**2022-DSE**
**BIO Mock Exam**
**Paper 1A**

Bishop Hall Jubilee School
2022 Mock Examination

# BIOLOGY

Date: 24-2-2022
Time: 8:20-10:50 am
Duration: 150 mins
Total page no.: 17(including cover page)

**GENERAL INSTRUCTIONS**

1. There are TWO sections, A and B, in this Paper. You are advised to finish Section A in about 35 minutes.
2. Section A consists of multiple-choice questions in this question paper, while Section B contains conventional questions printed separately in Question-Answer Book **B**.
3. Answers to Section A should be marked on the MC Answer Sheet while answers to Section B should be written in the spaces provided in the Question-Answer Book B. **The Answer Sheet for Section A and the Question-Answer Book B for Section B will be collected separately at the end of examination.**

---

**INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)**

1. After the announcement of the start of the examination, you should first write your name, class and class number in the space provided on the MC Answer Sheet.
2. When told to open this book you should check that all the question are there. Look for the words '**END OF SECTION A**' after the last question.
3. All questions carry equal marks.
4. **Answer ALL question in this paper**. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answer cannot be captured.
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.
6. No marks will be deducted for wrong answers.

**Section A: Multiple-choice Questions (36 marks)**

**There are 36 questions in this section.**

**The diagrams in this section are NOT necessarily drawn to scale.**

**1** A scientist discovered a new species of organism and classified it into eubacteria. Which of the following cell structures is most likely to be present in this new species?

**A** cell wall
**B** nucleus
**C** endoplasmic reticulum
**D** mitochondrion

**2** Which of the following types of cells probably contain the smallest number of mitochondria?

**A** muscle cells
**B** phagocytes
**C** epithelial cells of ileum
**D** epithelial cells of air sacs

**3** Which of the following statements about the properties of enzymes is ***incorrect***?

**A** Enzymes provide activation energy to start a reaction.
**B** The active sites of enzymes are substrate-specific.
**C** Being proteins, enzymes are denatured at high temperatures.
**D** Enzymes return to their original shapes after catalysing a reaction.

***Directions:*** Questions **4** and **5** refer to an experiment carried out by Sally to find out which kinds of fruits contain substances that prevent jelly from setting. She prepared four cups of jelly as shown below and left them in the refrigerator for two days.

| Cup | Contents | Did the jelly set after two days? |
|---|---|---|
| A | Jelly solution only | Yes |
| B | Jelly solution + kiwi fruit pieces | No |
| C | Jelly solution + strawberry pieces | Yes |
| D | Jelly solution + pineapple pieces | No |

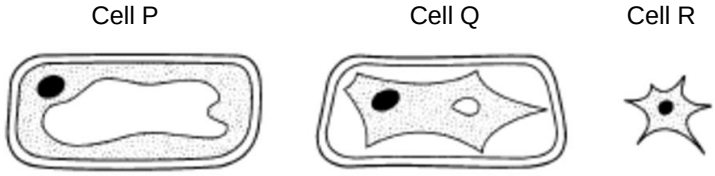
**4** What conclusion can be drawn from the results of the experiment?

**A** Different fruits contain different substances that prevent jelly from setting.
**B** Fruits contain substances that prevent jelly from setting.
**C** Kiwi fruits contain a substance that prevents jelly from setting.
**D** Kiwi fruits and pineapples contain the same substance that prevents jelly from setting.

**5** Which of the following correctly shows the independent variable and dependent variable in the experiment?

| | *Independent variable* | *Dependent variable* |
|---|---|---|
| **A** | the type of fruit | whether the jelly sets or not |
| **B** | the type of fruit | amount of jelly powder in the jelly solution |
| **C** | whether the jelly sets or not | the type of fruit |
| **D** | whether the jelly sets or not | amount of jelly powder in the jelly solution |

**6** Three cells, P, Q and R, were left in distilled water or 10% sucrose solution for 10 minutes. The cells were then examined under the microscope. The appearance of the cells is shown below.

