Name : ……

Class : ……...

SB015
Biology
Semester 1
Session 2023/2024
2 hours

SB015
Biologi
Semester 1
Sesi 2023/2024
2 Jam

No. Matrik										

No. Kad Pengenalan													

(*Isikan maklumat dengan lengkap*)

UNIT BIOLOGI
BIOLOGY UNIT

GEMPUR PSPM I

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU.
DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

ARAHAN KEPADA CALON:

Kertas soalan ini mengandungi 7 soalan.

Jawab **semua** soalan di ruangan yang disediakan dalam kertas soalan ini.

Kalkulator elektronik boleh digunakan.

INSTRUCTIONS TO CANDIDATE:

This question paper consists of 7 questions.

Answer **all** questions in the space provided in the question paper.

The use of electronic calculator is permitted.

Untuk Kegunaan Pemeriksa			
No. Soalan	Markah		Markah Penuh
	Pemeriksa	KP/ KKP	
1	/7		
2	/13		
3	/6		
4	/14		
5	/11		
6	/13		
7	/16		
JUMLAH	**/80**		

1 **FIGURE 1** represents different stages of mitosis labelled **A** to **F** in a cell with four chromosomes.

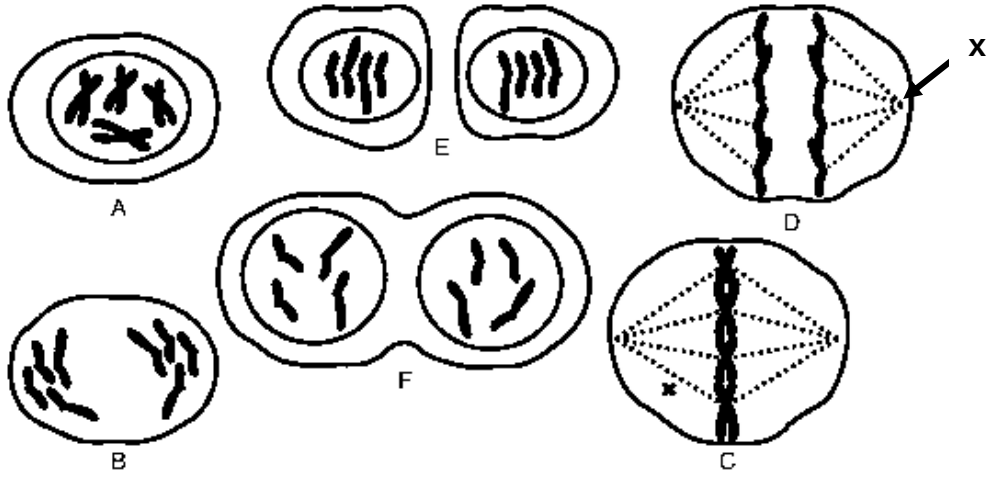

FIGURE 1

(a) Arrange in the correct sequence of stages **A** to **F** beginning with the earliest stage.

[1 *mark*]

_____

(b) Name structure **X** and state its function.

[2 *marks*]

Structure **X** : _____

Function : _____

(c) Based on the stages of process given below, give **three (3)** differences between behaviour of chromosomes during mitosis and meiosis I.

[3 *marks*]

Stage of process	Mitosis	Meiosis I
Prophase		
Metaphase		
Anaphase		

(d) Give **ONE** (1) similarity between mitosis and meiosis

[1 *mark*]

_____

2 (a) The gene for haemoglobin exists in two alternative forms:

H^A codes for the normal form of haemoglobin;
H^S codes for the abnormal form of haemoglobin.
H^A is dominant over H^S allele.

(i) What is meant by allele?

[1 *mark*]

_____

(ii) Draw a genetic diagram and explain how two parents who do not have sickle cell anaemia may have a child with the condition (Use the symbols H^A and H^S in your answer).

[5 *marks*]

(iii) The parents are about to have another child. What is the probability that this child will have sickle cell anaemia?

[1 *mark*]

_____

(b) Haemophilia is a rare genetic condition in which the blood clots very slowly. The genes that controls the ability of blood to clot is found only on the X chromosome. X^H represents an X chromosome with the dominant allele for normal blood clotting. X^h represents an X chromosome with the recessive allele which causes the blood to clot slowly. The Y chromosome is small and does not have the gene for blood clotting.

