

Preamble for Biology (5090)

The Examinations Council of Zambia has made adjustments to the assessment of **Biology** at Grade 12 level so as to be in line with the revised **Biology** Senior Secondary School Syllabus of 2013 developed by Curriculum Development Centre (CDC) of the Ministry of General Education.

Purpose

The purpose of the Biology assessment will be to evaluate candidates' competences in terms of scientific knowledge, skills and values about the living world, to certify, to place candidates into tertiary institutions and to evaluate acquisition of skills useful to candidates in their daily lives.

Assessment Objectives (AO)

Assessment in Biology will be done under three main Assessment Objectives (AO1, AO2 and AO3), as shown below.

Knowledge with Understanding

1. state biological phenomena, facts, laws
2. definitions, concepts, theories
3. understand and use biological vocabulary, terminology and conventions correctly (including symbols, quantities and units)
4. demonstrate knowledge of scientific instruments and apparatus, including techniques of operation and aspects of safety
5. state and determine scientific quantities
6. demonstrate knowledge of biological and technological applications with their social, economic and environmental implications.

Handling Information and Problems Solving

1. locate, select, organise and present information from a variety of sources
2. translate information from one form to another
3. manipulate numerical and other data
4. identify patterns, report trends and conclude
5. explain phenomena, patterns and scientific relationships
6. make predictions and propose hypotheses
7. solve problems using biological principles.

Experimental and Investigative Skills

1. follow a sequence of instructions
2. use techniques, apparatus, measuring devices and materials effectively, accurately and safely
3. make and record observations, measurements, calculations and estimates with due regard to precision, accuracy and correct units

4. make accurate scientific drawings with due regard to appropriateness and proper labelling
5. interpret, evaluate and report upon observations and experimental data
6. identify problems, design/plan and carry out investigations, including the selection of techniques, apparatus, measure devices and materials
7. evaluate methods and suggest possible improvements.

Test Design

The examination will be made up of three papers, Papers 1, 2 and 3.

As an alternative to Paper 3, Paper 6 will be provided for visually impaired candidates.

The examination will be made up of three components and structured as follows;

Paper	Code	Paper type	Duration	No. of Questions	Total marks	Weighting
1	5090/1	Theory, multiple choice	50 minutes	40	40	25%
2	5090/2	Theory, short/essay questions	1 hour 45 minutes	10	80	50%
3	5090/3	Practical	1 hour 15 minutes	2	40	25%
6	5090/6	Alternative to Practical	1 hour 15 minutes	3	40	25%
Total					160	100%

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

Biology

5090/1

Paper 1 Multiple Choice

Additional Materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

Time 50 minutes

Instructions to Candidates

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

Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in this paper. Answer all questions. For each question there are four possible answers: **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read very carefully the instructions on the Answer Sheet.

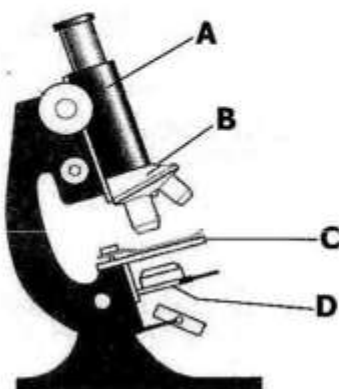
Information for Candidates

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this Question Paper.

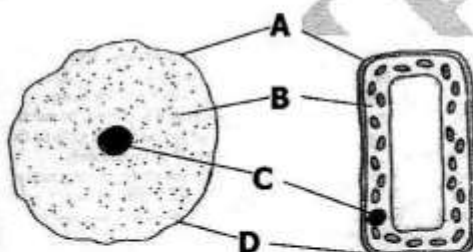
Cell phones are not allowed in the examination room.

- 1 The diagram below shows a microscope.