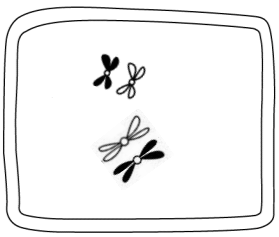



Which cell(s) had been placed in 10% sucrose solution?

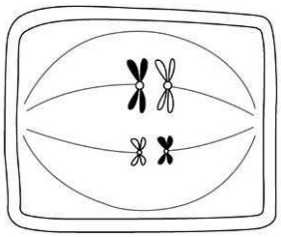
**A** cell P only
**B** cell R only
**C** cell P and cell Q only
**D** cell Q and cell R only

**7** The diagrams below show a cell at different stages of cell division.

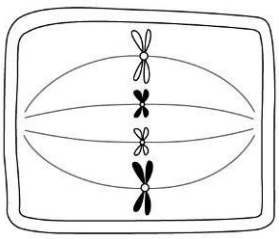
(1)



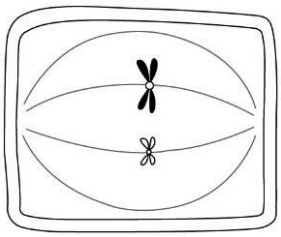
(2)



(3)



(4)



Crossing over is most likely to occur at

**A** stage (1).
**B** stage (2).
**C** stages (2) and (3).
**D** stages (3) and (4).

**8** The table below shows the nutrition label of a carton of milk.

| NUTRITION FACTS | |
|---|---|
| Serving size: 250 ml | |
| Servings per container: 4 | |
| | **Per 100 ml** |
| Energy | 273 kJ |
| Total fat | 9 g |
| Saturated fat | 6 g |
| Cholesterol | 30 mg |
| Sodium | 180 mg |
| Total carbohydrate | 12 g |
| Dietary fibre | 0 g |
| Sugars | 12 g |
| Protein | 8 g |


After a person drank the milk, digestion of the milk first took place in

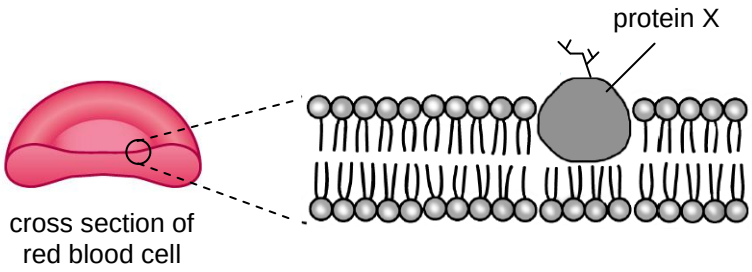
**A** the mouth.

**B** the stomach.

**C** the duodenum.

**D** the ileum.

**9** The diagram below shows part of the membrane of a red blood cell.




What is the most possible function of protein X?

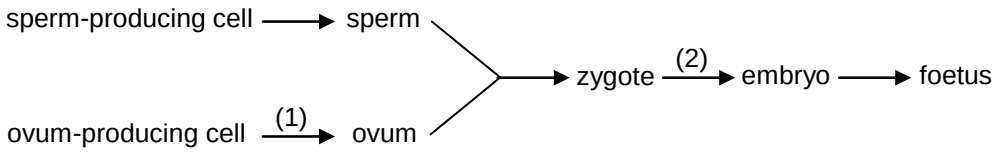
**A** as a carrier to carry molecules across the membrane

**B** provides a channel for transporting molecules across the membrane

**C** as an antigen for cell recognition

**D** as a pigment for carrying oxygen

***Directions:*** Questions **10** and **11** refer to the flow chart below, which shows the main processes involved in human reproduction.




