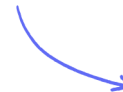


# Practice Paper 1

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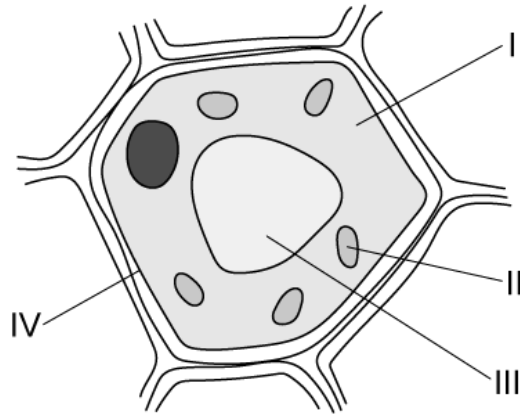


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Total Marks

/29

1 The diagram shows a typical plant cell.



Which of the cell components would be present in prokaryotes?

- A. I only
- B. II only
- C. II and III
- D. I and IV

(1 mark)

- 2 Neonicotinoids are synthetic compounds similar to nicotine that are commonly found in pesticides. Neonicotinoids are considered to be especially suitable as pesticides because they're not toxic to humans and other mammals.

Which of statements **I - IV** are reasons for this?

I. A larger proportion of synapses in insects are cholinergic compared to mammals.

II. Neonicotinoids are more effective at preventing acetylcholinesterase from breaking down acetylcholine in insects compared to mammals.

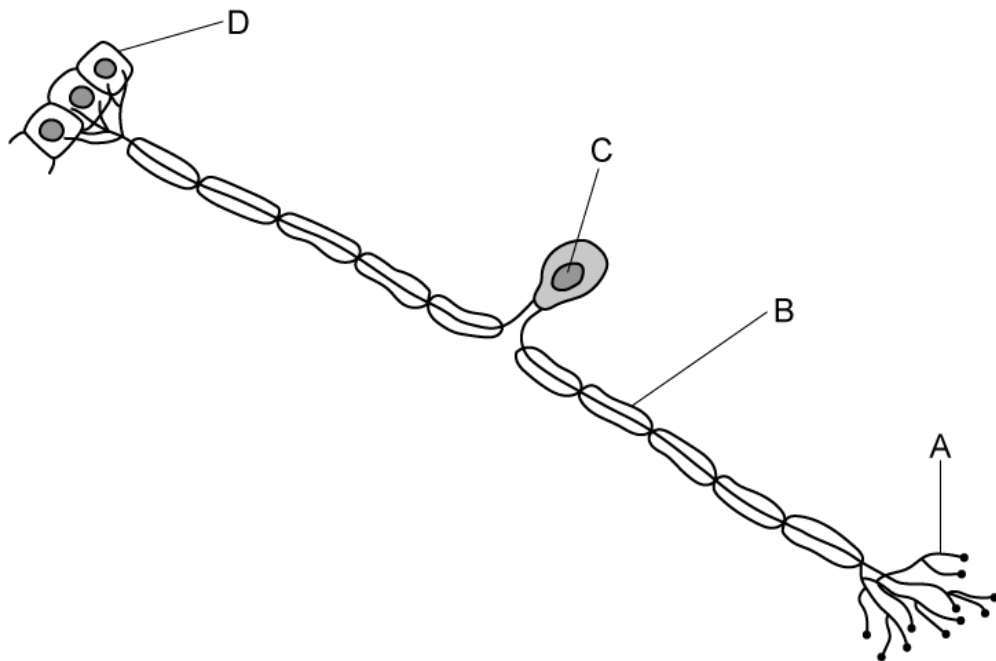
III. Acetylcholinesterase in insects cannot break down neonicotinoids.

IV. Neonicotinoids bind more strongly to acetylcholine receptors in insects.

- A.** I and IV
- B.** I, II and IV
- C.** II and III
- D.** II only

**(1 mark)**

- 3 Where would myelin be found?



(1 mark)

- 4 Membrane-bound sacs containing products of metabolism are produced by the endoplasmic reticulum.

Where are these products used?

- A. Inside lysosomes only.
- B. Outside the cell only.
- C. Inside the cell only
- D. Inside and outside the cell.

(1 mark)

5 In humans, cell division is regulated by several genes, one of which, p53, inhibits cell division at a particular checkpoint in the cell cycle through the following mechanism.

