FUKIEN SECONDARY SCHOOL
S6 First Term Uniform Test (2020-2021)
Biology
(1 hour)

Date: 21st October 2020 Name: _____
Time: 10:15a.m. – 11:15a.m. Class: _____No.: _____

Instructions to students:

1. Write your name, class and class number on both the question paper and the answer sheets.
2. Answer ALL questions.
3. Write down all the answers on the answer sheets.
4. Hand in the question paper and the answer sheets at the end of the examination.
5. The total mark of the paper is 60.

I. Multiple Choice Questions (20 marks)

1. If a heterozygous grey fruit fly is mated with a black-bodied fruit fly, what proportion of the offspring would be black?
   A 0%
   B 25%
   C 50%
   D 100%

2. A couple with normal vision gave birth to two boys. One of the boys suffers from red-green colour blindness. Which of the following are the genotypes of the couple?
   A X^BX^b and X^bY
   B X^BX^b and X^BY
   C X^bX^b and X^bY
   D X^BX^B and X^bY

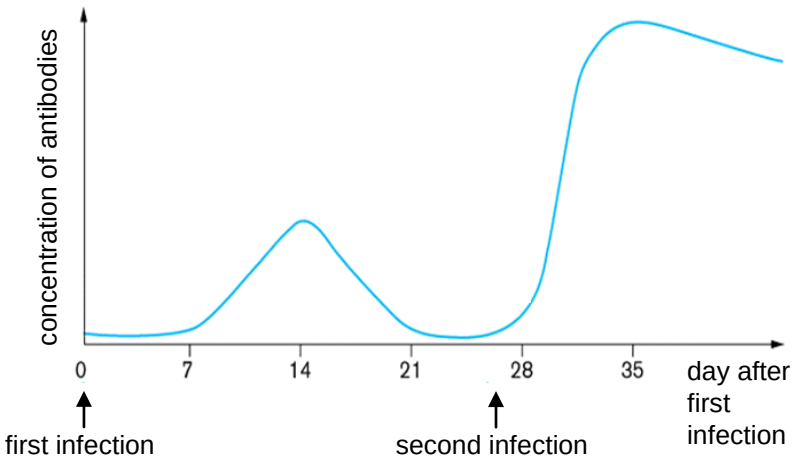
3. Which of the following comparisons between type 1 and type 2 diabetes is correct?

	Type 1 diabetes	**Type 2 diabetes**
A	Represents more than 90% of diabetes cases in Hong Kong	Represents less than 10% of diabetes cases in Hong Kong
B	Is caused by genetic factors only	Is caused by environmental factors only
C	Affects children only	Affects adults only
D	Can be controlled by injections of insulin	Cannot be controlled by injections of insulin

4. If a polypeptide consists of 240 amino acids, what is the minimum number of nucleotides needed on the sense strand (the coding strand) of a gene to code for it?

A 80
B 240
C 720
D 1440

5. The diagram below shows the concentration of antibodies in the blood of aperson infected with the same pathogen twice.

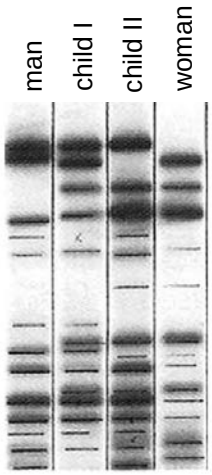


What can be deduced from the diagram?

A More pathogens are involved in the second infection.
B The pathogens in the first infection were inactivated before entering the body.
C More phagocytes were involved in the second infection.
D Plasma cells were produced faster in the second infection.

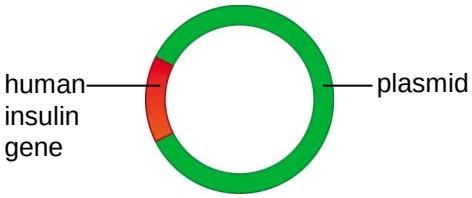
6. What causes artificial active immunity?
   A deliberately exposing a child to a disease
   B secretion of antibodies in milk
   C inoculation with a vaccine
   D injection of monoclonal antibodies

7. What conclusion can be made from the following evidence from an analysis of DNA fragments?



   A Both children are related to both parents.
   B Child I is related to the man but child II is not.
   C Both children are unrelated to either of the parents.
   D Child II is related to the man but child I is not.

