

Candidate Name

Candidate Number

Centre Name

Centre Number

Paper 2:**Sample Paper**

(2 hours)

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you must have a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:

- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- Objective section consists of 25 questions, and it is essential that you attempt all of them.
- Each question has four options labelled A, B, C, and D. Select the option that you think is correct. Mark it on the multiple-choice answer sheet using a soft pencil.
- Attempt all the questions from subjective section using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.

INFORMATION:

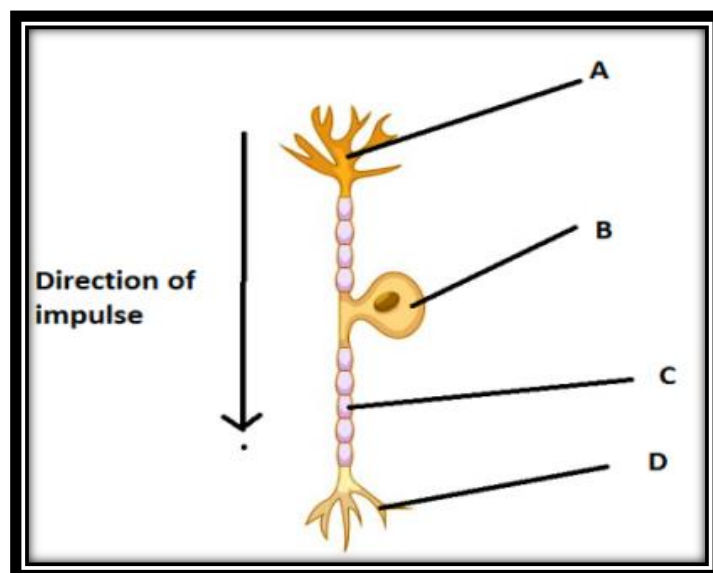
- This paper has a total of 100 marks.
- In objective section there are 25 questions, each carries one mark. There is no negative marking for incorrect responses.
- In subjective section, 45 marks are for extended theory and 30 marks for practical component.
- The number of marks assigned for every question or its parts is indicated within brackets [].

OBJECTIVE SECTION:**[Total 25 marks]**

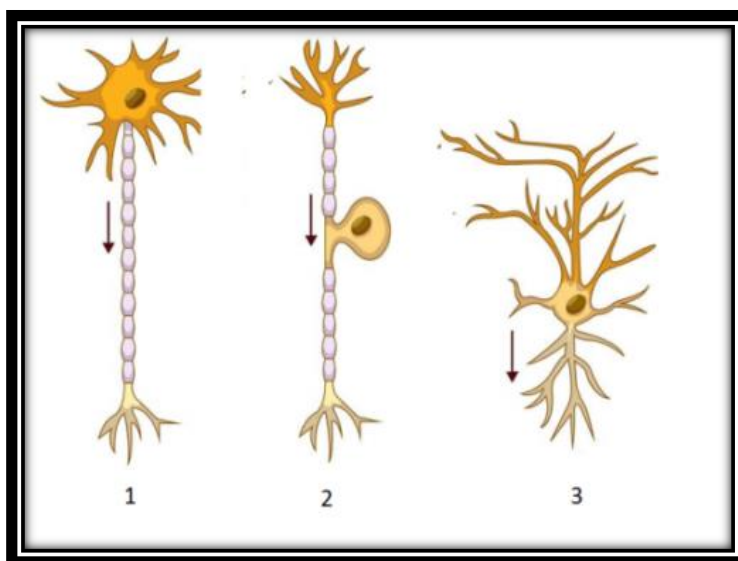
1. Which row is the correct sequence of events that occur in nervous coordination?

	1	2	3	4	5
A	Stimuli	Effector	Coordinator	Effector	Response
B	Receptor	Effector	Coordinator	Receptor	Response
C	Stimuli	Receptor	Coordinator	Effector	Response
D	Receptor	Stimuli	Effector	Coordinator	Response