- p53 stimulates transcription of a gene to produce protein X
- Protein X combines with a cyclin-dependent kinase (CDK) protein
- The complex prevents initiation of mitosis

A heritable mutation in the p53 gene produces a dominant allele which inhibits the normal function of p53.

Which of the following explains the potential result of inheriting a mutant version of the p53 gene.

- A.** Increasing production of protein X resulting in a faster rate of cell division
- B.** Uncontrolled cell division resulting from the formation of more CDK-protein X complexes
- C.** Decreased synthesis of protein X resulting in uncontrolled cell division
- D.** Decreased transcription of protein X resulting in programmed cell death

**(1 mark)**

6 What is the benefit of collecting accurate, quantitative data on atmospheric carbon dioxide levels?

- A.** Scientists can identify the sources of greenhouse gases such as methane.
- B.** Scientists can directly assess the impact of deforestation.
- C.** Scientists can prove that climate change is caused by human activities.
- D.** Scientists can identify trends in atmospheric carbon dioxide levels

**(1 mark)**

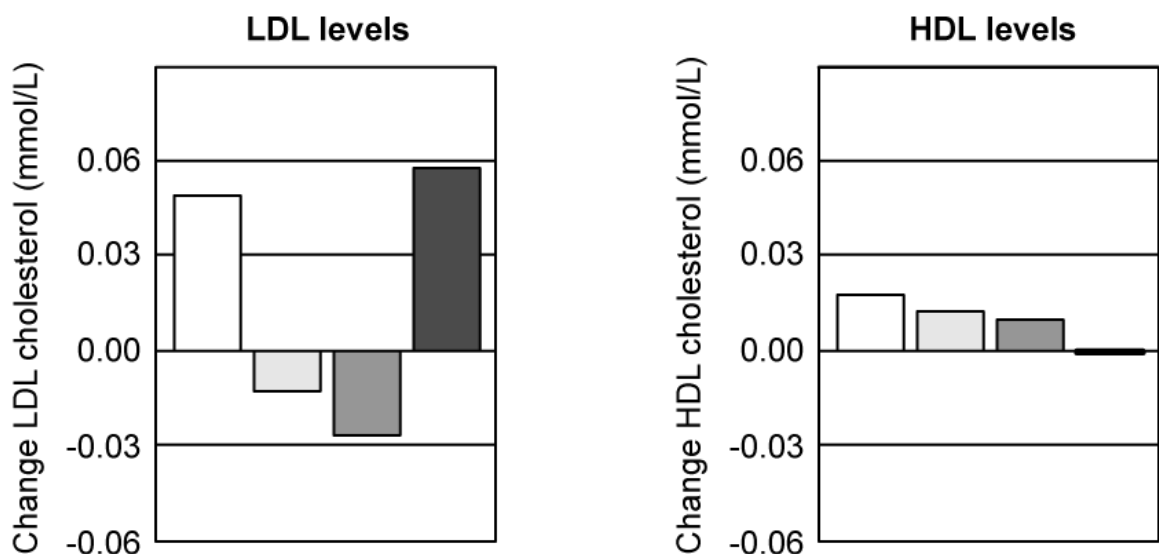
7 The Davson-Danielli model of cell membrane structure stated that cell membranes consisted of a phospholipid bilayer sandwiched between two layers of protein.

Which piece of evidence contributed to the falsification of the Davson-Danielli model and the acceptance of the Singer-Nicolson fluid mosaic model?

- A. The presence and positioning of globular peripheral and integral proteins.
- B. The amphipathic properties of phospholipids.
- C. The presence of a hydrophobic region on the surface of the membrane.
- D. The orientation of the hydrophobic phospholipid tails away from the proteins.

(1 mark)

8 A study was conducted to investigate the effect of different fatty acids on the levels of low-density lipoprotein (LDL) and high-density lipoprotein (HDL) in the human bloodstream. An increase in LDL levels in the blood has been linked to an increase in the risk of developing coronary heart disease (CHD). The results are shown in the graphs below.



**Key:** = Saturated Fatty Acids  
 = cis Polyunsaturated Fatty Acids  
 = cis Monounsaturated Fatty Acids  
 = trans Monounsaturated Fatty Acids

Which of the following conclusions would be the most valid concerning the data?

