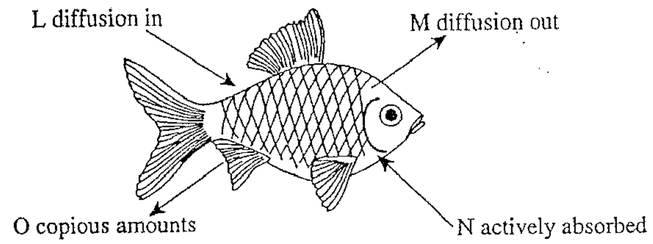
1. Antidiuretic hormone, ADH, is secreted by the pituitary gland. Its role is to regulate the functioning of the kidney. Which of the following does ADH primarily control?

(A) The concentration of sodium and potassium ions in the blood.
(B) The amount of water in the blood.
(C) The filtration process in the glomerulus.
(D) The concentration of urea and salt in the urine.

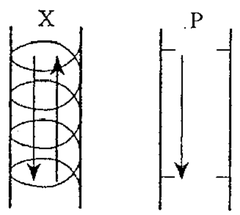
2. The diagram below shows osmoregulation in a freshwater fish.

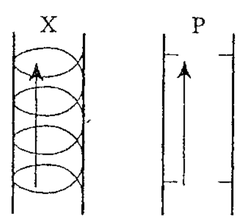


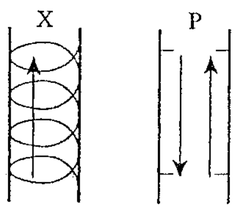
The parts of the diagram labelled L, M, N and O correspond to which alternative below?

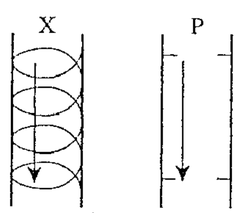
	L	*M*	*N*	*O*
(A)	salt	water	salt	urine
(B)	water	urine	salt	salt
(C)	water	salt	salt	urine
(D)	water	water	salt	urine

3. Which diagram below represents flow of materials (indicated by arrows) in xylem (labelled X) and phloem (labelled P)?

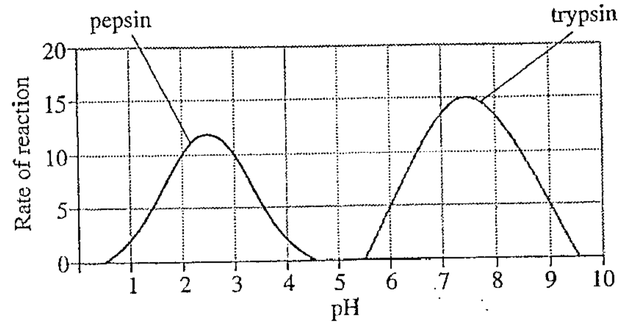
(A)


(B)


(C)


(D)


4. The graph below shows the effect of pH on the action of two different enzymes, pepsin and trypsin.



From the graph, which of the following conclusions can be made?

(A) The pH range for the activity of pepsin is the same as for trypsin.
(B) Pepsin works within the pH range 1 - 4.5 and trypsin 5.5 - 9.5.
(C) Pepsin's optimum rate of reaction is greater than trypsin's.
(D) The rate of reaction for both enzymes decreases significantly above a pH of 5.

5. 'X is an animal whose body temperature is regulated by heat gained from the external environment rather than heat generated by its own metabolic processes.' Which of the following best describes X?

(A) Osmoconformer
(B) Endotherm
(C) Osmoregulator
(D) Ectotherm

6. A gene for density of colour in cats has the alleles black (B) and grey (b). What term(s) would be used to describe a cat with genotype Bb?

(A) Homozygous
(B) Heterozygous
(C) Homozygous dominant
(D) Heterozygous dominant

7. In Shorthorn cattle (*Bos taurus*) a cross between a female with a red coat and a male with a white coat produced offspring of both sexes whose coats contained a mixture of red hairs and white hairs. When these offspring were crossed with each other, some of their offspring had coats with only red hairs. Which of the following would be most useful in explaining the results of these crosses?

