

Beasts on Land, in Air and Water

Examination

Reading Time: 10 minutes

Writing Time: 90 minutes

Name: _____

MARKS:

PART A Multiple choice: /50

PART B Short answer /92

142

GRADE

%

NAME _____

- | | | | | | | | | | |
|-----|---|---|---|---|-----|---|---|---|---|
| 1. | A | B | C | D | 26. | A | B | C | D |
| 2. | A | B | C | D | 27. | A | B | C | D |
| 3. | A | B | C | D | 28. | A | B | C | D |
| 4. | A | B | C | D | 29. | A | B | C | D |
| 5. | A | B | C | D | 30. | A | B | C | D |
| 6. | A | B | C | D | 31. | A | B | C | D |
| 7. | A | B | C | D | 32. | A | B | C | D |
| 8. | A | B | C | D | 33. | A | B | C | D |
| 9. | A | B | C | D | 34. | A | B | C | D |
| 10. | A | B | C | D | 35. | A | B | C | D |
| 11. | A | B | C | D | 36. | A | B | C | D |
| 12. | A | B | C | D | 37. | A | B | C | D |
| 13. | A | B | C | D | 38. | A | B | C | D |
| 14. | A | B | C | D | 39. | A | B | C | D |
| 15. | A | B | C | D | 40. | A | B | C | D |
| 16. | A | B | C | D | 41. | A | B | C | D |
| 17. | A | B | C | D | 42. | A | B | C | D |
| 18. | A | B | C | D | 43. | A | B | C | D |
| 19. | A | B | C | D | 44. | A | B | C | D |
| 20. | A | B | C | D | 45. | A | B | C | D |
| 21. | A | B | C | D | 46. | A | B | C | D |
| 22. | A | B | C | D | 47. | A | B | C | D |
| 23. | A | B | C | D | 48. | A | B | C | D |
| 24. | A | B | C | D | 49. | A | B | C | D |
| 25. | A | B | C | D | 50. | A | B | C | D |

Circle the correct response to each question on the answer sheet.

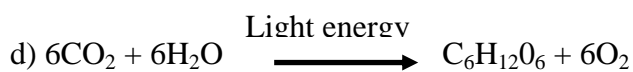
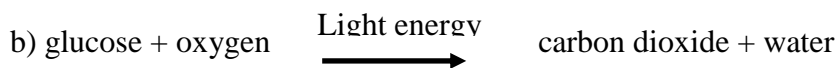
1) Aerobic respiration can only be achieved in:

- a) the absence of oxygen;
- b) the presence of oxygen;
- c) the ocean
- d) rainforests

2) If a parasite invades the small intestine of an animal, what effect will it most likely have on the body?

- a) Disrupts balance causing blindness
- b) Interferes with nutrient absorption
- c) Increases water retention
- d) Decreases white blood cell count

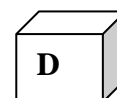
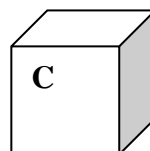
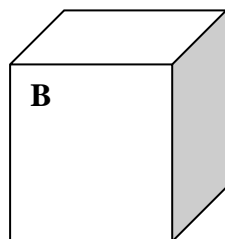
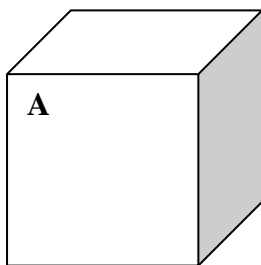
3) The chemical equation for photosynthesis is:



4) Which organism uses an Open Circulatory System:

- a. Mouse
- b. Fish
- c. Grasshopper
- d. Jellyfish

5) Which cube has the highest surface area to volume ratio?



6) Energy is exchanged at every level of a food chain. In what form is this energy past on from organism to organism in a food chain?

- a) heat energy.
- b) chemical energy.
- c) solar energy.
- d) solar radiation energy.

7) Consider the food chain shown below:

phytoplankton > *zooplankton* > *small fish* > *large fish* > *sea eagles*

Which of the following correctly describes the role of the zooplankton and large fish?

	Zooplankton	Large fish
A	Producer	Third order consumer
B	First order consumer	Fourth order consumer
C	First order consumer	Third order consumer
D	Second order consumer	Fourth order consumer

8) One of the following groups contains decomposer organisms only. Which one?

- a) Bacteria and fungi.
- b) Fungi and viruses.
- c) Dogs, flies and bacteria.
- d) Flies and native cats

9) Which of the following represents the flow of energy through a food chain?

- a) producer -> carnivore -> herbivore
- b) producer -> decomposer -> herbivore
- c) producer -> herbivore -> carnivore
- d) decomposer -> carnivore -> herbivore

10) All the chemical energy found in an animal's body originates from:

- a) the soil;
- b) water and carbon dioxide;
- c) sun;
- d) heat during the day.

11) A student was heard to say "Plants generate their energy through the process of photosynthesis". Which statement is true?

- a) Energy is created by plants and animals for their own use.
- b) Energy is used during photosynthesis to make more energy.
- c) Photosynthesis is a process that creates energy for plant use only.
- d) Photosynthesis is a process which converts energy from one form into another.

