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3009/1

BGCSE

School Number	Candidate Number
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BIOLOGY

PAPER 1 3009/1

Friday

17 MAY 2024

9:00 a.m.–10:15 a.m.
(1 hr. 15 mins.)

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname, name and initials in the spaces provided above.

There are fifty questions in this paper.

Answer **ALL** questions.

For each question, there are four possible answers labelled **A, B, C** and **D**.

Choose the **one** you consider correct and circle the **LETTER** of your choice in the booklet.

Calculators are permitted. However, **NO** graphing calculators are allowed.

FOR EXAMINER'S USE ONLY

Total marks

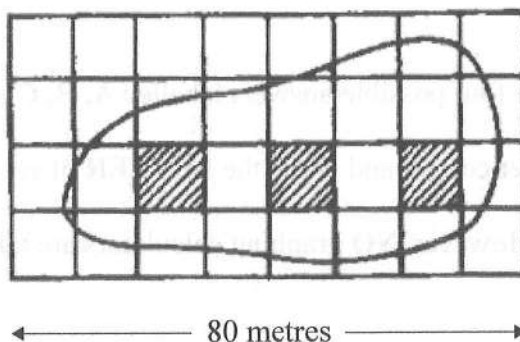
This question paper consists of 23 printed pages and 1 blank page.

1. What term is used to describe the process by which metabolic waste is removed from living organisms?
 - A digestion
 - B excretion
 - C nutrition
 - D respiration

2. A plant was placed in a dark cupboard for 24 hours. It was then exposed to sunlight for six hours. After which, a leaf was taken from the plant and tested for starch. The starch test was positive.

Which characteristic of living things is observed?

- A excretion
 - B irritability
 - C nutrition
 - D respiration
3. The diagram shown was included in a student's report of a study carried out on a pond.

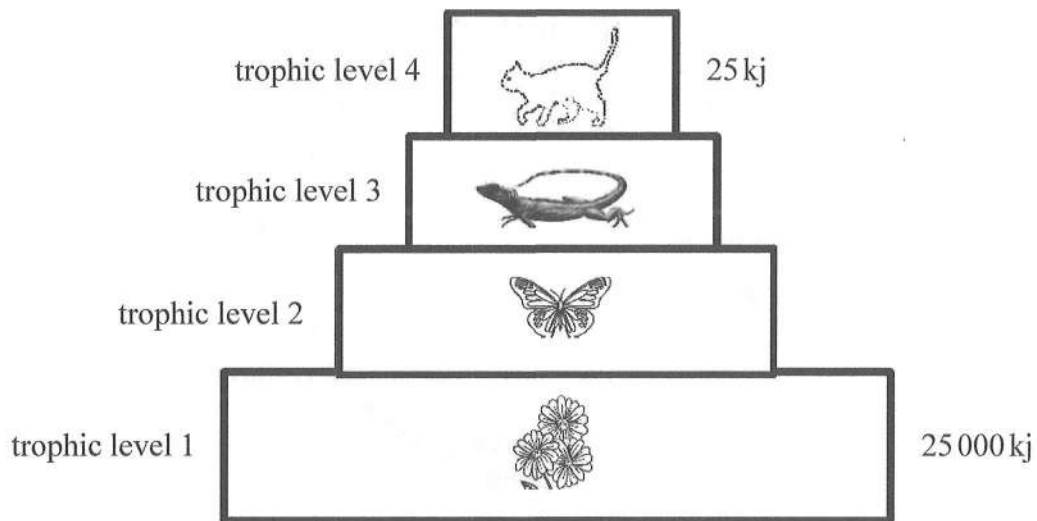


Which description of the diagram is most likely to correctly indicate what the diagram shows?

- A A diagram representing a quadrat placed in a selected habitat.
 - B A diagram showing a large net covering a pond.
 - C A map of a pond to show the main areas being investigated.
 - D A profile of the pond showing the main zones of vegetation.



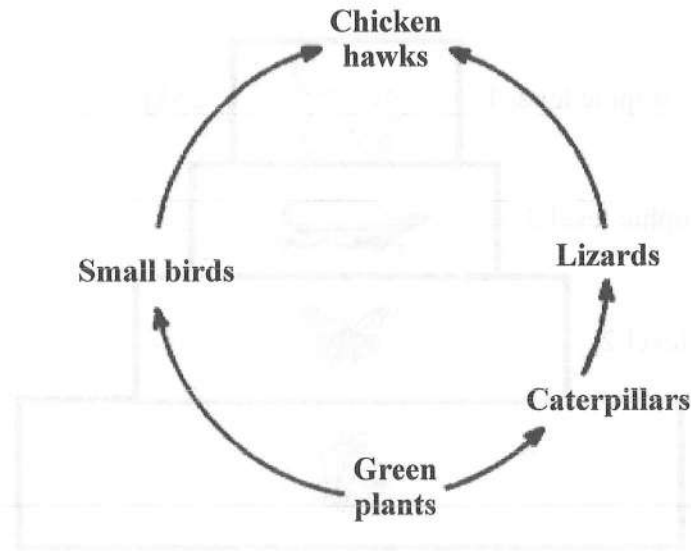
4. The diagram shows the amount of energy transferred in one day to each of the four trophic levels in an ecosystem.



If 10% of the energy transferred to one trophic level is transferred on to the next trophic level, what is the combined amount of energy transferred in one day to trophic level 1 and trophic level 3?

- A** 25 025 kJ
- B** 25 250 kJ
- C** 27 500 kJ
- D** 27 750 kJ

5. The diagram shows a food web.

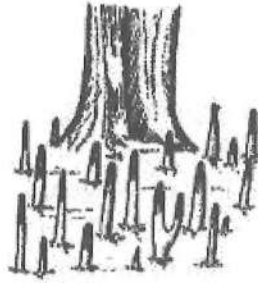


Which of the following organisms occupy the same trophic level?

- A caterpillars and green plants
 - B caterpillars and small birds
 - C chicken hawks and caterpillars
 - D small birds and green plants
6. Which agricultural practice would result in the **greatest** loss of soil nutrients in the long term?
- A adding fertilisers
 - B composting and ploughing back into the land
 - C reforestation
 - D slash and burn



7. The diagram shows a special root system.

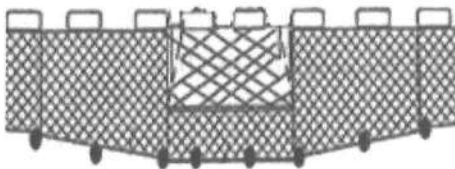


Which mangroves have this root system?

- A black and red mangroves
 - B black and white mangroves
 - C buttonwood and white mangroves
 - D red and buttonwood mangroves
8. The diagrams show different types of fishing gear.

Which type of gear is potentially most destructive to the fish population?

A seine net



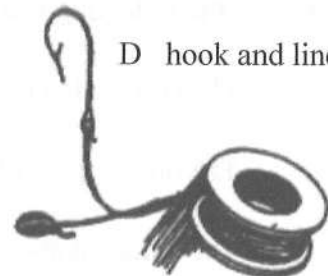
B spear gun



C trap



D hook and line

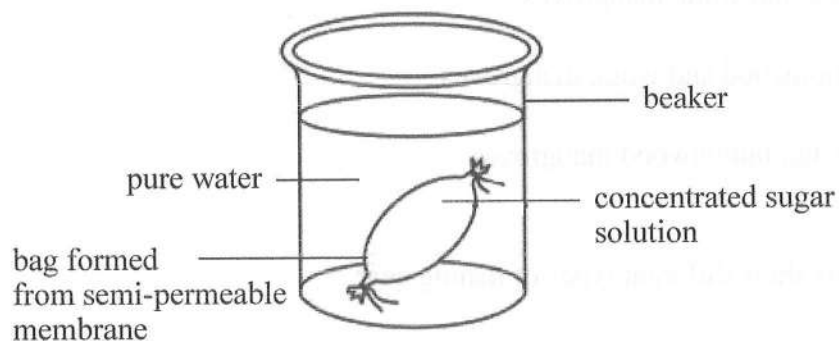


9. Mangroves are found growing in or near water and are able to conserve water.

Which statement best describes the soil condition in which they can grow best?

