

Annual Examinations for Secondary Schools 2019

YEAR 11

BIOLOGY

TIME: 2 hours

Name: _____

Class: _____

Question No.	Section A							Section B					
	1	2	3	4	5	6	7	1	2	3	4	5	
Max. mark	10	7	5	8	6	12	7	15	15	15	15	15	
Actual mark													TOTAL MARK

85% Theory Paper	15% Practical	Final Score

Section A: Answer all questions in this section.

1. Figure 1 below shows five protists.

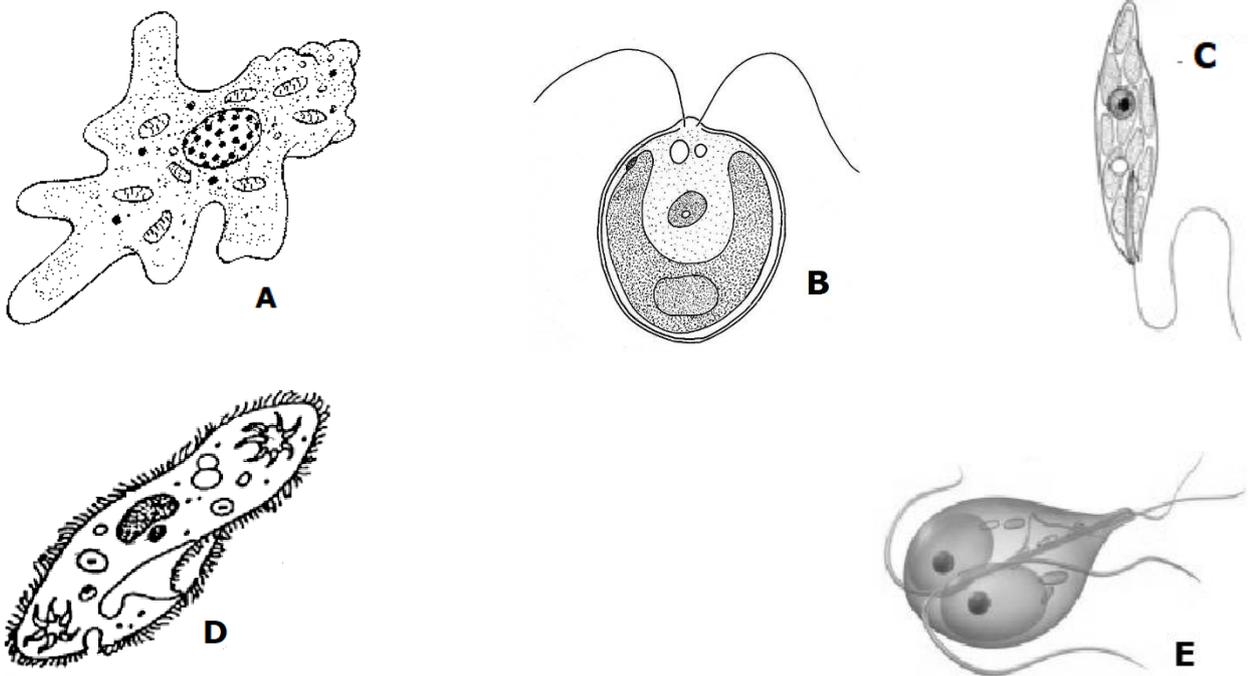


Figure 1

a. Identify protists **B**, **D** and **E** from the following dichotomous key.

1. Have flagella or cilia.....Go to 2
Do not have flagella or cilia.....**Amoeba**
2. Have flagella.....Go to 3
Have cilia.....**Paramecium**
3. Have two or more flagella.....Go to 4
Have one flagellum.....**Euglena**
4. Have an oval structure with equal sized flagella.....**Chlamydomonas**
Have oval structure with a tapering end and unequally sized flagella.**Giardia**

(3)

B _____ **D** _____ **E** _____

b. i. Protist C has a flagellum but also chloroplasts. It behaves like a plant in light but like an animal in the dark. Explain the mode of nutrition when 'It behaves like a plant in light'. (2)