(A) Co-dominance
(B) Sex linkage
(C) Simple Mendelian ratios
(D) The effect of environment on genotype

code		*code*	*acid*	*code*	*acid*	*code*	
AAG	phenylalanine	GAA	leucine	*TGG*	threonine	*CAC*	valine
ACA	cysteine	GGA	proline	*TTA*	asparagine	*CCT*	glycine
AGA	serine	GTA	histidine	*TTG*	asparagine	*CGT*	alanine
ATG	tyrosine	GTT	glutamine	*TTT*	lysine	*CTA*	aspartic acid

A small part of a strand had the following sequence of bases coding for four amino acids:

AAGCACCTATTG

A change occurred to one of the bases so that the new sequence was

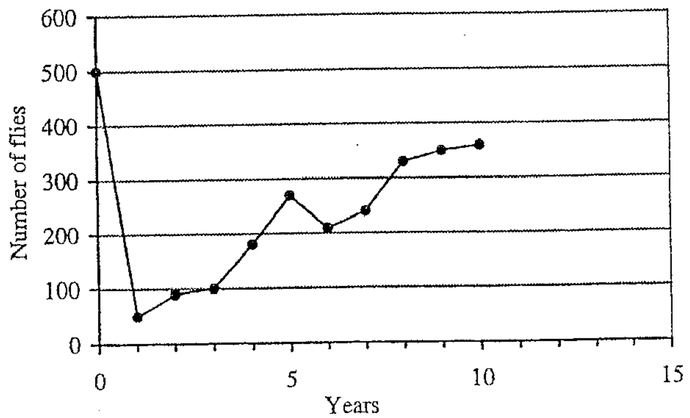
AAGCACGTATTG

Which of the following changes would occur in the amino acid sequence produced?

(A) Tyrosine would be substituted for aspartic acid.
(B) Alanine would be substituted for glycine.
(C) Histidine would be substituted for asparagine.
(D) Histidine would be substituted for aspartic acid.

9. The information in the graph below shows the change in numbers of a fruit fly population that was sprayed with a particular insecticide in the first year of investigation and again five years later.

Change in number of flies over time

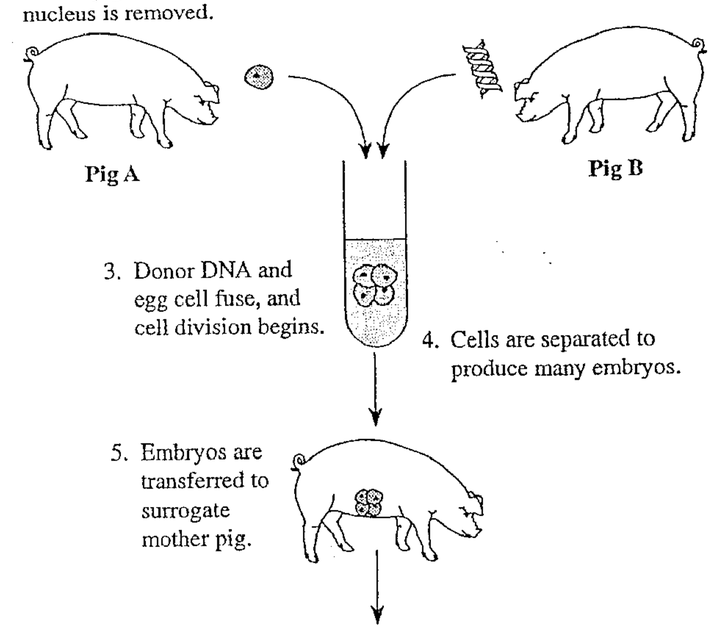


Which of the following best illustrates natural selection in the fly population?

(A) The rapid drop in numbers after the first spraying.
(B) The increase in numbers at the time of the first spraying.
(C) The relatively small drop in numbers after the second spraying.
(D) The gradual increase in numbers over the period of the study.

from a pig and the nucleus is removed.

from another pig.



What will be most likely produced as a result of this process?