- A A soil poor in nutrients and high in oxygen.
- B A soil poor in nutrients and low in oxygen.
- C A soil rich in nutrients and high in oxygen.
- D A soil rich in nutrients and low in oxygen.

10. The following apparatus was set up for a day to study the process of osmosis.

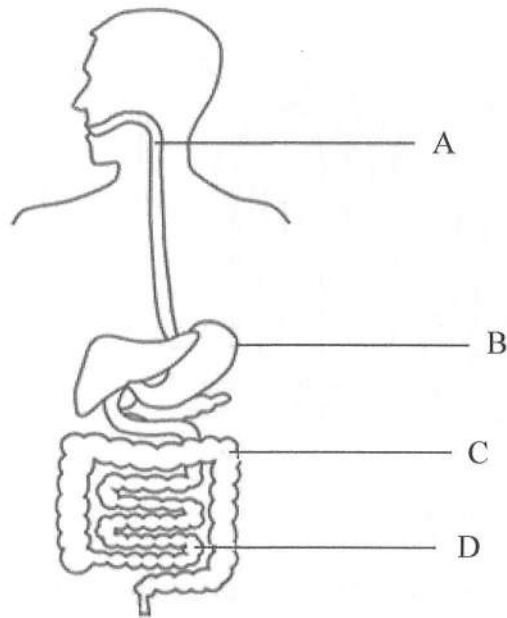


What will be observed at the end of the experiment?

- A The bag will increase in size.
 - B The concentration of the sugar solution will increase inside the bag.
 - C There will be no change inside the bag.
 - D The water level in the beaker will increase.
11. Which of the following is a form of chemical digestion?
- A The conversion of maltose into glucose in the small intestine.
 - B The breaking up of food into smaller pieces by the teeth.
 - C The emulsification of fats by the bile in the small intestine.
 - D The movement of food from the oesophagus to the stomach.



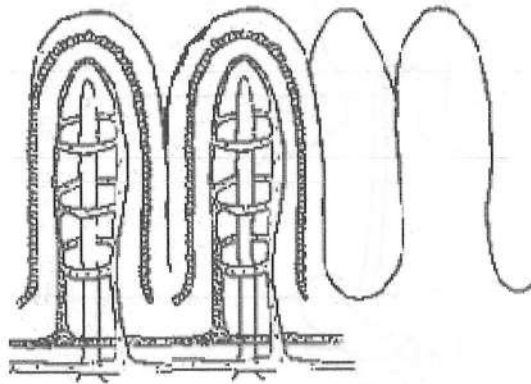
12. Which part of the digestive system has a low pH which is suitable for the action of pepsin?



13. Which elements are present in fats and oils?

- A hydrogen, oxygen and carbon
- B magnesium, phosphorus and hydrogen
- C nitrogen, oxygen and magnesium
- D phosphorus, nitrogen and carbon

14. The diagram shows the cross section of villi (finger-like projections) which are found in the small intestine.



What is the importance of the villi?

- A To allow the nutrients to diffuse into the stomach efficiently.
 - B To decrease the surface area of absorption for nutrients in the body.
 - C To increase the rate of digestion in the body.
 - D To increase the surface area for nutrients to be absorbed.
15. Which of the following would result in long term benefits to the marine fishing industry?
- I Establishing marine protected areas.
 - II Increase in marine pollution.
 - III Large scale dredging of coastal areas and wetlands.
 - IV Period for species renewal and reproduction.
 - V Reduction in overfishing.
- A I, II and III
 - B I, IV and V
 - C III, IV and V
 - D II, IV and V

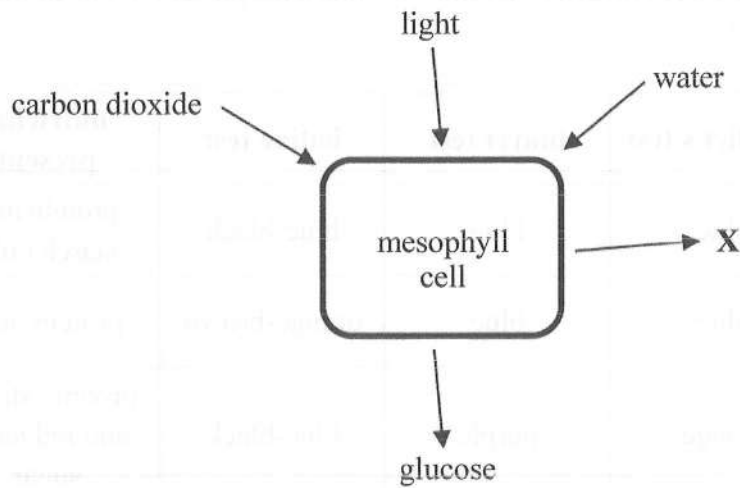


16. A student tested four different foods, A, B, C and D, to identify some of the nutrients present.

Which row of the table correctly identifies the nutrients present in one of the foods from the results of the food tests?

foods	Benedict's test	biuret test	iodine test	nutrients present
A	blue	blue	blue-black	protein and starch only
B	blue	blue	orange-brown	protein only
C	orange	purple	blue-black	protein, starch and reducing sugar
D	blue	blue	blue-black	starch and reducing sugar

The diagram below represents a process in plants. Questions 17, 18 and 19 refer to the diagram.



17. Which of the following is the route taken by the glucose made in the mesophyll cells?
- A mesophyll cells → epidermis → phloem → root cells
 - B mesophyll cells → guard cells → xylem → root cells
 - C mesophyll cells → phloem → root cells
 - D mesophyll cells → xylem → root cells
18. Substance X is a by-product of the process indicated. How does this substance leave the plant?
- A via the epidermis by diffusion
 - B via the phloem by diffusion
 - C via the stomata by diffusion
 - D via the xylem by diffusion
19. During this plant process, light energy is transferred into a different form.
What is this form of energy called?
- A chemical
 - B kinetic
 - C sound
 - D wind

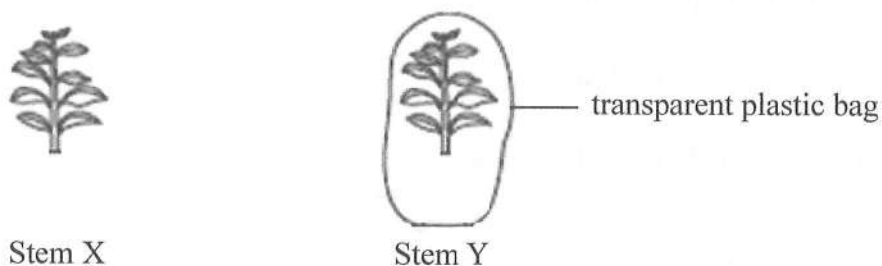


20. Where does translocation of food occur in plants?

- A air spaces
- B phloem sieve tubes
- C stomata
- D xylem vessels

21. The diagram shows an experiment to investigate transpiration in stems cut from the same plant. Both stems were of the same size and mass.

Stem X is not covered and Stem Y is covered with a transparent plastic bag.



What will be the result if both stems were weighed at the beginning of the experiment and two hours later?

