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SUGGESTED ANSWER
BIOLOGY
PAPER 3
4551/3

SPMRSM
2018

1 (a) KB0603 – Measuring Using Numbers

Score	Suggested Answer
3	Sample Answer: Group: P — Mass of salted French fries intake (g): 10 — Volume of urine produced (ml): Student 1: 142, Student 2: 144 Group: Q — Mass of salted French fries intake (g): 30 — Volume of urine produced (ml): Student 1: 97, Student 2: 99 Group: R — Mass of salted French fries intake (g): 60 — Volume of urine produced (ml): Student 1: 78, Student 2: 74

1 (b) (i) [KB0601 - Observation]

Score	Suggested Answer
3	Sample answer: 1. When the **mass of salted French fries intake** is **10g,** the **volume of urine produced (student 1) is 142 ml and (student 2) is 144 ml.** 2. When the **mass of salted French fries intake** is **30g,** the **volume of urine produced (student 1) is 97 ml and (student 2) is 99 ml.** 3. When the **mass of salted French fries intake** is **60g,** the **volume of urine produced (student 1) is 78 ml and (student 2) is 74 ml.**

1 (b) (ii) [KB0604 – Making inference]

Score	Explanation
3	Sample answers : 1. When the mass of salted French fries intake is lower / the lowest, the volume of urine collected is the **high / highest** , because (blood) **osmotic pressure decreases,** therefore less ADH secreted // kidney tubule is less permeable towards water // volume of water reabsorb (into blood capillaries) **decreases** // more aldosterone secreted // collecting duct more permeable to salts // more salts reabsorbed. **2.** When the mass of salted French fries intake higher / the highest, the volume of urine collected is **lower / the lowest** , because (blood) **osmotic pressure increases**, therefore more ADH secreted // kidney tubule is more permeable towards water // volume of water reabsorb (into blood capillaries) **increases** // less aldosterone secreted // collecting duct less permeable to salts // less salts reabsorbed.

1 (c) [KB0610 – Controlling Variables]

Score	Suggested Answer
3	Sample Answer : <table><tr><th>Variables</th><th>Method to handle the variable correctly</th></tr><tr><td><u>Manipulated variable</u>: Mass of salted French fries **intake**</td><td>Use **different** mass of salted French fries which are 10g, 30g and 60g.</td></tr><tr><td><u>Responding variable</u> : Volume of urine produced Average volume of urine produced</td><td>**Measure** and **record** the volume of urine produced by using a **measuring cylinder.** **Calculate** and **record** average volume of urine produced by using formula = $\frac{\textbf{Volume of urine produced by student 1} + \textbf{Volume of urine produced by student 2}}{2}$</td></tr><tr><td><u>Constant variable</u>: Number of student Time taken to collect urine Type of drink Gender / Age / body mass</td><td> **Fix** the number of student in each group that is 2 **Fix** the time taken to collect urine at 1 hour **Fix** the type of drink that is mineral water **Use** the **same** gender / age / body mass of students</td></tr></table>6 ticks

1 (d) [KB0611 – Making Hypothesis]

Score	Suggested Answer
3	<u>Sample answer</u> : The higher the mass of salted French fries intake, the lower the volume of urine produced// average volume of urine produced / vice versa.

1 (e) (i) [KB0606 – Communication]

Score	Suggested Answer
3	Sample answers : <table><tr><th rowspan="2">Mass of salted French fries intake (g)</th><th colspan="2">Volume of urine produced (ml)</th><th rowspan="2">Average of urine produced (ml)</th></tr><tr><th>Student 1</th><th>Student 2</th></tr><tr><td>**10**</td><td>**142**</td><td>**144**</td><td>**143**</td></tr><tr><td>**30**</td><td>**97**</td><td>**99**</td><td>**98**</td></tr><tr><td>**60**</td><td>**78**</td><td>**74**</td><td>**76**</td></tr></table>

