



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

1

When an individual sweats or takes salt, his or her blood osmotic pressure increases. The kidneys carry out osmoregulation to regulate the balance of water and salts, especially sodium chloride, resulting in more water and less salt being reabsorbed from the distal convoluted tubule and collecting duct into the blood capillaries. The urine produced is little but concentrated.

*Apabila seseorang individu berpeluh atau memakan garam, tekanan osmosis darahnya akan meningkat. Ginjal menjalankan proses pengosmokawalaturan yang mengawal atur keseimbangan air dan garam terutama natrium klorida menyebabkan lebih banyak air dan sedikit garam diserap semula dari tubul berlingkar distal dan tubul pengumpul ke dalam kapilari darah. Air kencing yang dihasilkan adalah sedikit tetapi pekat.*

A group of students conducted experiments to study the effect of salt water intake containing different sodium chloride concentration on the rate of volume urine production.

The students should follow the following steps:

*Sekumpulan murid telah menjalankan eksperimen untuk mengkaji kesan pengambilan air garam yang mengandungi natrium klorida yang berbeza kepekatan ke atas kadar isi padu penghasilan air kencing.*

*Murid-murid tersebut perlu menjalankan langkah-langkah seperti berikut:*

Step 1:

Three 17-year-old boys P, Q and R were selected from Form Five students.

Langkah 1:

*Tiga murid lelaki P, Q dan R yang berumur 17 tahun dipilih dalam kalangan murid Tingkatan Lima.*

Step 2:

All students are not allowed to eat and drink starting from 11.00 p.m.

The next morning, all the students were required to urinate to clear the bladder.

Langkah 2:

*Semua murid tidak dibenarkan makan dan minum bermula jam 11.00 malam.*

*Pagi keesokan harinya, kesemua murid dikehendaki membuang air kecil bagi mengosongkan pundi kencing.*

**Step 3:**

At 8.00 a.m., each student is given a different salt water concentration of sodium chloride, NaCl as follows:

- Student P: 500 ml 2.0 % NaCl
- Student Q: 500 ml 4.0 % NaCl
- Student R: 500 ml 6.0 % NaCl

**Langkah 3:**

*Pada jam 8.00 pagi, setiap murid diberi minum air garam yang berbeza kepekatan bagi natrium klorida, NaCl seperti berikut:*

- *Murid P: 500 ml 2.0 % NaCl*
- *Murid Q: 500 ml 4.0 % NaCl*
- *Murid R: 500 ml 6.0 % NaCl*

**Step 4:**

All students are required to rest for 2 hours in a laboratory at room temperature, 30°C.

**Langkah 4:**

*Semua murid dikehendaki untuk berehat selama 2 jam di dalam sebuah makmal pada suhu bilik, 30°C.*

**Step 5:**

In the 2 hours period, students are required to measure urine volume at 9.00 a.m. (Reading 1) and 10.00 a.m. (Reading 2) by using a measuring cylinder.

**Langkah 5:**

*Dalam tempoh 2 jam, murid dikehendaki mengukur isi padu air kencing pada jam 9.00 pagi (Bacaan 1) dan jam 10.00 pagi (Bacaan 2) dengan menggunakan silinder penyukat.*

Table 1 shows the results of this experiment.

Jadual 1 menunjukkan keputusan eksperimen ini.