- ii. Describe the function of the flagellum. (2)

- c. Protist A reproduces by binary fission.
 i. State whether this mode of reproduction is sexual or asexual. (1)

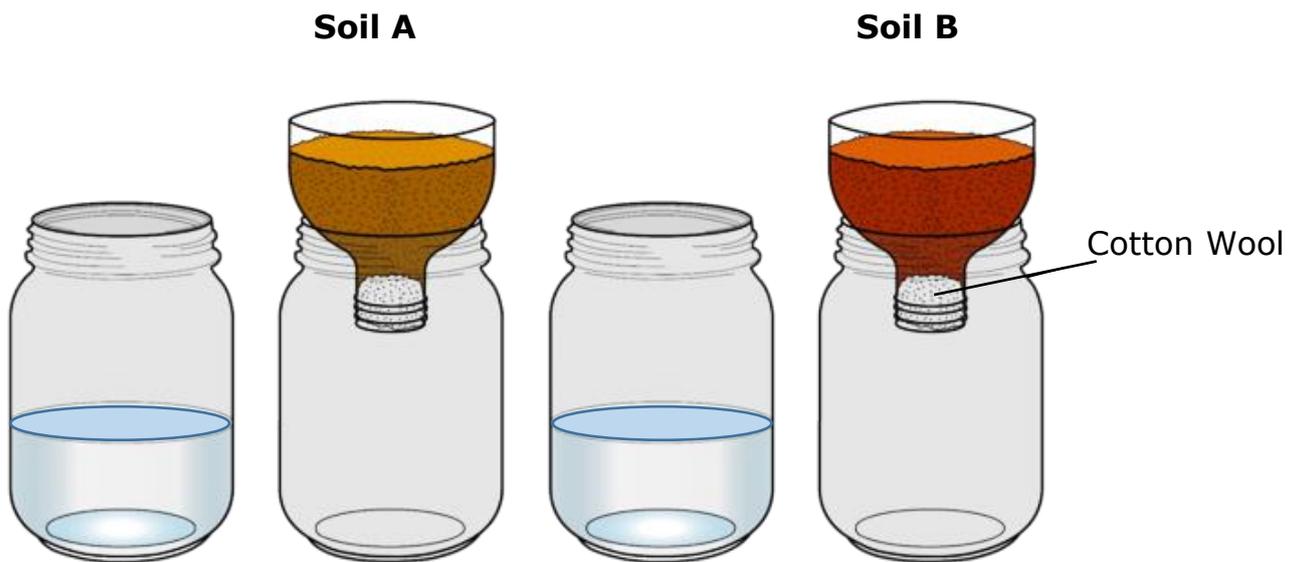
- ii. Give **one** advantage and **one** disadvantage of this mode of reproduction. (1, 1)

Advantage _____

Disadvantage _____

Total: 10 marks

- 2a. In an investigation on the retention of water by soil, the following apparatus is used. The water in the jars is slowly tipped into each soil.