- A The mass of Stem X decreased more than Stem Y.
- B The mass of Stem Y decreased more than Stem X.
- C The mass of both stems decreased by the same amount.
- D The mass of both stems stayed the same.

22. Which of the following statements is true?

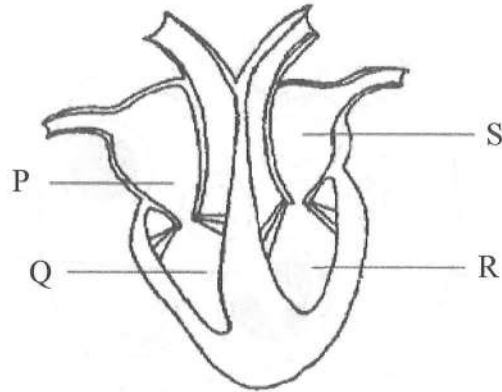
- A Aerobic respiration releases more energy than anaerobic respiration.
- B Anaerobic respiration in yeast forms lactic acid.
- C Humans only respire aerobically.
- D Ethanol is the only product of anaerobic respiration in yeast.

23. Which change occurs as a result of vigorous exercise?
- A a decrease in the blood sugar level
 - B a decrease in the production of lipase
 - C an increase in the blood sugar level
 - D an increase in the production of insulin
24. Which are **TWO** features of gas exchange surfaces in humans?
- A good blood supply and small surface area
 - B good blood supply and thin walls
 - C thick walls and moist lining
 - D thick walls and large surface area
25. Which component of blood is directly responsible for clotting?
- A blood plasma
 - B platelets
 - C red blood cells
 - D white blood cells
26. Which of the following is true of nicotine?
- A It causes addiction in smokers.
 - B It constricts the bronchioles.
 - C It paralyses the cilia lining.
 - D It reduces the lung's ability to reduce dirt and bacteria.

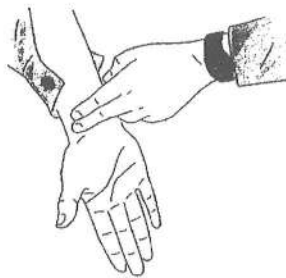


27. The diagram shows a vertical section through a mammalian heart.

Which labelled chambers contain blood at the highest pressure?



- A** P and Q
B P and S
C Q and R
D R and S
28. The diagram shows how to take the radial pulse in the lower arm.



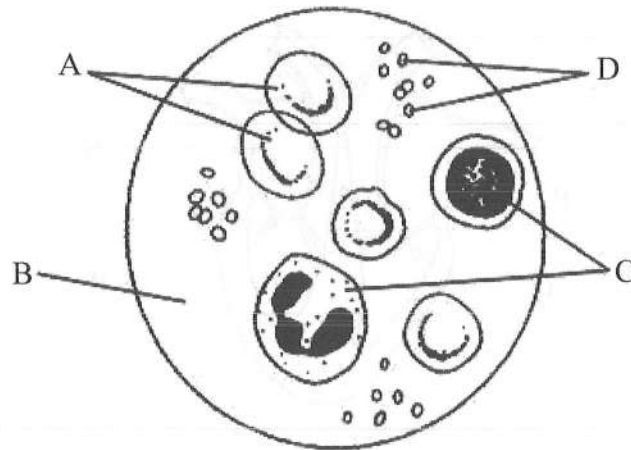
A person counted 24 beats in 15 seconds in the lower arm.

What is the number of beats in one minute?

- A** 39
B 30
C 48
D 96

29. The diagram shows the components of human blood as seen under a microscope.

Which component is responsible for the body's immune response to invading bacteria?

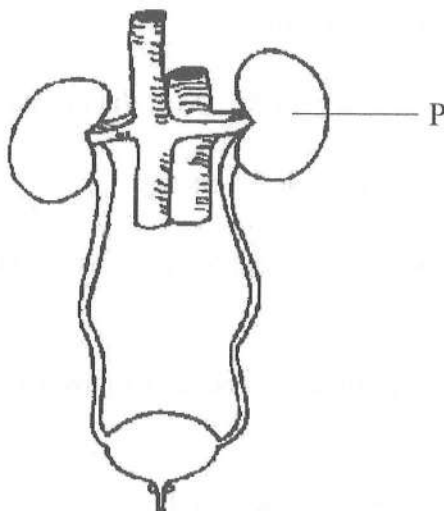


30. Which substances are excretory products of growing plants?

- A calcium oxalate, oxygen and chlorophyll
- B carbon dioxide, glucose and water
- C oxygen, calcium oxalate and tannin
- D glucose, water, and tannin



31. The diagram shows the urinary system.



What is the function of structure P?

- A filters the blood
 - B makes urea
 - C regulates blood glucose level
 - D stores toxins in the blood
32. The renal artery, renal vein and ureter are structures attached to the kidneys.

The table shows the concentration of urea in these three structures on a scale from 1 to 3. The number 1 represents the highest concentration of urea and the number 3 represents the lowest concentration of urea.

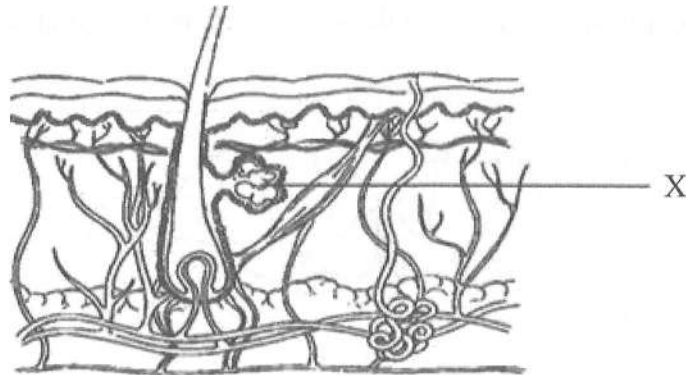
Which of the following correctly gives the concentration of urea in these structures?

	renal artery	renal vein	ureter
A	2	3	1
B	1	3	2
C	3	1	2
D	3	2	1

33. Which statement explains why people with kidney failure should not eat too much protein?
- A They do not need protein to grow.
 - B They are not able to properly make use of the nutrients in protein.
 - C They will use the protein to release energy.
 - D They will accumulate high concentrations of urea in the blood.
34. The adrenal gland, pancreas, pituitary gland and thyroid gland are all examples of endocrine glands.
- Which endocrine gland is also an exocrine gland?
- A adrenal gland
 - B pancreas
 - C pituitary gland
 - D thyroid gland
35. A small raccoon was brought into the laboratory for an experiment. The rate of its heartbeat increased considerably every time it was handled.
- Which structure produces the secretion that caused the raccoon's response?
- A adrenal gland
 - B hypothalamus
 - C pituitary gland
 - D thyroid gland



36. The diagram shows a section through the skin.



What is the correct name and function of structure X?

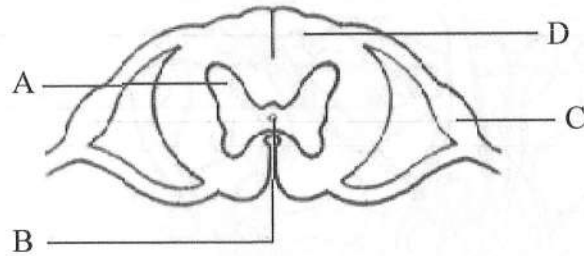
	name	function
A	sebaceous gland	produces oil
B	sebaceous gland	produces sweat
C	sweat gland	produces oil
D	sweat gland	produces sweat

37. Which structures are **not** found in the dermis of the skin?

- A blood vessels
- B hair follicles
- C melanocytes
- D sweat glands

38. The diagram below shows a transverse section of the spinal cord.

In which one of the following regions of the spinal cord are the synapses to be found?