2. Which structure on the image below is a dendrite?



3. In a reflex arc, which is the correct sequence of neurones, electrical impulses travel through?



	First neurone	Second neurone	Third neurone
A	1	2	3
B	1	3	2
C	2	1	3
D	2	3	1

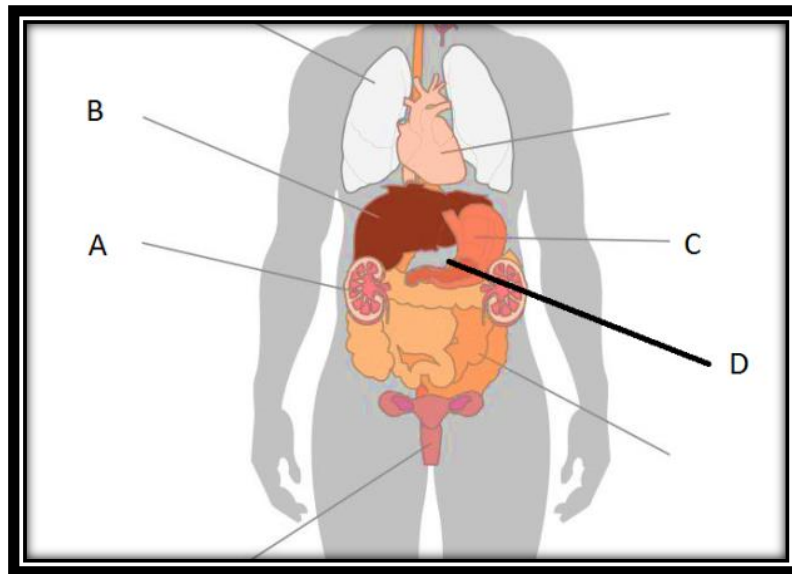
4. The pupil reflex is an example of a reflex action, which is the correct sequence of events that occur when a person is standing in a bright room.

	First	Second	Third	Fourth
A	Ciliary muscles contract	Radial muscle contract	Pupil dilates	More light enters the eye
B	Circular muscle contract	Radial muscle relax	Pupil constricts	Less light enters the eye
C	Circular muscle relax	Radial muscle contract	Pupil constricts	Less light enters the eye
D	Ciliary muscles relax	Radial muscles contract	Pupil dilates	Less light enters the eye

5. Name the chemical substance produced by endocrine glands and transported in the blood are called?
- A. Antibody
 - B. Antigen
 - C. Hormone
 - D. Neurotransmitter
6. Colour blindness is an inherited condition, which structures have been affected when an individual has this condition?
- A. Cone cells
 - B. Rod cells
 - C. Optic nerve
 - D. Damage to retina
7. Match the corresponding missing words with the numbers in the following statement:
When there is too little1..... in the blood, the pancreas secretes ...2...., this protein travels to the3..... to breakdown4..... returning normal range.

	1	2	3	4
A	Glycogen	Glucose	Liver	Glucagon
B	Glycogen	Glucagon	Liver	Glucose
C	Glucose	Glycogen	Liver	Glucagon
D	Glucose	Glucagon	Liver	Glycogen

8. The process of deamination occurs where in the body?



9. When blood arrives from the renal artery into the nephron the structure branches of arterioles which supply a group of closely packed capillaries called?

A – Bowman's capsule

B – Tubules

C – Glomerulus

D – Collecting duct

10. Dialysis is method used to treat individuals who may have one or both kidneys damaged. Which processes does the kidney dialysis machine rely on?

1. Diffusion

2. Active transport

3. Osmosis

A. 3 only

B. 1 and 2

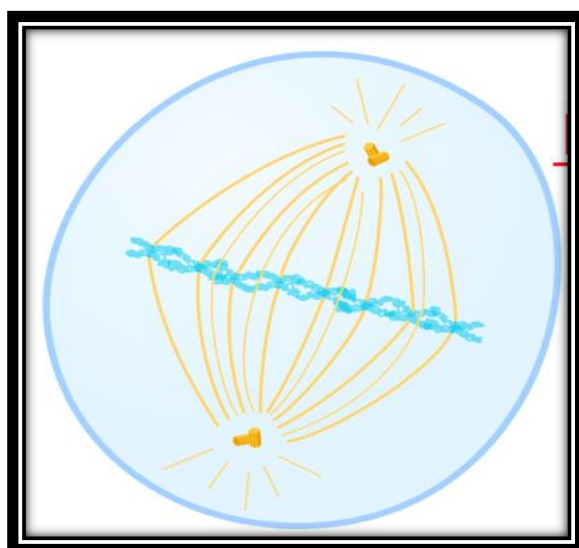
C. 1 Only

D. 1, 2 and 3

11. Type 1 diabetes an inherited condition, a symptom includes having glucose present in the urine, which biochemical test could be carried out to identify if someone has diabetes?

