Class		Class number		Biology Group	
Name					

Diocesan Girls' School

2022 HKDSE MOCK EXAM

BIOLOGY PAPER 1

Time allowed: 2 hours 30 minutes
This paper must be answered in English.

GENERAL INSTRUCTIONS

1 There are **TWO** sections, A and B, in this Paper. Section A carries 36 marks and Section B carries 84 marks. You are advised to finish Section A in about 35 minutes.

2 Section A consists of multiple-choice questions in this question book. Section B contains conventional questions printed separately in Question-Answer Book B.

3 Answers to Section A should be marked on the Multiple-choice Answer Sheet while answers to Section B should be written in the spaces provided in Question-Answer Book B. **The Answer Sheet for Section A and the Question-Answer Book for Section B must be handed in separately at the end of the examination.**

SECTION A (MULTIPLE-CHOICE QUESTIONS)

INSTRUCTIONS FOR SECTION A

1 Read the instructions on the Answer Sheet carefully. Fill in the information required in the spaces provided.

2 When told to open this book, you should check that all the questions are there. Look for the words '**END OF SECTION A**' after the last question.

3 All questions carry equal marks.

4 **ANSWER ALL QUESTIONS**. 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.

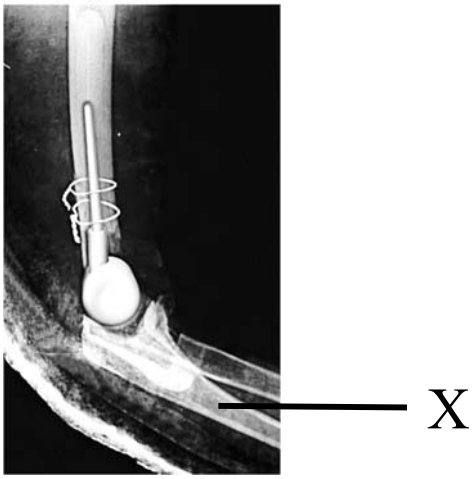
5 You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

6 No marks will be deducted for wrong answers.

There are 36 questions in this section.

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

Directions: Questions 1 and 2 refer to the photograph below, which shows an artificial joint in a person's arm:



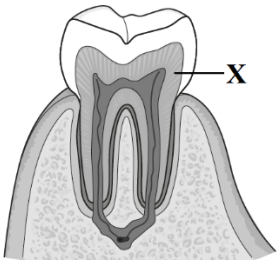
1. Which of the following combinations correctly describes the movment at this joint?

	Type of joint	***Movement of the joint***
A.	hinge joint	allows movement in one plane
B.	ball and socket joint	allows movement in one plane
C.	ball and socket joint	allows movement in all planes
D.	hinge joint	allows movement in all planes

2. Structure X is able to
   (1) carry out respiration.
   (2) transmit force.
   (3) form white blood cells.

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

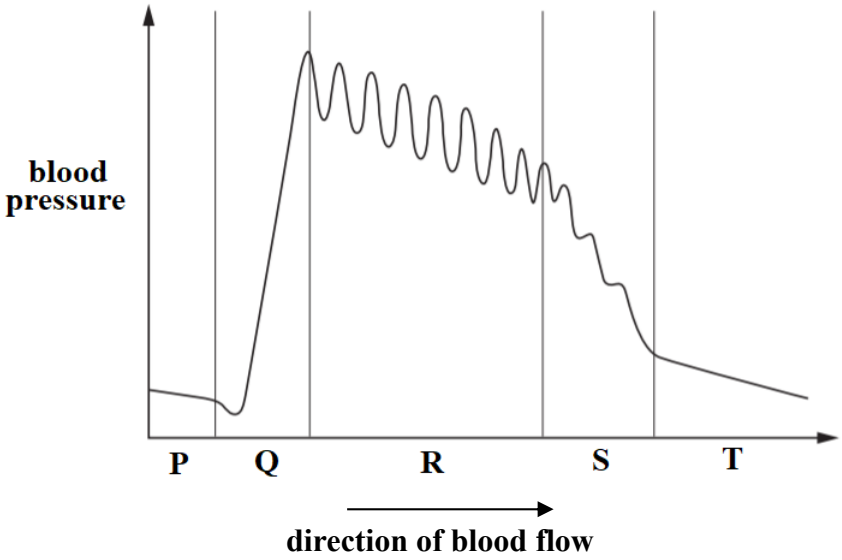
3. The diagram below shows the vertical section of a human tooth:



   Which of the following statements about X is correct?
   (1) It contains a large amount of calcium salts.
   (2) It receives a continuous supply of nutrients.
   (3) It has a rich supply of nerve endings.

