

1. **FIGURE 1** shows chromosomal behaviour during two stages of cell division in an organism.

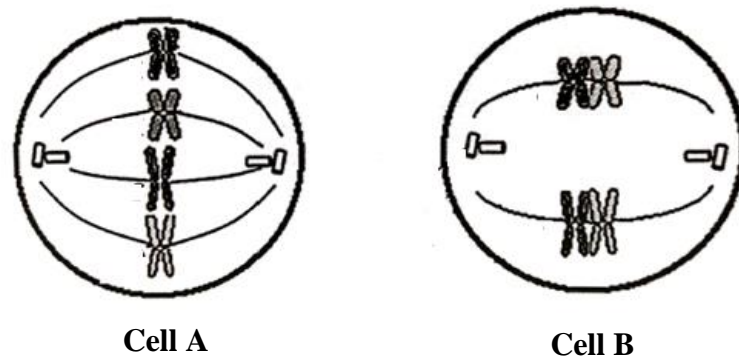


FIGURE 1

- (a) Identify the types of cell division for Cell A and Cell B.

[2 marks]

A: _____

B: _____

- (b) Give **ONE** difference between stages shown in Cell A and Cell B.

[1 mark]

- (c) How many chromosomes in each daughter cell of cell A and cell B after its complete cell division?

[2 marks]

Cell A : _____

Cell B : _____

- (d) Explain what happens if cell A fail to divide its cytoplasm?

[2 marks]

2. (a) The phenotypes of watermelon are controlled by two genes, ***R*** (fruit shape) and ***L*** (skin type). Round fruit is dominant to long fruit and smooth skin is dominant to wrinkled skin. The genes are located on the different chromosome.

(i) Identify the genotype of heterozygous round fruit with homozygous smooth skin watermelon.

[1 mark]

(ii) Genotype of watermelon answered in (a)(i) were crossed with homozygous recessive watermelon. Use a punnett square to show the cross and the ratio of offspring phenotypes.

[4 marks]

(b) Haemophilia is an X-linked recessive disorder that prevents blood clotting.

(i) Define X-linked recessive inheritance.

[1 marks]

- (ii) Peter, a haemophiliac male, marries Diana, whose normal but carry recessive allele on her X chromosome. Using suitable symbols, draw a genetic diagram and a Punnett square to show the possible genotypes and phenotypes of offspring including the ratio of their phenotypes.

[6 marks]

3. In a population of hamster, allele for grey fur (**G**) is dominant over allele for black fur (**g**). It was found that 36% of the hamster have black fur. It is assumed that the population is at genetic equilibrium.

(a) Calculate the frequency of grey and black fur alleles.

[4 marks]

(b) Calculate the number of grey fur hamster in a population of 800 hamster.

[2 marks]

4. (a) **FIGURE 2** shows protein synthesis that occurs in eukaryotic cell.

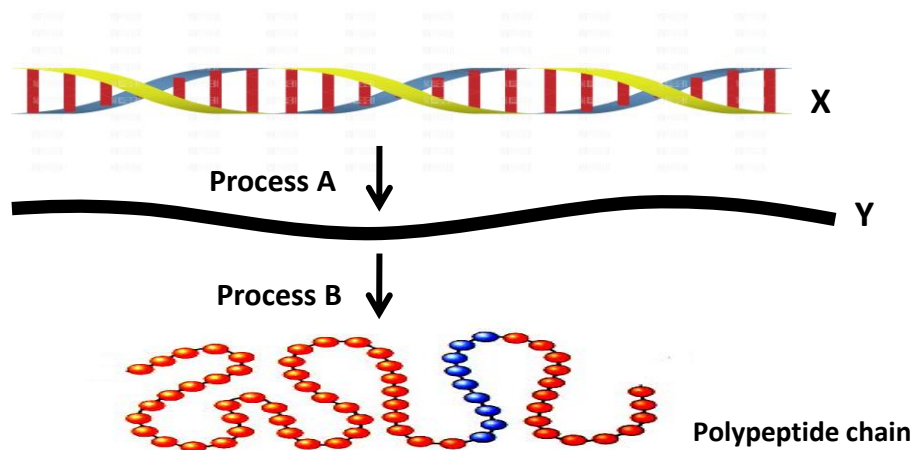


FIGURE 2

(i) Name strand **Y**.

[1 mark]

(ii) What is the function of strand Y in process B?

[1 mark]

(iii) Explain **THREE** differences between processes **A** and **B**.

[3 marks]

(b) Explain a gene expression regulation by the lac operon in the presence of lactose in *E.coli*.

[9 marks]

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5. (a) **FIGURE 3** shows the types of chromosomal aberration.