12) Arteries are stronger than veins because:

- a) they carry blood away from the heart at low pressure;
- b) they carry oxygenated blood;
- c) they carry blood toward the heart at high pressure;
- d) they carry blood away from the heart at high pressure.

13) Which option best outlines the flow of blood through the heart as it arrives from the body?

- a) Right atrium -> left ventricle, -> left atrium -> left ventricle
- b) Right atrium -> right ventricle, -> left atrium -> left ventricle
- c) Left atrium -> left ventricle, -> right atrium -> right ventricle
- d) Left atrium -> right ventricle, -> right atrium -> left ventricle

14) When similar cells with identical functions in an organism are grouped together they form a:

- a) membrane;
- b) specialised cell;
- c) system;
- d) tissue.

15) During a fish dissection a student identified the structure below. This structure forms part of the

- a) digestive system of the fish,
- b) skins protective barrier,
- c) respiratory system of the fish,
- d) nervous system of the fish.



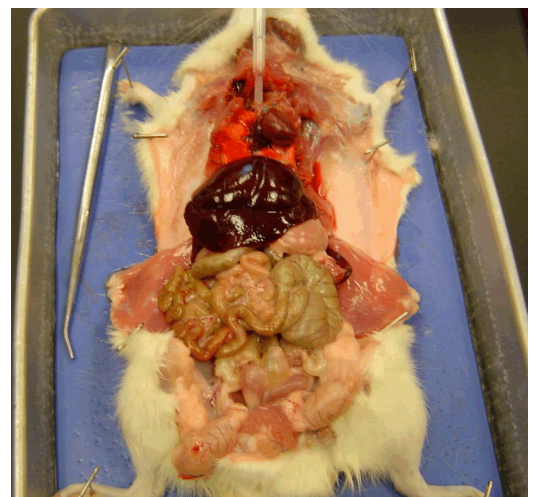
16) A system in the body:

- a) performs many different functions,
- b) is made of organs and performs a specialised role,
- c) is made up of a group of cells all performing the same specialised role,
- d) is made up of only nerve cells.

17) During a rat dissection a student was asked to identify the stomach, small intestine, liver and pancreas.

In actual fact he was asked to find parts of the:

- a) nervous system,
- b) urinary system,
- c) respiratory system,
- d) digestive system.



- 18) In the lungs oxygen diffuses into the blood while carbon dioxide diffuses out of the blood. Diffusion is best described as:
- a) the movement of a substance from an area of low concentration to an area of high concentration;
 - b) the movement of a substance from an area of high concentration to an area of low concentration
 - c) a state of equilibrium
 - d) a single-celled organism
- 19) A section of DNA that codes for the synthesis of a particular protein is called:
- a) a ribosome;
 - b) a gene;
 - c) a chromosome;
 - d) the nucleus.
- 20) Oxygen absorption is vital to all living organisms. The worm does not have any specialised organs for gas exchange. Which option best explains why?
- a) The worm does not require oxygen and is able to stay for long periods of time underwater.
 - b) The worm exchanges gases directly through its skin because it has a large surface area to volume ratio.
 - c) The worm sucks air through its mouth and directly into its blood.
 - d) The worm traps air in special air sacs under its body.
- 21) Insects are usually small creatures. Their ability to grow to great size is severely limited by:
- a) the temperature of their environment;
 - b) their ability to exchange gases;
 - c) the type of food they eat;
 - d) insufficient water intake.
- 22) Gills and lungs:
- a) assist in the absorption of carbon dioxide;
 - b) assist the organism in the digestion of food;
 - c) allow for carbon dioxide to be absorbed into the blood in large quantities;
 - d) increase the surface area through which carbon dioxide is removed from the blood and oxygen absorbed into the blood.
- 23) Which of the following is most likely to increase the rate of diffusion?
- a) a steep concentration gradient and low surface area to volume ratio.
 - b) a high surface area to volume ratio coupled with a steep concentration gradient;
 - c) a warm environment;
 - d) a cold environment coupled with a low surface area to volume ratio.

- 24) The role of a cell membrane is:
- a) to control what enters and exits a cell;
 - b) to establish compartments within a cell;
 - c) restrict the movement of substances between one part of a cell and another;
 - d) all of the above.
- 25) Stick insects
- a) release toxins into their prey to kill it.
 - b) are invertebrates
 - c) are made from a substance similar to sticks
 - d) have 8 legs
- 26) The counter-current flow of water across fish gills is designed:
- a) to maximise the amount of oxygen uptake;
 - b) to minimise the amount of carbon dioxide loss;
 - c) to allow fish to filter plankton;
 - d) to keep the gills moist.
- 27) Both rats and fish have a renal system to remove liquid waste from the organism. How does a unicellular organism, such as a paramecium remove liquid waste?
- a) By kidneys.
 - b) By chloroplasts.
 - c) By diffusion
 - d) By exercise and movement.
- 28) Which one of the following is not a survival advantage for a stick insect population?
- a) Long days.
 - b) Reproduction.
 - c) Skin colouration
 - d) Body shape.