**10** Which of the following types of cells have the highest percentage of cells carrying a Y chromosome?

**A** sperm-producing cells
**B** sperms
**C** ovum-producing cells
**D** ova

**11** What contraceptive methods can work by affecting processes (1) and (2) respectively?

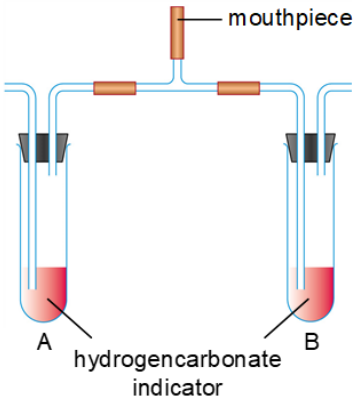
| | *(1)* | *(2)* |
|---|---|---|
| **A** | tubal ligation | diaphragm |
| **B** | tubal ligation | intrauterine device |
| **C** | contraceptive pills | diaphragm |
| **D** | contraceptive pills | intrauterine device |

**12** Which of the following statements about a light microscope are correct?

(1) The coarse adjustment knob is used to get a sharp focus.
(2) The diaphragm regulates the amount of light passing through the condenser.
(3) The coarse adjustment knob adjusts the distance between the stage and the objective.

**A** (1) and (2) only
**B** (1) and (3) only
**C** (2) and (3) only
**D** (1), (2) and (3)

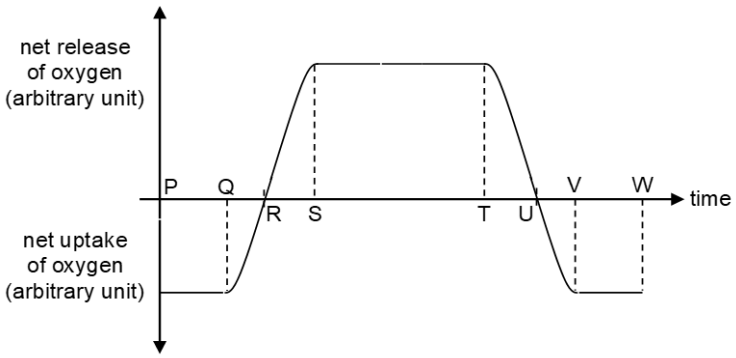
**13** The diagram below shows a set-up for comparing the carbon dioxide content in inhaled air and exhaled air. The hydrogencarbonate indicator was red in colour at the beginning. A student breathed deeply and slowly through the mouthpiece.




What is the colour of the indicator in tubes A and B after the student had breathed a few times through the mouthpiece?

| | *Tube A* | *Tube B* |
|---|---|---|
| **A** | red | red |
| **B** | yellow | purple |
| **C** | purple | yellow |
| **D** | red | yellow |

***Directions:*** Questions **14** and **15** refer to the graph below, which shows the net amounts of oxygen given out and absorbed by a field of grass during a 24-hour period.




**14** During which time period(s) is the amount of oxygen produced by the grass more than that used by the grass?

**A** P–Q and V–W

**B** Q–V

**C** R–U

**D** S–T

**15** During which time period(s) is the grass respiring?

**A** P–W

**B** P–Q and V–W

**C** P–R and U–W

**D** R–U

**16** Which of the following events does ***not*** involve the cerebrum?

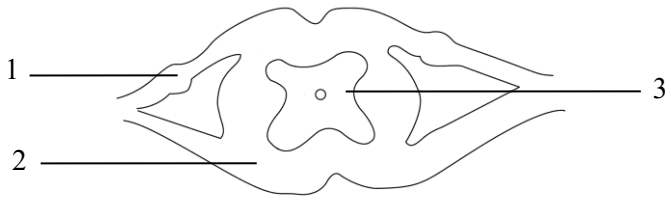
**A** Feeling pain after pricking a finger on a sharp needle