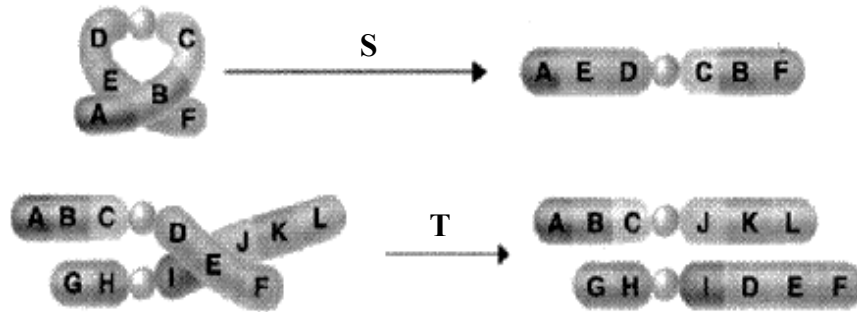


FIGURE 3

(i) Identify chromosomal aberration **S** and **T**.

[2 marks]

S: _____

T: _____

(ii) State **ONE** difference between chromosomal aberration **S** and **T**.

[1 mark]

(b) **FIGURE 4** shows the karyotype of two individuals suffering from genetic disorders.

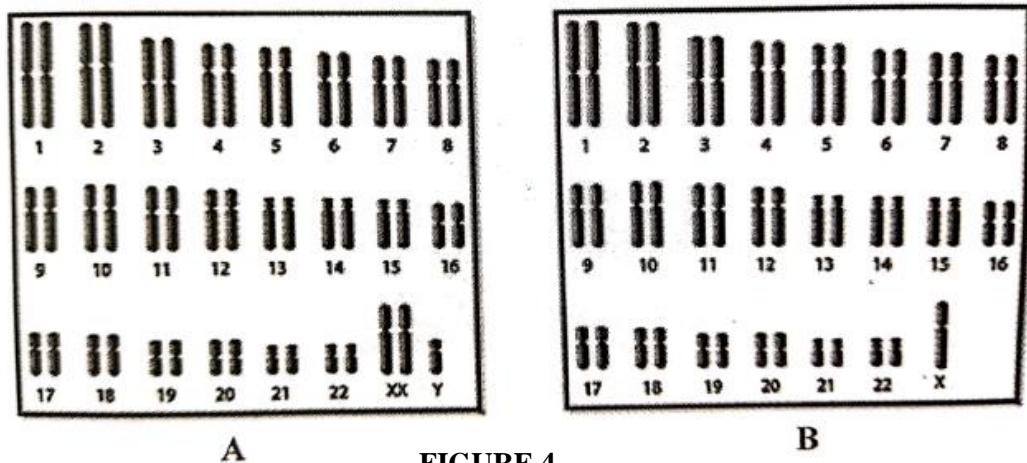


FIGURE 4

(i) State the ploidy level of individual **A** and **B**.

[2 marks]

A: _____

B: _____

(ii) Give **TWO** characteristics of individual **B**.

[2 marks]

(iii) How does the genetic disorder in individual **A** occur?

[4 marks]

6. (a) **FIGURE 5** shows two DNA strands, **P** and **Q**.

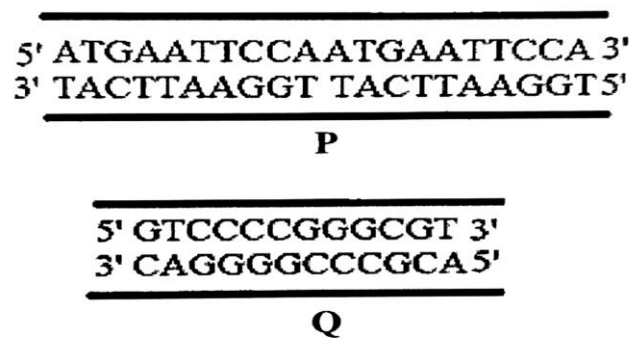


FIGURE 5

(i) Identify the restriction enzymes which cut **P** and **Q**.

[2 marks]

P : _____

Q: _____

(ii) What would happen if the restriction enzyme in bacterial cell fails to function?

[1 mark]

- (b) **TABLE 1** shows the result of screening process in recombinant DNA technology by using antibiotics and X-gal.

Number of bacterial colonies			
Original	Ampicillin		Tetracyclin
	White	Blue	
50	10	30	0

TABLE 1

- (i) Identify the screening technique used.

[1 mark]

- (ii) Why does the growth of bacterial colony is inhibited by tetracyclin antibiotics?

[1 mark]

- (iii) What is indicated by the white colonies?

[1 mark]

- (iv) Explain your answer in 6(b)(iii).

[3 marks]

(c) **FIGURE 6** shows part of the stages in the synthesis of human insulin using recombinant DNA.