<http://www.thunderboltkids.co.za/Grade5/04-earth-and-beyond/chapter2.html>

Figure 2

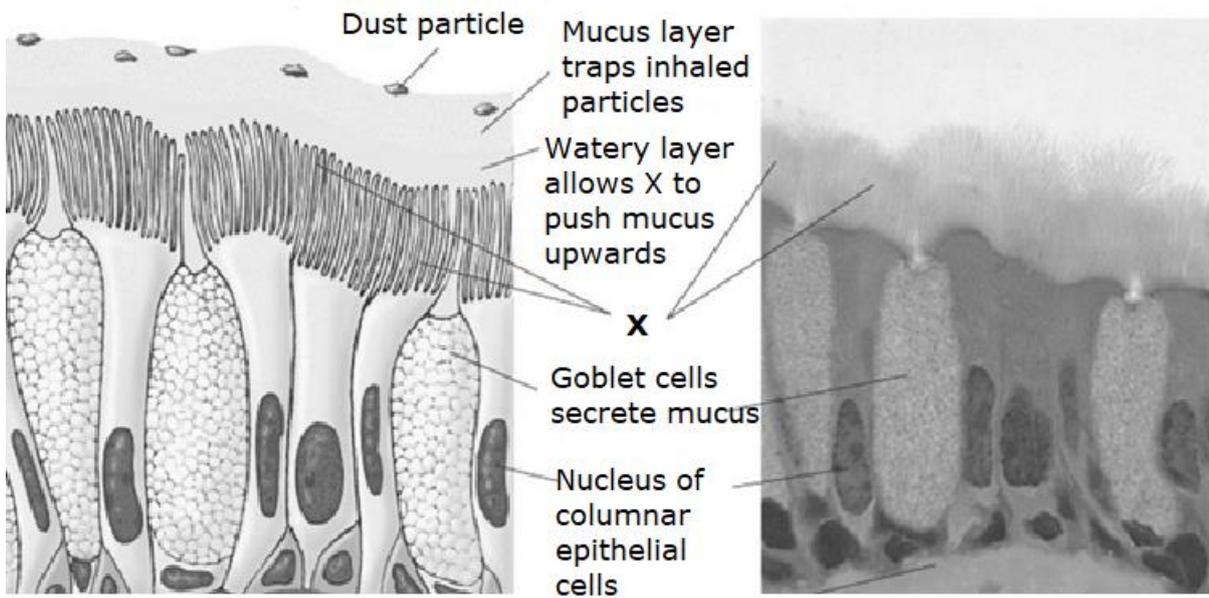
- i. Given that soil A is loam soil and soil B is clay soil, draw on the diagram the level of water that passes through into **each** jar. (2)
- ii. Explain the reason to your answer to ai., in terms of particle size and air spaces of soils A and B. (2)

iii. State **one** variable that must be kept constant throughout this investigation. (1)

b. Organic matter is a source of mineral nutrients in soil. Give **one** other advantage of organic matter in soil. (2)

Total: 7 marks

3. Figure 3 shows the inner lining of the trachea of the respiratory system.



Adapted from <https://socratic.org/questions>

Figure 3- Drawing and photomicrograph of inner lining of trachea

a. The inner lining of the trachea is defined as a tissue. Define the term tissue. (2)

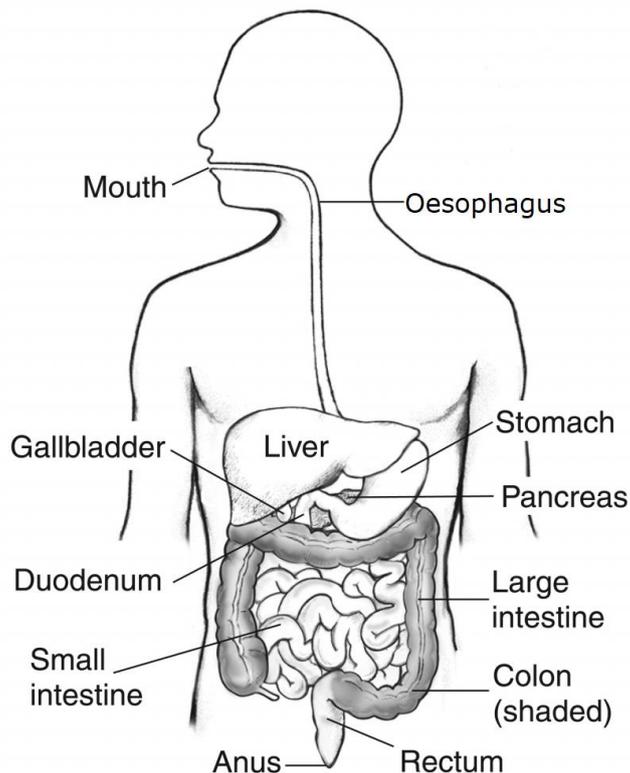
b. i. Name the structures labelled X. (1)

ii. Describe the function of structures X in terms of defence against disease. (1)

c. Identify the function of the nucleus of these cells. (1)

Total: 5 marks

4. Figure 4 shows the diagram of a human alimentary canal.



<http://humananatomyly.com/>

Figure 4

a. List the structure that matches the following statement: (4)