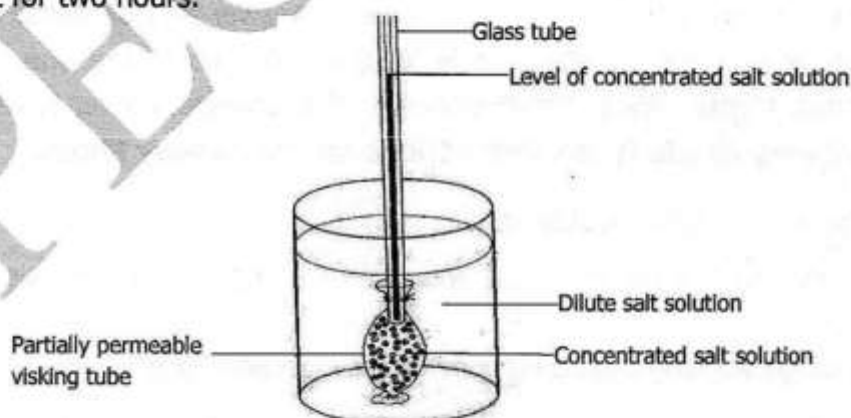
Which labelled part regulates the amount of light passing through the object?

- 2 The diagrams below show the cells from a leaf of a bean plant and a cell from the liver of a human being.



Which label is **not** pointing to the correct structure found in both cells?

- 3 The diagram shows an apparatus used to investigate osmosis. The apparatus was set up and left for two hours.



What would be the observation in this experiment?

	Level of liquid in glass tube	Explanation
A	Falls	Salt molecules moved out of the visking tube into the beaker.
B	Falls	Water molecules moved out of the visking tube into the beaker.
C	Rises	Salt molecules moved from the beaker into the visking tube.
D	Rises	Water molecules moved from the beaker into the visking tube.

4 The following are statements describing some characteristics of enzymes.

1. They are proteins.
2. They are secreted in the alimentary canal.
3. They speed up biochemical reactions.
4. None of them work at low pH.

Which of the statements above is correct for all enzymes?

- A** 1 and 3
B 1 and 4
C 2 and 3
D 2 and 4

5 A food sample was tested for the presence of nutrients and gave the following results:

- a purple colour with Biuret reagent.
- a blue colour when heated with Benedict's solution.
- a yellow colour with iodine solution.
- a white emulsion with ethanol.

What nutrients did the food sample contain?

- A** Fat and Protein.
B Fat and Starch.
C Protein and Reducing Sugar.
D Reducing Sugar and Starch.

6 The table below shows the average daily intake of nutrients for four people.

Food	Person W	Person X	Person Y	Person Z
Carbohydrate	520g	30g	50g	40g
Fat	110g	200g	50g	20g
Iron	15mg	4mg	30mg	20mg
Protein	50g	180g	120g	65g
Vitamin C	95mg	100mg	10mg	80mg

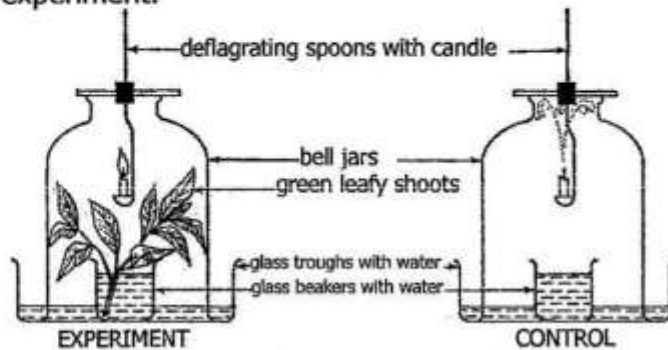
In which person will cuts on the skin be least likely to heal properly?

- A** W
B X
C Y
D Z

7 Which of the following signs shows that a plant was grown in a soil deficient in magnesium ions?

- A** Poor root growth.
B Small leaves.
C Stunted growth.
D Yellow leaves.

- 8 The apparatus below was an experiment set up to demonstrate photosynthesis. The candle in the experiment burnt longer than the candle in the control experiment.



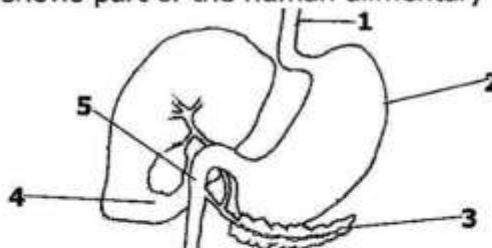
What conclusion can be drawn from the experiment?