- A. Biuret solution
- B. Benedict's solution
- C. Ethanol emulsion
- D. DCPIP solution

12. Which state of mitosis is being observed in the image below:

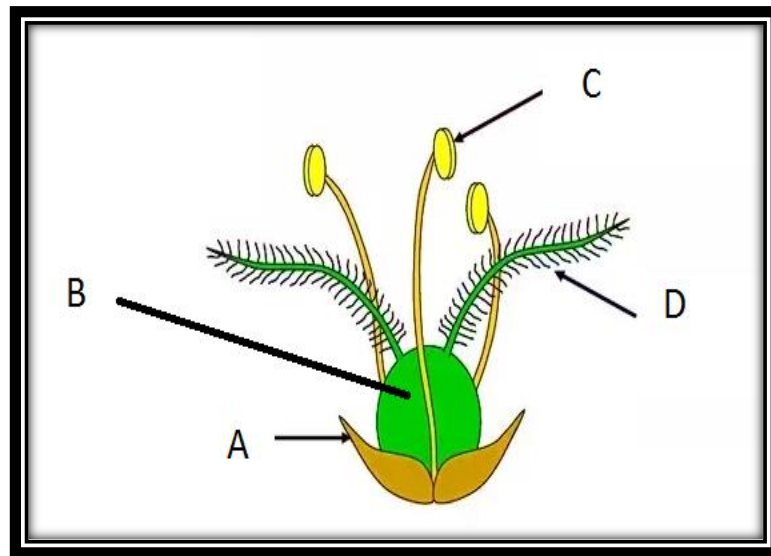


- A – Anaphase
- B – Metaphase
- C – Prophase
- D – Telophase

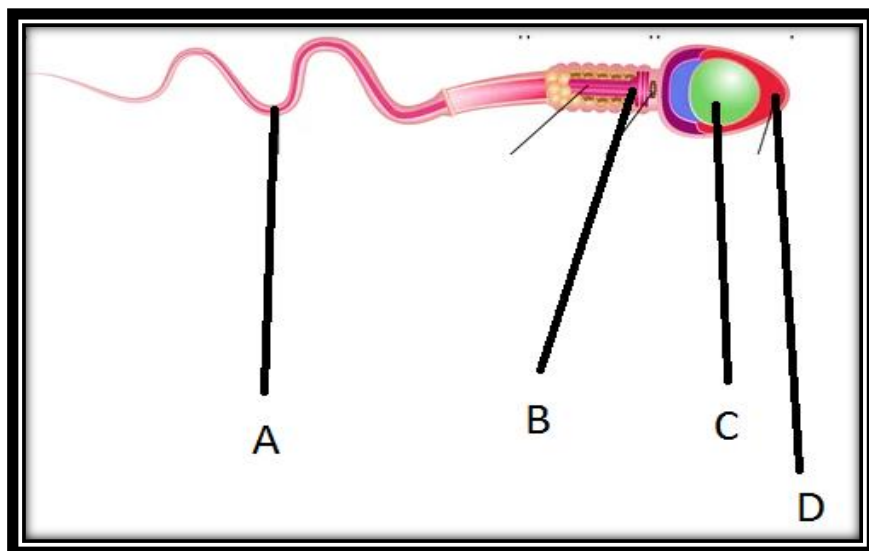
13. Which of the follow is the create statement about meiosis?

- A. Produces 2 haploid daughter cells
- B. Produce 4 diploid daughter cells
- C. Produces 2 diploid daughter cells
- D. Produces 4 haploid daughter cells