39. Which one of the following parts of the eye causes the greatest refraction of light?

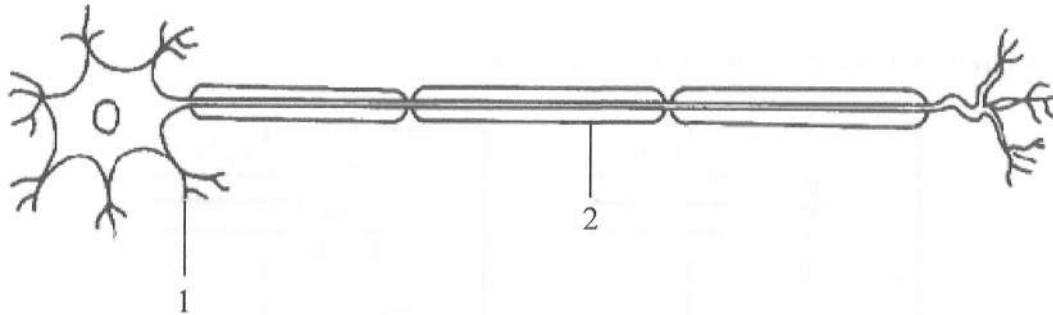
- A aqueous humor
- B cornea
- C lens
- D vitreous humor

40. Which of these conditions applies to the iris muscles when the eye is in bright light?

- A circular muscles contract, radial muscles relax
- B circular muscles contract, radial muscles contract
- C circular muscles relax, radial muscles relax
- D circular muscles relax, radial muscles contract



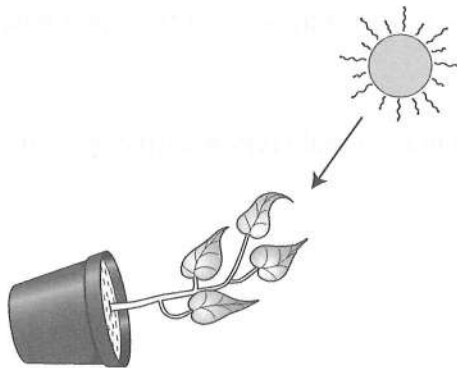
41. The diagram shows a motor neurone.



Which row correctly labels the diagram?

	1	2
A	axon	dendrite
B	cell body	axon
C	dendrite	myelin sheath
D	synapse	dendrite

42. The diagram shows the growth of a shoot in response to gravity and light.

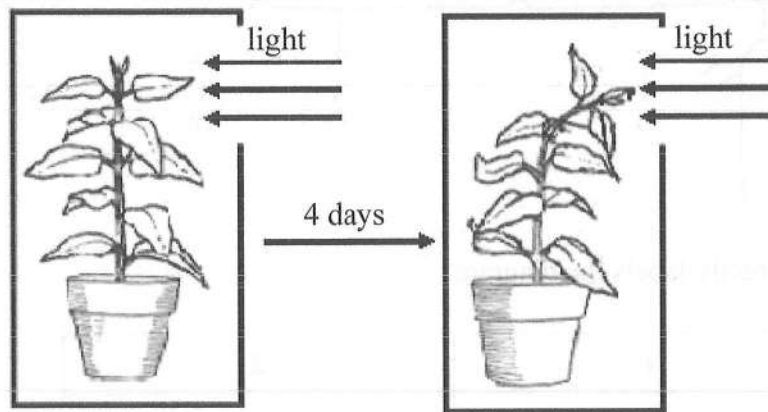


Which growth responses are shown in the diagram by the shoot?

- A negative geotropism, negative phototropism
- B positive geotropism, negative phototropism
- C negative geotropism, positive phototropism
- D positive geotropism, positive phototropism

43. A seedling was covered with a cylindrical box with a side opening. A lamp was placed near the side opening of the box for four days.

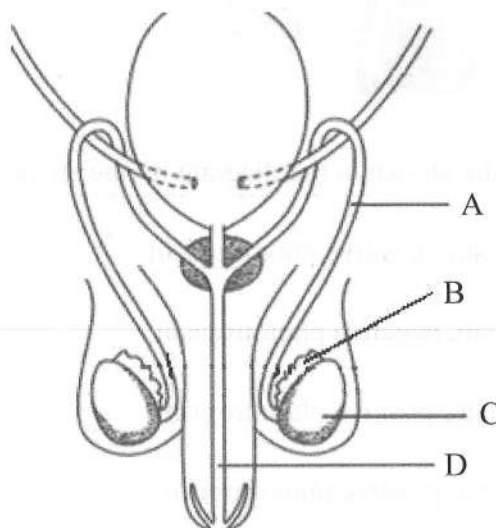
The diagram shows the results of the experiment.



What accounts for the growth of the seedling towards the light?

- A Auxin accumulates more on the side of the shoot tip closest to the light.
 - B Auxin accumulates more on the side of the shoot tip farthest from the light.
 - C Auxin accumulates more on the side of the shoot base closest to the light.
 - D Auxin accumulates more on the side of the shoot base farthest from the light.
44. The diagram represents the human male reproductive system.

Which part stores gametes?



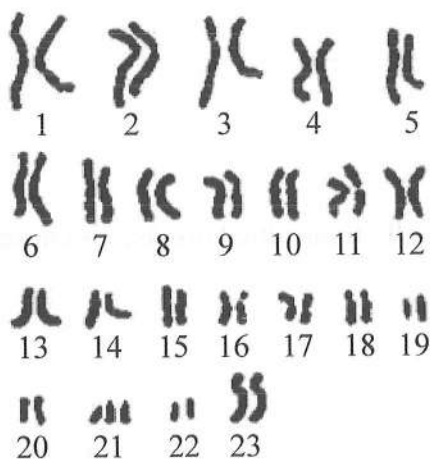
45. What explains why the menstrual flow stops during pregnancy?
- A There is an absence of progesterone.
 - B The development of the foetus stops movement of sperms in the uterus.
 - C The foetus feeds on the menstrual lining.
 - D The uterus lining is needed to supply oxygen and nutrients to the foetus.
46. Which of the following occurs in humans after fertilisation has occurred?
- I The zygote divides by mitosis.
 - II The zygote divides by meiosis.
 - III The uterus lining increases in thickness.
 - IV The fallopian tube pushes the zygote towards the uterus.
- A I and II only
 - B I, III and IV only
 - C II, III and IV only
 - D I, II and III only
47. Which of the following sexually transmitted diseases is caused by a virus?
- A chlamydia
 - B gonorrhoea
 - C herpes
 - D syphilis

48. The diagram shows a developing foetus.



Which of the following is **not** true of structure X?

- A It is attached to the uterus.
 - B It is connected to the foetus.
 - C It contains capillaries from the mother only.
 - D It helps the foetus to excrete waste materials.
49. The diagram shows the chromosomes present in each body cell of one person.