- A Oxygen is liberated during photosynthesis.
 B Carbon dioxide is used during photosynthesis.
 C Water is used during photosynthesis.
 D Light energy is used during photosynthesis.
- 9 What type of nutrition is carried out by a *Rhizopus*?
- A Autotrophic nutrition.
 B Parasitic nutrition.
 C Photosynthesis.
 D Saprophytic nutrition.
- 10 The following is a dental formula of a dog

$$i: \frac{3}{3}, c: \frac{1}{1}, pm: \frac{4}{4}, m: \frac{2}{3}$$

How many premolars are in the upper jaw of the dog?

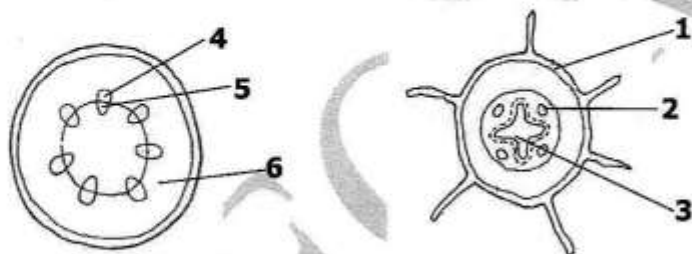
- A 2
 B 4
 C 6
 D 8
- 11 The diagram below shows part of the human alimentary canal.



Which two structures produce substances involved in the digestion of fat (lipid)?

- A 1 and 2
 B 1 and 5
 C 2 and 3
 D 3 and 4

- 12 Which equation represents anaerobic respiration in human muscles?
A glucose \rightarrow carbon dioxide + ethanol (alcohol) + energy.
B glucose \rightarrow carbon dioxide + lactic acid + energy.
C glucose \rightarrow ethanol (alcohol) + energy.
D glucose \rightarrow lactic acid + energy.
- 13 A medical officer in the Ministry of Health needs to introduce a publicity campaign to reduce the spread of AIDS. What advice should be included?
A Do not drink from cups used by other people.
B Do not kiss infected people.
C Do not use soap and towels used by other people.
D Have sexual intercourse with only one faithful partner.
- 14 Which of the following statements best describes the importance of immunisation?
A To monitor the growth of children.
B For the body to produce antigens.
C For the body to produce antibodies.
D For the body to produce hormones.
- 15 The diagram shows sections from the root and stem of a plant.



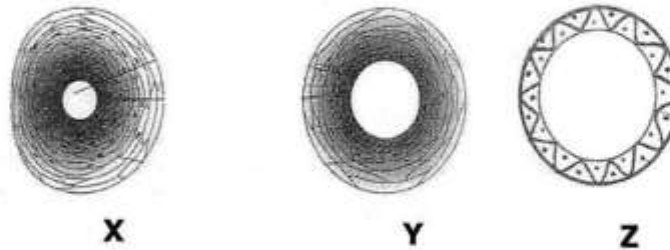
Which tissues conduct sucrose in solution?

	Root	Stem
A	1	5
B	2	4
C	2	6
D	3	5

- 16 Which one of the following correctly identifies the blood group with its antigen and antibody?

	Blood Group	Antigen	Antibody
A	A	A	A
B	B	A	B
C	AB	None	AB
D	O	None	A and B

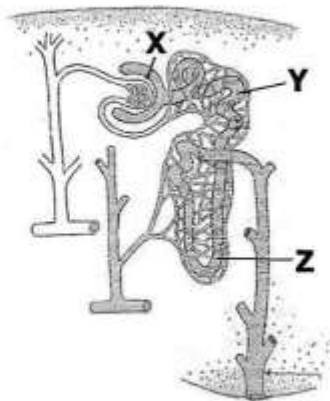
- 17 The diagram shows sections through three types of blood vessels, **X**, **Y** and **Z** (not drawn to scale).



What are the names of these blood vessels?

	X	Y	Z
A	Artery	Capillary	Vein
B	Artery	Vein	Capillary
C	Capillary	Vein	Artery
D	Capillary	Artery	Vein

- 18 The diagram below shows a nephron in a human kidney.