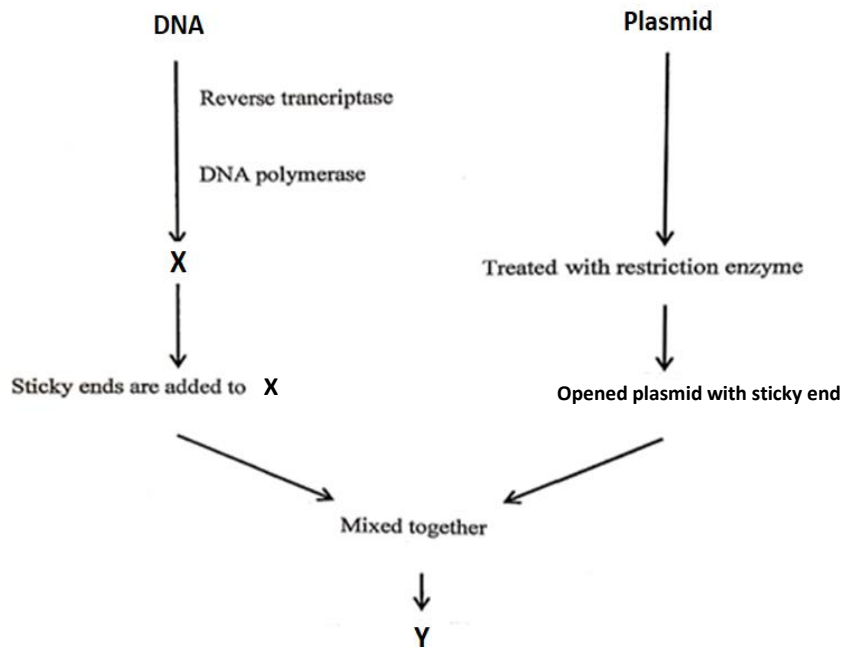


FIGURE 6

(i) Identify molecule **X** and **Y**.

[2 marks]

X: _____

Y: _____

(ii) What would be the consequences if enzyme DNA polymerase is not functional?

[1 mark]

(iii) Explain briefly how sticky ends are linked when **X** and opened plasmid molecule are mixed.

[2 marks]

7. (a) Explain briefly the consequences if megaspore mother cells fails to undergo meiosis.

[3 marks]

(b) **FIGURE 7** shows the concentration of hormones during pregnancy.

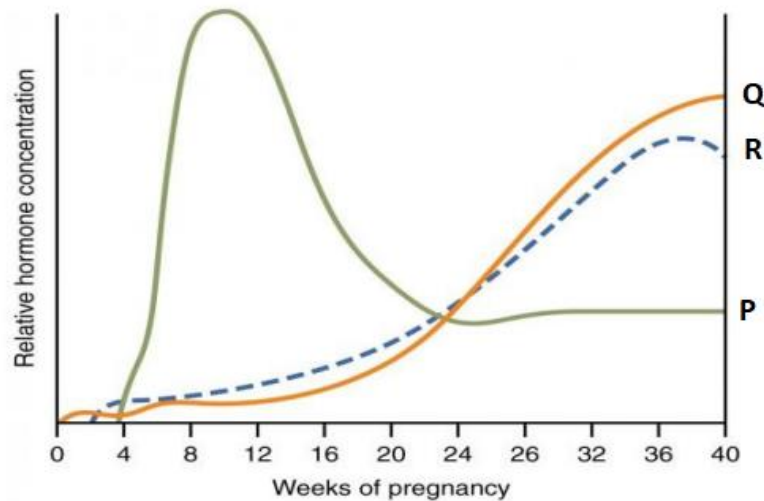


FIGURE 7

(i) Name hormone **P**, **Q** and **R**.

[3 marks]

P: _____

Q: _____

R: _____

(ii) Describe the role of hormone **P** during the first trimester of pregnancy.

[2 marks]

(iii) State why hormone **P** decline after the first trimester of pregnancy.

[2 marks]

(iv) During second trimester of pregnancy, 20% of woman may experience bleeding. Relate bleeding with the level of hormone **R** during pregnancy.

[2 marks]

(v) Explain the significance of the increasing levels of hormone **Q** during last weeks of pregnancy?

[2 marks]

(c) **FIGURE 8** shows two types of plant growth pattern. Give TWO differences between **P** and **Q**.

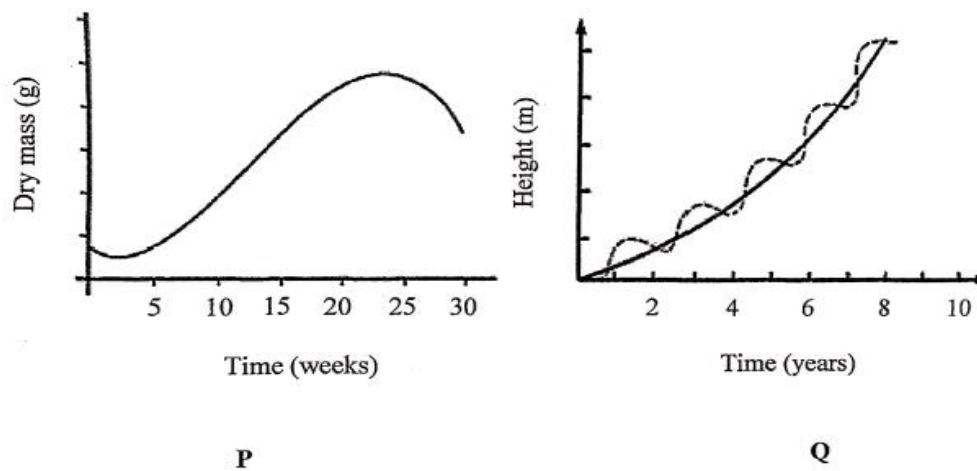


FIGURE 8

[2 marks]

END OF QUESTION PAPER