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

Directions: Questions 4 and 5 refer to the graph below, which shows the changes in blood pressure in one circulation in the human body:



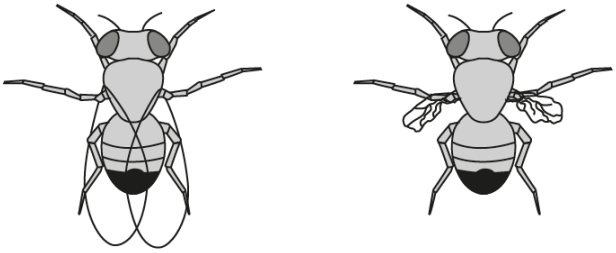
4. Which of the following are responsible for the changes in blood pressure in R?
   (1) Pumping of heart
   (2) Elasticity of the wall of R
   (3) Thickness of the wall of R

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

5. Which of the following descriptions about the different sections shown above is incorrect?

A. P is highly branched.
B. Q has thick muscular wall.
C. S is the site for material exchange.
D. T has large lumen.

6. The diagrams below show the fruit flies with normal wings and vestigial wings. It is known that the type of wing of a fruit fly is controlled by a pair of alleles. A fruit fly homozygous for normal wings was crossed with a fruit fly with vestigial wings and all their offspring had normal wings. The offspring were then allowed to interbreed to produce the F_2 generation.

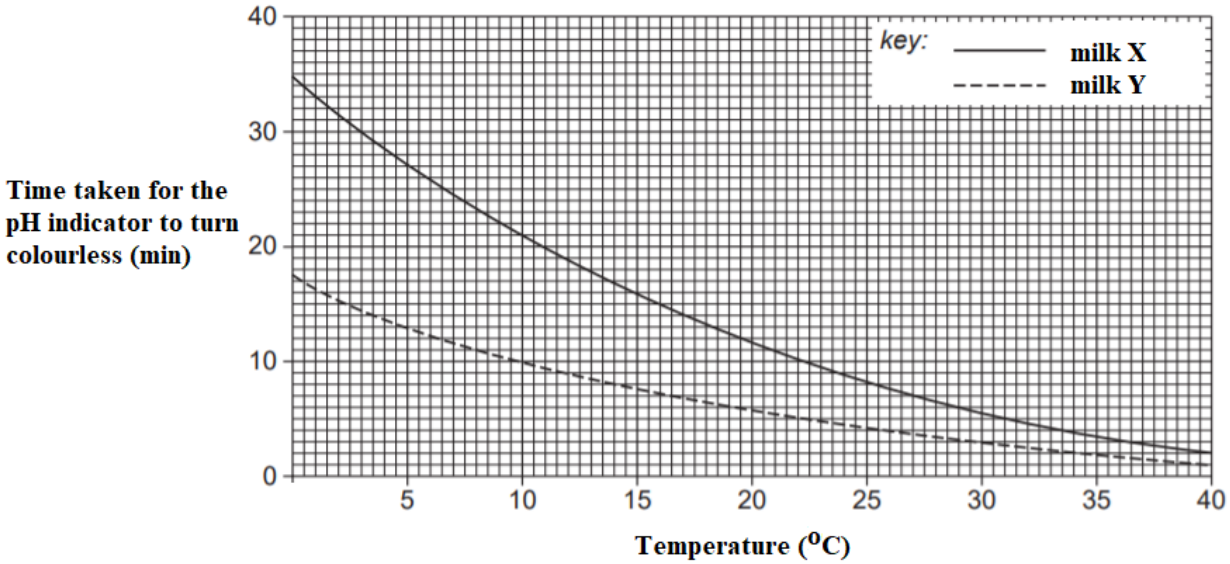


with normal wings with vestigial wings

Which of the following statements about the F_2 generation are correct?