14. Which letter represents the location of fertilisation?



15. The sperm cell is a specialised animal cell, where on the image below is there a high concentration of mitochondria.



16. Which is the correct function of the female hormones in the menstrual cycle?

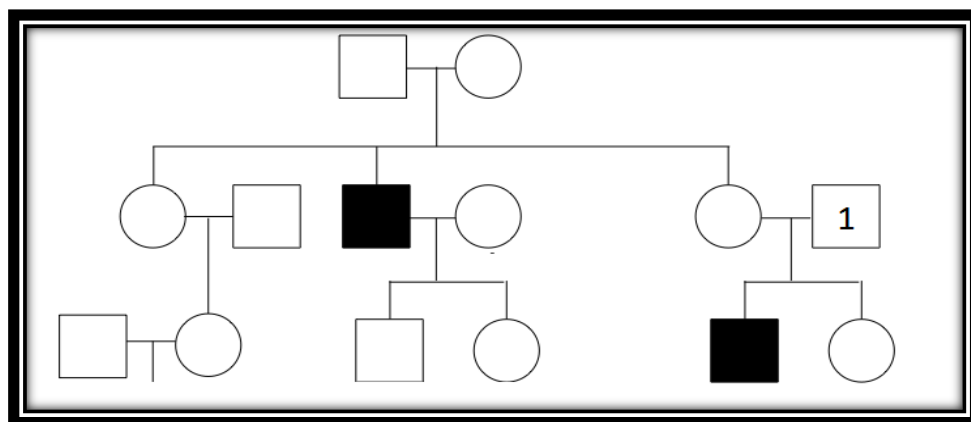
	FSH	LH	Oestrogen	Progesterone
A	Causes a mature egg to develop.	Causes ovulation.	Inhibits FSH	Maintains the uterus lining
B	Maintains the uterus lining	Causes a mature egg to develop.	Maintains the uterus lining	Inhibits FSH
C	Causes ovulation.	Causes a mature egg to develop.	Inhibits FSH	Maintains the uterus lining
D	Causes a mature egg to develop.	Inhibits FSH	Maintains the uterus lining	Causes ovulation.

17. Which of the following statements regarding contraception are true?

1. The condom is a barrier method of contraception
2. The IUD is a surgical method of contraception.
3. Sterilisation is a surgical method of contraception.

- A. 1 and 3
- B. 1, 2 and 3
- C. 1 and 2
- D. 1 only

18. A pedigree diagram below shows the inheritance of cystic fibrosis is caused by a recessive allele (c), what is the phenotype of person 1?



- A. Carrier
B. Has cystic fibrosis
C. Cc
D. cc
19. Colour blindness is caused by a recessive allele located on the X chromosome; a man who does not have colour blindness wishes to have a child with a woman who has colour blindness.

What is the probability of boy being born having colour blindness?

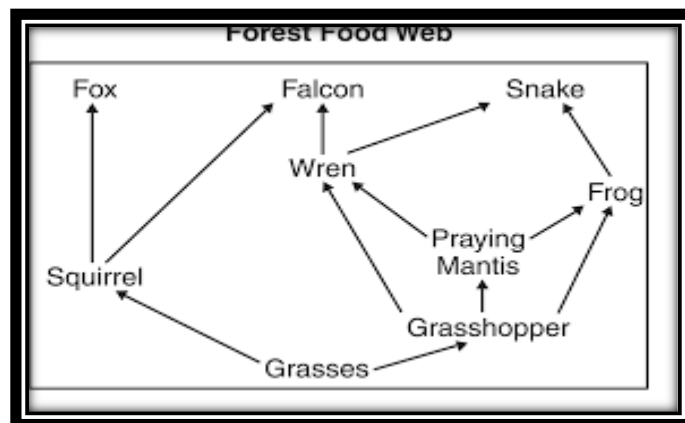
- A. 25%
B. 50%
C. 100%
D. 0%

20. Which is the correct statement about why a tiger and lion can interbreed to make a hybrid?

		
	Lion	Tiger
Kingdom	Animalia	Animalia
Phylum	Chordata	Chordata
Class	Mammalia	Mammalia
Order	Camivora	Camivora
Family	Felidae	Felidae
Genus	Panthera	Panthera
Species	Leo	Tigris

- A. They are the same Class
- B. They are the same Species
- C. They are the same Genus
- D. They are the same Phylum

21. Below is a food web of a forest habitat:



(find similar)

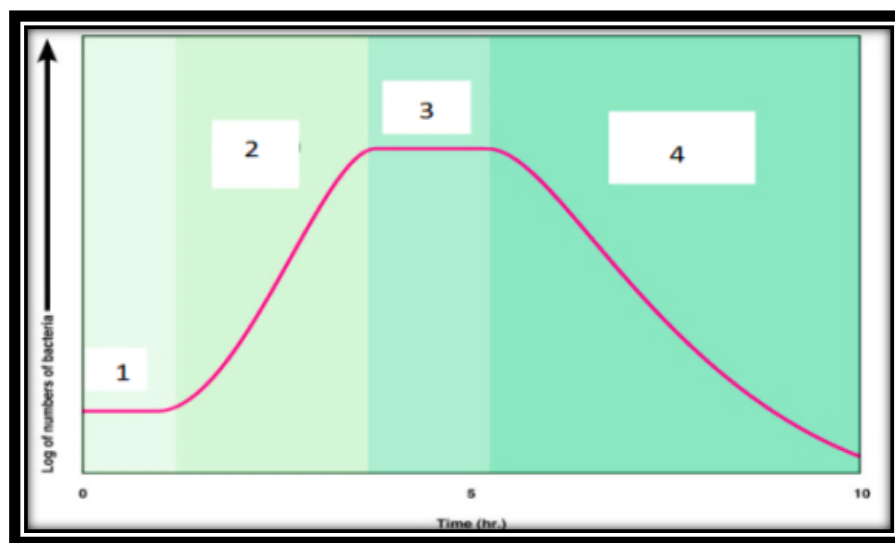
Which trophic level is the Praying Mantis?