Statement	Structure
Secretes the enzyme trypsin	
Secretes an acidic juice that destroys bacteria in food	
The site where absorption of digested food occurs	
Produces bile	

b. Explain why the following statements are **incorrect**.

i. The human colon contains bacteria that digest cellulose. (2)

ii. Digestive enzymes act more easily on food that is not chewed. (2)

Total: 8 marks

5. The Algerian hedgehog (Maltese: Qanfud) is a terrestrial mammal found on the Maltese Islands. It feeds on snails, slugs, insects and small vertebrates such as frogs and lizards.

a. Define the term vertebrate. (1)

b. i. List **two** characteristics of mammals. (2)

ii. The binomial name of the Algerian hedgehog is *erinaceus algerius*. Write down the binomial name in the correct form. (2)

c. From the initial statement above, name the animal that is an endotherm. (1)

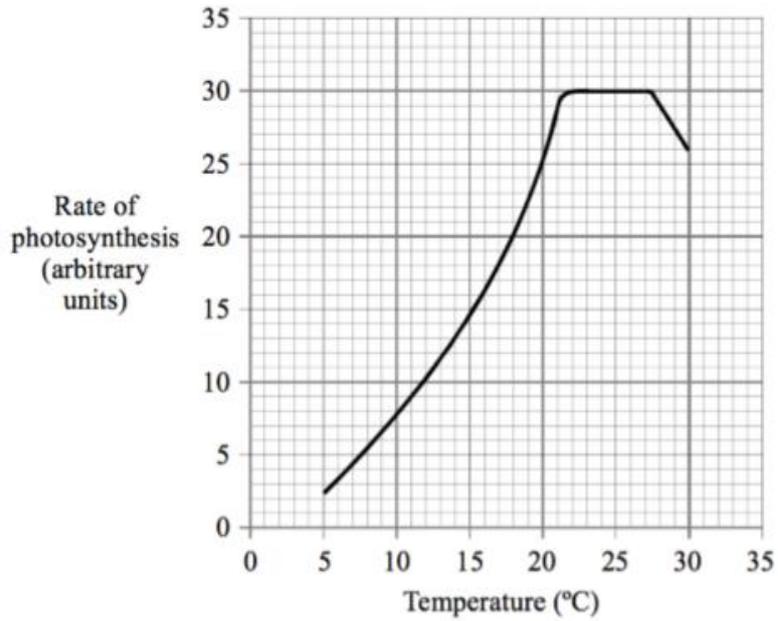
Total: 6 marks

6a. Table 1 below summarises photosynthesis and respiration reactions at different 24-hour conditions. Fill in the missing sections with appropriate biological content. (6)

Condition	Rate of Photosynthesis vs Rate of Respiration	Overall result
Dark (Night)		
	Photosynthesis rate equals respiration rate	
		Carbon dioxide taken in from air and oxygen released in air

Table 1

b. The graph below shows the effect of temperature on the rate of photosynthesis.



Graph 1

Explain why:

- i. The rate of photosynthesis increases between 5°C and 21°C. (2)

- ii. There is no change in the rate of photosynthesis between 21°C and 27°C. (2)

- iii. Above 30°C, there is no photosynthesis occurring. (2)

Total: 12 marks

7. Hypophosphatemia is a form of rickets caused by an X-linked dominant allele. The action of this allele stops the effect of vitamin D on the body, resulting in bow shaped legs.

a. The phenotypic ratio of a cross between an affected mother and an unaffected father is the following:

25% unaffected son
25% affected son

25% unaffected daughter
25% affected daughter

Using a genetic diagram in the space below, show how the results of this cross is obtained. (4)

Parents' Genotype: Mother _____ Father _____

Gametes: 

Cross:

Results:

b. Explain why when an affected male is crossed with an unaffected female all the sons born to this couple are unaffected. (2)

c. Name **one** food that is rich in vitamin D. (1)

Total: 7 marks

Section B: Answer question 1 and any other two questions from this section on the foolscaps provided.

