

SULIT  
4551/3  
Biologi  
Kertas 3  
September  
2009  
1½ jam

Nama ..... Tingkatan .....



**PROGRAM PENINGKATAN PRESTASI  
SPM 2009**

**BIOLOGI  
Kertas 3  
Satu jam tiga puluh minit**

**JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU**

1. *Tuliskan Nama dan Tingkatan anda dalam ruangan yang disediakan*
2. *Calon dikehendaki menjawab semua soalan.*
3. *Calon dikehendaki membaca maklumat yang terdapat dalam halaman 2*

Untuk Kegunaan Pemeriksa		
Soalan	Markah Penuh	Markah Diperoleh
<b>1</b>	33	
<b>2</b>	17	
Jumlah		

Kertas soalan ini mengandungi 8 halaman bercetak

[Lihat sebelah

### INFORMATION FOR CANDIDATES

1. This question paper consists of two questions. Answer **all** the questions.
2. Write your answers for **Question 1** in the spaces provided in the question paper
3. Write your answers for **Question 2** on the lined pages at the end of the question paper in detail. You may use equations, diagrams, tables, graph and other suitable methods to explain your answer.
4. Show your working, it may help you to get marks
5. If you wish to cancel any answer, neatly cross out the answer.
6. The diagrams in the questions are not drawn to scale unless stated.
7. Marks allocated for each question or part question are shown in brackets
8. The time suggested to complete **Question 1** is 45 minutes and **Question 2** is 45 minutes
9. You may use a non-programmable scientific calculator
10. Hand in this question paper at the end of the examination.

#### Marks awarded

Score	Description
3	<b>Excellent:</b> The best response
2	<b>Satisfactory:</b> an average response
1	<b>Weak:</b> An inaccurate response
0	No response <u>or</u> wrong response

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Answer all questions.

### Question 1

Diagram 1.1 shows part of an urban area where the River Indah flows.

[Rajah di bawah menunjukkan sebahagian dari kawasan bandar di mana Sungai Indah mengalir]

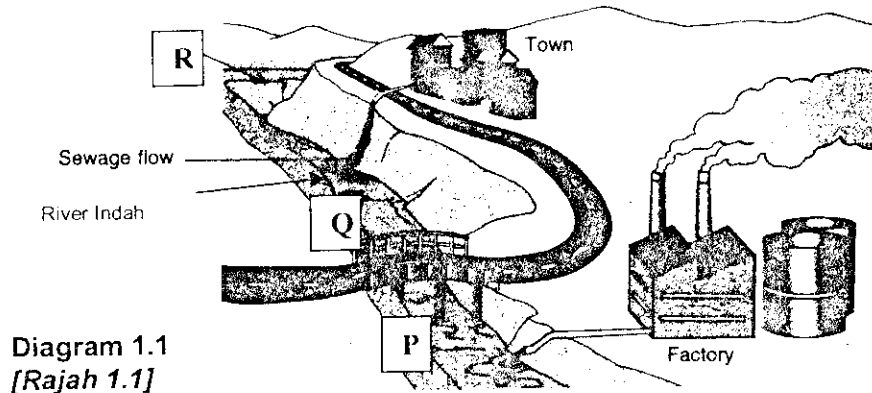


Diagram 1.1  
[Rajah 1.1]

An experiment is carried out to investigate the water pollution level in three different locations P, Q and R in River Indah. Three water samples are collected and labelled as P, Q and R as shown in the Diagram 1.2. 200 ml of each water sample is put in a reagent bottle and mix with 1 ml of 0.1% methylene blue. All the bottles are kept in a dark cupboard. Observation is made every minute to see the changes of methylene blue colour.

[Satu eksperimen dijalankan untuk mengkaji tahap pencemaran air dari tiga lokasi P, Q dan R yang diambil dari Sungai Indah yang dijangka tercemar. Ketiga-tiga sampel air ini dilabelkan sebagai P, Q dan R seperti ditunjukkan dalam Rajah 1.2 di bawah. 200 ml air dari setiap kawasan dimasukkan ke dalam botol reagen dan dicampurkan dengan 1 ml 0.1% metilena biru. Semua botol disimpan dalam almari gelap. Pemerhatian dijalankan setiap minit untuk melihat perubahan warna metilena biru.]