A. The ratio of normal wings to vestigial wings in the offspring is 3:1.
B. All offspring have normal wings.
C. Half of the offspring have vestigial wings.
D. Only ¼ of the offspring have normal wings.

Directions: Questions 7 to 9 refer to an investigation of lipid digestion. A solution of enzyme P was added to two different types of milk, X and Y, with pH indicator added. The pH indicator is colourless in acidic solution and pink in alkaline solution. The mixtures were put in water baths of different temperatures. The results are shown in the graph below:

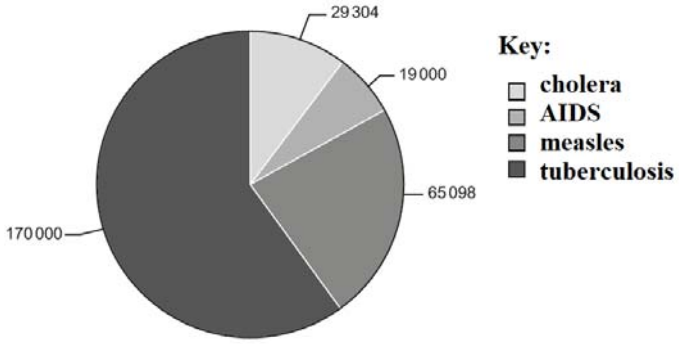


7. In which of the following regions of the human alimentary canal can enzyme P be found?
A. Mouth cavity
B. Stomach
C. Duodenum
D. Ileum

8. Which of the following is/are the independent variable(s) in this investigation?
(1) The lipid content in the milk
(2) The temperature of mixtures
(3) The type of milk
(4) The activity of enzyme P
A. (2) only
B. (4) only
C. (1) and (3) only
D. (1), (2) and (3) only

9. Which of the following is a correct interpretation of the results?
A. Enzyme P becomes denatured at 40°C.
B. Milk X has a higher lipid content than milk Y.
C. The activity of enzyme P increases with increasing temperature.
D. The optimum temperature of enzyme P is 40°C.

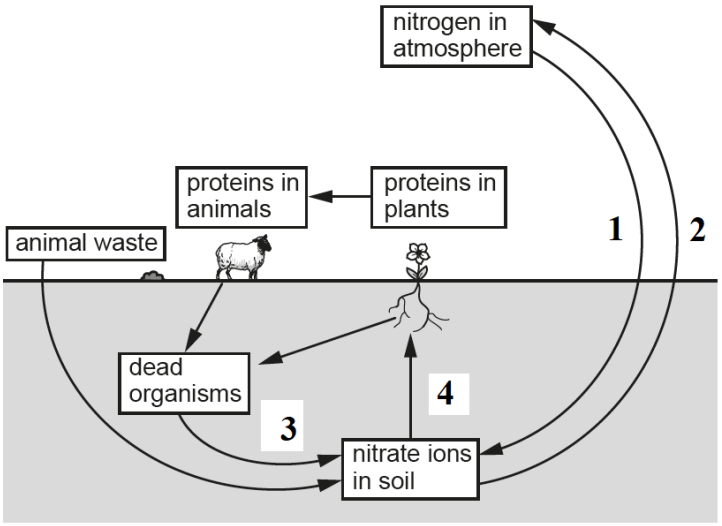
10. The following pie chart shows the number of people infected with four different infectious diseases in a country:



Which of the following diseases is caused by bacteria and leads to the smallest number of infections?