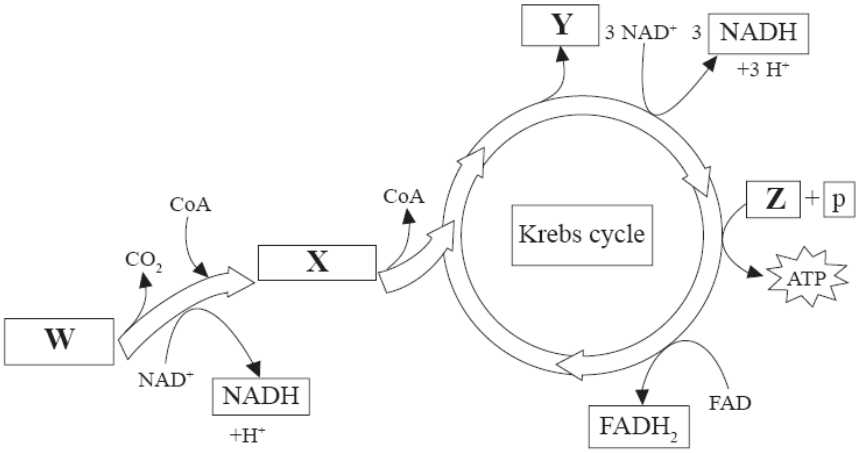
Directions: Questions 8 and 9 refer to the diagram below. The diagram shows a recombinant plasmid involved in the production of human insulin using recombinant DNA technology.



8. Which of the following cells is the best source of the human insulin gene?
   A E. coli
   B pig pancreatic cell
   C human red blood cell
   D human pancreatic cell

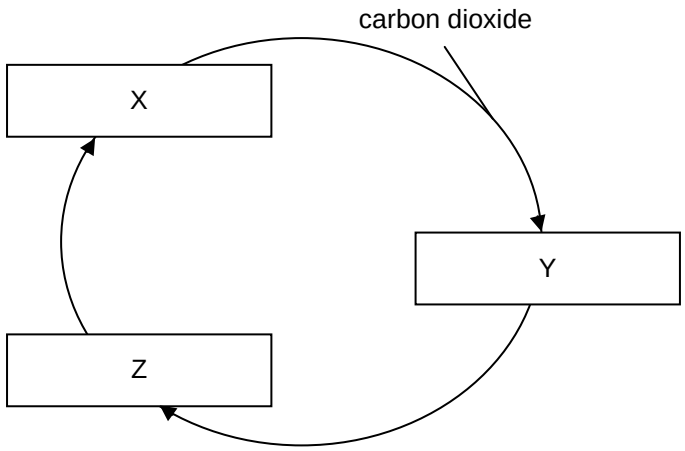
9. Which cell should the recombinant plasmid be introduced into for rapid replication?
   A bacterial cell
   B plant cell
   C pig pancreatic cell
   D human pancreatic cell

10. The diagram below shows the link reaction and stages of the Krebs cycle. Which molecules are represented by the letters W, X, Y and Z?



	W	X	Y	Z
A	acetyl-CoA	carbon dioxide	ADP	pyruvate
B	pyruvate	acetyl-CoA	carbon dioxide	ADP
C	ADP	carbon dioxide	acetyl-CoA	pyruvate
D	acetyl-CoA	pyruvate	carbon dioxide	ADP

11. The diagram below shows the Calvin cycle.



Which of the following correctly shows the number of carbon of compounds X, Y and Z?