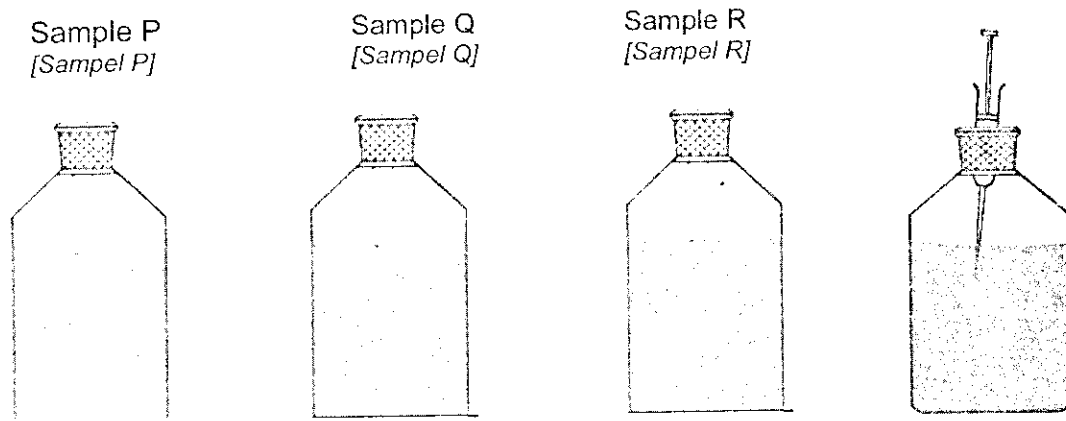


Diagram 1.2  
[Rajah 1.2]

Each sample is mixed with methylene blue  
[Setiap sampel dicampur dengan metilena biru]

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The time taken for methylene blue become colourless is shown in Diagram 2;  
 [Masa yang diambil oleh metilena biru untuk luntur ditunjukkan dalam Rajah 2]

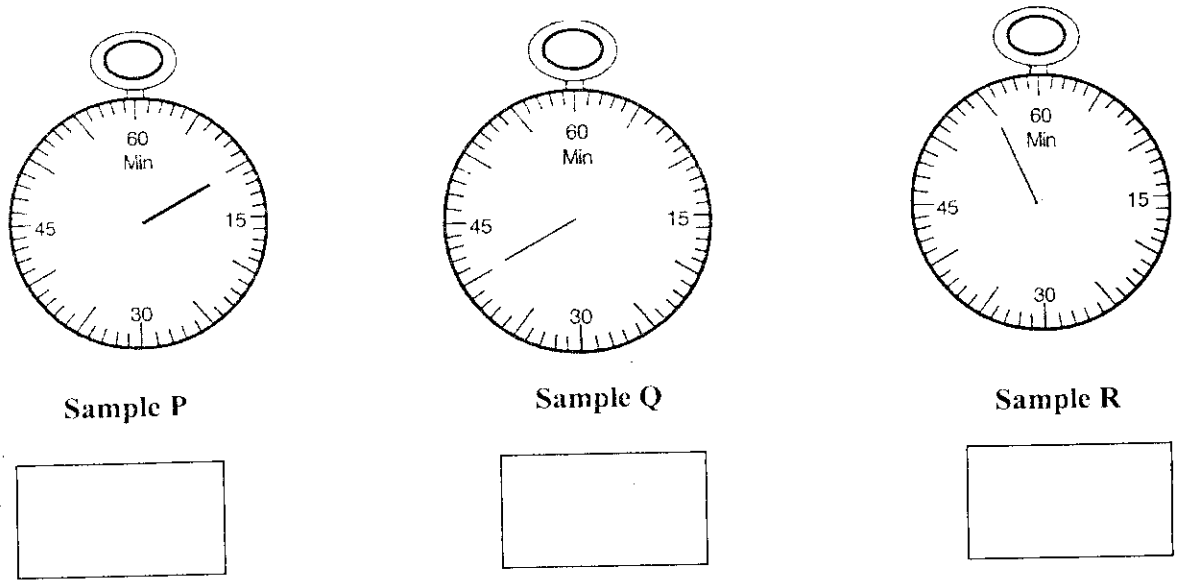


Diagram 2

Base on the Diagram 1 and 2 answer all questions:

[Berdasarkan Rajah 1 dan ~~Jadual 1~~ <sup>Rajah 2</sup> jawab semua soalan berikut:]

1(a) Record the time taken for each sample to become colourless in the boxes provided in Diagram 2.  
 [Catatkan masa bagi setiap sampel air untuk menjadi jernih dalam kotak yang disediakan pada Rajah 2]

[3 marks]

(b)(i) State **two** observations on the time taken in this experiment.  
 [Nyatakan dua pemerhatian tentang masa dalam eksperimen ini]

Observation 1  
 [Pemerhatian 1]

.....

.....

Observation 2  
 [Pemerhatian 2]

.....

.....

[3 marks]

Untuk kegunaan pemeriksa

1(a)

[ ]

1(b)(i)

[ ]

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(b)(ii) State **one** inference for each observation made in (b) (i).  
*Nyatakan satu inferens bagi setiap pemerhatian yang dibuat pada 1(b)(i)]*

**Inference for observation 1** [*Inferens bagi pemerhatian 1*]

.....  
.....

**Inference for observation 2** [*Inferens bagi pemerhatian 2*]

.....  
.....

[3 marks]

1(b)(ii)

(c) Construct a table and record the results of the experiment which includes the following aspects:

*[Bina satu jadual dan rekodkan keputusan eksperimen yang meliputi aspek-aspek berikut :]*

- Water sample [*sampel air*]
- Time taken [*masa*]

[3 marks]

1(c)

- (d) What is the relationship between time taken, oxygen content and pollution level in this experiment?  
 [Apakah hubungan antara masa diambil, tahap pencemaran dan kandungan oksigen dalam eksperimen ini?]