A. Cholera
B. AIDS
C. Measles
D. Tuberculosis

Directions: Questions 11 and 12 refer to the diagram below, which shows some processes of the nitrogen cycle:



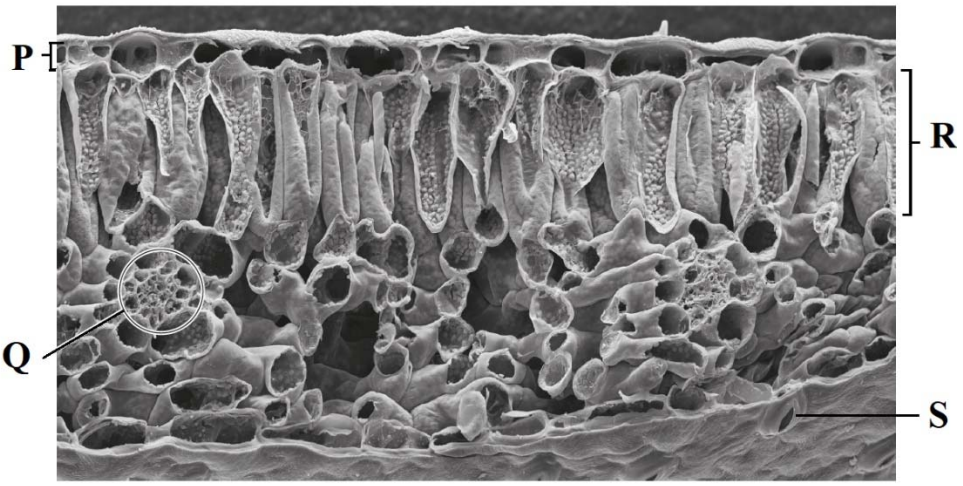
11. Process 2 is

A. nitrification.
B. denitrification.
C. decomposition.
D. nitrogen fixation.

12. Which of the following processes does not require the action of bacteria?

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

Directions: Questions 13 and 14 refer to the photomicrograph below, which shows the cross-section of a leaf:



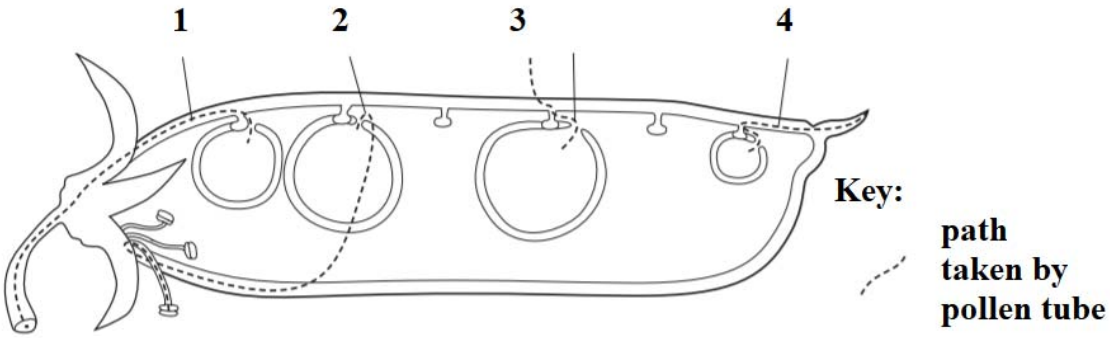
13. Which of the following combinations correctly shows the functions of cell types P, Q and R?

	P	***Q***	***R***
A.	protection	transport	photosynthesis
B.	protection	support	storage
C.	photosynthesis	transport	storage
D.	storage	support	photosynthesis

14. Which of the following comparisons of the different cell types is/are correct?
    (1) Cell type P contains more chloroplasts than cell type S.
    (2) Cell type Q contains a larger vacuole than cell type P.
    (3) Cell type R contains more mitochondria than cell type Q.

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

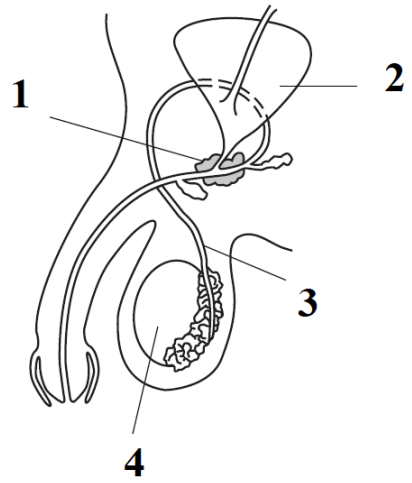
15. The diagram below shows the fruit of a plant:



Which of the following correctly identifies the path taken by the pollen tube?