- A: Trophic level 1
- B: Trophic level 3
- C: Trophic level 4
- D: Trophic level 2

22. Which is the correct chemical process for the conversion of N_2 to NO_3 ?

- A: Denitrification
- B: Ammonification
- C: Nitrification
- D: Nitrogen fixation

23. Which row matches the correct phases of a bacterial growth curve?



	1	2	3	4
A	Lag phase	Log phase	Stationary phase	Death phase
B	Log phase	Lag phase	Stationary phase	Death phase
C	Stationary phase	Log phase	Lag phase	Death phase
D	Lag phase	Stationary phase	Log phase	Death phase

24. Air pollution has increased over time, carbon dioxide is a main waste gas produced in variety of human activities. Which environmental issue does carbon dioxide contribute to?

A: Acid rain

B: Ozone depletion

C: Global warming

D: Eutrophication

25. Which strategies are applicable for the reduction of CFC's in the atmosphere?

A: Paris Climate Change Agreement

B: Kyoto Protocol

C: Montreal protocol

D: Oslo protocol

EXTENDED THEORY:

[Total 45 marks]

Q1)

Temperature is an important environmental factor that will determine an organism's survivability in their habitat.



- a) State the name of **two** vertebrates groups that are unable to regulate their internal body temperature? [2]
- b) Predict and explain three adaptations of organisms that live in cold climates? [3]
- c) Define the term homeostasis? [2]
- d) Describe and explain how the human body carries out coordination in a cold environment? [6]

[Total: 13 marks]

Q2)

Organisms have evolved over a very long time, and developed into the current forms observed today. Fossil evidence has shown that some species were very different to today; however, the crocodile has shown little change in appearance.

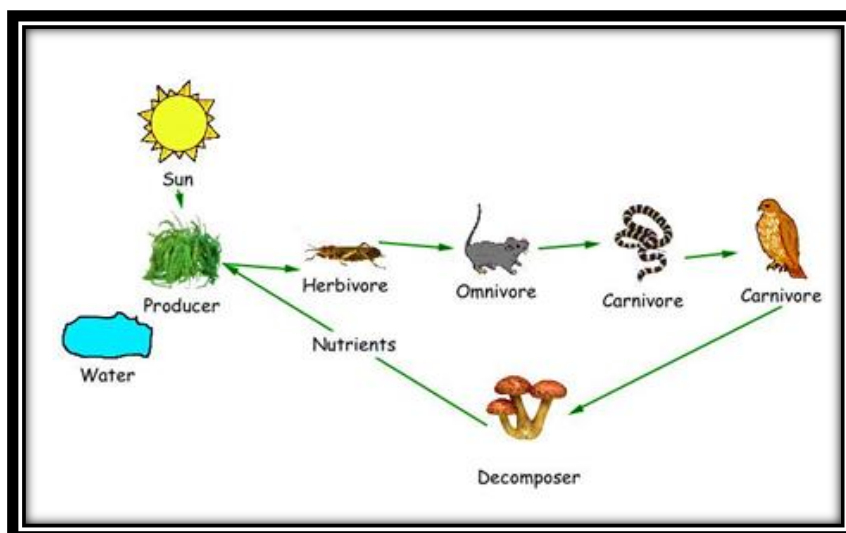


- a) Name the process that is the mechanism for evolution? [1]
- b) Explain why the crocodile has shown very little change over millions of years? [4]
- c) Describe the process of selective breeding? [4]
- d) Discuss the advantages and disadvantages of selective breeding with an example? [4]

[Total 13 marks]