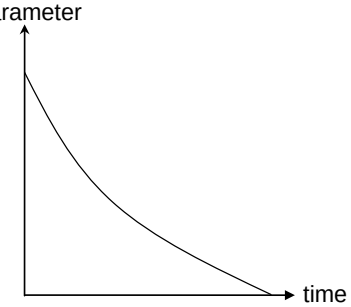
	X	Y	Z
A	5-C	6-C	3-C
B	5-C	3-C	6-C
C	3-C	3-C	5-C
D	5-C	3-C	3-C

12. Which of the following substances pass in and out of the leaves through the stomata?
    (1) carbon dioxide
    (2) oxygen
    (3) water vapour
    A (1) and (2) only
    B (1) and (3) only
    C (2) and (3) only
    D (1), (2) and (3)

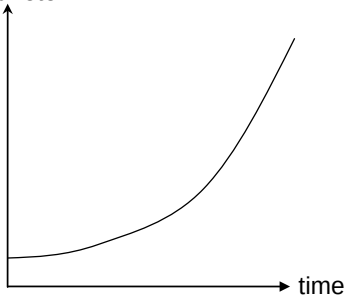
13. How are single-celled organisms different from the more complex organisms?
    A Single-celled organisms do not respond to stimuli.
    B Single-celled organisms do not reproduce.
    C Single-celled organisms do not have tissues.
    D Single-celled organisms are made up of a number of cells.

14. Which of the following graphs shows the parameter being controlled by a negative feedback mechanism?

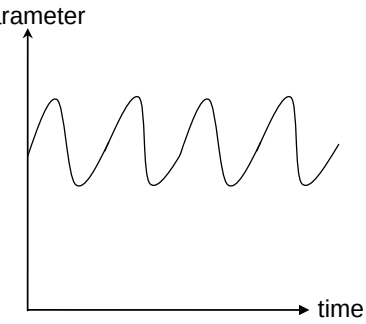
A



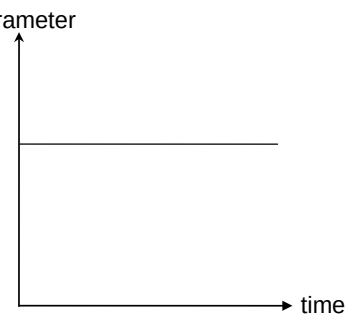
B



C

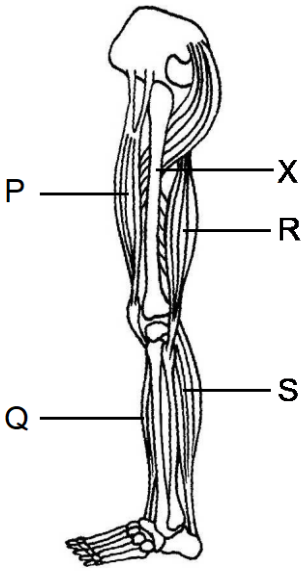


D



Directions: Questions 15 and 16 refer to the diagrams below. Diagram I shows an athlete at the starting blocks. Diagram II shows the muscles and the bones in his left leg.

I



II

15. In diagram I, which muscles in the left leg of the athlete are contracting?

A P and Q

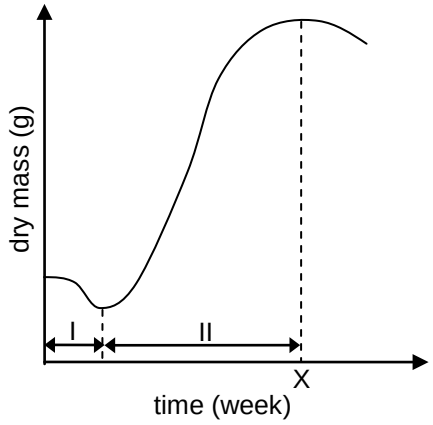
B P and S

C Q and R

D R and S

16. Which of the following are produced in structure X?
    (1) calcium salts
    (2) red blood cells
    (3) white blood cells
    A (1) and (2) only
    B (1) and (3) only
    C (2) and (3) only
    D (1), (2) and (3)

17. The diagram shows the growth curve of an annual plant.



What happens during periods I and II?

	I	II
A	The rate of photosynthesis is zero.	The rate of photosynthesis is faster than the rate of respiration.
B	The rate of photosynthesis is equal to the rate of respiration.	The rate of photosynthesis is slower than the rate of respiration.
C	The rate of photosynthesis is slower than the rate of respiration.	The rate of photosynthesis is equal to the rate of respiration.
D	The rate of photosynthesis is faster than the rate of respiration.	The rate of photosynthesis is equal to zero.