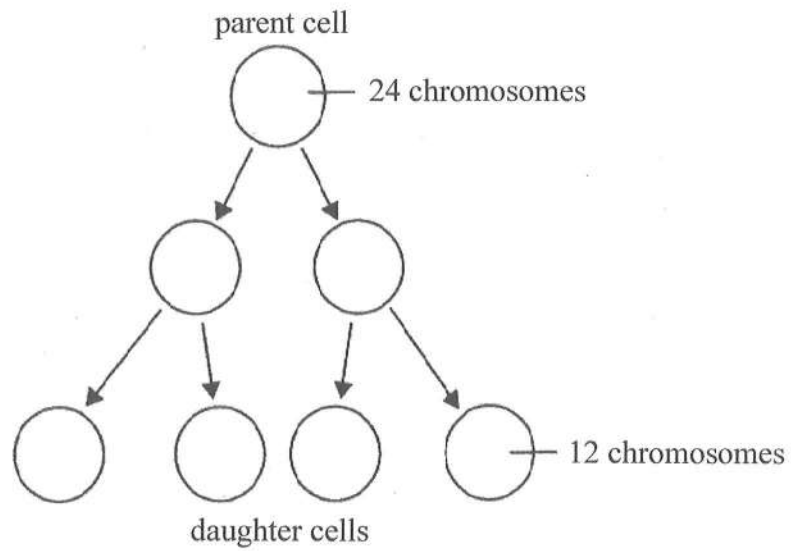


Which number identifies chromosomes that show an error must have occurred during cell division?

- A 1
- B 10
- C 21
- D 23



50. The diagram represents one type of cell division.



Which type of cell could be represented by the daughter cells in the diagram?

- A bone cell
- B blood cell
- C muscle cell
- D gamete

The figure shows a sequence of 10 numbers in a triangle.



Which of the following is a factor of the sum of the numbers in the triangle?

- A 120
- B 180
- C 240
- D 360

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3009/2

BGCSE

School Number	Candidate Number
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BIOLOGY

PAPER 2 3009/2

Friday

17 MAY 2024

10:30 a.m.–12 noon
(1 hr. 30 mins.)

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

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INSTRUCTIONS AND INFORMATION FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname, name and initials in the spaces provided above.

Answer **ALL** questions on this paper.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

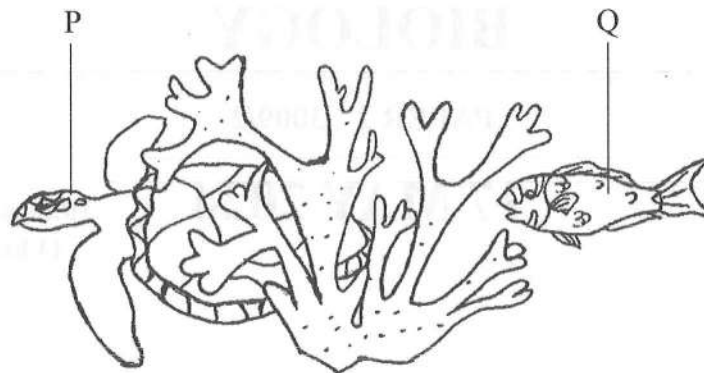
Confine your answer to the lines following each question. The mark for each part-question is given in brackets [].

Calculators are permitted. However, **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 17 printed pages and 3 blank pages.

1. The diagram below shows a thin finger coral (*Porites furcata*), and two other marine organisms in a Bahamian coral reef ecosystem.



- (a) Complete the following information about the classification of the thin finger coral.

Genus	
Species	

[2]

- (b) Give **TWO** differences between organisms P and Q.

1 _____

2 _____

_____ [2]

- (c) (i) Explain the importance of the binomial system.

_____ [1]

- (ii) Define the term species.

_____ [1]



- (d) Name **TWO** abiotic factors that affect the growth of corals.

1 _____

2 _____ [2]

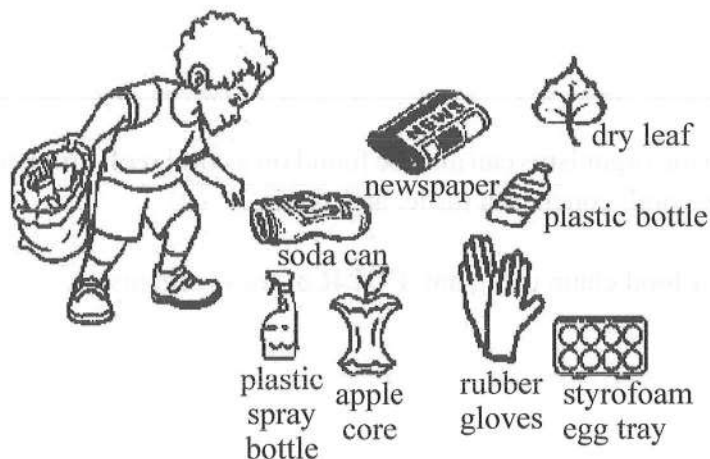
- (e) The following organisms can also be found on a coral reef: grouper, phytoplankton, parrot fish, algae, coral, conch, sea turtle, and shark.

Construct a food chain using any **FOUR** of these organisms.

[2]

TOTAL MARKS [10]

2. The diagram below shows waste items collected during lunch time on a school campus.



- (a) (i) Each of the waste items collected can be classified into one of two groups of materials: biodegradable or non-biodegradable.

Using the table below, classify any **FOUR** of the waste items collected, into one of these two groups of materials.

biodegradable materials	non-biodegradable materials

[2]

- (ii) Name **ONE** waste item that would be a potential threat or danger to marine life and explain your choice.

name of waste _____

explanation _____

[3]



(b) Some of the waste items collected on the school campus can be recycled or reused.

(i) State **TWO** advantages of recycling waste items.

1 _____

2 _____
_____ [2]

(ii) Describe **ONE** challenge of recycling waste items.

_____ [1]

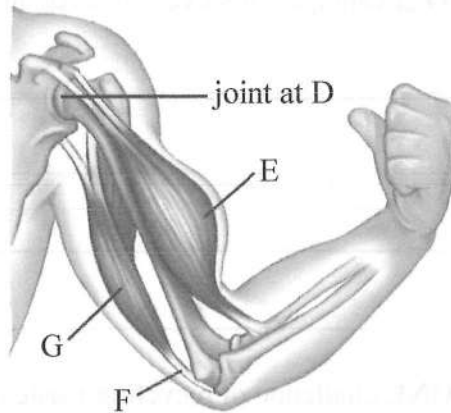
(c) Apart from recycling and reusing, identify **TWO** other ways, that the school may reduce the amount of waste items on the school's campus.

1 _____

2 _____
_____ [2]

TOTAL MARKS [10]

3. The diagram shows the muscles and bones that are used to bend and straighten a person's arm.



- (a) Describe the role of tissue F.

F _____
_____ [1]

- (b) (i) Name the liquid found in the joint at D **AND** describe the function of this liquid.

name of liquid _____
describe the function _____
_____ [2]

- (ii) Name the structure found at joint D that acts as a shock absorber.

_____ [1]

- (c) A male athlete is in training and is lifting dumb-bell weights. The athlete initially lifts the dumb-bells a short distance off the ground, then bends his arms to raise the dumb-bells to chest height. Finally, the athlete straightens his arms to push the dumb-bells straight up above his head.

- (i) State the names of the muscles E and G.

muscle E _____

muscle G _____ [1]



Describe what happens to muscle E and G to:

- (ii) bend the arms to raise the dumb-bell to chest height

_____ [2]

- (iii) straighten the arms to push the dumb-bell straight up above the head.

_____ [2]

- (d) State the term used to describe a pair of muscles such as muscles E and muscle G, that work together to control a particular movement.

_____ [1]

TOTAL MARKS [10]

4. The table below shows the blood sugar level of two individuals, X and Y, after each consumed a solution containing 100 g of sugar. Sugar levels were recorded every 30 minutes for three hours (180 minutes) from the time of consumption of the sugar solution (0 minutes).

time/minutes	blood sugar level/mg per 100 cm ³ blood	
	individual X	individual Y
0 (sugar drink consumed)	90	90
30	160	130
60	220	120
90	200	110
120	150	90
150	140	90
180	110	90

- (a) (i) Describe the change to the blood sugar level for individual Y during the three hours (180 minutes) after drinking the sugar solution.