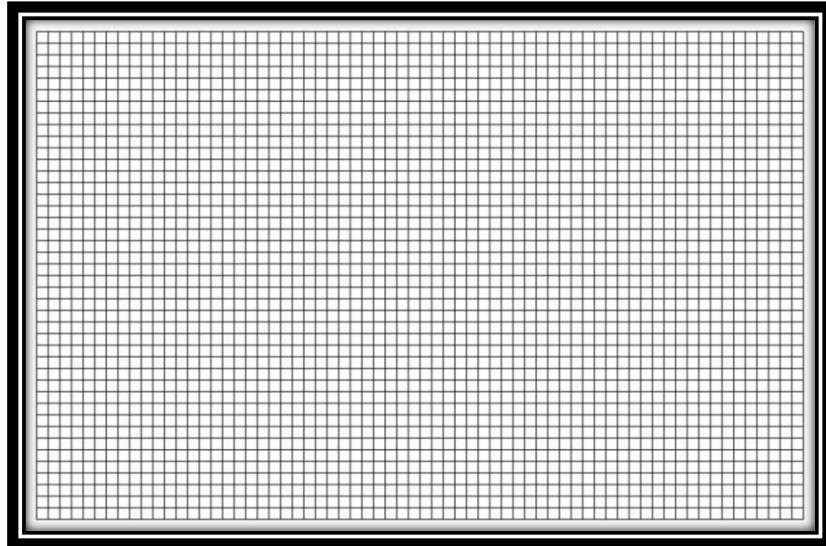
Q3)

Ecosystems involve interaction of the community of all living organisms with its abiotic environment. Below is simple food chain of grassland habitat.



- a) Describe the process by which decomposers gain their nutrition? [3]
- b) The table below shows the total populations of each species in the habitat draw a pyramid of numbers to represent this data. [4]

	Number of individuals
Grass	1200
Grass hoppers	2000
Mice	800
Snakes	200
Bird of prey	50



- c) Describe the limitation of the pyramid of numbers in the representation of an ecosystem? [2]
- d) Explain why the number of individuals up the food chain is decreasing? [4]

A farmer decides to spray the nearby area with pesticides and fertilisers to increase food production.



- e) Describe and explain the wider impact of the farmer's activities on the ecosystem? [6]

[Total 19 marks]

PRACTICAL COMPONENT:

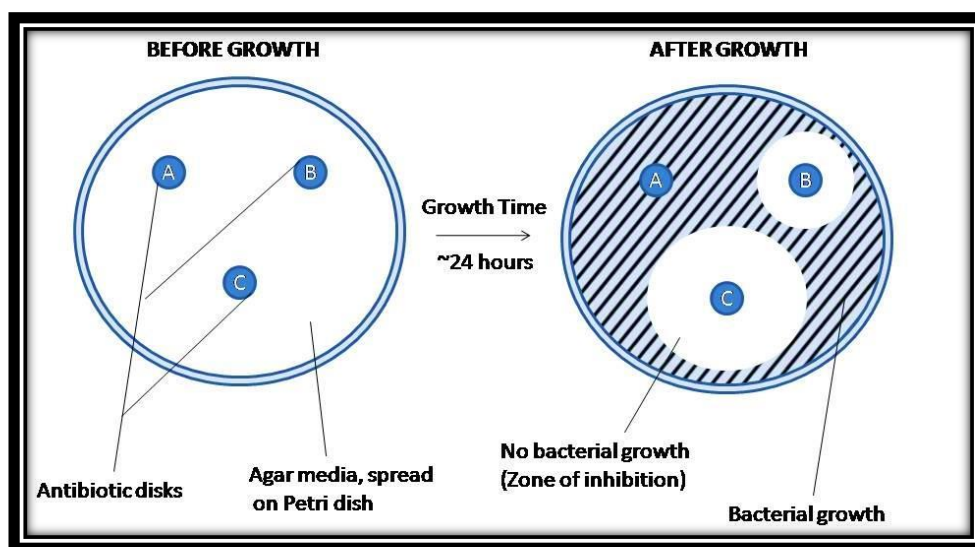
[Total 30 marks]

Q1)

The student had carried out aseptic technique to test the effectiveness of antiseptics on bacterial growth.

- a) Describe the process of aseptic techniques when preparing bacterial cultures? [6]
- b) Why is it essential to place the lid on the petri dish? [1]
- c) Suggest a reason why incubation of bacteria is carried out at 25 °C? [1]

The results are shown below:



- d) What was the dependent variable of this experiment? [1]
- e) Which was the most effective disk at preventing bacterial growth give reason? [1]

Bacteria reproduce rapidly, the total number of bacteria double every 15 minutes.