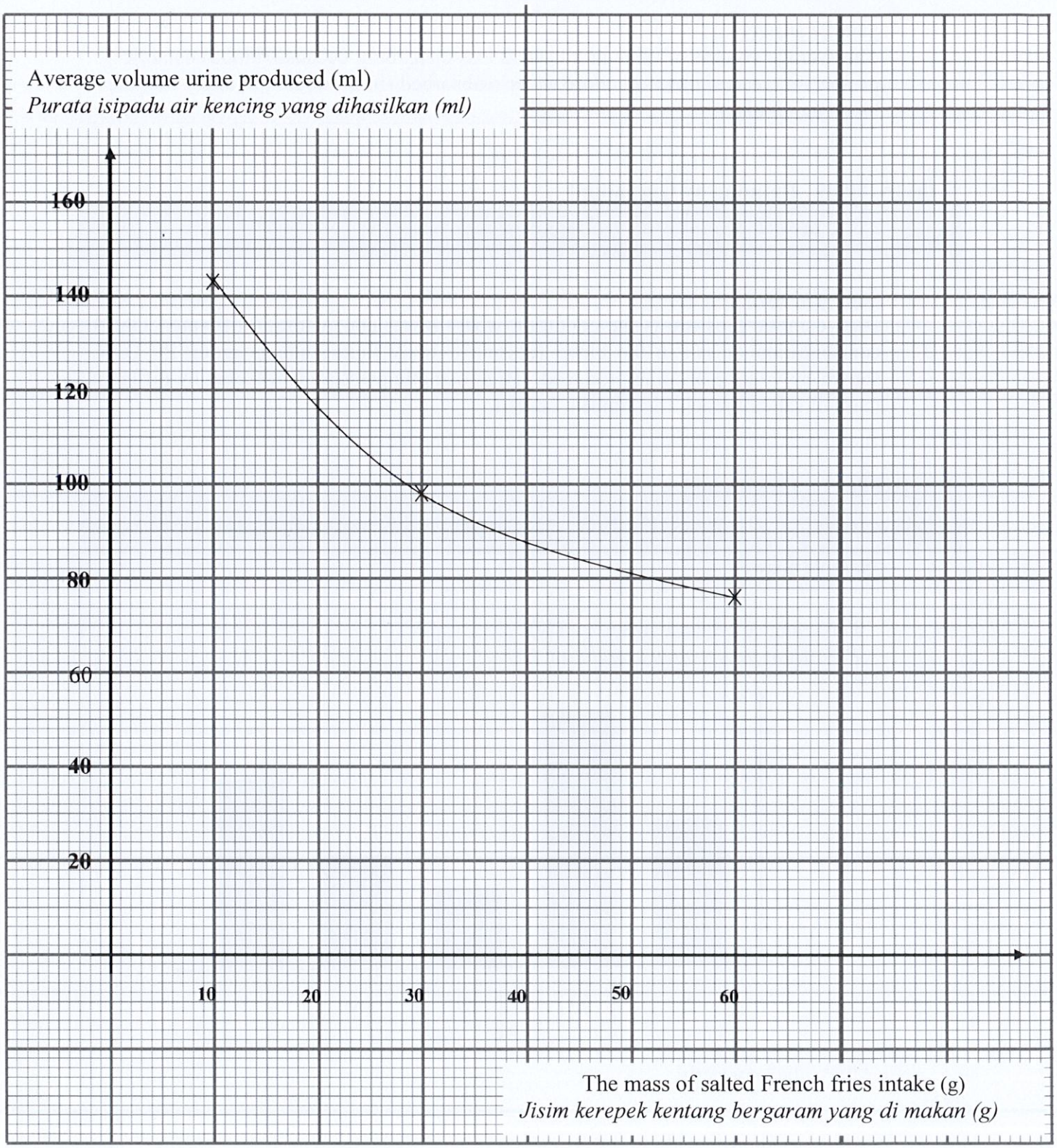
1 (e)(ii) [KB0612 – Plotting a graph]

Score	Suggested Answer
3	P : Uniform scales for the both axes - 1 mark T : All 3 points plotted correctly - 1 mark B : All points connected smoothly - 1 mark

1 (f) [KB0608 – Interpreting Data]

Score	Suggested Answer
3	Sample answers : The higher the mass of salted French fries intake, the lower the average volume of urine produced because the (blood) osmotic pressure increases due to more water reabsorbed into the blood capillaries // more ADH secreted // kidney tubule is more permeable to water / vice versa. **OR** The higher the mass of salted French fries intake, the lower the average volume of urine produced because the (blood) osmotic pressure increases due to less salts reabsorbed (from tubule of kidney into the blood capillaries) // less aldosterone secreted // collecting duct less permeable to salts.

Average volume of urine produced against the mass of salted French fries intake
Purata isipadu air kencing yang dihasilkan melawan jisim kerepek kentang bergaram yang dimakan



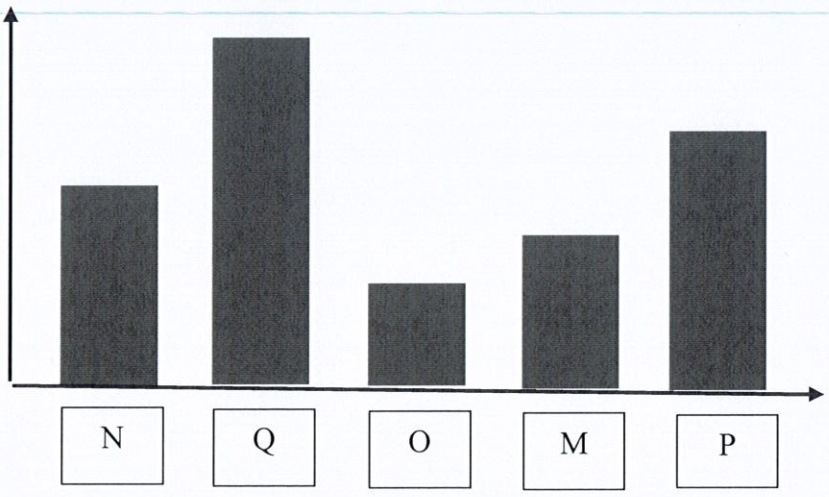
1 (g) [KB0605 – Predicting]