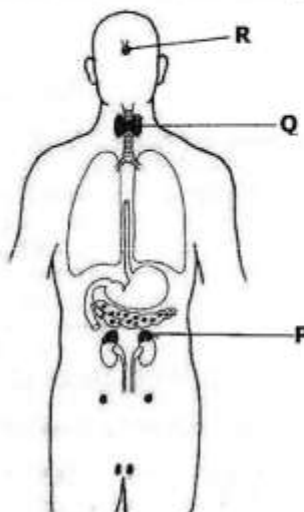
What processes occur at points **X**, **Y** and **Z**?

	X	Y	Z
A	Ultrafiltration	Selective reabsorption	Osmoregulation
B	Ultrafiltration	Osmoregulation	Selective reabsorption
C	Selective reabsorption	Osmoregulation	Ultrafiltration
D	Selective reabsorption	Ultrafiltration	Osmoregulation

- 19 What happens when human body temperature falls below 37°C?

	Blood flow to skin	Sweating
A	Decreased	Decreased
B	Decreased	Increased
C	Increased	Decreased
D	Increased	Increased

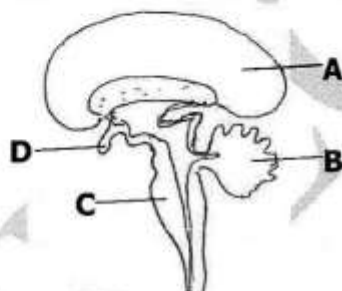
- 20 The diagram below shows some of the endocrine glands in humans.



Which hormones are produced in the glands labelled **P**, **Q** and **R**?

	P	Q	R
A	ADH	Insulin	Adrenalin
B	ADH	Thyroxine	Glucagon
C	Adrenalin	ADH	Thyroxine
D	Adrenalin	Thyroxine	ADH

- 21 The diagram shows a section through the brain and part of the spinal cord.



Which region controls the breathing rate and heart rate?

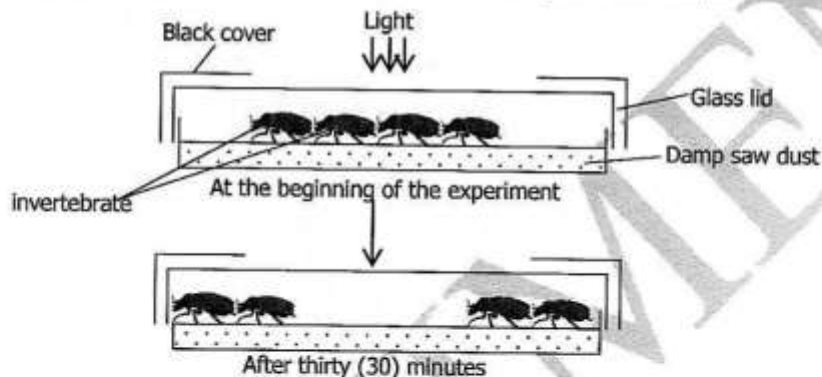
- 22 Which of the following correctly identifies the part of the ear and the structure found in it?

	Outer ear	Middle ear	Inner ear
A	Cochlea	Eustachian tube	Pinna
B	Cochlea	Pinna	Ossicles
C	Pinna	Ossicles	Cochlea
D	Pinna	Cochlea	Eustachian tube

- 23 Which of the following correctly differentiates a hinge joint from a ball and socket joint?

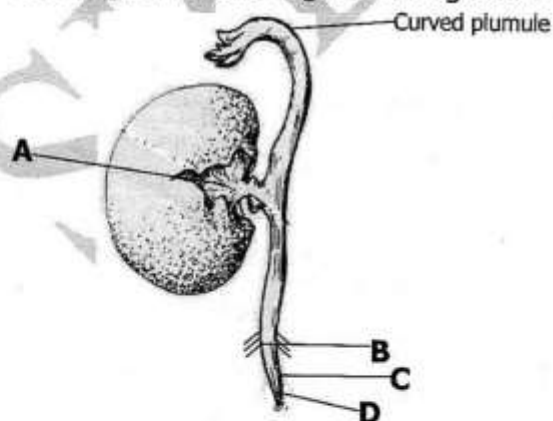
	Hinge joint	Ball and socket
A	Allows movement in three planes	Allows movement in one plane
B	Allows movement in one plane	Allows movement in three planes
C	Is a fixed joint	Is a movable joint
D	Is found at the shoulder	Is found at the knee

- 24 The diagram shows a set-up of an experiment to demonstrate the behaviour of invertebrates placed in a partially covered glass box exposed to light.



