks*/*markah*]

1(b)(i)

(ii) State inferences from the observations in 1(b)(i).
Nyatakan inferens daripada pemerhatian di 1(b)(i)

Inference from observation 1:
Inferens daripada pemerhatian 1:

.....

.....

.....

.

Inference from observation 2:
Inferens daripada pemerhatian 2:

.....

.....

.....

[3 *marks*/*markah*]

1(b)(ii)

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

Variable *Pembolehubah*	Method to handle the variable *Cara mengendali pembolehubah*
Manipulated variable: *Pembolehubah dimanipulasikan:*	....
Responding variable: *Pembolehubah bergerak balas:*	....
Constant variable: *Pembolehubah dimalarkan:*	....

Table 2
Jadual 2

[3 *marks*/*markah*]

1(c)

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

.....

.....

.....

[3 *marks*/*markah*]

1(d)

(e)(i) Construct a table and record all the data collected in this experiment.
Your table should have the following titles:
Bina satu jadual dan rekodkan semua data yang dikumpul dalam eksperimen ini.
Jadual anda hendaklah mengandungi tajuk-tajuk berikut:

- Physical activities
  Aktiviti fizikal
- Volume of urine produced by each group, m*l*
  Isipadu air kencing yang dihasilkan oleh setiap kumpulan, ml
- Average volume of urine produced
  Purata isipadu air kencing yang dihasilkan

Use the formulae: $\frac{\text{reading 1 + reading 2}}{2}$

Gunakan formula: $\frac{\textit{bacaan 1 + bacaan 2}}{2}$

1(e)(i)

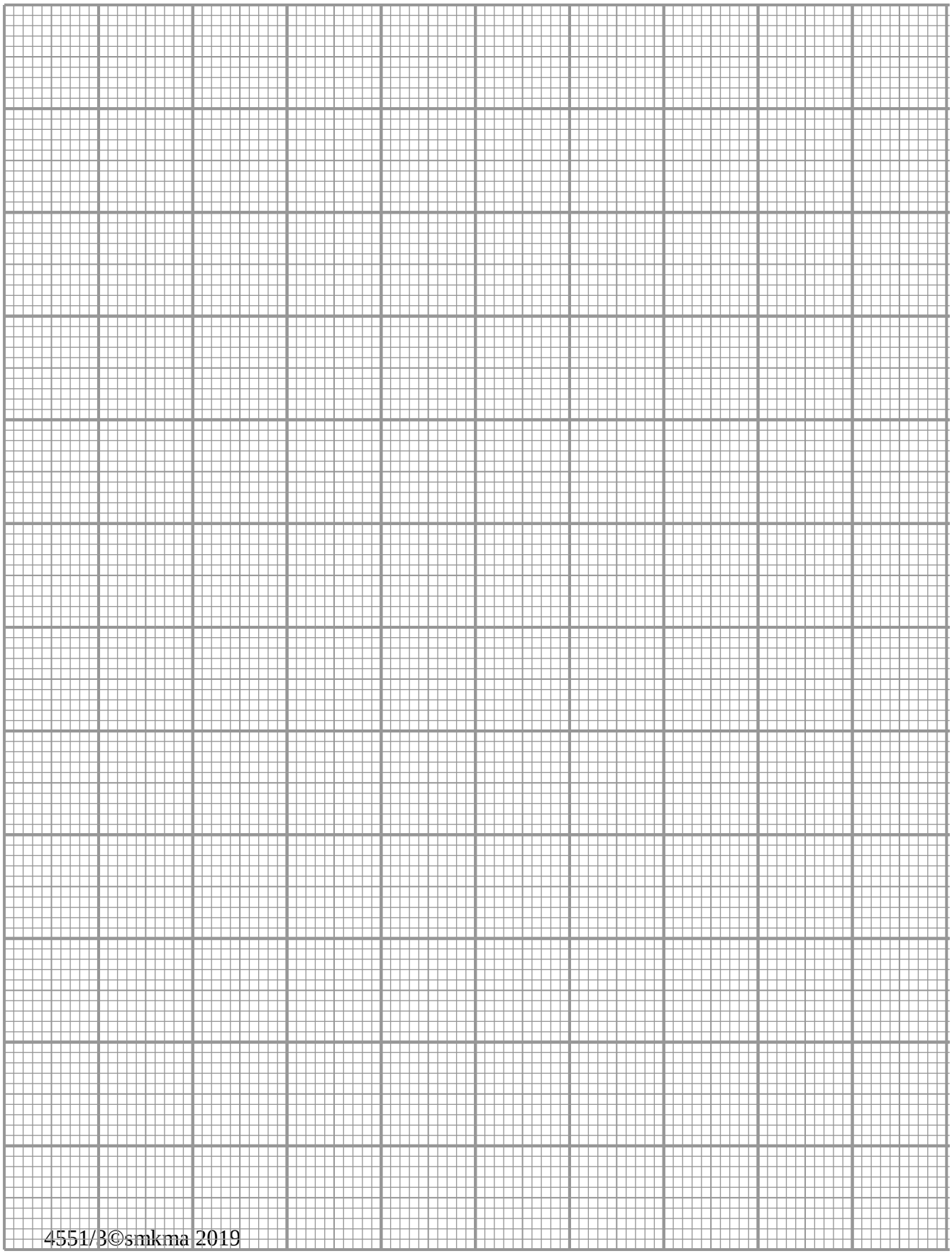
[3 *marks*/*markah*]

(e)(ii) Use the graph paper provided on page 7 to answer this question.
By using the data in 1(e)(i), draw a bar chart volume of urine produced against the physical activities.
Guna kertas graf yang disediakan di halaman 7 untuk menjawab soalan ini.
Menggunakan data di 1(e)(i), lukis carta bar isipadu air kencing dihasilkan melawan aktiviti fizikal.