Score	Suggested Answer
3	Sample answers : The average volume of urine produced is less than 76 ml because (blood) osmotic pressure increases, therefore more water reabsorbed (from tubule of kidney into the blood capillaries).

1 (h) [KB0609 –Defining by Operation]

Score	Suggested Answer
3	Sample answers : High osmotic pressure is the condition where lower concentration of water/ higher concentration of salt in the blood (plasma) / body fluid students group P// Q//R, shown by volume of urine produced. High osmotic pressure is affected by different mass of salted French fries **intake / eaten.**

1 (i) [KB0602 – Classifying]

Score	Mark scheme
3	Sample answer Percentage of water reabsorbed (%) *Peratusan penyerapan semula air (%)*  All 4 label correctly

Question 2

No.	Suggested Answer	Score
2(i)	Sample answers : 1. Does the size of potato cubes // total surface area per volume affect the rate of diffusion of substances // percentage of difussion of substances // percentage portion of the cube which changes colour // length of diffusion of substances // percentage of coloured area? 2. What is the effect of different size of potato cubes // total surface area // on the rate of diffusion of substances // percentage of difussion of substances // percentage portion of the cube which changes colour // length of diffusion of substances // percentage of coloured area?	3

No.	Suggested Answer	Score
2(ii)	Sample answers : 1. The higher the size of potato cubes, the lower the rate of diffusion of substances. 2. The higher the total surface area // Saiz of potato cubes, the higher the rate of diffusion // percentage of difussion // percentage portion of the cube which changes colour // length of diffusion // percentage of coloured area . 3. As the total surface area // Saiz of potato cubes increases, the rate of diffusion // percentage of difussion // percentage portion of the cube which changes colour // length of diffusion // percentage of coloured area .	3

No.	Suggested Answer	Score
2(iii)	Sample answers : 1. Manipulated variable: Total surface area per volume // Size of potato cubes 2. Responding variable: (Rate of diffusion of substances // percentage of difussion of substances // percentage portion of the cube which changes colour // length of diffusion of substances // percentage of coloured area 3. Controlled variable: Time taken // types of solution used // size of grid	3

	Suggested Answer	Score
2(iv)	Sample answers: Apparatus: • Beakers • White tile • Knife/scissors/razor blade • Ruler / transparency grid • Stopwatch • Petri dish • White tile • Forceps Materials: • Potatoes * • Coloured solution / liquid // red ink / eosin solution / methylene blue solution * • Filter paper	3

	Suggested Answer	Score	
2(v)	Sample answer : Procedures: 1. The potatoes is **cut** into cubes with 1cm side by using a knife. 2. The beaker is **filled** with coloured liquid. 3. The potato cube is **immersed** into the beaker. 4. The stopwatch is **started**. 5. **After 30 minutes (30 min – 1 hour),** the potato cube **is removed** from the beaker. 6. The outer surface of the cube **is dried** by using a filter paper/tissue paper. 7. The potato cube is **cut** into half using a knife. 8. **Measure** and **record** the coloured area / height of coloured area / length of diffusion by using a **grid // ruler**. 9. **Calculate** and **record** the percentage of coloured area // rate of diffusion of substances by using a **formula** : Percentage of coloured area = $\frac{\text{Length of coloured area}}{\text{Total length of diffusion pathway}}$ x 100% Rate of diffusion of substances = $\frac{\text{Length of coloured area}}{\text{Time}}$ 10. Step 1 until 9 is repeated by using different size / dimension of potato cube which are **2 cm, 3 cm and 4 cm** respectively. ** Accept any suitable measurement. 11. All the data is **recorded** in the **table / tabulate** data. 12. The experiment **is repeated twice** to get the **average reading**.	K's K1 K1 K1 K1 K2/K1 K5 K1 K3 K3 K3 K4 K1 K5	3

No.	Suggested Answer	Score
2(vi)	Sample answers : (C1) (C2) Side dimension / size of the potatoes cube (cm) | Length of diffusion of substances (cm) | Percentage portion of cube which changes colour / percentage of coloured area (%) // Rate of diffusion of substances (cm/min) 1 | | | 2 | | | 3 | | | 4 | |	2