**B** Reading a book

**C** Pupil constriction

**D** Smelling a flower

**17** The diagram below shows a transverse section of the spinal cord.




Synapses can be found in

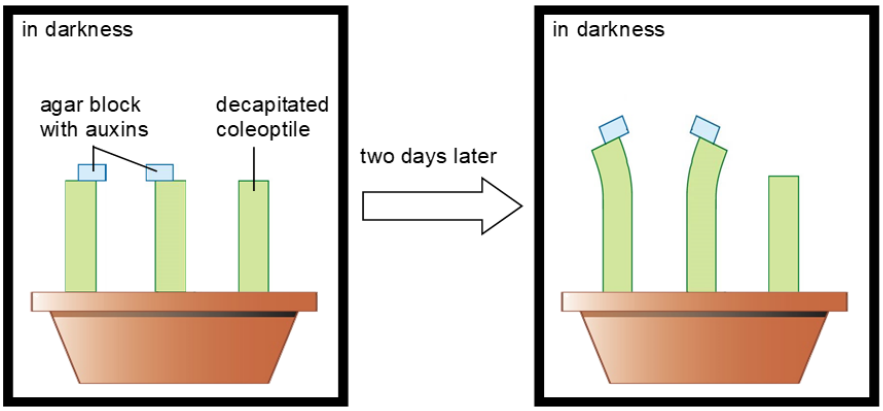
**A** 1 only.

**B** 3 only

**C** 1 and 3 only

**D** 1, 2 and 3.

**18** The diagram below shows an experiment carried out to study the growth of coleoptiles.




Which of the following can be concluded from the results?

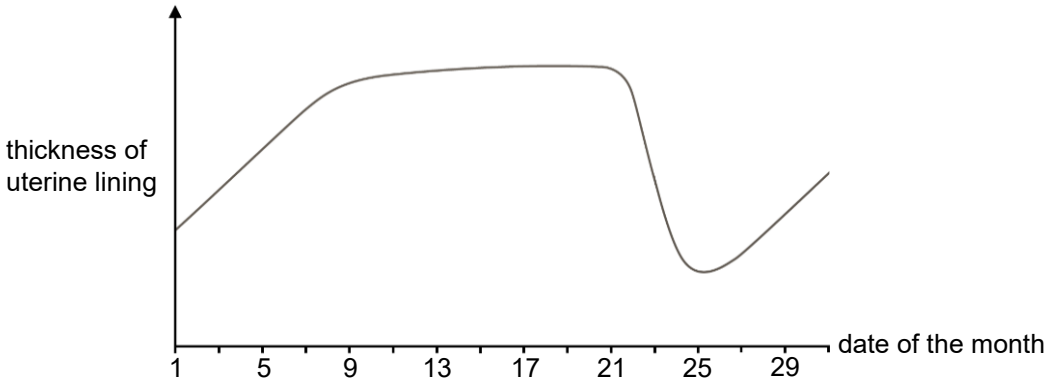
**A** The tips are necessary for the growth of the coleoptiles.

**B** Auxins are produced from the tips of the coleoptiles.

**C** Auxins cannot be transported laterally.

**D** The sides with a higher concentration of auxins grow more rapidly.

**19** The graph below shows the changes in the thickness of the uterine lining of a woman in a certain month.




Which of the following can be deduced from the graph?

(1) Menstruation is likely to have occurred during the 21st–25th day.

(2) The woman would have a higher chance of becoming pregnant if she has sexual intercourse during the 13th–21st day.

(3) A large yellow body is likely to be found in the ovary of the woman during the 9th–15th day.