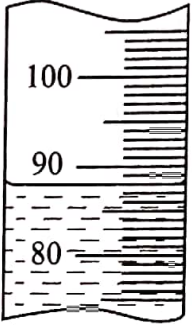
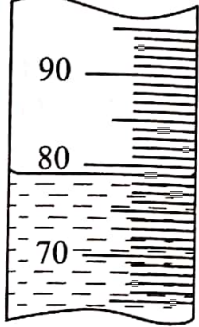
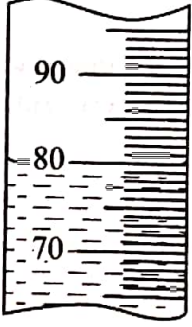
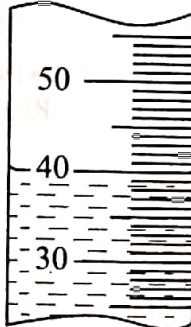
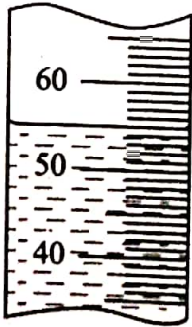
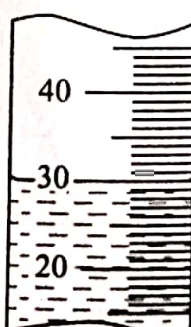
Student Murid	Salt water concentration (%) Kepekatan air garam (%)	Volume of urine produced (ml) Isi padu air kencing yang dihasilkan (ml)	
		Reading 1 Bacaan 1	Reading 2 Bacaan 2
P	2.0	 <input type="text"/>	 <input type="text"/>
Q	4.0	 <input type="text"/>	 <input type="text"/>
R	6.0	 <input type="text"/>	 <input type="text"/>

Table 1  
Jadual 1

- (a) Record the volume of urine (in ml) that have been collected in the measuring cylinder in the space provided in Table 1 on page 4.

*Rekod isi padu air kencing (dalam ml) yang dikumpulkan di dalam silinder penyukat dalam ruang yang disediakan dalam Jadual 1 di halaman 4.*

[3 marks]  
[3 markah]

1(a)

3

- (b) (i) Based on Table 1, state **two** different observations.

*Berdasarkan Jadual 1, nyatakan **dua** pemerhatian yang berbeza.*

Observation 1:

*Pemerhatian 1:*

.....

.....

Observation 2:

*Pemerhatian 2:*

.....

.....

[3 marks]  
[3 markah]

1(b)(i)

3

- (ii) State **two** inferences which correspond to the observations in 1(b)(i).

*Nyatakan **dua** inferens yang sepadan dengan pemerhatian di 1(b)(i).*

Inference from observation 1:

*Inferens daripada pemerhatian 1:*

.....

.....

Inference from observation 2:

*Inferens daripada pemerhatian 2:*

.....

.....

[3 marks]  
[3 markah]

1(b)(ii)

3

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

Variable <i>Pemboleh ubah</i>	Method to handle the variable <i>Cara mengendali pemboleh ubah</i>
Manipulated variable <i>Pemboleh ubah dimanipulasikan</i> ..... ..... ..... .....	..... ..... ..... .....
Responding variable <i>Pemboleh ubah bergerak balas</i> ..... ..... ..... .....	..... ..... ..... .....
Constant variable <i>Pemboleh ubah dimalarkan</i> ..... ..... ..... .....	..... ..... ..... .....

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 from this experiment.

Your table should have the following titles:

*Bina satu jadual dan rekod semua data yang dikumpul daripada eksperimen ini.*

*Jadual anda hendaklah mengandungi tajuk-tajuk berikut:*

- Student  
*Murid*
- Salt water concentration  
*Kepekatan air garam*
- Volume of urine within 2 hours of Reading 1 and Reading 2  
*Isi padu air kencing dalam masa 2 jam bagi Bacaan 1 dan Bacaan 2*
- Total volume of urine produced  
*Jumlah isi padu air kencing yang dihasilkan*
- Rate of urine production  
*Kadar penghasilan air kencing*

Use the formula:

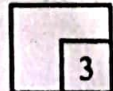
*Gunakan formula:*

$$\text{Rate of urine production} = \frac{\text{Total volume of urine}}{\text{Time}}$$

$$\text{Kadar penghasilan air kencing} = \frac{\text{Jumlah isi padu air kencing}}{\text{Masa}}$$

1(e)(i)

[3 marks]  
[3 markah]



[ Lihat halaman sebelah ]

- (ii) Use the graph paper provided on page 9 to answer this question.  
Using the data in 1(e)(i), draw a graph of rate of urine production against salt water concentration.

*Guna kertas graf yang disediakan di halaman 9 untuk menjawab soalan ini. Menggunakan data di 1(e)(i), lukis graf bagi kadar penghasilan air kencing melawan kepekatan air garam.*

[3 marks]  
[3 markah]

1(e)(ii)

3
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- (f) Based on the graph in 1(e)(ii), state the relationship between the rate of urine production and salt water concentration

Explain your answer.