[2]

- (ii) Name the hormone that is released as a result of drinking a solution containing 100 g of sugar.

_____ [1]

- (iii) Name the organ where this hormone is produced.

_____ [1]



- (iv) Explain the role of the hormone named in (a)(ii) in controlling the blood sugar level in the body.

[3]

- (b) (i) From the results in the table, suggest the name of the disease individual X has.

[1]

- (ii) Give **ONE** reason for your answer to part (b)(i).

[1]

- (iii) State the name of the term used to describe the maintenance of constant internal conditions, such as the control of blood sugar levels.

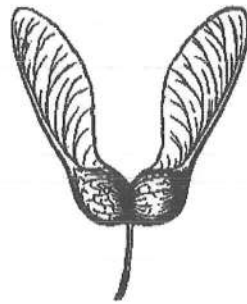
[1]

TOTAL MARKS [10]

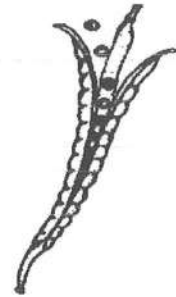
5. The diagrams below show three different types of fruits.



S



T



U

- (a) (i) Name the method of dispersal for each fruit and give one adaptive feature for its dispersal.

diagram	method of dispersal	adaptive features
S		
T		
U		

[3]

- (ii) Suggest the letter of the fruit that is likely to be dispersed furthest from the parent plant.

_____ [1]

- (b) (i) Coconuts are dispersed by water.

Suggest and explain how coconuts are adapted so that they can be dispersed by water.

[3]



- (ii) Describe **TWO** benefits of seed dispersal to plants.

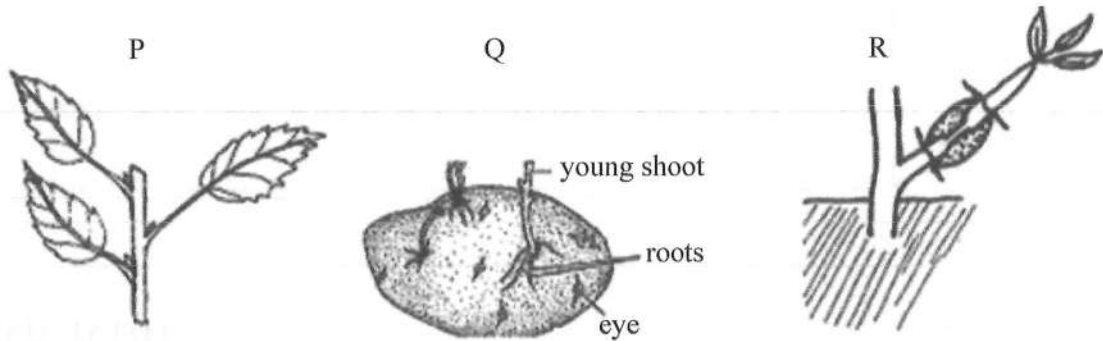
1 _____

2 _____

_____ [2]

TOTAL MARKS [9]

6. The diagrams show different methods of asexual reproduction.



(a) (i) Name the different methods of asexual reproduction shown in the diagrams above.

P _____

Q _____

R _____ [3]

(ii) State which structures in diagram Q could be used to produce a new plant.

_____ [1]

(iii) Describe how diagram Q can be used to produce several new plants.

_____ [2]

(iv) State **TWO** differences between methods P and R named in (a)(i).

1 _____

2 _____

_____ [2]



- (b) State **TWO** differences between asexual and sexual reproduction in plants.

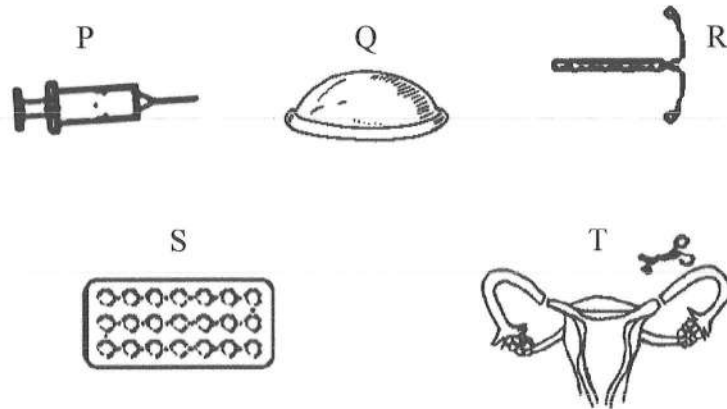
1 _____

2 _____

_____ [2]

TOTAL MARKS [10]

7. The diagrams represent various forms of birth control methods.



(a) Write the letter of the birth control method which best fits the description.

	description	method
(i)	Administered once every 3 months	
(ii)	Block the entrance to the uterus	
(iii)	Surgical procedure done on females	
(iv)	Taken orally	

[4]

(b) (i) Give the name of a hormone contained in birth control pills.

_____ [1]

(ii) Describe how the pill works as a method of chemical birth control.

_____ [1]



- (c) State **ONE** step that must be completed for birth control methods R and T before they can be used.

_____ [1]

- (d) The table below show the results of a study conducted by the Ministry of Health and Wellness on the effectiveness of three birth control methods used in The Bahamas.

Use the data from the table to answer the questions below.

birth control methods	percentage effectiveness
Male Condom	87
Natural Cycles	56
Withdrawal	43

- (i) Name the least effective method of birth control and explain why this method has low effectiveness.

least effective method _____

explanation _____

_____ [2]

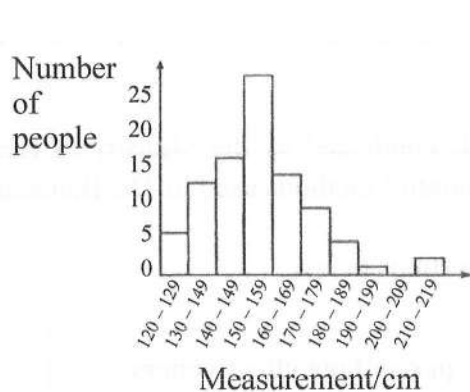
- (ii) Outline an additional step which can be taken when using a male condom to increase its effectiveness to above 87%.

_____ [1]

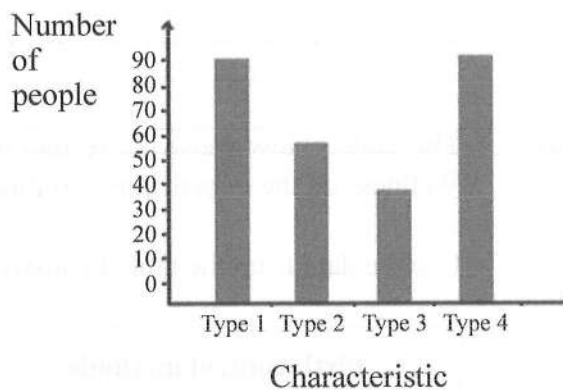
TOTAL MARKS [10]

8. The graphs below show two types of variation.

(a) Identify the type of variation shown in graph 1 and graph 2.



graph 1



graph 2

_____ variation

_____ variation

[2]

(b) Some human traits or features are inherited while others are influenced by the environment.

(i) State **TWO** inherited traits in humans that show the type of variation shown in **graph 2**.

1 _____

2 _____ [2]

(ii) State **ONE** trait in humans that is affected by an environmental factor and that is an example of the type of variation shown in **graph 1**.

trait _____

environmental factor _____ [2]

(c) Mutation can occur during cell division.

(i) Describe what is meant by mutation.