(A) Genetically altered pigs
(B) Clones of Pig A
(C) Clones of Pig
(D) Transgenic offspring.

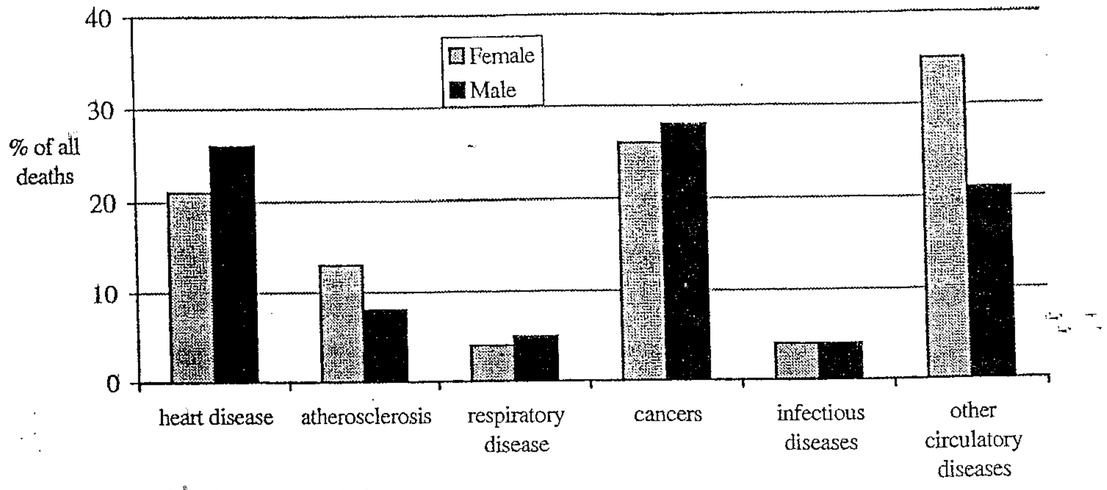
11. Which of the following conditions could be treated with antibiotics?

	Condition	**Cause**
(A)	Down syndrome	Additional chromosome
(B)	Smallpox	Virus
(C)	Pneumonia	Bacteria
(D)	BSE	Prion

12. Which of the following is an example of the body's specific immune response?

(A) The first line of defence such as the skin
(B) Inflammation
(C) Phagocytosis
(D) Antibody production.

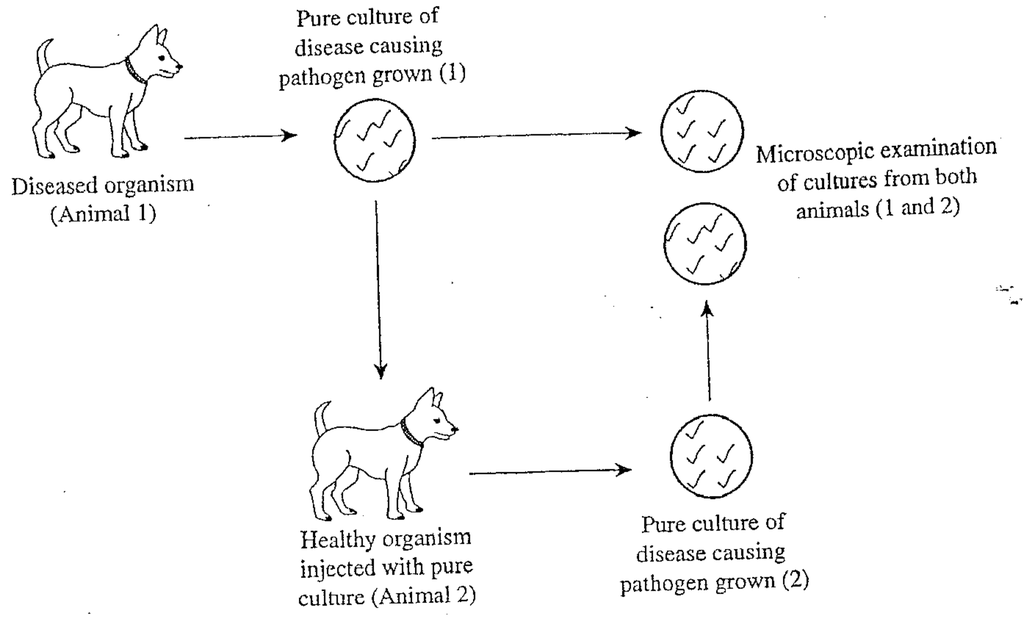
13. Use the information in the graph to answer the question below.