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

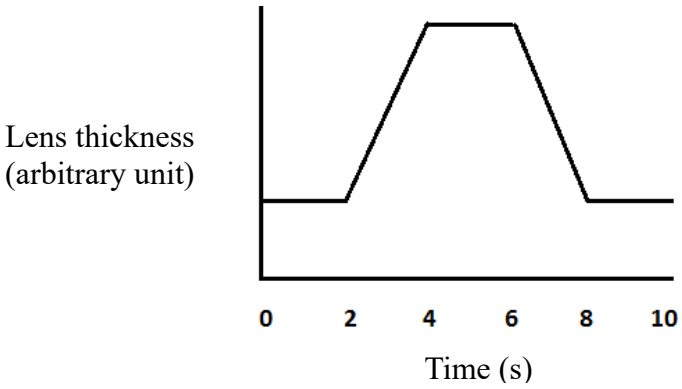
Directions: Questions 16 and 17 refer to the diagram below, which shows part of the male urinogenital system in humans:



16. Which of the following structures contribute to the content of semen?
A. 1 and 4 only
B. 1 and 3 only
C. 2 and 4 only
D. 1, 2 and 4 only

17. Which of the following structures serves a similar function as the oviduct in the female reproductive system?
A. 1
B. 2
C. 3
D. 4

Directions: Questions 18 and 19 refer to the diagram below, which shows the changes of the lens thickness in a boy's eye in 10 seconds:



18. During which period was the boy looking at an object moving towards him?
A. 0-2 s
B. 2-4 s
C. 4-6 s
D. 6-8 s

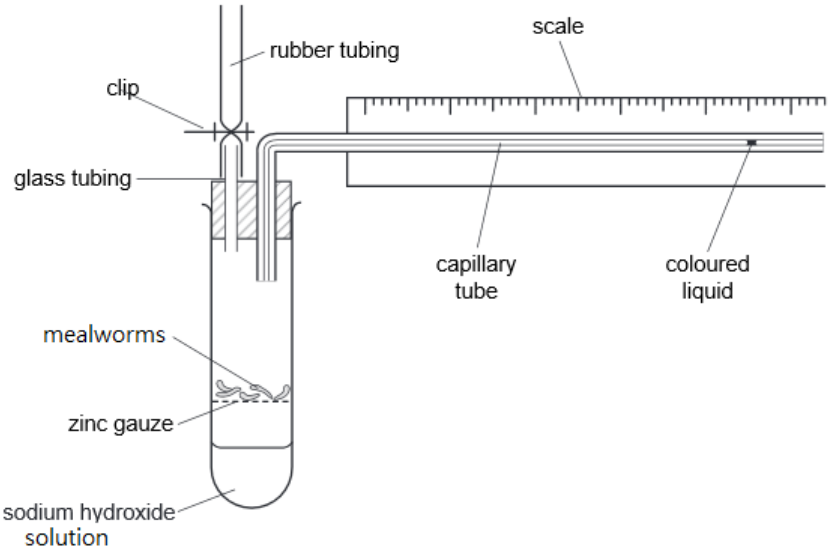
19. Which of the following brings about the change in the lens thickness during 6-8 s?

	Ciliary muscles	***Tension in suspensory ligaments***
A.	contract	incraese
B.	relax	increase
C.	contract	decrease
D.	relax	decrease

20. If the base sequence on the coding strand of the DNA is TAC, which of the following combinations correctly shows the corresponding mRNA codon and tRNA anticodon?

	mRNA codon	*tRNA anticodon*
A.	AUG	UAC
B.	UAC	AUG
C.	UAC	ATG
D.	AUG	TAC

21. The diagram below shows a set-up for investigating the respiration of mealworms:



During the experiment, the coloured liquid in the capillary tube will move. This is caused by the

A. heat released.
B. food consumed.
C. oxygen absorbed.
D. carbon dioxide released.

22. A student carried out an experiment to study osmosis in plant cells. Five strips of similar size cut from a fresh potato were put in sucrose solutions of different concentrations for two hours. The masses of the potato strips before and after the immersion were measured and recorded. The table below shows the results of the investigation.