- A.** *trans* monounsaturated fatty acids led to the most significant change in the HDL levels, leading to a decreased risk of developing CHD
- B.** All the fatty acids led to an increase in the HDL levels in the bloodstream, which would lead to a decrease in the risk of developing CHD
- C.** *cis* monounsaturated fatty acids caused the greatest decrease in LDL levels and would result in a lowered risk of developing CHD
- D.** *cis* monounsaturated fatty acids led to a smaller decrease in LDL levels than *cis* polyunsaturated fatty acids which would lead to a greater decrease in the risk of developing CHD

**(1 mark)**

9 Which of the following causes fibrous polypeptides to be insoluble?

- A.** They are very long.
- B.** Their surface has nonpolar amino acids.
- C.** They are usually structural.
- D.** They have more than one polypeptide chain.

**(1 mark)**

- 10** Lactase is an enzyme that is often immobilised and used in the food industry to produce lactose-free milk.

Which of the following would **not** be an advantage of using lactase?

- A.** Increases the sweetness of many dairy products, such as yoghurt and milk shakes
- B.** It may increase the rate of crystallisation of frozen dairy products, such as ice cream
- C.** It may increase the fermentation rate of products such as yoghurt and cheese
- D.** Lactase is able to function closer to its optimum conditions in a controlled factory environment

**(1 mark)**

- 11** The approximate angle of orientation ('twist') of one nucleotide in respect to its neighbouring nucleotide in a given strand of DNA is between 35 and 40 degrees. How many base pairs are required for the double-helix to twist by one whole turn?

- A.** 5
- B.** 8
- C.** 10
- D.** 12

**(1 mark)**

- 12** A polypeptide has the following amino acid sequence:

histidine - glutamine - lysine - alanine - valine - histidine - valine

The table below gives the tRNA anticodons for each amino acid.



Amino acid	tRNA anticodons
histidine	CAU
valine	GUA
lysine	AAA
alanine	GCU
glutamine	CAG

A mutation causes the 18<sup>th</sup> base in the DNA sequence to be deleted.

Which of the following would represent the amino acid sequence after this deletion?

- A.** histidine - glutamine - lysine - alanine - valine - histidine
- B.** histidine - glutamine - lysine - alanine - valine
- C.** histidine - glutamine - lysine - alanine - valine - glutamine
- D.** histidine - glutamine - lysine - alanine - valine - histidine - valine

**(1 mark)**

**13** Which of the following statements about eukaryotic chromosomes are correct?

- I. Chromosomes are long, linear molecules that can be condensed for compact storage.
- II. After DNA replication, the two strands of DNA are held together at the centromere.
- III. DNA wraps around histone proteins to form chromatids.

- A.** I and II only
- B.** II only
- C.** II and III only
- D.** I, II, and III

**(1 mark)**

14 Which of the following is **not** correct regarding online gene databases?

- A. Online databases can be used to find the locus of a human gene.
- B. Online databases can be used to find out the chromosome on which a gene is located.
- C. Online databases can be used to determine the evolutionary relationships of organisms.
- D. Online databases can only be used by scientists with special access.

**(1 mark)**

15 Which of the following statements best describes how Mendel eliminated any uncertainty from his experiments?

- A. He performed a large number of crosses over many years.
- B. He studied the trait of height, which could be measured easily.
- C. He studied a wide variety of traits, such as flower colour, shape of pea, height of stem.
- D. He carefully transferred pollen from one pea plant to the reproductive parts of another.

**(1 mark)**

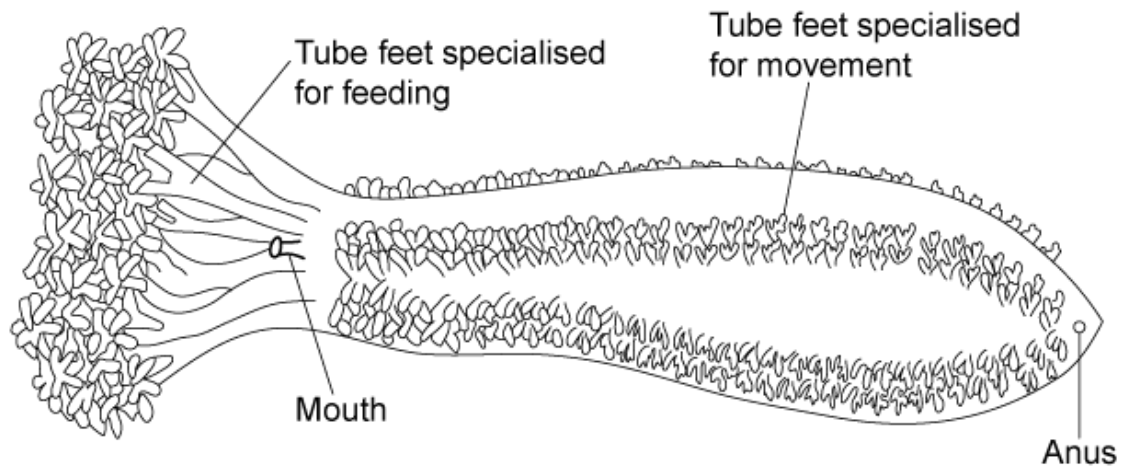
16 Two parents have an equal chance of having a child with blood groups A, B, AB, or O.