Which statement below is most correct?

(A) The percentage incidence of female deaths from infectious diseases is the same as that of males.
(B) Males die from cancers because they spend too much time in the sun.
(C) Females are more likely to die of heart disease than males.
(D) Diet can influence the prevalence of respiratory diseases in both males and females.

14. Refer to the diagram below.



Which of the following scientists pioneered this procedure?

(A) Ronald Ross
(B) Robert Koch
(C) Louis Pasteur
(D(MacFarlane Burnett

15. Which of the following is most likely to be a strategy for preventing and controlling disease in the community?

(A) Production of antibodies after a viral attack
(B) Use of the pesticide DDT
(C) Immunisation against heart disease
(D) Setting up 'Fit for Life' programs.

Part B

Question 17 (4 marks)

Part B

Total marks 60
Attempt Questions 16-28.
Allow about 1 hour and 45 minutes for this part.

Answer Part B questions in the spaces provided.
Show all relevant working in questions that require calculations.

Question 16 (6 marks)

During your studies you have performed a first hand practical investigation on the structure of the major transport systems in plants.

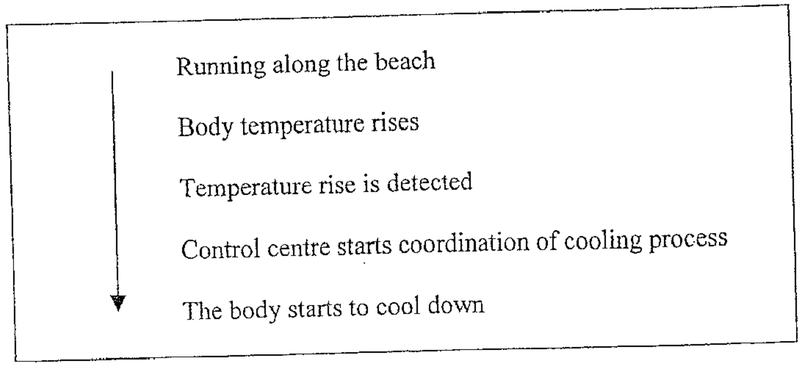
(a) Outline the procedure you used. (2 marks)

(b) Draw a diagram of a longitudinal section of a xylem vessel or phloem tissue under a magnification of 400x. Label TWO features of its structure and relate its importance in the movement of materials throughout the plant. (4 marks)

Question 17 (4 marks)

(a) (i) Outline the steps that occur when a chemical interacts with an enzyme to cause a reaction. (2 marks)

(ii) The regulation of internal conditions in humans is a complex operation.



In the above example of a "biofeedback" system, name the control centre and describe the process the human body goes through to cool down. (2 marks)

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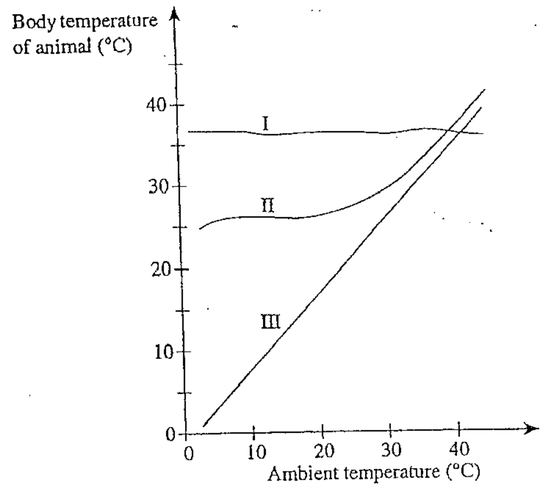
Question 18 (6 marks)

The graph below shows the results of an experiment in which the internal temperature of three different animals was monitored as the ambient (air) temperature changed.