(i) State the type of inheritance shown in the control of blood clotting.

[1 *mark*]

_____

(ii) State the genotype for the following individuals:

[2 *marks*]

Haemophiliac male.

_____

A woman with normal blood clotting but have a son with haemophilia.

_____

(iii) Explain how a son inherit haemophilia when this disease has not previously existed in his parent.

[3 *marks*]

_____

_____

_____

_____

3 (a) List down the **TWO (2)** conditions that can remain the genetic equilibrium in a population.

[2 *marks*]

_____

_____

(b) You are researching a population of 100 squirrels, where 80 of them are gray and 20 are black. You know that the black color is a recessive trait for this type of squirrel. By using the Hardy-Weinberg Equilibrium equation, $p^2 + 2pq + q^2 = 1$, determine the number of squirrels that are heterozygous for grey color.

[4 *marks*]

4 (a) **FIGURE 4.1** shows two processes that occur in a eukaryotic cell.

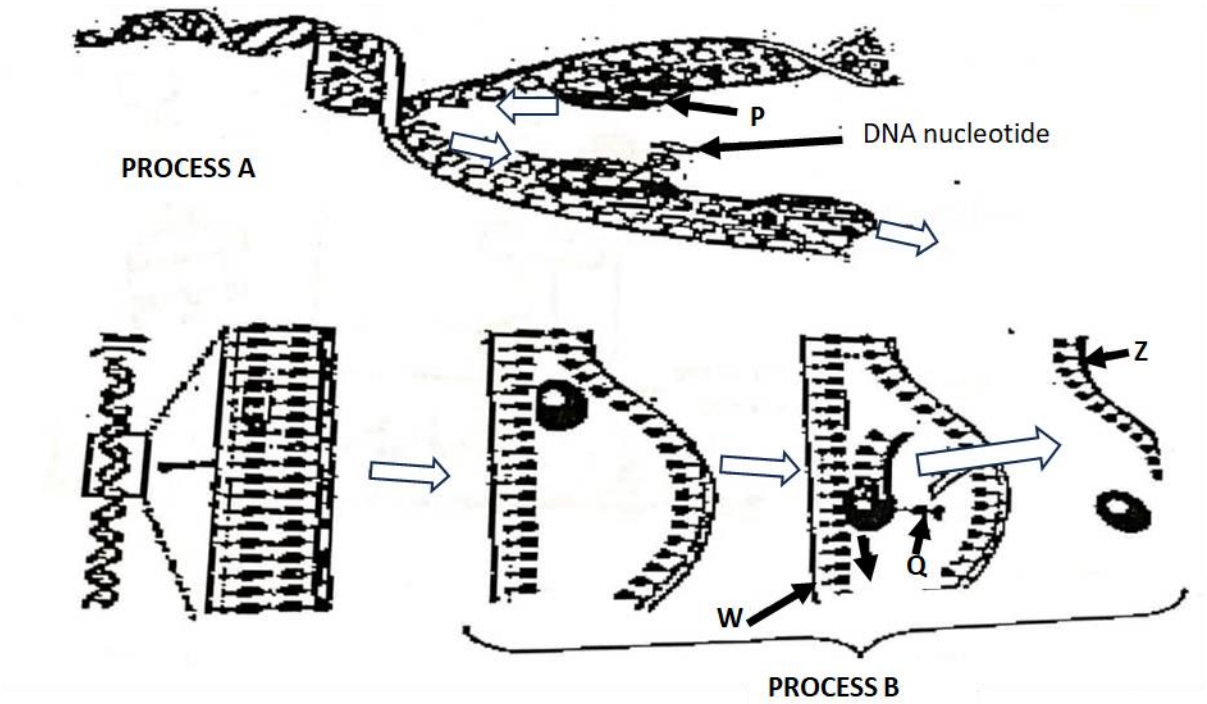

FIGURE 4.1

(i) Name the processes labelled A and B shown in **FIGURE 4.1**.

[2 *marks*]

Process A : _____

Process B : _____

(ii) If the nucleotide sequence of strand W is 3' AGGCTTACCGTA 5', write the nucleotide sequence of strand Z.