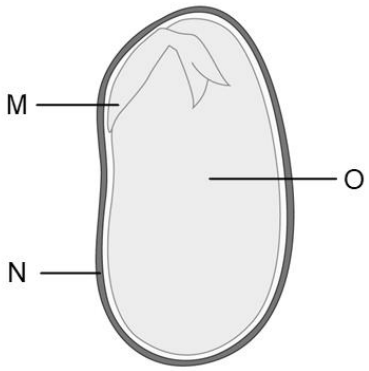
**A** (1) and (2) only

**B** (1) and (3) only

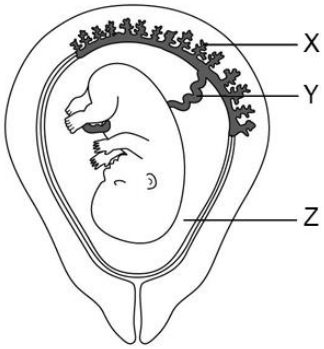
**C** (2) and (3) only

**D** (1), (2) and (3)

**20** The diagrams below show a seed and a foetus in the uterus.




**Seed**



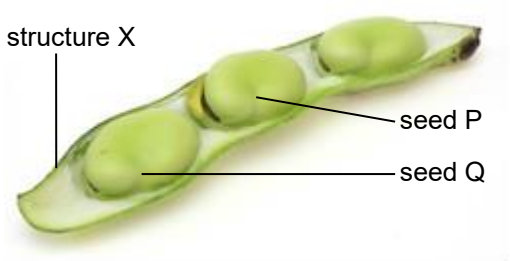

**Foetus in uterus**

Which of the following pairs of structures serve similar functions?

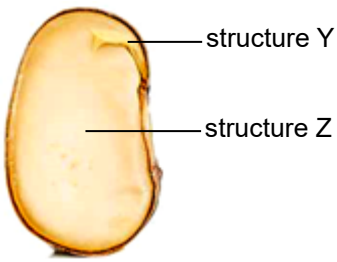
**A** M and Y
**B** N and X
**C** N and Z
**D** O and Z

***Directions***: Questions **21** and **22** refer to Photograph I and Photograph II below. Photograph I shows an opened broad bean pod and Photograph II shows the vertical section of a broad bean.

***Photograph I***




***Photograph II***

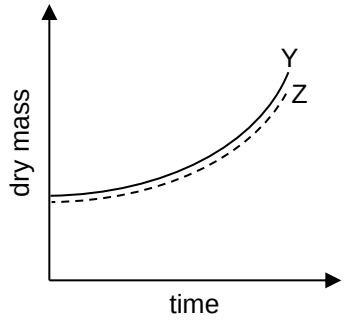



**21** Which of the following statements about the labelled structures in Photograph I is correct?

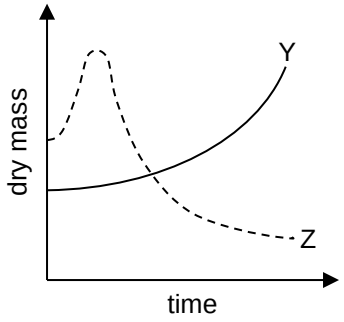
**A** Structure X is developed from the carpel of the flower.
**B** Structure X is diploid while seeds P and Q are haploid.
**C** Structure X helps disperse seeds P and Q.
**D** Seeds P and Q have the same genetic make-up.

**22** Which of the following graphs correctly shows the changes in dry mass of structures Y and Z shown in Photograph II during germination?

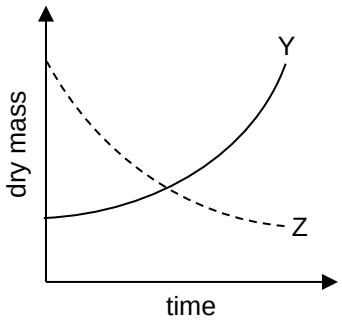
**A**



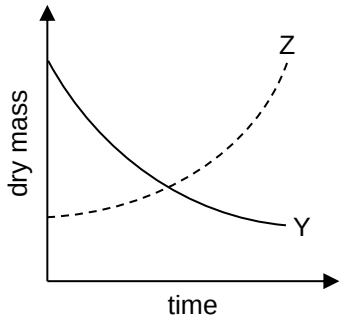

**B**



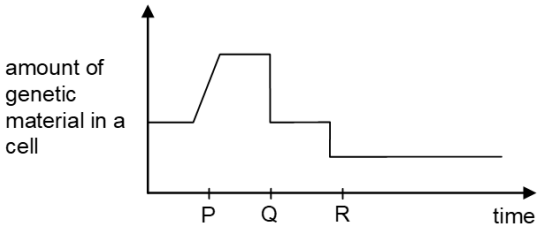

**C**




**D**




**23** The graph below shows the changes in the amount of genetic material in a mammalian cell which is undergoing cell division.