.....

.....

.....

.....

[3 marks]

1(d)

- (e) State the variables in the experiment and explain how the variables are operated.  
 [Nyatakan pembolehubah dan cara mengendalikan pembolehubah]

Variables [Pembolehubah]	How the variables are operated [Cara bagaimana pembolehubah dioperasi]
<p><b>Manipulated variable</b> [Pembolehubah di manipulasi]</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p>
<p><b>Responding variable</b> [Pembolehubah bergerakbalas]</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p>
<p><b>Fixed variables</b> [Pembolehubah dimalarkan]</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p>

[3 marks]

1(e)

- (f) State the hypothesis for this experiment.  
 [Nyatakan hipotesis bagi eksperimen ini]

.....

.....

.....

1(f)

[3 marks]

- (g) Explain the relationship between the oxygen content and water pollution.  
 [Terangkan hubungan antara kandungan oksigen dengan pencemaran air]

.....

.....

.....

1(g)

[3 marks]

- (h) Based on the experiment, define BOD operationally.  
 [Berdasarkan eksperimen, beri definisi BOD secara operasi]

.....

.....

.....

1(h)

[3 marks]

- (i) The experiment is repeated by using water sample from a river in agricultural area.  
 Predict the time taken for methylene blue to turn colourless.  
 [Eksperimen ini diulang dengan menggunakan sample air dari kawasan pertanian.  
 Ramalkan masa pelunturan warna metilena biru kepada tidak berwarna]

.....

.....

.....

1(i)

[3 marks]

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- (j) Arrange the water sample P, Q and R according the most polluted to the less polluted water.

*[Susun sampel air mengikut yang paling tercemar ke kurang tercemar.]*

10)

[3 marks]

**[33 marks]**

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- 2 Some of the terrestrial plants are adapted to overcome excessive loss of water during transpiration by having small leaves, sunken stomata and hairy surface of leaves. Most of the water vapour diffused out of the plant through the stomata on the lower epidermis of the leaves.

[Sesetengah tumbuhan darat di sesuaikan untuk mengatasi masalah kehilangan air berlebihan semasa transpirasi dengan mempunyai daun yang kecil, liang stoma terbenam dan permukaan daun yang berbulu. Kebanyakan wap air meresap keluar melalui liang stoma di bawah permukaan daun]

Diagram 1 shows a set up of apparatus and materials to be used in an experiment to study the transpiration in plant.

[Rajah 1 menunjukkan satu set radas dan bahan yang digunakan dalam eksperimen untuk mengkaji kadar transpirasi dalam tumbuhan]

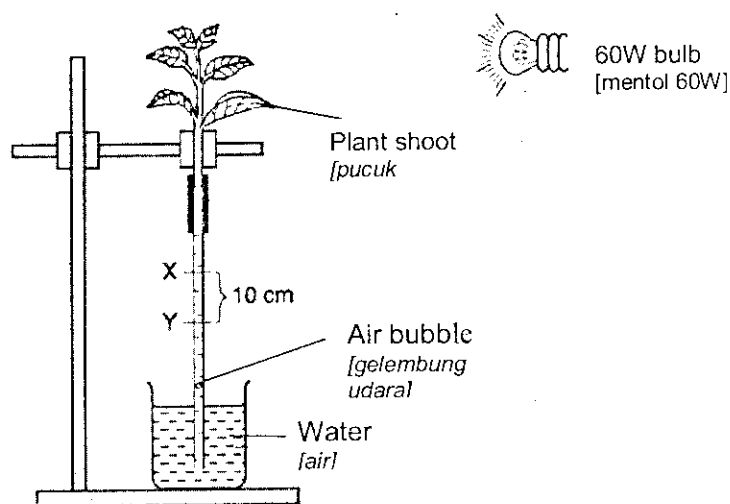


Diagram 1  
[Rajah 1]

Based on the information and Diagram 1, design a laboratory experiment to determine whether the number of leaves affecting the rate of transpiration in plants. Any common chemicals and scientific apparatus that found in the laboratory can be used in the experimental design.

[Berdasarkan kepada pernyataan dan Rajah 1, reka bentuk satu eksperimen makmal untuk menentukan yang bilangan daun mempengaruhi kadar transpirasi dalam tumbuhan. Mana-mana bahan kimia dan alat radas dalam makmal boleh digunakan dalam mereka bentuk eksperimen ini.]

The experiment design must include the following aspects:

[Reka bentuk eksperimen ini mestilah mengandungi aspek berikut:]

- Problem statement [Pernyataan masalah]
- Aim of experiment [Tujuan eksperimen]
- Variables [Pembolehubah]
- Hypothesis [Hipotesis]
- Apparatus and materials [Radas dan Bahan]
- Technique [Teknik]
- Procedures [Kaedah]
- How data is communicated [Bagaimana data dikomunikasikan]
- Conclusion [Kesimpulan]

[17 marks]

END OF QUESTION PAPER

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