1. Read the following text and answer the questions on it.

Warming alters predator-prey interactions in the Arctic

Under warming conditions, arctic wolf spiders' tastes in prey might be changing, according to new research by the scientist Professor Koltz from Washington University in St. Louis. This starts a new cascade of food web interactions that could decrease some impacts of global warming.

"We often think about how warmer temperatures might strengthen or weaken interactions between predators and their prey," Koltz said. "But in this case we show that when warming alters those interactions, it can also lead to changes in ecosystem-level processes like decomposition rates."

Koltz and her team study wolf spiders. Wolf spiders don't make webs. This type of spider hunts on the ground and can eat almost anything smaller in size, from plant-eating bugs to other predators.

But they really love to eat *Collembola*, the small arthropods commonly called springtails. It's this spider's snack that connects them to the below ground environment. Springtails eat both plants and fungi. And, in wet tundra, the fungi in the ground largely control how quickly dead plant matter is decomposed and its nutrients released into the soil and air.

Arctic wolf spiders are thus said to have an "indirect" effect on decomposition. The spiders eat animals (springtails) that eat fungi; if more fungi-eaters get eaten, then fungi grow unchecked. When there is a lot more fungal activity, there is faster decomposition.

Decomposition is usually positive for plants, in that it releases more nutrients to the soil. Some of these nutrients, such as nitrogen, are sought-after fertilizers that increase plant productivity. But decomposition is a double-edged sword for the environment. As microbes eat dead plants, they also respire carbon dioxide and methane, both powerful greenhouse gases.

What they discovered was surprising. At ambient temperatures, there were fewer springtails left in the high spider density areas, and decomposition of leaf litter had happened faster. This was expected since wolf spiders love to eat springtails. But in the warmed areas with high spider densities, the researchers found significantly more of the springtail prey, and less evidence of decomposition of the leaf litter in the soil.

The researchers believe that under warming conditions, the wolf spiders are developing a taste for different prey. Instead of springtails, they could be eating more of the intermediate predators, like smaller spiders.

That's good news for springtails and maybe for the climate, too.

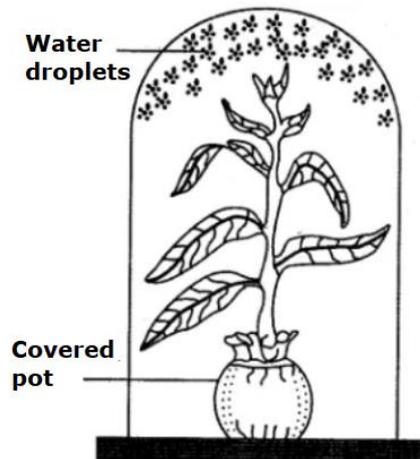
Adapted from <https://www.sciencedaily.com/releases/2018/07/180723152553.htm>

- a. Find the term in the text that indicates: (1, 1)
- an organism that hunts, catches and kills animals.
 - a biological community of interacting organisms and their physical environment.
- b. List **two** characteristics of Arthropods. (2)
- c. Springtails are insects while spiders are arachnids. Distinguish between insects and arachnids. (2)
- d. i. Describe a food web. (1)
- From the fourth paragraph in the text, identify a food chain. (2)

- e. Explain, in your own words, how the warming of the Arctic results in less greenhouse gases in the environment. (3)
- f. Name **one** nutrient other than nitrogen that is released from decomposition and briefly explain the importance of the cycle of this nutrient. (1, 2)

Total: 15 marks

2a. Below is a simple apparatus showing the process of transpiration.