[1 *mark*]

_____

(iii) What is the importance of strand Z?

[1 *mark*]

_____

(iv) Give **TWO** differences of the process A and B.

[2 *marks*]

_____

_____

(v) What happen if DNA ligase is mutated and cannot perform its function?

[1 *mark*]

_____

(vi) Why does lagging strand is replicated discontinuously?

[1 *mark*]

_____

(b) **FIGURE 4.2** shows the elongation stage in translation process. Explain the stage of translation before the stage shown in **FIGURE 4.2**.

[6 *marks*]

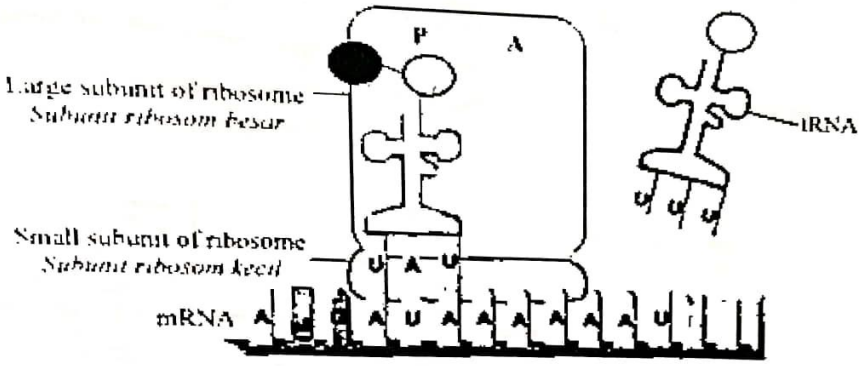

FIGURE 4.2

5 (a) **FIGURE 5** shows the red blood cell which undergo gene mutation.

FIGURE 5

(i) State the type of gene mutation shown in **FIGURE 5**.

[1 *mark*]

_____

(ii) Name the genetic disorder as shown in **FIGURE 5**.

[1 *mark*]

_____

(iii) Briefly describe how this genetic disorder happen.

[1 *marks*]

_____

_____

(b) A cross was made between black mustard (2n = 16) and radish (2n = 20). This produced a sterile hybrid **Q**. This produced a sterile hybrid **Q**. Hybrid **Q** then asexually reproduced and mutation occur producing fertile species **R**.

(i) What type of polyploidy occurred in the statement above?

[1 *mark*]

_____

(ii) What is the chromosomes number for the sterile hybrid **Q**?

[1 *mark*]

_____

(iii) Why is hybrid **Q** sterile?

[1 *mark*]

_____

(c) Differentiate between Klinefelter syndrome and Turner syndrome as the result of a type of chromosome mutation in human.

[5 *marks*]

6 (a)

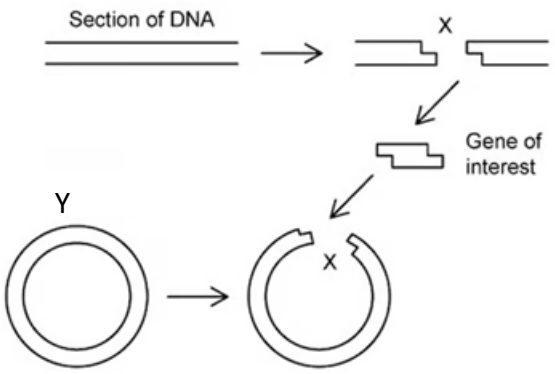

FIGURE 6

(i) Name structure Y and the enzyme used at the location mark X.

[2 *marks*]

(ii) Explain why the enzyme in (a) are useful in the process shown in **FIGURE 6** above.

[2 *marks*]

(iii) Name another enzyme that would be needed to finish inserting gene of interest into structure Y.

[1 *mark*]

_____

(iv) State the characteristics of structure Y and the source to isolate this structure

[3 *marks*]

_____

_____

_____

(b) State why mRNA is used to produced cDNA and explain the production of cDNA by using mRNA.

[5 *marks*]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

7 (a) Explain the roles of hormones during pregnancy and parturition.

[12 *marks*]

(b) Explain the structure of secondary oocyte.

[4 *marks*]

END OF QUESTION PAPER