_____ [2]

(ii) What type of mutation causes sickle cell anaemia?

_____ [1]



- (d) Why is it not advised to constantly use the same brand of insecticide to kill cockroaches in your home?

[2]

TOTAL MARKS [11]

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School Number	Candidate Number
Surname, Name and Initials	

BIOLOGY

PAPER 3 3009/3

Thursday

23 MAY 2024

12:30 p.m.–2:00 p.m.
(1 hr. 30 mins.)

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided above.

Answer **ALL** questions in **Section A** in the space provided.

Answer **TWO** out of **THREE** questions in **Section B** in the spaces in the question booklet.

Candidates are advised to spend no more than **35 minutes** on **Section A**.

The mark for each part question is given in brackets [].

Calculators are permitted. However, **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
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TOTAL	

This question paper consists of 16 printed pages.

SECTION A

Answer **ALL** questions in this section.

1. The diagrams below show some of the methods used to preserve foods.



P



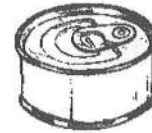
Q



R



S



T



U

- (a) (i) Give **ONE** advantage of preserving foods.

_____ [1]

- (ii) State **TWO** methods of preserving food shown in the diagrams above.

For each stated method, identify the letter of a food in the diagrams that matches to this method of preservation.

1 _____

2 _____

[2]

- (iii) Identify **ONE** method from the diagrams shown above which works by the principle of osmosis.

_____ [1]



- (b) (i) Additives are used in the processing of foods.

Explain **TWO** benefits of this practice to the consumers.

1 _____

2 _____

[2]

- (ii) List **TWO** common health concerns associated with the use of additives in foods.

1 _____

2 _____

[2]

- (c) Microorganisms are useful to humans.

Name **TWO** foods that are produced using microorganisms.

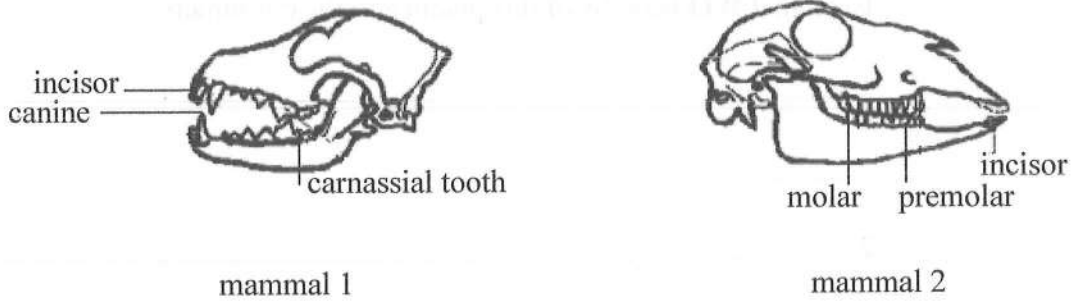
1 _____

2 _____

[2]

TOTAL MARKS [10]

2. The diagram below shows the dentition of two mammals.



- (a) Identify the type of diet for both mammal 1 and mammal 2.

mammal 1 _____

mammal 2 _____

[2]

- (b) State **TWO** ways in which the digestive systems of mammal 1 and mammal 2 suited for their diet.

1 _____

2 _____

[2]

- (c) Compare the dentition of mammal 1 and mammal 2.

[4]



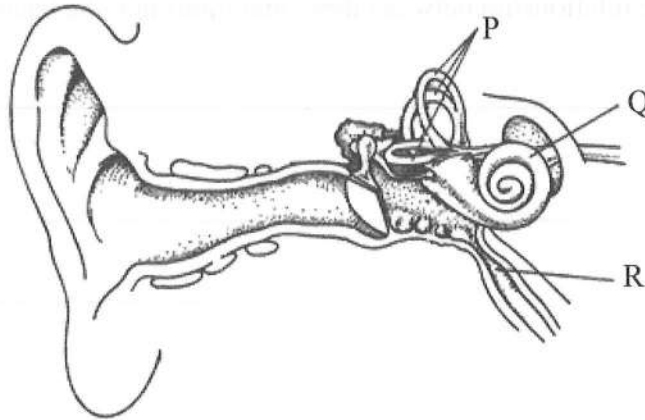
- (d) Some mammals have bacteria living in their digestive systems.

Explain the relationship between these mammals and the bacteria living in their digestive systems.

[2]

TOTAL MARKS [10]

3. The diagram below shows a cross-section through the inner ear.



- (a) (i) State the names of the structures labelled P, Q and R.

P _____

Q _____

R _____

[3]

- (ii) Explain how P helps in controlling our balance.

[2]

- (b) The human ear can hear a wide range of sounds from 20 Hz to 20 000 Hz.

- (i) Name the fluid that transmits vibrations in part Q.

[1]

- (ii) Explain how structures Q enables low frequency sounds to be detected.

[2]



(c) A passenger on a flight experiences difficulty hearing because of the increasing altitude.

(i) Explain why the passenger experiences difficulty in hearing as the aeroplane climbs to higher altitudes.

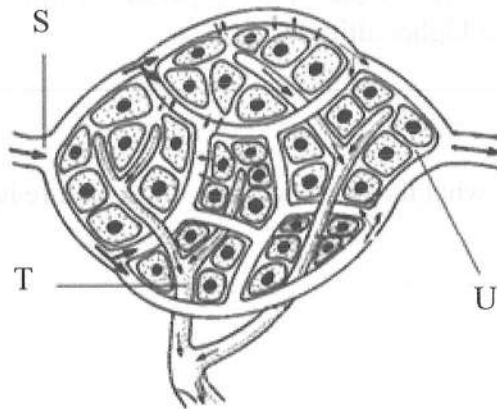
_____ [1]

(ii) Suggest what the passenger can do to restore hearing.

_____ [1]

TOTAL MARKS [10]

4. The diagram represents a section of a body tissue with capillaries.



- (a) Name the fluids found in S, T and U.

S _____

T _____

U _____

[3]

- (b) (i) Describe **ONE** difference and **ONE** similarity between the fluids contained in T and U.

difference _____

similarity _____

[2]

- (ii) Explain what would happen if the water potential of the fluid in vessel S increases.

[1]



- (c) The type of vessel labelled T is also found in the small intestine.

State the name of this type of vessel in the small intestine **and** describe its function.

name _____

function _____

[2]

- (d) Vessel T forms small bead shaped structures called nodes.

Describe the role of these nodes in protecting the body during an infection.

_____ [2]

TOTAL MARKS [10]

SECTION B

Answer **TWO** of the three questions in the spaces provided at the back of this question booklet.

5. Rocky shores are mainly located on the windward side of most islands in The Bahamas.
- (a) (i) Draw a labelled diagram showing the zones of the rocky shore ecosystem. [4]
- (ii) Describe **TWO** ways in which the rocky shore ecosystem is important for The Bahamas. [2]
- (b) State the name of an organism found in the rocky shore ecosystem and explain how this organism is adapted to:
- avoid predators
 - survive extreme temperatures, and
 - resist strong wave action. [4]
- (c) (i) Describe what is meant by a Marine Protected Area. (MPA) [2]
- (ii) Name **ONE** island where a MPA is located. [1]
- (d) An oil spill occurred at Clifton Pier in Southwest New Providence.
- (i) Explain the impact of an oil spill on this sandy/rocky shore ecosystem. [5]
- (ii) Suggest **TWO** measures that can be taken to conserve this ecosystem. [2]

TOTAL MARKS [20]



6. (a) Define the term allele. [1]

(b) (i) Explain what sex-linked traits are. [3]

Cystic fibrosis is a genetic disease controlled by a single gene. A woman who is a carrier (heterozygous) for cystic fibrosis marries a man who has cystic fibrosis (homozygous recessive).