The next two questions refer to the following information. The following list describes some of the characteristics of the genus *Euglena*, of which there are 450 species:

- 1) **Euglena are single celled organisms approximately 100 micrometres in length.**
- 2) **Euglena have a single, whip-like flagellum and contractile fibres which they use to change the shape of their body and move about in water.**
- 3) **Euglena can occur in soil, fresh water and the ocean.**
- 4) **Some species of Euglena contain chlorophyll and can photosynthesize.**

- 29) Which one of the following lists those characteristics of Euglena that make it animal-like?
- a) 2, 3 and 4 only.
 - b) 1 only.
 - c) 1, 2 and 3 only.
 - d) 2 only.
- 30) Which one of the following lists those characteristics of Euglena that make it plant-like?
- a) 2, 3 and 4 only.
 - b) 4 only.
 - c) 2 and 3 only.
 - d) 3 only.

The following information refers to questions 31-35.

A student performed 2 studies to investigate the factors that affect the germination of acacia seeds.

Study 1

The acacia seeds were divided evenly so that there were 20 sets of 25 seeds. Twenty petri dishes were then prepared. Each contained damp paper. Each set of seeds was then placed in a separate petri dish. Each petri dish was maintained at 1 of 4 temperatures for 30 days. The temperature and time periods were defined as the germination temperature and the germination period, respectively. The table below shows the results

Storage period (weeks)	Number of seeds germinating when kept at the given temperature			
	13°C	18°C	23°C	28°C
0	0	0	0	0
4	0	2	0	0
6	3	8	6	0
8	7	22	18	0
10	15	24	21	1

Study 2

Acacia seeds were placed in dry containers. The containers were stored at various temperatures for 10 weeks.

The acacia seeds were divided evenly so that there were 20 sets of 25 seeds. Twenty petri dishes were then prepared. Each contained damp paper. Each set of seeds was placed in a petri dish. The petri dishes were maintained at 1 of 4 temperatures for 30 days. The table below shows the results

Storage temperature (°C)	Number of seeds germinating when kept at the given germinating temperature			
	13°C	18°C	23°C	28°C
0	15	24	21	1
5	16	23	21	1
10	0	6	4	0
15	0	0	0	0
20	0	0	0	0

- 31) In general, the results of Study 1 suggest that acacia seeds that are placed in a petri dish containing damp paper are most likely to germinate when they are maintained at which of the following temperatures ranges?
- a) 13 - 15°C
 - b) 18 - 23°C
 - c) 23 - 28°C
 - d) > 28°C
- 32) Another petri dish with 25 acacia seeds had been included in Study 2 and were kept at a storage temperature of 13°C and a germination temperature of 18°C. Based on the information provided, the number of seeds that would have germinated after being maintained for 30 days would most likely have been closest to:
- a) 0.
 - b) 8.
 - c) 16.
 - d) 24.
- 33) In Study 2, at the storage temperature of 5°C, as germination temperature increased from 13°C to 28°C, the number of seeds that germinated:
- a) decreased only.
 - b) increased only.
 - c) decreased, then increased.
 - d) increased, then decreased.
- 34) Which of the following sets of seeds were exposed to the same conditions prior to being placed in the petri dishes?
- a) The seeds from Study 1 that were stored for 8 weeks and the seeds from Study 2 that were stored at 5°C
 - b) The seeds from Study 1 that were stored for 8 weeks and the seeds from Study 2 that were stored at 15°C
 - c) The seeds from Study 1 that were stored for 10 weeks and the seeds from Study 2 that were stored at 5°C
 - d) The seeds from Study 1 that were stored for 10 weeks and the seeds from Study 2 that were stored at 15°C

35) A student stored 100 acacia seeds at a constant temperature for 10 weeks. The student then divided the seeds into 4 sets and maintained them as described in Study 2. The results were as follows:

Germination temperature (°C)	Number of seeds that germinated
13	1
18	6
23	3
28	0

These seeds most likely had a storage temperature of:

- a) 0°C.
- b) 5°C.
- c) 10°C.
- d) 15°C.

36) A bird and a jellyfish rely on the same laws of physics to propel them in the air or in the water. The bird pushes air down with its wings while the jellyfish pushes water back. Both of these creatures rely on one of Newton's Laws of Motion that states:

- a) Every action has an equal and opposite reaction.
- b) An object in motion will continue to travel in a straight line unless acted on by an outside force.
- c) An object submerged in a fluid experiences a force equal to the weight of the fluid it displaces.
- d) A heavy object in motion is harder to stop than a light object in motion.



37) Which one of the following experiences the greatest force?

- a) A 0.8 kg bird pushing 40.0 grams of air at a speed of 3.0 m/s downwards.
- b) A 200 kg shark pushing 200 grams of water at a speed of 1.0 m/s backwards
- c) A 0.1 kg jelly fish pushing 10.2 grams of water at a speed of 0.8 m/s backwards
- d) A 15.1 kg crane pushing 2.9 kg of air at a speed of 2.5 m/s downwards.