18. A vasectomized man cannot
    A produce sperm in his testes.
    B produce sex hormones in his testes.
    C have sexual intercourse with his wife.
    D pass sperm to his wife.

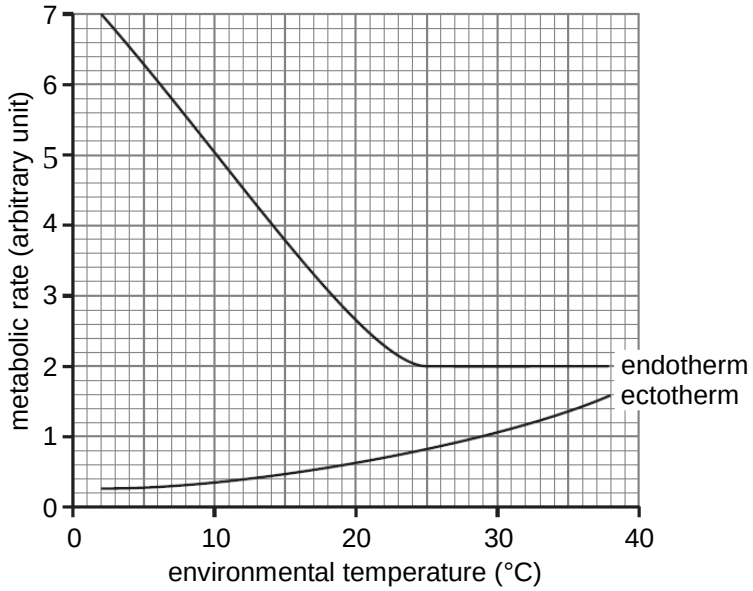
19. Which of the following is/are the advantage(s) of sexual reproduction?
    (1) The chance of disease transmission from parents is reduced.
    (2) There is a greater variation among the offspring.
    (3) Offspring receives water and nutrients from parents.
    A (1) only
    B (3) only
    C (1) and (2) only
    D (2) and (3) only

20. Which of the following statements about the second meiotic division is correct?
    A Independent assortment of chromosomes occurs.
    B Pairing of homologous chromosomes occurs.
    C Each chromosome consists of a pair of chromatids during prophase.
    D Chromosomes become visible at the end of telophase.

End of Part I

II. Structured Questions (40 marks)

1. The metabolism of endotherms (homoiotherms) and ectotherms (poikilotherms) is influenced by the temperature of the external environment, though in different ways. The graph below shows how the metabolic rate of both groups is influenced by changes in environmental temperature.



a Explain why the metabolic rate of an endotherm increases as the environmental temperature falls below 20°C. (2 marks)

b Suggest explanations for the metabolic rate of an endotherm remaining steady between 25°C and 40°C. (2 marks)

c Explain why the metabolic rate of an ectotherm increases as the environmental temperature increases. (2 marks)

d At a low temperature, the metabolic rate of an endotherm is many times that of an ectotherm. Suggest ***one*** advantage and ***one*** disadvantage of this. (2 marks)

2. There are various causes of infertility.

a Explain why infertility may result in each of the following situations.

i The level of follicle stimulating hormone (FSH) in blood is low. (2 marks)

ii The level of luteinising hormone (LH) in blood is low. (2 marks)