*Berdasarkan graf di 1(e)(ii), nyatakan hubungan antara kadar penghasilan air kencing dengan kepekatan air garam.*

*Terangkan jawapan anda.*

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[3 marks]  
[3 markah]

1(f)

3
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- (g) Based on the result of this experiment, state the operational definition of the rate of urine production.

*Berdasarkan keputusan eksperimen ini, nyatakan definisi secara operasi bagi kadar penghasilan air kencing.*

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.....

[3 marks]  
[3 markah]

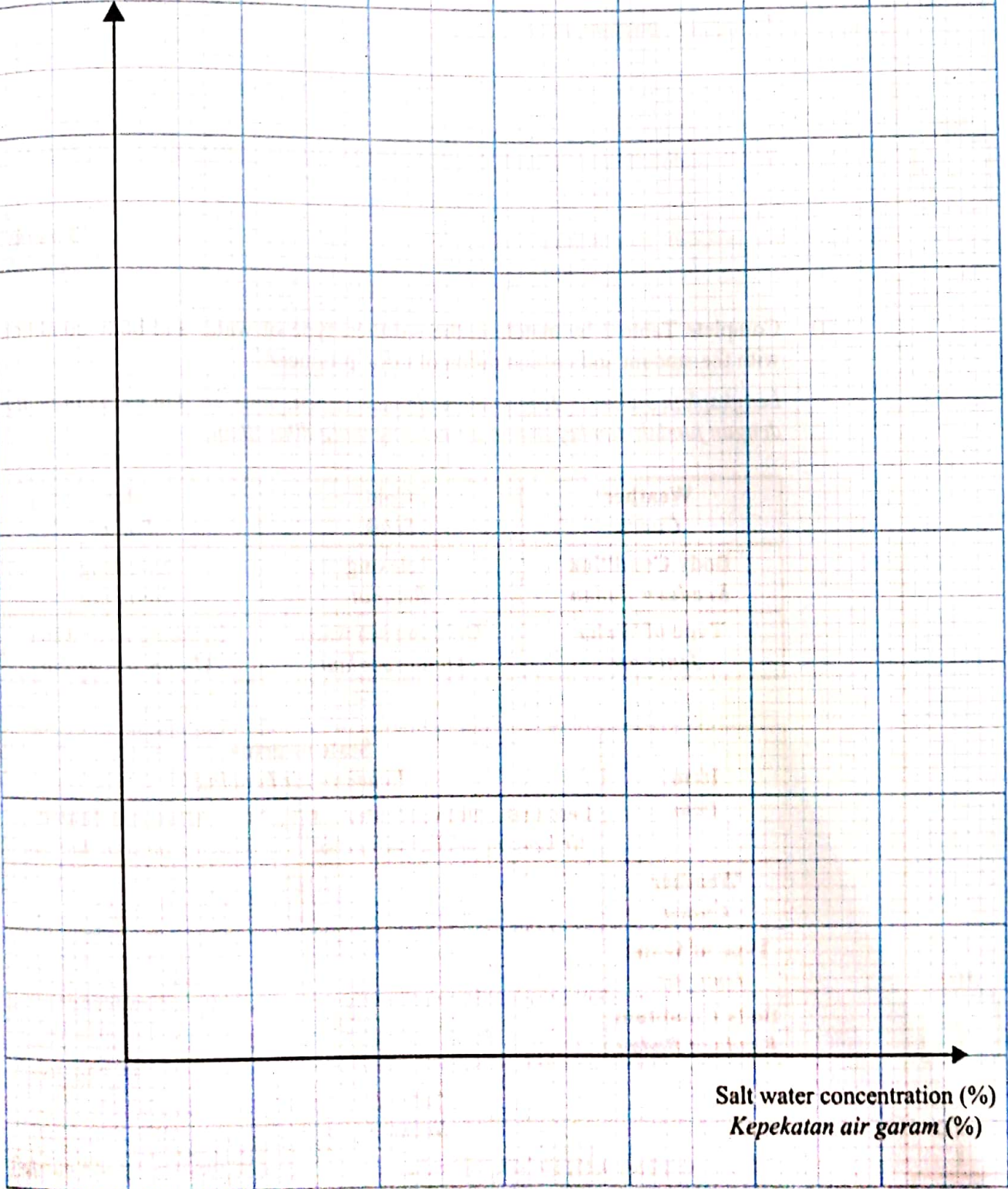
1(g)