38) It would be impossible for a whale to live on land. The gravitational force acting on it would be such that it would collapse under its own weight. Why are such large creatures able to live in water and move effortlessly?

- a) There is more oxygen in water than in the air.
- b) The buoyant force of water acts against the gravitational force acting on the whale.
- c) Gravity is less when submerged in water.
- d) There is no gravitational force when submerged in water.



39) A 250 kg lion at rest accelerates at 8.0 m/s^2 while a 1,200 kg elephant at rest takes 1 second to accelerate to a speed of 3 m/s. Which animal exerts the greatest force?

- a) Lion
- b) Elephant
- c) Both exert the same force.
- d) Not enough information is given to be able to work out the force of each animal.

40) Bats navigate through sonar. Sonar is sound waves travelling through a medium such as air or water. Sound energy travels through a medium as moving waves. Sound energy can also be thought of as

- a) potential energy,
- b) heat energy,
- c) kinetic energy
- d) gravitational potential energy..

41) If a particular bird species lacks the variation needed to adapt to a changing environment, it will;

- a) eventually, through evolution, it will acquire them,
- b) most likely become extinct ,
- c) most likely evolve into a lower form organism through a process called devolution,
- d) likely most evolve into higher form via the process of evolution.

42) Which one of the following is a random occurrence?

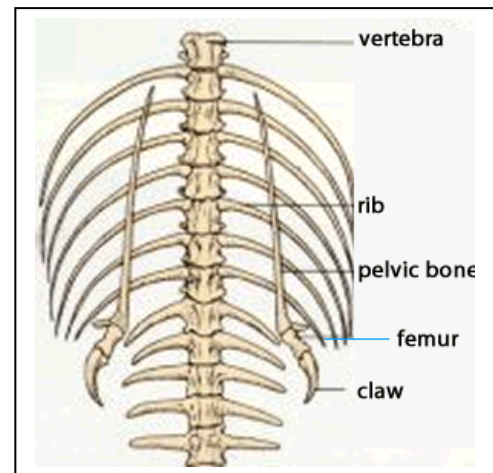
- a) adaptation,
- b) speciation,
- c) natural selection,
- d) mutation.

43) Consider the following, speciation, isolation, natural selection and mutation. If evolution is to occur in which order must these take place?

- a) speciation, natural selection, mutation, isolation,
- b) natural selection, mutation, speciation, isolation,
- c) mutation, isolation, natural selection, speciation.
- d) isolation, mutation, speciation, natural selection.

- 44) A characteristic that makes an organism particularly well suited to its environment is known as:
- an abiotic factor,
 - a biotic factor,
 - a random occurrence,
 - an adaptation.
- 45) Africa and South America slowly drifted apart after once being a single landmass for millions of years. Monkeys on the two continents, although very similar, show numerous genetic differences. Which factor is probably the most important in maintaining these differences?
- Similar environments
 - Varying rates of mutation
 - Geographic isolation
 - Identical ancestors.
- 46) Which of the following characteristics in a bird population living on an isolated island provide the greatest potential for evolutionary change in colouration?
- A population of 100, all of which are green in colour.
 - A population of 100, with 20 different colour variations.
 - A population of 10,000, with two different colour variations
 - A population of 10,000 with 20 different colour variations.

- 47) Upon close examination of the skeleton of an adult python, a pelvic girdle and leg bones can be seen. These features are an example of :
- selective breeding,
 - homologous structures,
 - vestigial structures,
 - comparative structures.



- 48) From an evolutionary point of view which of the following variations are not important.
- Peter has a broken hand due to an accident but Paul has two perfect hands.
 - Peter shows an abnormal number of toes due to a mutation but Paul does not.
 - Peter was born blind but Paul has excellent vision.
- 1 only
 - 1 and 2 only
 - 2 and 3 only
 - 1, 2 and 3

49) Which of the following is evidence for a common ancestor as proposed by Darwin?

1. There are patterns in the fossil record.
2. Different bird species on an island tend to resemble one another.
3. Early Human embryos live well in water.
4. Anatomical structures, such as the Human forelimb and the chicken wing appear to be modified structures of an ancestral limb.

- a) 1 only
- b) 1 and 2 only
- c) 1, 2, 3 and 4
- d) 2, and 4 only



50) How would an evolutionary biologist explain the remarkable resemblance of a stick insect to a scorpion.

- a) An ancestor of this insect encountered a population of scorpions and after a while developed features that caused it to blend in well to avoid been eaten.
- b) A number of insects within the population resembled scorpions and over time survived better than the others as birds avoided them.
- c) Ancestors of this insect found that by stretching to reach food far away their limbs grew longer and eventually resembled the limbs of a scorpion.
- d) Stick insect eggs were hatched in a scorpion nest and consequently matured to take on greater scorpion characteristics.

Section B SHORT ANSWER

Answer all questions neatly in the space provided.

1) Using your knowledge of diffusion, explain why “skin breathers”, such as worms, are generally small in size and flat in shape.

_____ 2 marks

2. Give a reason as to why cells need to be small in size.

_____ 2 marks

3) Gills are well suited to enable aquatic animals to get oxygen. Why are gills unsuitable for terrestrial animals?