Which of the following statements about the events that happen at time P, Q and R are correct?

(1) At P, DNA replicates.

(2) At Q, the exchange of genetic material between non-sister chromatids of homologous chromosomes may occur.

(3) At R, four genetically different daughter cells are formed.

**A** (1) and (2) only

**B** (1) and (3) only

**C** (2) and (3) only

**D** (1), (2) and (3)

**24** Diagram I shows a man riding a bicycle. Diagram II shows the muscles in his left leg when he is standing upright.


**Diagram I**

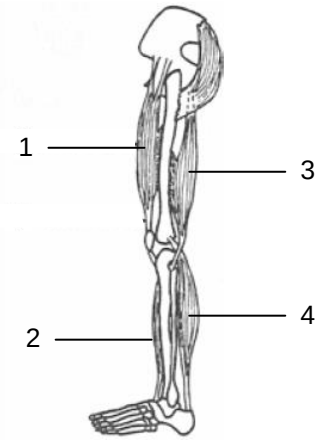
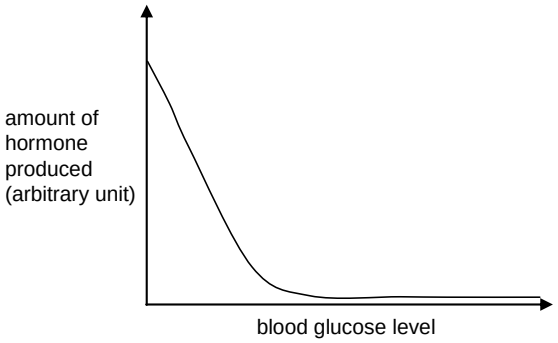



**Diagram II**

Which muscles in the man's left leg are contracting in Diagram I?

**A** muscles 1 and 2 only
**B** muscles 1 and 4 only
**C** muscles 2 and 3 only
**D** muscles 3 and 4 only

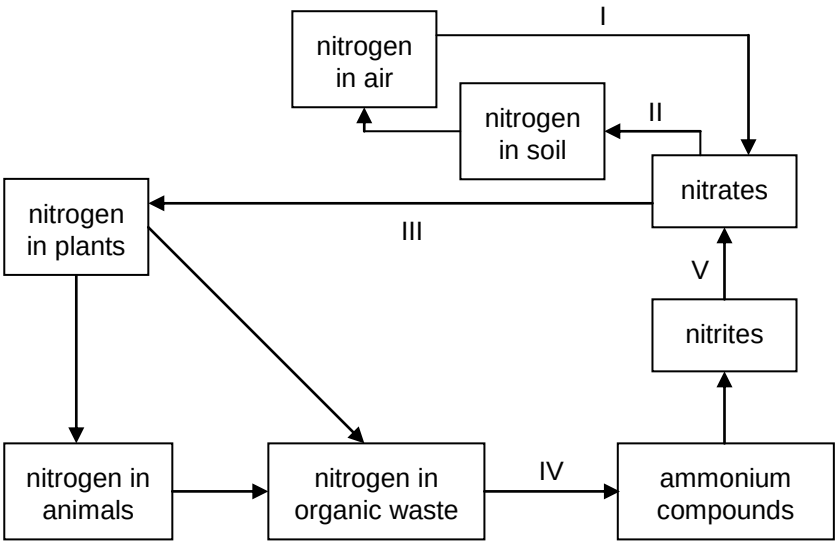
**25** The graph below shows the amount of a hormone produced by the body as the blood glucose level varies.