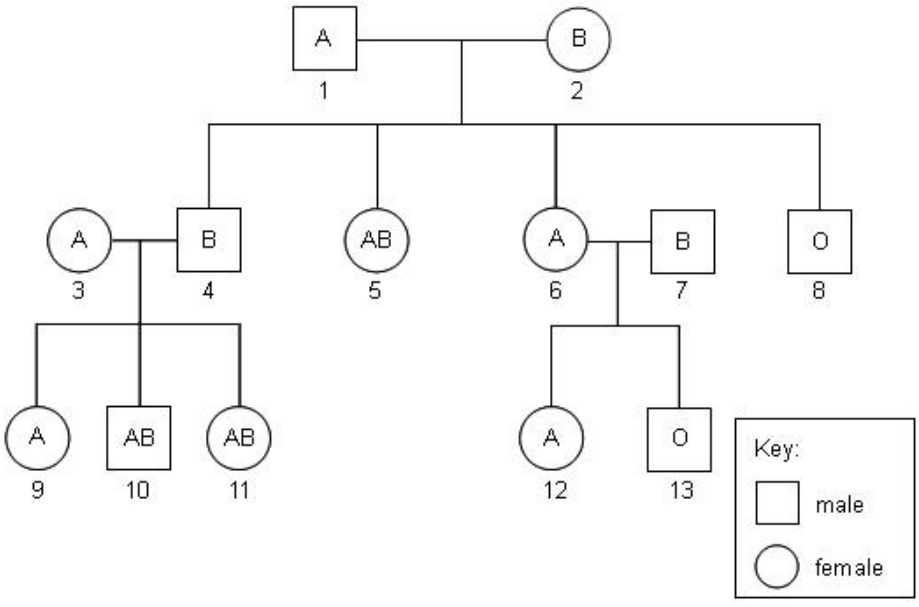
b The ova released by a woman can be fertilized successfully, but the resulting embryo cannot implant. Her doctor prescribed some pills for her. Suggest what kind(s) of hormone(s) may be present in the pills and explain how this/these hormone(s) can increase the chance of pregnancy. (3 marks)

3. Human blood can be classified into four groups, A, B, AB and O. ABO blood groups are determined by the presence or absence of antigens A and B on the surface of the red blood cells. The inheritance of blood groups is controlled by three alleles:

I^A	Responsible for the production of antigen A
I^B	Responsible for the production of antigen B
I^O	Produces no antigens

Alleles I^A and I^B are co-dominant while allele I^O is recessive to both.

The pedigree below shows the inheritance of ABO blood groups in a family.



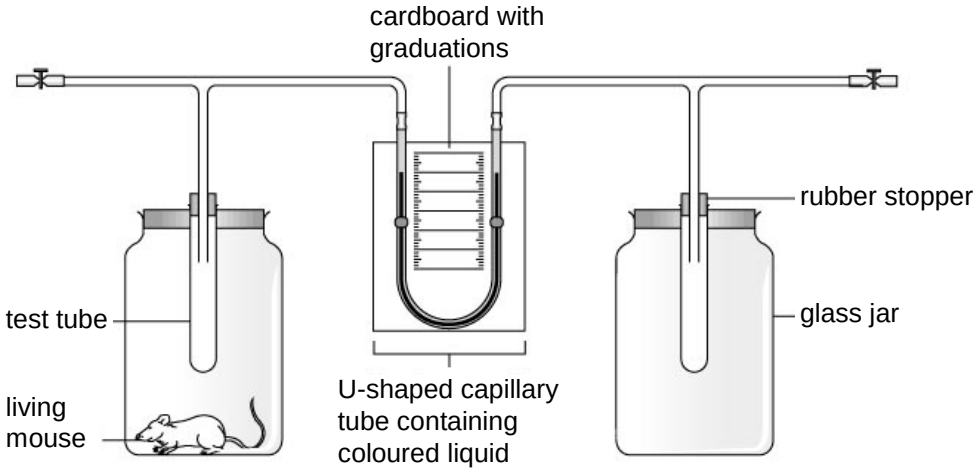
a Which antibody or antibodies is/are present in the plasma of individual 13? (1 mark)

b What are the genotypes of individuals 1 and 2 respectively? (2 marks)

c If individuals 6 and 7 are going to have another child, what is the chance that the child would be a girl of blood group A? Explain your answer. (4 marks)

d A girl claimed that she is the daughter of individual 5. The girl is of blood group O. Explain whether this girl is the daughter of individual 5. (3 marks)

4. A student prepared the following set-up to demonstrate the release of heat by a living mouse during respiration.



a The coloured liquid levels on both sides of the U-shaped capillary tube did not change much in the investigation. Why? (2 marks)

b What would happen to the liquid levels if the set-up was able to detect the heat production? Explain. (3 marks)

c Suggest ***one*** improvement to make the set-up more sensitive to heat changes. (2 marks)

d Write a word equation to show how heat was produced during respiration by the mouse. (2 marks)

e Apart from being lost as heat, state ***one*** other fate of the energy released during respiration. (1 mark)

5. Describe how homeostasis is brought about by negative feedback mechanism. (5 marks)

End of Paper