_____ 2 marks

4) Why are fish so sensitive to adverse water quality and pH?

_____ 2 marks

5) Why is the mammalian heart sometimes referred to as a “double pump”?

_____ 2 marks

6) There are two basic types of circulatory systems. Name both of them and briefly discuss the features of each:

_____ 2 marks

7

a) Name the process whereby organic matter is broken down into inorganic matter?

1 mark

b) Where does the energy for all life on earth originate from?

1 mark

c) What does a herbivore eat?

1 mark

d) What does a carnivore eat?

1 mark

e) What does a scavenger eat?

1 mark

f) What does a omnivore eat?

g) Using the organisms listed below, construct an appropriate food chain in the box:

rat, grass, locust, cat, fungus

2 marks

What is meant by the term *Food Web*?

1 marks

9

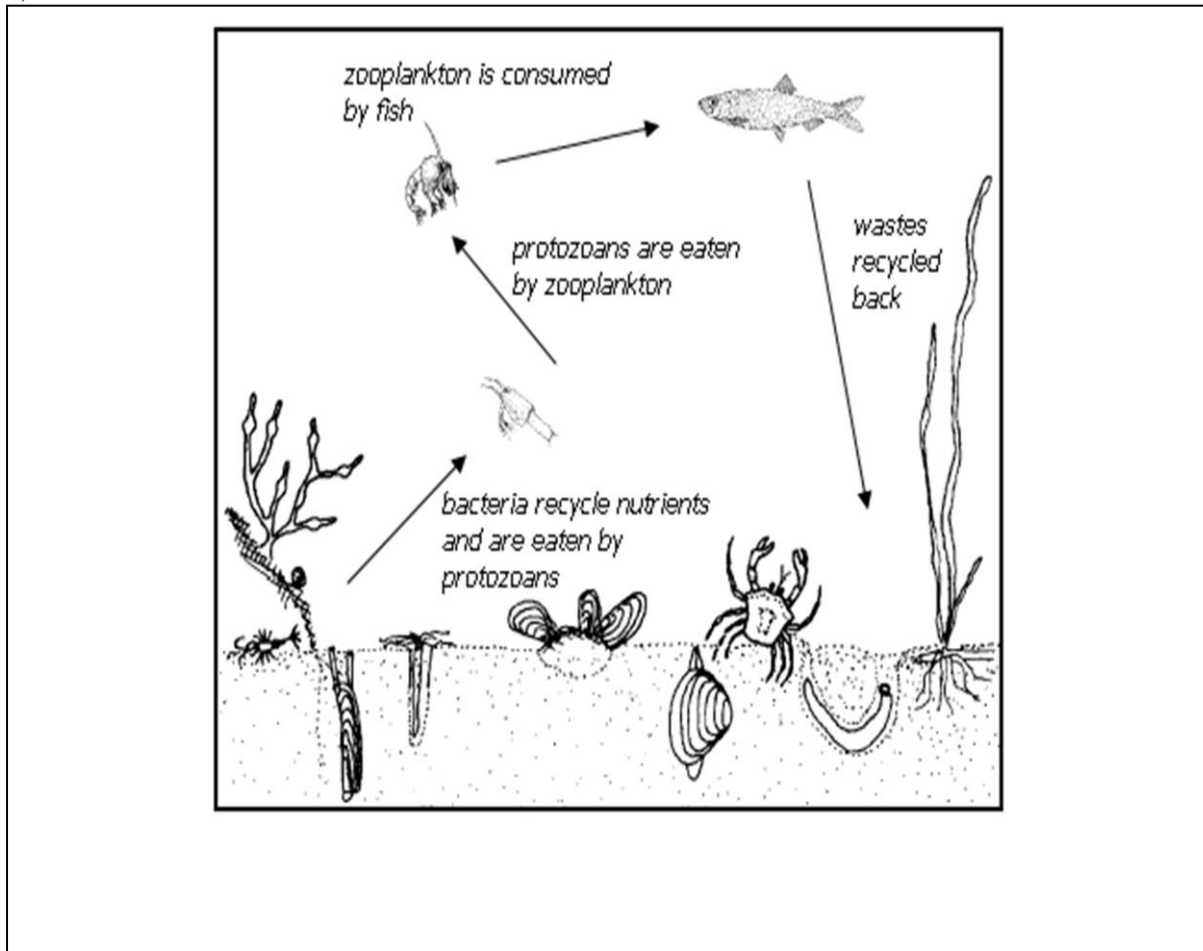
8) Stick insects have a number of special adaptations that enable them to survive in their environment. Identify three adaptations stick insects have and state the function of each.

Adaptation	Function
i.	
ii.	
iii.	

6 marks

6

9) Consider the food web shown below.



a) Identify the organisms that can be classified as *decomposers*?

b) Which organism/s are first order *consumers*?

c) What would happen if a chemical that killed bacteria only was placed in the lake?

d) Which organism, pictured in the diagram, undergoes *photosynthesis*?