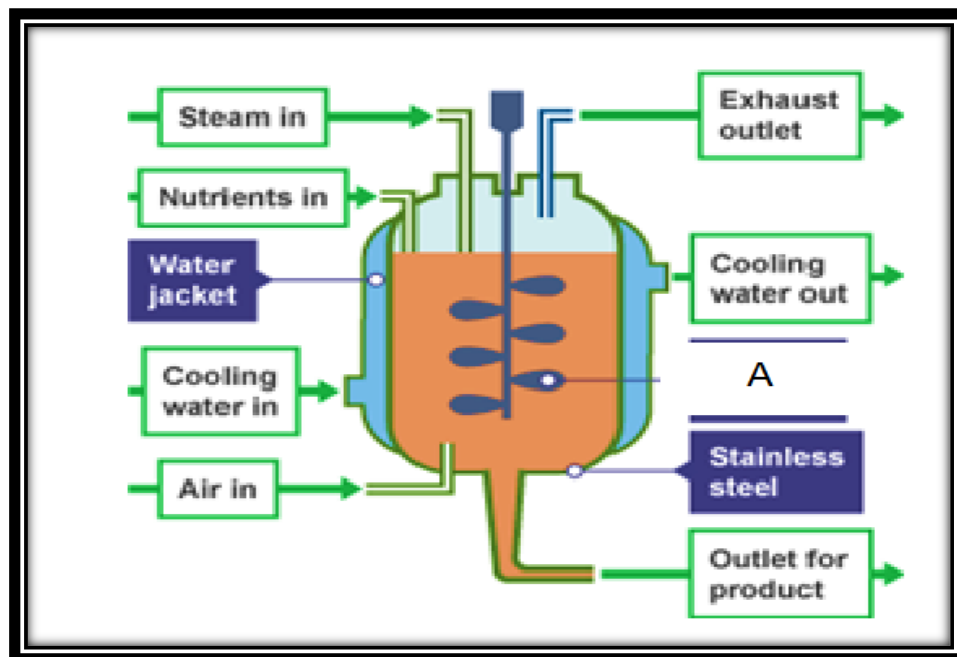
Student successfully isolated a small colony of bacteria containing 20 bacteria.

- f) Calculate the total number of bacteria after 8.75 hours? [3]

Assume there are no limiting factors.

Provide your answer in standard form.

Bacteria can be genetically modified to produce insulin using a fermenter as shown in the image below:



- g) What is the function of structure labelled A? [1]
- h) Why was DNA from a human able to be genetically modifying bacteria to produce insulin? [2]

[Total 16 marks]

Q2)

Students carry out an investigation looking at human reaction times looking at caffeine and background noises. They carried out the ruler drop test using the following method:

1. Jack holds out his hand with a gap between his thumb and first finger.
2. Salma holds the ruler with the zero at the top of Jack's thumb.
3. Salma drops the ruler without telling Jack and he must catch it.
4. The number level with the top of Jack's thumb is recorded.
5. They repeated this five times.

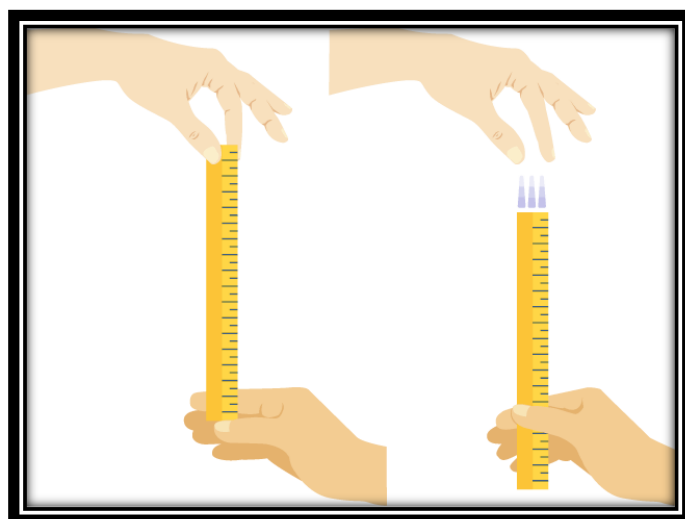


Table 1

Repeat	Distance on ruler with caffeine (cm)	Distance on ruler with noise (cm)	Distance on ruler without noise or caffeine (cm)
1	20.0	22	17
2	16.0	25	15
3	X	23	16
4	14.0	28	20
5	15.0	24	19
Average	16.4	24.4	17.4