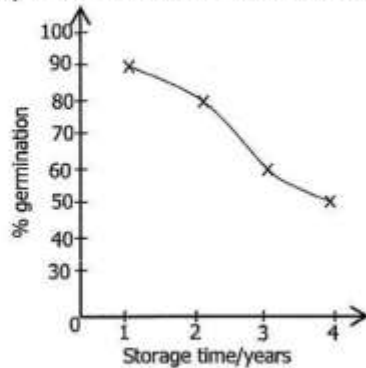
What response is shown by these animals in this experiment?

- A Negative phototaxis.
 - B Negative phototropism.
 - C Positive phototaxis.
 - D Positive phototropism.
- 25 The diagram shows a germinating seed.



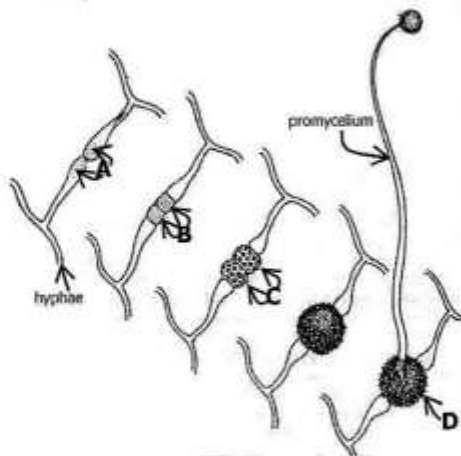
Which part is the region for cell differentiation?

- 26 The graph shows the effect of storage time on the germination of some seeds.



What can be concluded from the graph?

- A** Older seeds do not germinate.
B Older seeds germinate better than younger seeds.
C Younger seeds always germinate.
D Younger seeds germinate better than older seeds.
- 27 The diagram below shows sexual reproduction in fungus.



Which of the labelled stages is the zygospore?

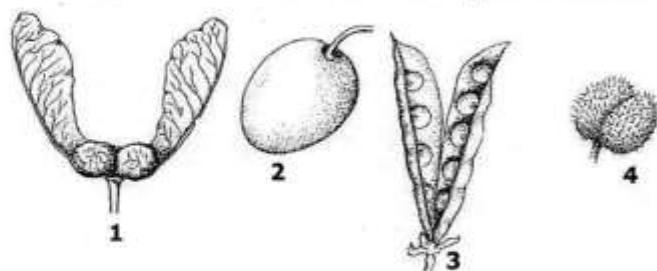
- 28 Some of the events which occur during sexual reproduction in a flowering plant are listed below.
1. Male gamete fuses with female gamete.
 2. Anthers split open.
 3. Growth of pollen tube.
 4. Pollen grain sticks to stigma.
 5. Seed develops inside ovary.

In which order do these events take place?

First → Last

A	2	4	3	1	5
B	3	2	4	5	1
C	4	2	1	5	3
D	4	2	3	1	5

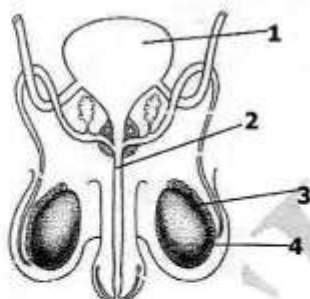
- 29 The diagrams show four different types of fruits.



Which two fruits are dispersed by animals?

- A 1 and 2
- B 1 and 3
- C 2 and 4
- D 3 and 4

- 30 The diagram shows a section through the male reproductive system.



In which numbered parts are sperms produced and where are they stored?

	Production of sperms	Storage of sperms
A	1	2
B	2	3
C	3	1
D	4	3

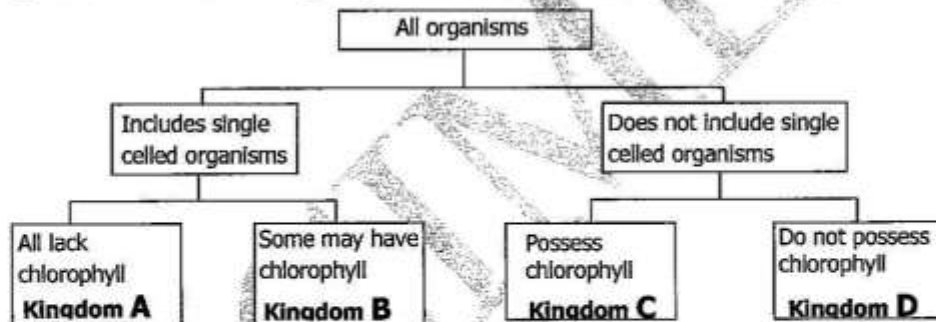
- 31 How often is an ovum usually released from the ovaries of a woman?