Total 4 marks

4

10) In a woodland habitat rabbits and mice fed on grass and seeds. Foxes fed on both rabbits and mice but owls only ate the mice. Draw a food web to illustrate the feeding relationships:

2 marks

12 a) What is the term for a characteristic that makes an organism suited to survive in its environment? Give an example

2 marks

b) Define a *species*?

2 marks

c) Define "Natural selection" with an example.

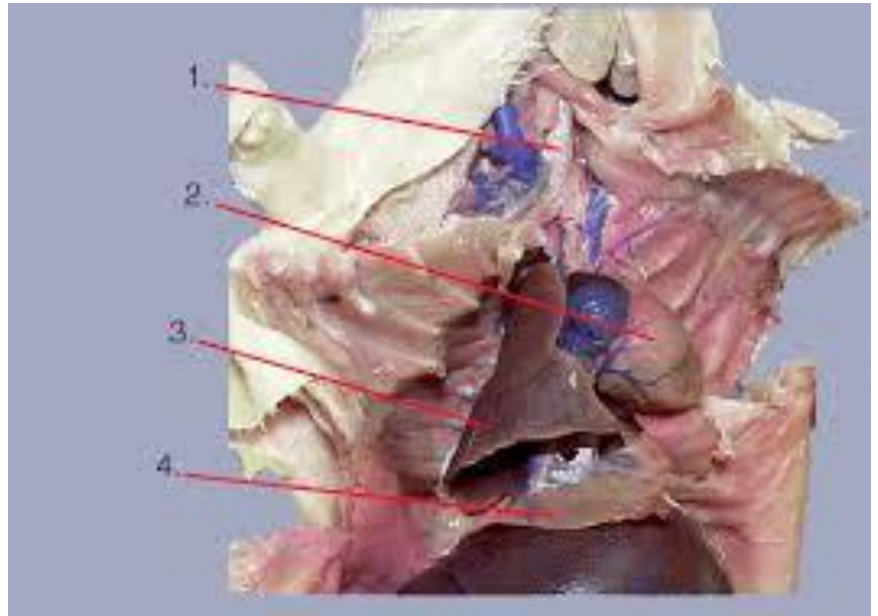
2 marks

d) Define "Survival of the fittest" with an example

2 marks

- e) Explain how a population of green grasshoppers can evolve into two different species of grasshoppers? Use the following words in context.
natural selection, mutation, variation, isolation, survival of the fittest 4 marks

13. Consider the rat dissection shown below.



- a) Item labelled "1" is a tube that contains rings of cartilage.

Name _____

Function _____

- b) Item "2"

Name _____

Function _____

- c) Item "3"

Name _____

Function _____

- d) Item "4"

Name _____

Function _____

2 + 2 + 2 + 2 = 8 marks

8

14. The number of mosquitoes that survived in a body of water was plotted against the pH of the water. The results are shown on the right. 1000 mosquito larvae were placed in 20 litres of water and the pH of the water adjusted accordingly.

a) Plot the results shown on the right on an appropriate set of axis on the graph paper below and draw a line of best fit.