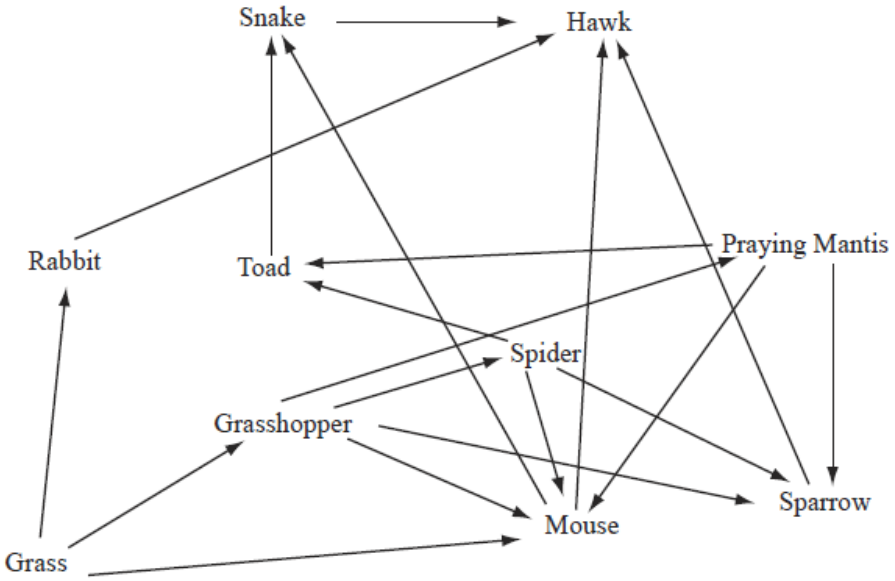
Sucrose solution	I	II	III	IV	V
Initial mass of potato strip (g)	1.36	1.45	1.46	1.47	1.41
Final mass of potato strip (g)	1.49	1.31	1.47	1.38	1.48

Which of the following conclusions can be drawn?

(1) The average water potential of the potato cells is closest to that of sucrose solution III.
(2) The potato strip after immersing in sucrose solution II is the most flaccid.
(3) The water potential of sucrose solution I is higher than that of sucrose solution IV.

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

Directions: Questions 23 and 24 refer to the diagram below, which shows a simplified food web of a terrestrial habitat:



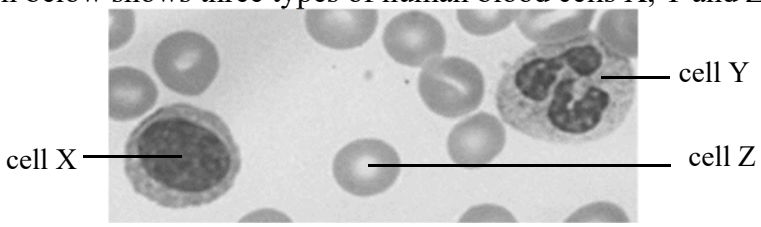
23. Which of the following organisms are tertiary consumers?
    (1) Toad
    (2) Hawk
    (3) Sparrow
    (4) Mouse

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

24. Which of the following is/are the relationship(s) between grasshopper and mouse?
    (1) Competition
    (2) Predation
    (3) Commensalism

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

25. The photomicrograph below shows three types of human blood cells X, Y and Z:



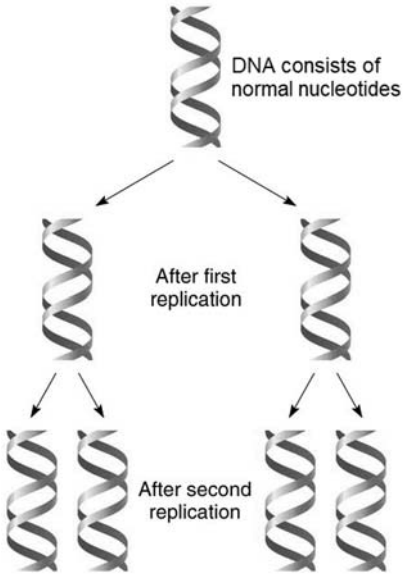
Which of the following are correct descriptions of the cells?
(1) Cell X contains chromosomes while cell Z does not.
(2) Cell X contains one nucleus while cell Y contains a few nucleus.
(3) Cell Y contains a purple pigment while cell Z contains a red pigment.