(ii) State the genotypes of the parents. [2]

(iii) Use a Punnett square to determine the result of the cross between the parents.

State the meaning of any symbol that you use to represent the alleles. [4]

(iv) Find the probability that a child born to these parents:

- will have cystic fibrosis [1]

- will be a carrier (heterozygous) for cystic fibrosis. [1]

(d) (i) Explain the meaning of co-dominance. [2]

(ii) ABO blood group data can sometimes be used to prove that a man is **not** the father of a particular child.

However, on its own, ABO blood group data can never prove that a man is the father of a particular child.

Explain why both statements are true. [2]

(e) Two students were engaged in an argument about genotype and phenotype. One said they are the same and the other said they are totally different.

Use your knowledge to settle the argument and provide examples. [4]

TOTAL MARKS [20]

7. (a) Define the term genetic engineering. [1]
- (b) Tissue culture has been used to produce banana plants and strawberry plants.

Describe the process of tissue culture to produce new plants. [5]

- (c) Table 1 shows changes in the world population from 1950 to 2020.

Table 1

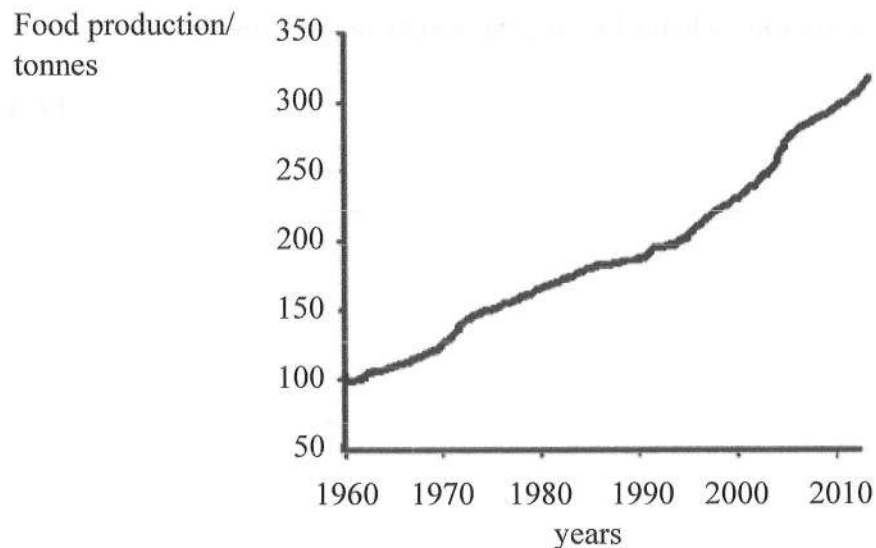
Year	World population/ billions
1950	2.5
1960	3.1
1970	3.7
1980	4.5
1990	5.3
2000	6.1
2010	7.0
2020	7.8

- (i) Using the data in the table, plot a graph to show changes in the world population from 1950 to 2020.

Plot graph on the grid on page 13. [4]

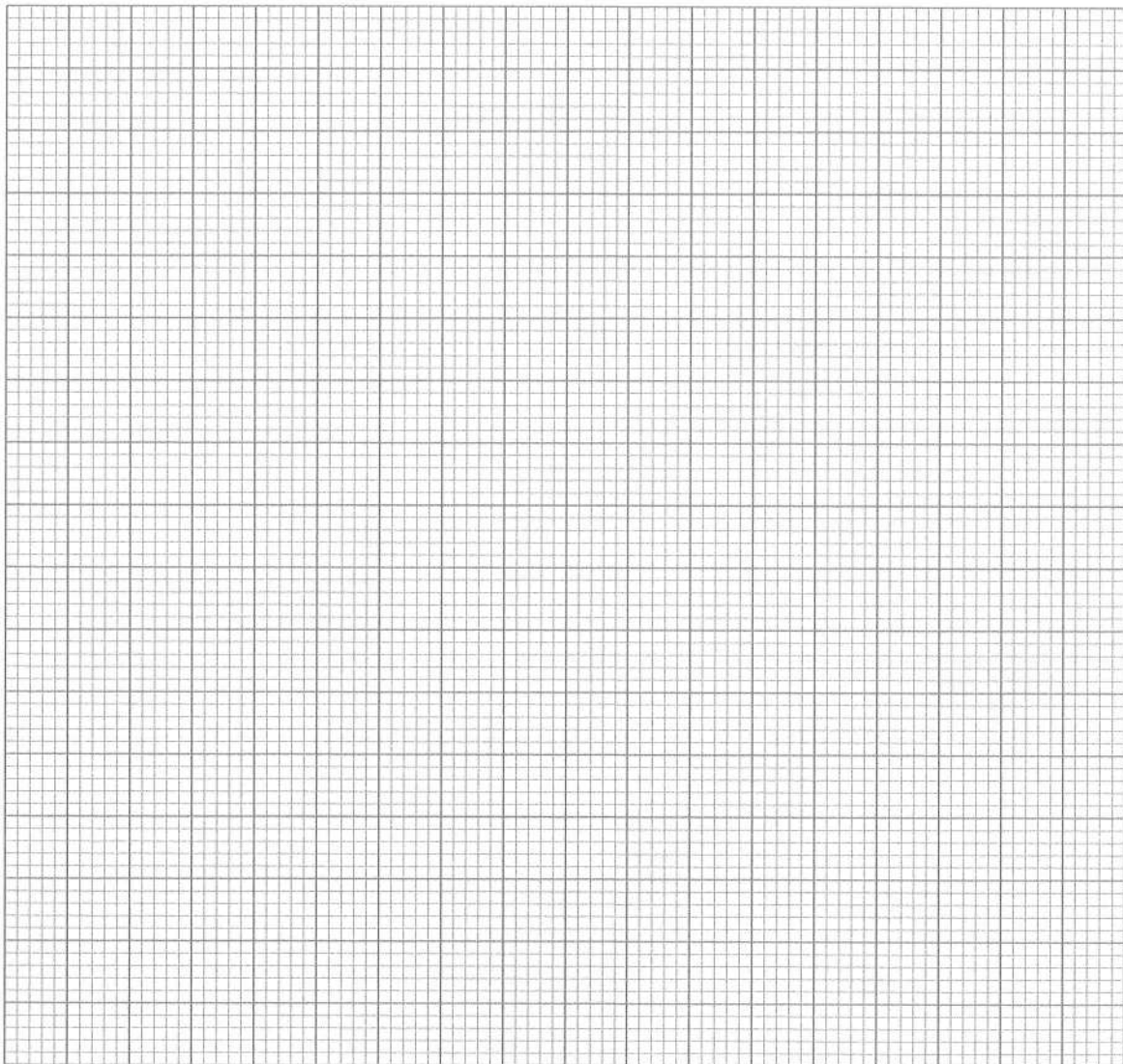
- (ii) Calculate the expected world population in 2020 if the growth rate shown from 1950 to 1970 had remained constant. Show your working. [2]

- (d) The graph shows changes in the world food production from 1961 to 2009.



- (i) With reference to the graph, describe the trend in world food production from 1961. [1]
- (ii) Suggest **THREE** factors that could impact world food production. [3]
- (e) Genetic engineering has been used in the agricultural industry especially in the cultivation of vegetables like corn. Some people are concerned about the use of genetically modified organisms (GMOs) and genetically modified foods (GMFs).
Suggest **TWO** advantages and **TWO** disadvantages of using genetically modified organisms (GMOs) or genetic modified foods (GMFs). [4]

TOTAL MARKS [20]



Question

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Question
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Question
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