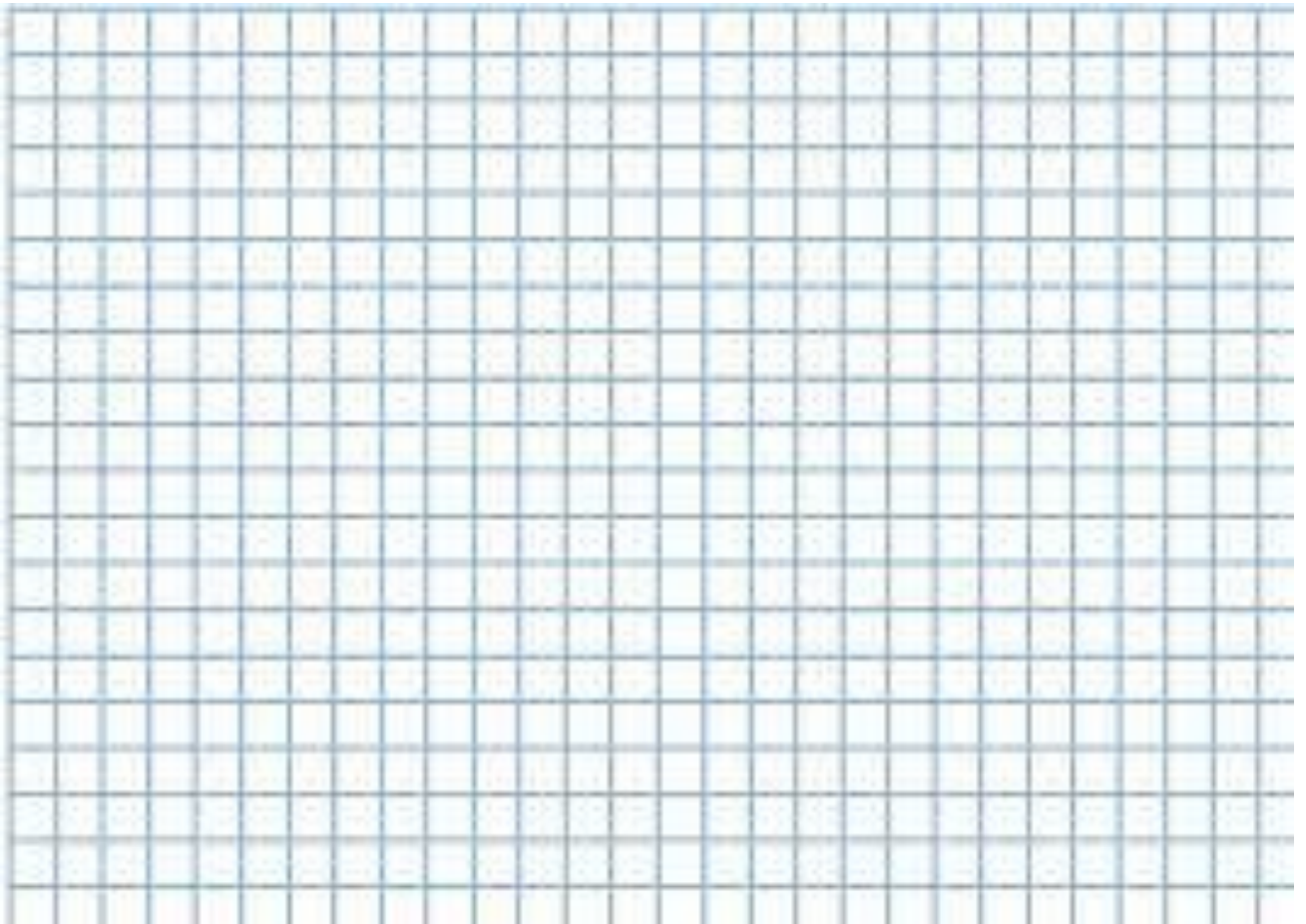
6 marks

b) Identify the :