1(e)(ii)

[3 *marks*/*markah*]

Bar chart of volume of urine produced against the physical activities.
Carta bar isipadu air kencing yang dihasilkan melawan aktiviti fizikal



(e)(iii) Based on the bar chart in 1(e)(ii), explain the relationship between the volume of urine produced against the physical activities.
Berdasarkan carta bar dalam 1(e)(ii), terangkan hubungan antara isipadu air kencing dihasilkan dengan aktiviti fizikal.

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.....

[3 *marks*/*markah*]

1(e)(iii)

(f) This experiment is repeated by giving isotonic drinks to group T that carried out cycling activity.
Predict the volume of urine produced.
Explain your prediction.
Eksperimen ini diulangi dengan memberikan minuman isotonik kepada kumpulan T yang menjalankan aktiviti berbasikal.
Ramalkan isipadu air kencing yang akan diperolehi.
Terangkan ramalan anda.

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.....

[3 *marks*/*markah*]

1(f)

(g) Based on the result of this experiment, state the operational definition for osmoregulation.
Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi untuk pengosmokawalaturan

.....

.....

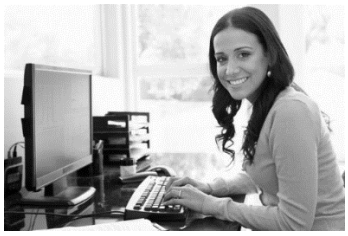
.....

.....

[3 *marks*/*markah*]

1(g)

(h) The following list is activities in different situation.
Senarai berikut adalah aktiviti dalam situasi berbeza.

 W	 X
 Y	 Z

Complete Table 3 by classify the activities in different situation into correct column.
Lengkapkan Jadual 3 dengan mengelaskan aktiviti dalam situasi berbeza ke dalam lajur yang betul.

Concentrated and less urine produced *Air kencing pekat dan sedikit*	Less concentrated and more urine produced *Air kencing cair dan banyak*

1 (h)

[3 *marks*/*markah]*

2.

Sungai Kim Kim, Pasir Gudang

KUALA LUMPUR (Bernama)-- At the end of February 2019, the Minister of Energy, Science, Technology, Environment and Climate Change (MESTECC), Yeo Bee Yin, revealed the facts about 25 dead rivers in Malaysia.

The sixteen rivers are in Johor, five in Selangor, three in Penang and one in Melaka. These rivers are categorized as Class 4 and 5 which are severe pollution and no aquatic life can survive.

According to National Water Quality Standards (SKAK), the main rivers in Malaysia are divided into three categories, namely clean river, moderately contaminated, or contaminated rivers.

The river was also divided into six classes after being tested for quality in Class 1, 2A, 2B, 3, 4 and 5. The quality of the river was determined through 12 parameters such as Biochemical Oxygen Demand (BOD) and Ammonia Nitrogen (NH3N).

In this case, the major contributor to the high BOD is the waste while the main contributor to NH3N is animal's dung and waste. Shortly after the issue of the deadly river in Malaysia was discussed, the country was thrown with a toxic pollution case at Sungai Kim Kim

KUALA LUMPUR (Bernama) -- Pada akhir Februari 2019, Menteri Tenaga, Sains, Teknologi, Alam Sekitar dan Perubahan Iklim (MESTECC), Yeo Bee Yin, mendedahkan fakta mengenai 25 sungai mati di Malaysia.

Enam belas sungai tersebut berada di Johor, lima di Selangor, tiga di Pulau Pinang dan satu di Melaka. Sungai-sungai ini dikategorikan sebagai Kelas 4 dan 5 iaitu pencemaran teruk dan tiada hidupan akuatik yang boleh hidup di dalamnya.

Menurut Standard Kualiti Air Kebangsaan (SKAK), sungai utama di Malaysia dibahagikan kepada tiga kategori iaitu sungai bersih, sungai sederhana tercemar, atau tercemar.

Sungai turut dibahagikan kepada enam kelas setelah diuji kualitinya iaitu Kelas 1, 2A, 2B, 3, 4 dan 5. Kualiti sungai ditentukan melalui 12 parameter seperti Keperluan Oksigen Biokimia (BOD) dan Ammonia Nitrogen (NH3N).

Dalam hal ini, penyumbang utama BOD yang tinggi adalah sampah-sarap manakala penyumbang utama NH3N adalah najis binatang dan air kumbahan. Tidak lama selepas isu sungai mati di Malaysia dibincangkan, negara digemparkan dengan kes pencemaran toksik di Sungai Kim Kim.

Based on the above newspaper article, design a laboratory experiment to study the level of water pollution in three different station along the Kim Kim River.
Berdasarkan kepada petikan akhbar di atas, rekabentuk satu eksperimen makmal untuk menentukan tahap pencemaran air tiga stesen yang berbeza di sepanjang Sungai Kim Kim .

The planning of your experiment must 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
- Experimental procedure
  Prosedur Eksperimen
- Presentation of Data
  Persembahan data

[17 marks / *markah]*

END OF QUESTION PAPER

KERTAS SOALAN TAMAT