(a) (i) Which of these animals (I, II or III) is most likely to be an endotherm? (1 mark)

(ii) Justify your conclusion using information from the graph. (1 mark)

(b) (i) Define the term *enantiostasis*. (1 mark)

(ii) Discuss the importance of enantiostasis to estuarine organisms. (3 marks)

Question 20 (5 marks)

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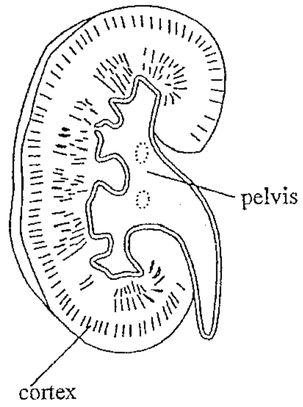
Question 19 (4 marks)

The diagram below shows a section of a healthy mammalian kidney.



(a) Describe TWO differences in the composition of soluble materials taken from the cortex and the pelvis. (2 marks)

(b) Explain the significance of these differences with reference to the kidney's function as an organ involved in homeostasis. (2 marks)

Question 21 (6 marks)

Question 20 (5 marks)

(a) During the nineteenth century, Gregor Mendel and other biologists carried out experiments in an attempt to understand the inheritance of characteristics. Mendel was the most successful in discovering the principles of genetics. Describe two aspects of Mendel's techniques that led to his success. (2 marks)

(b) Farmer McDonald is interested in raising sheep that have white wool, which is a dominant characteristic. He has a prize-winning white ram called Franklin that he wishes to use for breeding purposes, but he needs to ensure that it is homozygous for white wool. He decides to do a test cross using a white heterozygous ewe called Morgan. Use a Punnett square to estimate the chance of producing black sheep if Franklin is heterozygous. Show all of your working. (3 marks)

Question 21 (6 marks)

(a) With reference to a specific example, outline how the theory of evolution is supported by: (4 marks)

(i) palaeontology

(ii) biogeography

(b) With reference to an Australian species, explain why changes in the physical environment, chemical environment or increased competition for resources has led to changes in the species. (2 marks)

Question 22 (6 marks)

Beadle and Tatum developed the hypothesis of 'one gene - one protein'.

(a) State what they meant by this phrase. (1 mark)

(b) Explain why their hypothesis was modified to 'one gene — one polypeptide'. (2 marks)

(c) Outline the work of the geneticists Sutton and Boveri in identifying the importance of chromosomes in cell biology (3 marks)

Question 23 (4 marks)

Genetic engineering is a scientific technique that is rapidly expanding. With reference to a plant AND an animal example that has been genetically altered, discuss the impact this could have on biodiversity. (4 marks)

Question 25 (6 marks)

Question 24 (6 marks)

(a) With the use of a diagram, describe an experiment by Louis Pasteur that contributed to our understanding of the cause of disease. (2 marks)

(b) In your Biology course, you gathered and processed information to trace the historical development of the cause and prevention of a disease caused by a microorganism. Outline your findings. (4 marks)

Question 27 (4 marks)

Question 25 (6 marks)

(a) Distinguish between infectious and non-infectious disease. (1 mark)

(b) Name ONE infectious disease and state: (5 marks)

(i) how the disease is transmitted.

(ii) the typical symptoms of the disease.

(iii) the possible prevention and treatment of the disease.

Question 26 (2 marks)

(a) Suggest a reason for the suppression of the immune response in organ transplant patients. (1 mark)

(b) Describe ONE implication immune suppression may have on a patient. (1 mark)

Question 27 (4 marks)

Identify four T lymphocyte types in the immune system and describe the role each plays in the immune response. (4 marks)

Question 28 (2 marks)

Australia's geographical isolation has ensured the protection of many native plants and animals, but this protection would not have continued without strict quarantine laws. Name ONE disease which is not presently in Australia and describe the consequence if it were to be introduced. (2 marks)