i. Dependent variable

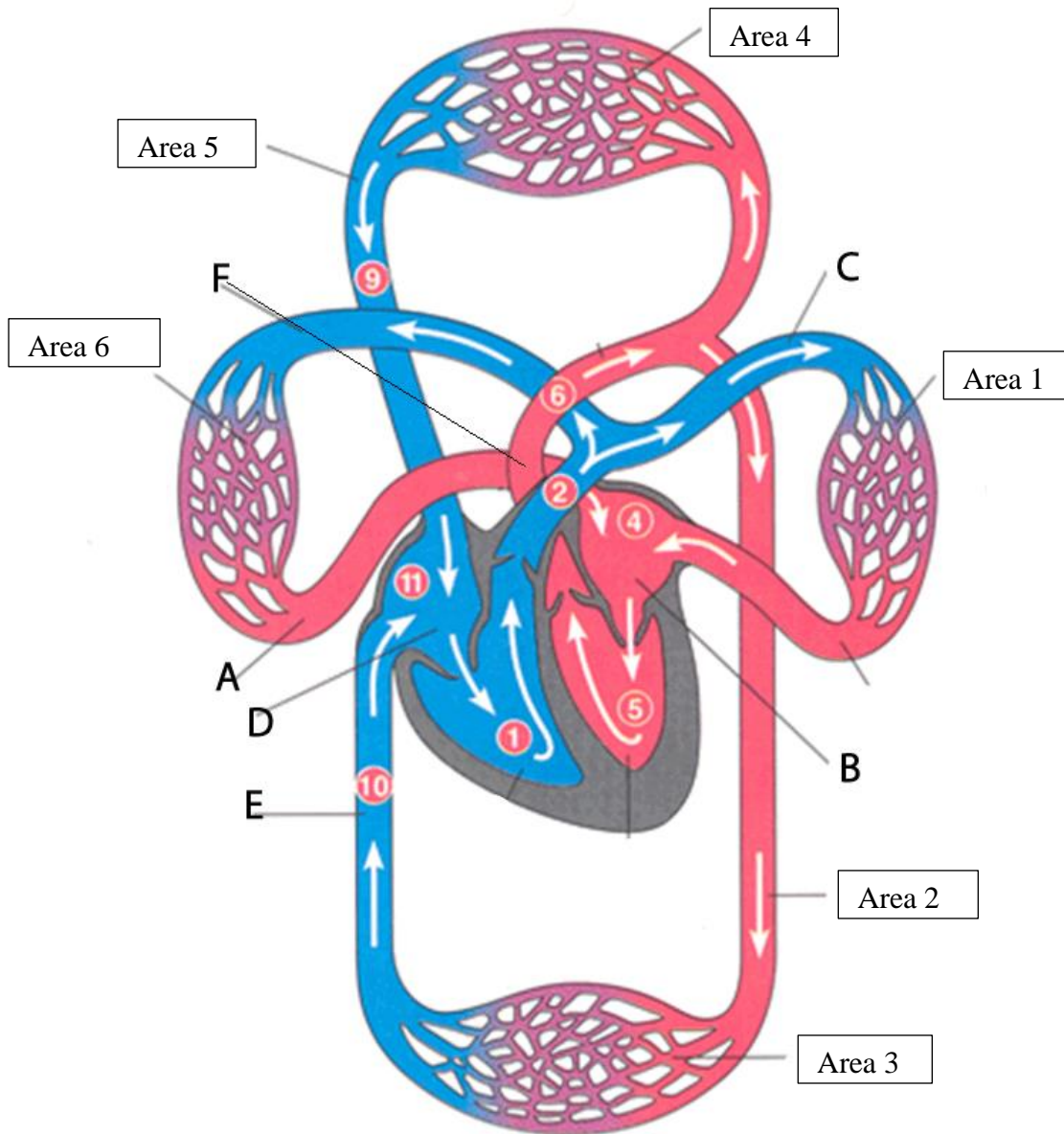
ii. Independent variable

Number of mosquito larvae that hatched	pH of the water
0	1
30	2
60	3
122	4
235	5
472	6
944	7
500	8
240	9
0	14



15) Below is a representation of the circulatory system of an organism.

a) Identify the structures labelled A through to F.



- A _____
- B _____
- C _____
- D _____
- E _____
- F _____

c) In which areas does gas exchange take place?

_____ 1 mark

7

16 a) A three chambered heart is found in which organism?

_____ 1 mark

b) How does the bird's respiratory system differ from that of the mammalian respiratory system?

_____ 2 marks

c) Urine is excreted from the body. What organ is responsible for producing urine?

_____ 1 mark

d) Which type of cell is brain tissue composed of?

_____ 1 mark

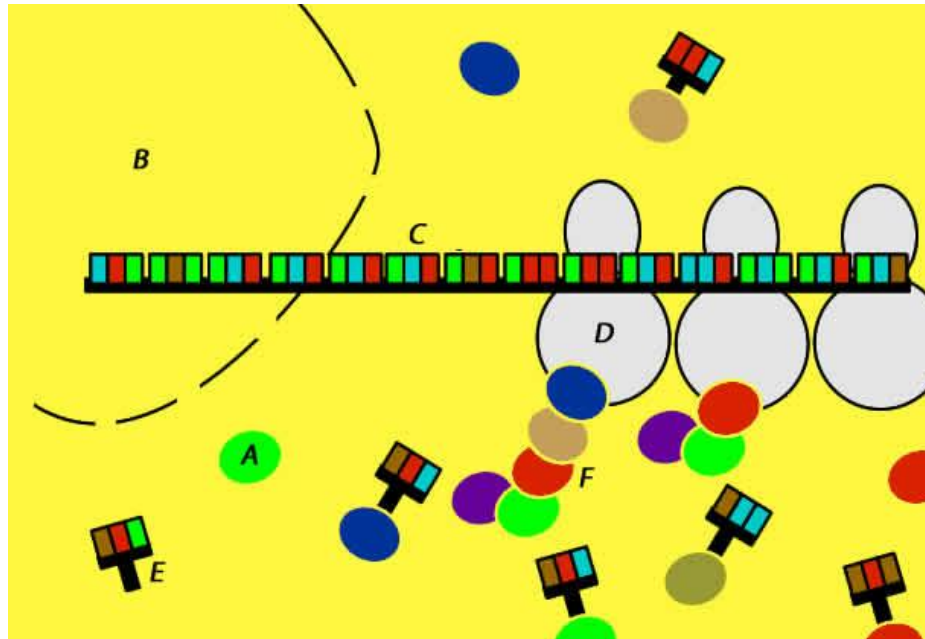
e) List one function of the liver.

_____ 1 mark

f) What are capillaries?

_____ 2 marks

17 Match the following words to labels on the diagram below and give a brief explanation of the function of each . (6 marks)



Structure	Label	General function
tRNA		
mRNA		
Ribosome		
Protein		
Amino acid		
Nucleus		

18 Use some of these words to complete the sentences below:

Chain, form, photosynthesis, sound, recycled, web, chemical, surroundings, trophic, proteins, fats, energy, level, organism, hydrogen

Energy and Matter in Ecosystems

Ecosystems all over the Earth have shared some of the very same atoms of carbon, hydrogen, nitrogen and oxygen at some point in time. All natural ecosystems, no matter how big or small, or where they are located, use renewable energy and recycle matter. The Law of Conservation of _____ states that energy cannot be created or destroyed only changed from one _____ to another. Your own body provides a very good example of this law. The _____ energy in the food you eat is not destroyed. It is transformed into other forms: movement energy, stored chemical energy, _____ energy and heat. The heat energy is eventually transferred to the _____. It's not destroyed — just converted. It's the same for ecosystems. The energy that enters an ecosystem flows through it and is transformed into other forms of energy, including heat. Heat is eventually transferred to the surroundings. The path that food energy takes from organism to organism in an ecosystem is called a food _____. Each energy level in a food chain is called a _____ level (feeding level). _____ are chemicals that are required for the growth and repair of cells in all living things. All proteins are combinations of chemical 'building blocks' called amino acids. These are made up of atoms of carbon, _____, oxygen and nitrogen. These atoms are _____ over and over again in natural ecosystems.

10

END OF THE EXAM. (Make sure your name is clearly written on the front of the exam and you have replaced the named Answer sheet part A inside the front cover)