<https://www.aplustopper.com/transpiration-icse-solutions-class-10-biology/>

Figure 5

- i. Describe the process of transpiration. (3)
- ii. Covering the pot is a precaution. Explain the importance of this precaution. (2)
- iii. List **two** factors that may affect transpiration. (2)
- b. Draw a cross-section of a dicot stem and label the tissues forming a vascular bundle. (4)
- c. Translocation is another important mode of transport in plants.
- i. Name the sugar that is transported from the leaves. (1)
- ii. Name and describe the tissue that transports this sugar. (1, 2)

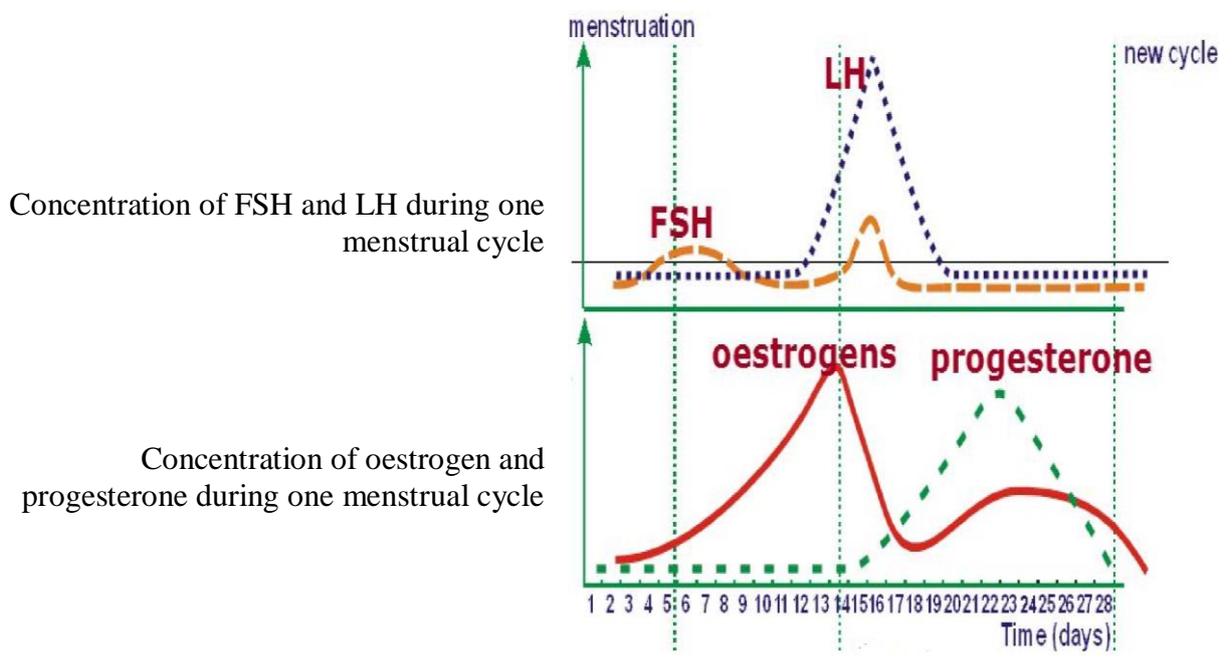
Total: 15 marks

3. Use your biological knowledge to explain the following:

- a. Osmoregulation in humans is a mechanism to maintain volume and composition of body fluids. (4)
- b. Human blood pressure is lower in veins than in arteries. (4)
- c. Organisms cannot survive without water. (3)
- d. The human brain is the command centre for the nervous system. (4)

Total: 15 marks

4. The graph below shows the fluctuations of the hormones involved in a menstrual cycle.



Graph 2

- a. Name the site of secretion of the following hormones:
- oestrogen and progesterone;
 - follicle stimulating hormone (FSH) and luteinising hormone (LH). (1, 1)
- b. Describe how the changes in the ovary relate to the hormone FSH. (2)
- c. i. Describe the changes in the uterine wall (endometrium) when levels of progesterone in blood increase. (2)
- ii. Explain the importance of these changes in the uterine wall. (2)
- d. Fertilisation can occur up to 24 hours after ovulation. Explain. (2)
- e. i. Describe the pathway of sperm from the cervix to the site of fertilisation. (4)
- ii. Name the first cell formed after fertilisation. (1)

Total: 15 marks

5. Distinguish between the following sets of biological terms:

- parasitism and mutualism; (3)
- tissue fluid and lymph; (5)
- mitosis and meiosis; (4)
- mosses and conifers. (3)

Total: 15 marks