What are the genotypes of the parents?

- A. AB, AO
- B. AO, BO
- C. AB, OO
- D. AB, AB

(1 mark)

17 Sea cucumbers are heterotrophic marine organisms that feed on dead or waste material from the seafloor and surrounding water. They pick up and consume food particles using specialised tube feet that surround their mouths, as shown in the diagram below.



Which mode of nutrition and explanation is correct for sea cucumbers?

	<b>Mode of nutrition</b>	<b>Explanation</b>
<b>A</b>	Detritivore	They feed on dead and waste material and carry out external digestion
<b>B</b>	Detritivore	They feed on dead and waste material and carry out internal digestion
<b>C</b>	Saprotroph	They feed on dead and waste material and carry out internal digestion
<b>D</b>	Consumer	They feed on living organisms

**(1 mark)**

**18** A company is advertising a peat-free compost with the statement below:

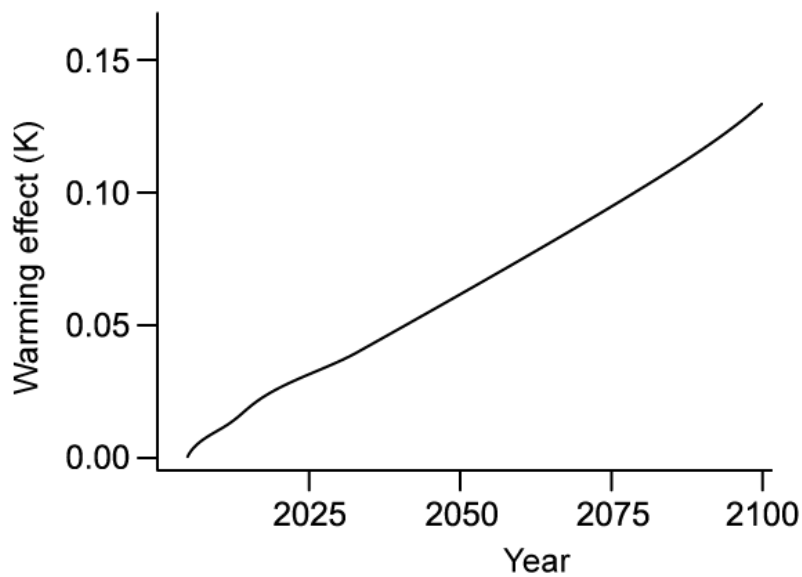
**'Our peat-free compost is perfect for supporting growth in your plants whilst protecting the environment'**

Which statement best justifies the use of this statement in the advertising of this peat-free compost?

- A.** Compost with peat in it may contain partially digested organisms
- B.** Peat free compost will contain a lower proportion of fungi which may parasitise crop plants
- C.** Using peat-free compost reduces demand on the peat bogs which are an unsustainable resource
- D.** Peat-free compost contains more nutrients for maximum plant growth

**(1 mark)**

**19** The graph below shows the predicted effect on global warming of the continued draining of peat bogs. Warming effect is measured on the kelvin (K) scale.



How does peat drainage lead to the effect on warming seen in the graph?

- A.** Drainage allows saprotroph activity to increase, releasing carbon dioxide when the organic matter stored in the peat is broken down.
- B.** Water seals the stored carbon dioxide underground, so the loss of water allows the gas to escape.
- C.** The removal of water from the peatland allows herbivores to move in and consume the vegetation growing on the peat bog, eventually leading to the release of carbon stored in the vegetation into the atmosphere
- D.** Drained land can be used for crop growth, removing carbon from the soil.

**(1 mark)**

20 Which of the following must occur for speciation to take place?

- I. Two populations of a species must be separated by a mountain range or body of water.
- II. No gene exchange can take place between two populations of a species.
- III. Two populations must develop differences in their physical characteristics.