3
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**Rate of urine production against salt water concentration**  
**Kadar penghasilan air kencing melawan kepekatan air garam**

Rate of urine production (ml/h)  
Kadar penghasilan air kencing (ml/j)



Salt water concentration (%)  
Kepekatan air garam (%)

- (h) In another experiment, student P rested and given 500 ml distilled water in a laboratory at temperature of 30°C. Predict the amount of urine volume obtained within 2 hours.

Explain your answer.

*Dalam eksperimen lain, murid P direhatkan dan diberi minum air suling sebanyak 500 ml di dalam makmal yang bersuhu 30°C. Ramalkan jumlah isi padu air kencing yang diperolehi dalam masa 2 jam.*

*Terangkan jawapan anda.*

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.....

.....

[3 marks]  
[3 markah]

- (i) Complete Table 3 by matching the weather, type of water and body condition with the amount and concentration of urine produced.

*Lengkapkan Jadual 3 dengan memadankan cuaca, jenis air dan keadaan badan dengan jumlah dan kepekatan air kencing yang dihasilkan.*

<b>Weather</b> <i>Cuaca</i>	<b>Cold</b> <i>Sejuk</i>	<b>Hot</b> <i>Panas</i>
<b>Body Condition</b> <i>Keadaan Badan</i>	<b>Relaxing</b> <i>Berehat</i>	<b>Sweating</b> <i>Berpeluh</i>
<b>Type of Water</b> <i>Jenis Air</i>	<b>Drinking sea water</b> <i>Minum air laut</i>	<b>Drinking river water</b> <i>Minum air sungai</i>

<b>Item</b> <i>Item</i>	<b>State of urine</b> <i>Keadaan air kencing</i>	
	<b>Less urine and concentrated</b> <i>Air kencing sedikit dan pekat</i>	<b>More urine and diluted</b> <i>Air kencing banyak dan cair</i>
<b>Weather</b> <i>Cuaca</i>		
<b>Type of Water</b> <i>Jenis Air</i>		
<b>Body Condition</b> <i>Keadaan Badan</i>		

Table 3  
Jadual 3

[3 marks]  
[3 markah]

1(h)

3
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1(i)

3
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Total  
1

33
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4551/3

- 2 Encik Mazlan is an agriculture officer who wants to help the orchard farmers in Kampung A to reduce the crops pest, squirrels that has increased in population. To ensure that all the squirrels are completely rid of, the use of repellent for squirrels is consider most effective. To buy enough repellent, the number of squirrels in a particular location in Kampung A must be estimate.

*Encik Mazlan ialah seorang pegawai pertanian yang berhasrat untuk membantu pekebun ladang di Kampung A bagi mengurangkan perosak tanaman iaitu tupai yang semakin meningkat populasinya. Bagi memastikan kesemua tupai dapat dihalau sepenuhnya, penggunaan ubat penghalau haiwan perosak untuk tupai adalah difikirkan paling berkesan. Untuk membeli ubat penghalau haiwan perosak yang mencukupi, jumlah tupai di lokasi tertentu dalam Kampung A mesti dianggarkan dahulu.*

Based on the information above, plan a laboratory experiment to study the estimate population of squirrels at several locations in Kampung A, which are in Rambutan Orchard, Cabbages Farm and Chilies Farm.

*Berdasarkan maklumat di atas, rancang satu eksperimen makmal untuk mengkaji anggaran populasi tupai di beberapa lokasi dalam Kampung A iaitu di Ladang Rambutan, Kebun Kubis dan Kebun Cili.*

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  
*Pemboleh ubah*
- 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 QUESTION PAPER**  
**KERTAS PEPERIKSAAN TAMAT**