Which of the following is an action of this hormone on the body?

**A** It stimulates the excretion of glucose in urine.
**B** It stimulates the uptake of glucose by the body cells.
**C** It stimulates the conversion of glycogen into glucose.
**D** It stimulates the absorption of glucose in the small intestine.

***Directions:*** Questions **26** and **27** refer to the diagram below, which shows some processes in the nitrogen cycle.




**26** Which of the labelled processes involve actions of microorganisms?

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

**27** What kind of organisms is responsible for carrying out process IV?

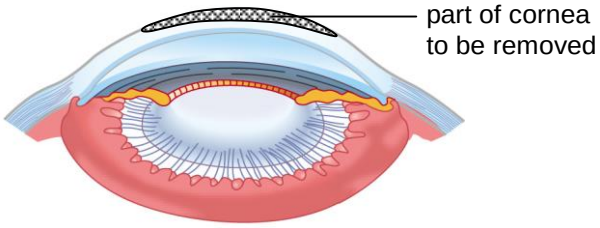
**A** producer
**B** primary consumer
**C** secondary consumer
**D** decomposer

**28** What is/are the function(s) of ligaments in the elbow joint?

(1) transmit the force exerted by the lower arm to the upper arm
(2) hold the bones of the upper arm and lower arm in position
(3) reduce friction between the bones of the upper arm and lower arm

**A** (1) only
**B** (2) only
**C** (1) and (2) only
**D** (2) and (3) only

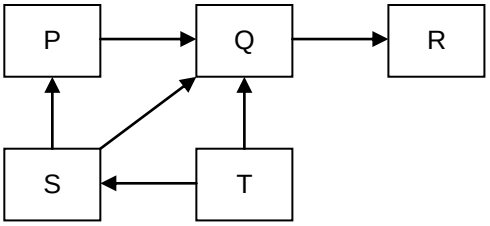
**29** Certain eye defects can be corrected by laser surgery. The diagram below shows the front part of an eye. The part of cornea to be removed by laser beam is indicated.




Which of the following eye defects can be corrected by the removal of part of the cornea shown?

**A** short sight
**B** long sight
**C** cataract
**D** colour blindness

**30** The diagram below shows a food web.




What is/are the relationship(s) between organisms P and Q?

(1) predation
(2) mutualism
(3) competition

**A** (1) only
**B** (1) and (2) only
**C** (1) and (3) only
**D** (2) and (3) only

**31** The following are some processes in respiration or photosynthesis. Which of them produce ATP?

(1) Krebs cycle
(2) Calvin cycle
(3) glycolysis
(4) oxidative phosphorylation

**A** (1) and (2) only
**B** (3) and (4) only
**C** (1), (3) and (4) only
**D** (2), (3) and (4) only

**32** A plant is supplied with water containing radioactive oxygen atoms. After putting the plant under bright light for three hours, which of the following substances in the plant will contain the radioactive oxygen atoms?

(1) oxygen (2) glucose (3) carbon dioxide

**A** (1) only
**B** (1) and (2) only
**C** (2) and (3) only
**D** (1), (2) and (3)

**33** The table below shows the characters of four children in a family.

| | **Height** (cm) | **Blood group** | **Eye colour** |
|---|---|---|---|
| Suzie | 156 | A | Brown |
| Sally | 160 | O | Brown |
| Eric | 176 | A | Blue |
| Kenny | 180 | AB | Blue |

Suzie and Sally are twins. Which of the following information allows you to determine whether they are identical twins or fraternal twins?

(1) They are different in height.
(2) They are of different blood groups.
(3) They have the same eye colour.