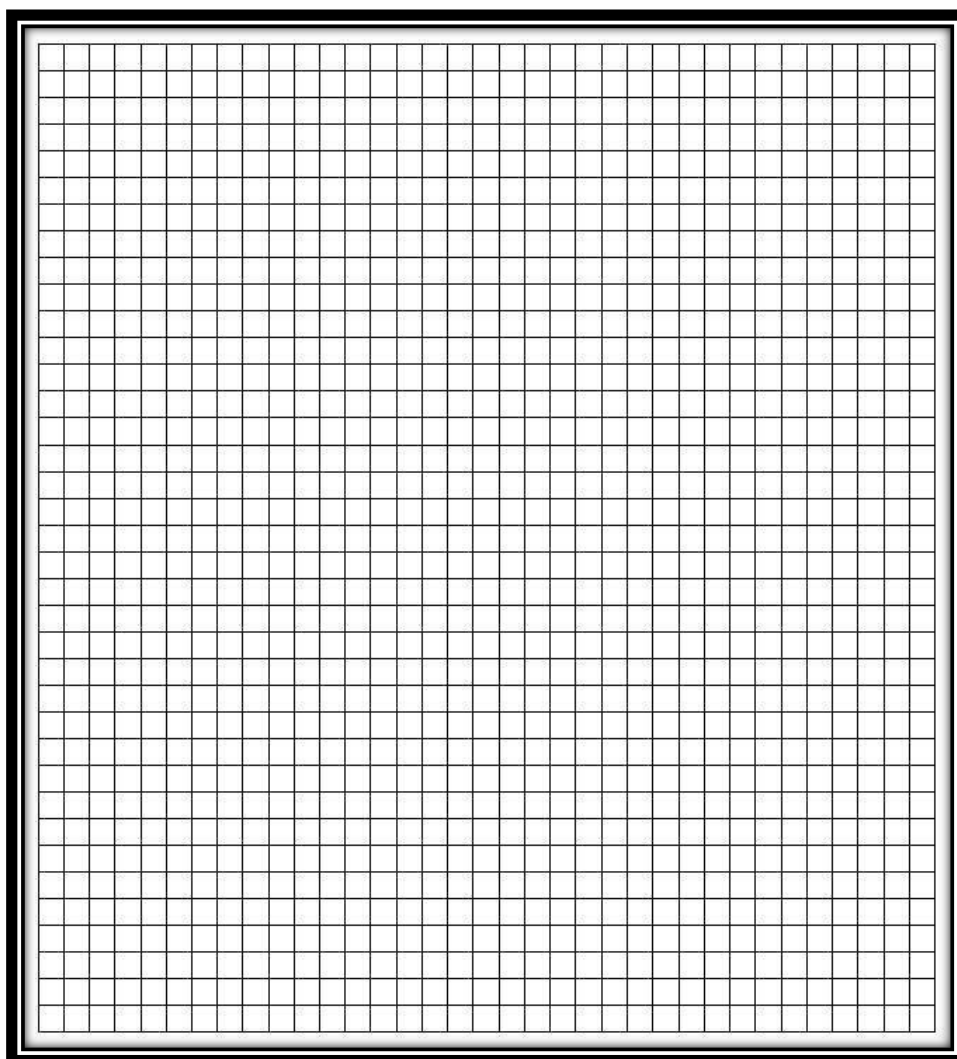
- a) Calculate the value of X? [1]
- b) What was the purpose of doing the experiment without noise or caffeine? [1]
- c) Name a potential source of error in this experiment? [1]
- d) What conclusion can be drawn from Jack and Salma results? [3]

The reaction time of Jack can be calculated using the following information:

Table 2

Catch distance (cm)	Reaction time (ms)
1	50
5	90
10	140
15	170
20	200
25	230
30	250

e) Draw the graph to represent the data of **Table 2**. [4]



f) Deduce Jack's reaction time from your graph using **table 1**: [1]

	Reaction time (ms)
With caffeine	
With load noises	
Without caffeine or loud noises	

g) Suggest improvements that could be done to increase the validity of Jack and Salma's experiment? [3]

[Total 14 marks]