- A. I and II only
- B. II only
- C. II and III only
- D. I, II, and III

(1 mark)

21 The data below shows the number of DNA base sequence matches found between four species of marine mammal when a short section of their DNA is sequenced.

	Humpback whale	Sperm whale	Harbour porpoise	Bottlenose dolphin
Humpback whale				
Sperm whale	62			
Harbour porpoise	59	59		
Bottlenose dolphin	56	53	62	

What can be concluded from the data?

- A. Sperm whales are more closely related to humpback whales than they are to harbour porpoises or bottlenose dolphins.

- B.** Harbour porpoises are more closely related to humpback whales than they are to sperm whales.
- C.** All four species are more closely related to each other than they are to other marine mammals.
- D.** All four species together form a clade.

**(1 mark)**

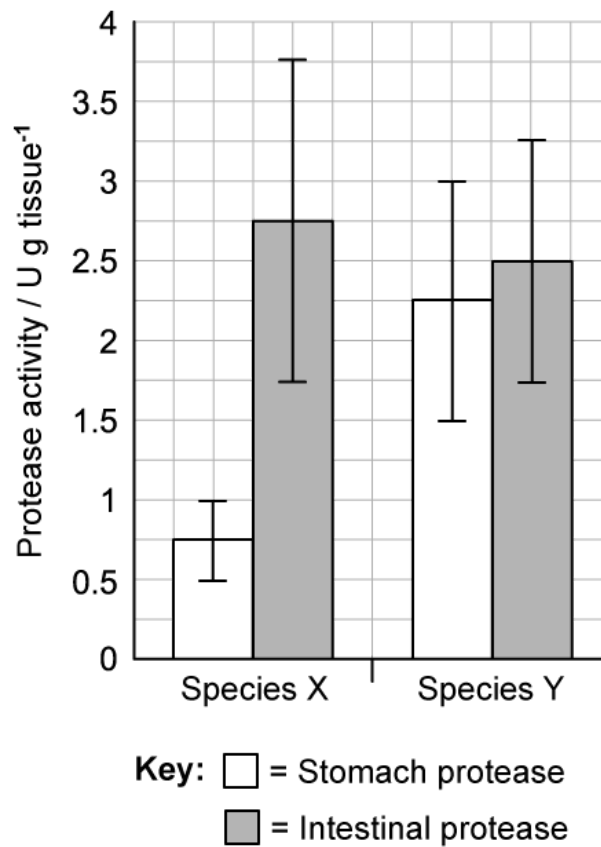
**22** Which of the following is **not** a feature of a clade?

- A.** All members of a clade descend from a common ancestor.
- B.** Clades are formed on the basis of evolutionary relationships.
- C.** Clades are usually identified by observing homologous characteristics.
- D.** Clades must include **all** the descendants of a common ancestor, living and extinct.

**(1 mark)**

**23** The activity of two types of protease enzymes was measured in two different species of fish; species **X** and species **Y**. The results of the research are shown in the graph.

The unit U denotes the enzyme required for the production of 1  $\mu\text{mol}$  of product per minute. The bars represent standard deviation.



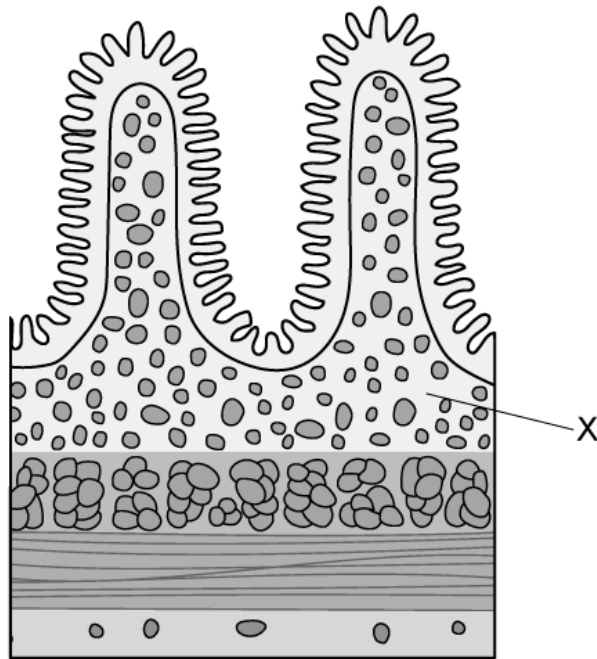
Which statement about protease enzymes is correct?