**A** (1) only
**B** (2) only
**C** (3) only
**D** (1) and (2) only

**34** In a certain species of primrose, the colour of the flowers is controlled by two genes, I and II. The dominate allele (B) of gene I controls the production of a blue pigment and the dominant allele (Y) of gene II controls the production of a yellow pigment. The table below shows the possible genotypes and phenotypes of the primrose species.

| Genotype | Phenotype |
|---|---|
| BBYY, BBYy, BbYY, BbYy | Green flower |
| BByy, Bbyy | Blue flower |
| bbYY, bbYy | Yellow flower |
| bbyy | White flower |

If two primrose plants with green flowers of identical genotype are crossed, the ratio of offspring having green flowers to blue flowers is 3:1. Which of the following can be deduced based on the result of the cross?

(1) The parents must be homozygous dominant for gene I.
(2) The parents must be heterozygous for gene II.
(3) Gene I and gene II are located on different pairs of chromosomes.

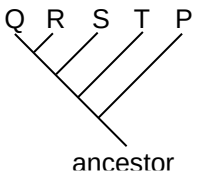
**A** (1) and (2) only
**B** (1) and (3) only
**C** (2) and (3) only
**D** (1), (2) and (3)

**35** Cytochrome c is an important protein involved in respiration. Researchers investigated the amino acid sequence of cytochrome c from five different mammals. The table below shows the number of differences between the amino acid sequence of cytochrome c of the five species.

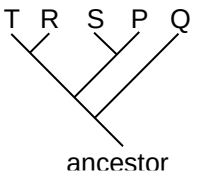
| | Number of amino acid differences | | | | |
|---|---|---|---|---|---|
| Species | P | Q | R | S | T |
| P | - | | | | |
| Q | 12 | - | | | |
| R | 11 | 1 | - | | |
| S | 10 | 3 | 2 | - | |
| T | 11 | 6 | 5 | 3 | - |

Which of the following evolutionary trees best illustrates the phylogenetic relationships of the five mammalian species?

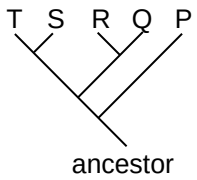
**A**



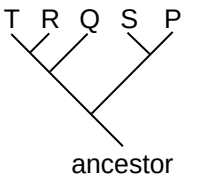

**B**



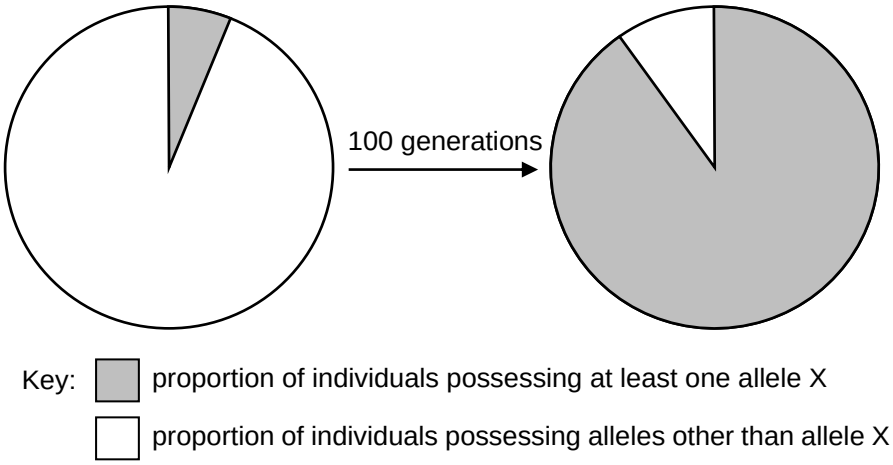

**C**




**D**



**36** The pie charts below show the change in the proportion of individuals possessing at least one allele X in a lizard population over 100 generations.




Based on the pie charts above, which of the following statements is/are correct?

(1) Allele X must be a dominant allele.
(2) Allele X can cause disease in heterozygous condition.
(3) Individuals possessing two copies of allele X are more likely to survive and reproduce.

**A** (3) only
**B** (1) and (2) only
**C** (1) and (3) only
**D** (2) and (3) only

**END OF SECTION A**