- A Once a week.
- B Once every 14 days.
- C Once every 28 days.
- D Once every 9 months.

- 32 Birth control methods may be classified as hormonal, mechanical and behavioural. Which is the correct identification of each of these groups?

	Behavioural	Hormonal	Mechanical
A	Condom	Spermicide	Rhythm
B	Condom	Intra-uterine device (IUD)	Vasectomy
C	Rhythm	Condom	Spermicide
D	Rhythm	Pill	Diaphragm

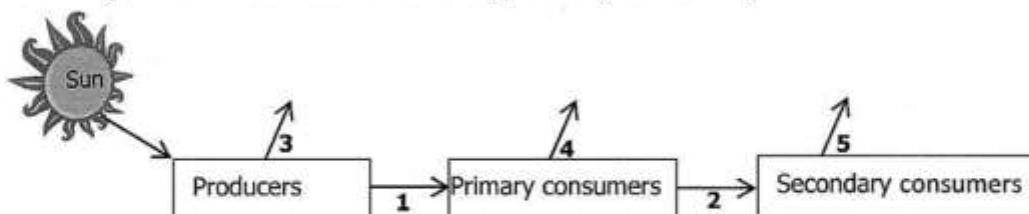
- 33** In cats, the gene for folded ear is dominant to the gene for normal ear. Over a period of years, two cats which were heterozygous for the gene, produced a total of 120 kitten. What would be the expected ratio of folded ear to normal ear amongst these offspring?
- A** 90:30
B 80:40
C 60:50
D 30:90
- 34** Which of the following genetic diseases is caused by chromosomal mutation?
- A** Colour blindness.
B Downs syndrome.
C Haemophilia.
D Sickle cell anaemia.
- 35** The diagram shows how living organisms may be separated into kingdoms.



Which kingdom represents the fungi?

- 36** A metal crucible weighing 25g was half filled with a fresh sample of soil and was weighed. The new mass was 50g. It was left overnight in an oven at 102°C and by the morning the mass was 44g. What was the percentage by mass of water in the original soil sample?
- A** 6%
B 12%
C 24%
D 33%

- 37 The diagram shows the flow of energy through an ecosystem.



Which arrows represent the least amount of energy transferred between organisms and greatest amount of energy lost to the environment?

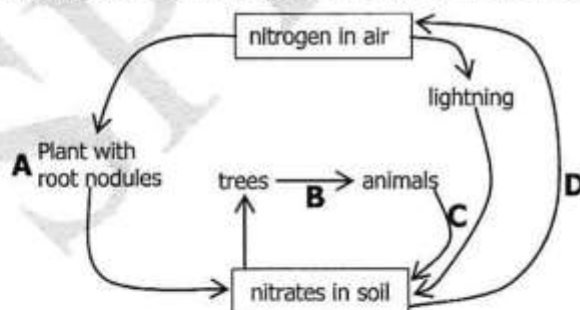
	Least energy transferred	Greatest energy lost
A	1	4
B	1	5
C	2	3
D	2	4

- 38 The following are events which occurred in a given town leading to a reduction in the number of people in that area from 1500 to 1300.

- 1 100 people shifted to the nearest town.
- 2 Heavy rainfall resulting in massive floods.
- 3 Outbreak of cholera due to garbage.
- 4 Improved medical facilities.

Which of these events would reduce the population size of this community?

- A 1, 2, 3
 B 1, 2, 4
 C 1, 3, 4
 D 2, 3, 4
- 39 The diagram below represents the nitrogen cycle.



At which point in the cycle are nitrogen fixing bacteria found?

- 40 Which of the following does **not** reduce biodiversity?
- A Deforestation
 B Overfishing
 C Poaching
 D Tourism

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