- A. The activity of the stomach protease of species Y is 2.5 times greater than that of species X.
- B. The activity of the intestinal protease of species X is significantly higher than the stomach protease of species X.
- C. Endopeptidase proteases hydrolyse peptide bonds at the ends of polypeptides.
- D. The activity of the intestinal proteases of both species X and Y are significantly higher than the stomach proteases.

(1 mark)

24 What is 'X' on the diagram?

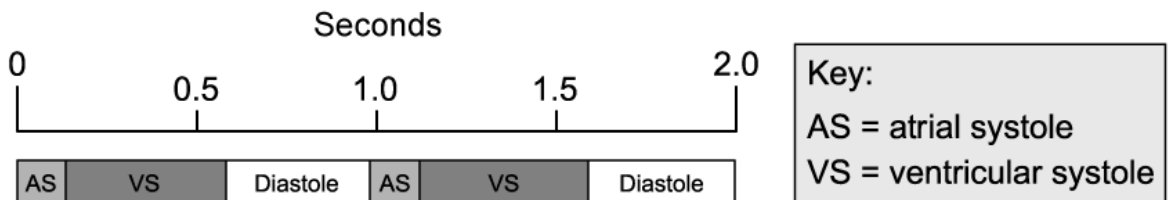




- A. Longitudinal muscle
- B. Circular muscle
- C. Sub-mucosa
- D. Serosa

(1 mark)

25 The diagram below shows two cardiac cycles of a patient. The events of the cycle are placed next to a timescale.



What is the patient's heart rate in beats per minute?

- A. 80
- B. 60

C. 120

D. 65

(1 mark)

26 Which is a reason why fungi such as *Penicillium* have evolved to produce antibiotics?

A. To destroy bacteria that could otherwise feed on *Penicillium*

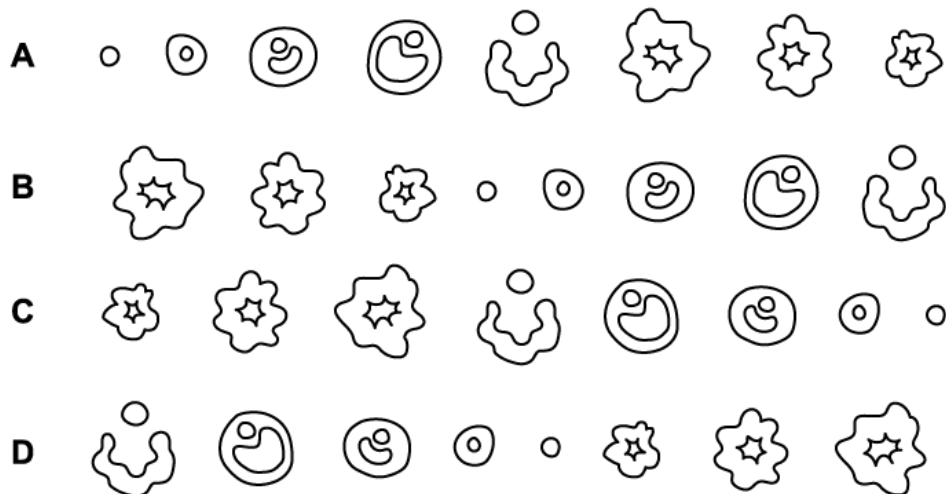
B. To destroy bacteria that could otherwise harm the fungus's host organisms

C. To destroy saprophytic bacteria as a way of *Penicillium* out-competing bacterial competitors for food

D. To kill viruses that may otherwise be pathogenic to the fungus

(1 mark)

27 Identify the set of images that correctly shows follicle development during the course of the menstrual cycle.



(1 mark)

**28** What is the function of pulmonary surfactant?

- A.** To increase surface tension on the alveolar walli.
- B.** To reduce the diffusion distance across the alveolar wall.
- C.** To stop the alveoli sacs from sticking together.
- D.** To trap microorganisms and prevent infection.

**(1 mark)**

**29** In which of the following scenarios would there be an increase in the breakdown of glycogen in the liver?

- A.** When the beta cells of the islets of Langerhans secrete insulin.
- B.** When the beta cells of the islets of Langerhans secrete glucagon.
- C.** After eating a meal high in carbohydrates.
- D.** When the alpha cells of the islets of Langerhans secrete glucagon.

**(1 mark)**