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

26. Which of the following biomolecules are involved in translation?
    (1) DNA
    (2) mRNA
    (3) amino acid
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

27. Which of the following contraceptive methods has/have the same principle as the safe period (or rhythm) method?
    (1) Use of condoms
    (2) Taking contraceptive pills
    (3) Tubal ligation
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

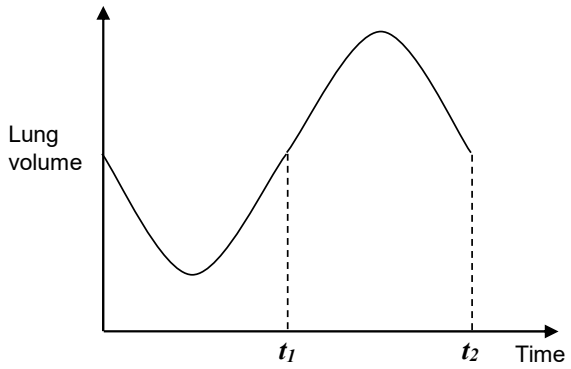
28. A cell, which contains DNA molecules consisting of normal nucleotides, is cultured in a medium with free radioactive nucleotides. Assume that the cell contains no other free nucleotides.



What is the percentage of radioactive nucleotides in each DNA molecule formed after the second replication?
A. 100%
B. 50%
C. 50% or 100%
D. 50% or 75%

29. Which of the following base pairs may join by hydrogen bonds between the free RNA nucleotides and the DNA template strand in transcription?
    (1) A and T
    (2) U and A
    (3) C and G
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

Directions: Questions 30 and 31 refer to the graph below, which shows the changes in lung volume in a person over a period:



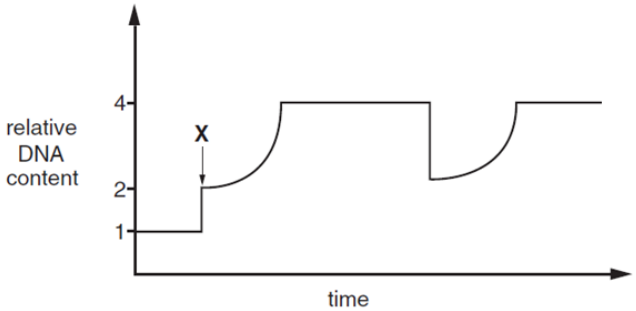
30. Which of the following correctly describes a condition of the breathing system at t_1?
A. The intercostal muscles are contracting.
B. The diaphragm is moving upwards.
C. The rib cage is moving downwards and inwards.
D. There is no airflow between the lungs and the surrounding atmosphere.

31. Which of the following correctly describes the difference between the air pressure in the lungs at t_1 and t_2?
A. Air pressure in the lungs at t_1 is higher than that at t_2.
B. Air pressure in the lungs at t_1 is lower than that at t_2.
C. Air pressure in the lungs at t_1 is the same as that at t_2.
D. Cannot be determined.

32. Which of the following combinations correctly describes and explains a difference between inhaled air, exhaled air and the air in the air sacs?

	Description	***Explanation***
A.	Exhaled air has a lower water content than inhaled air.	Water is absorbed by the mucus along the respiratory tract.
B.	Inhaled air has a lower oxygen content than the air in the air sacs.	Inhaled air mixes with residual air in the air sacs.
C.	Exhaled air has a higher oxygen content than the air in the air sacs.	Air forced out from the air sacs mixes with air along the respiratory tract.
D.	Exhaled air has a higher carbon dioxide content than the air in the air sacs.	Epithelial cells along the respiratory tract release carbon dioxide.

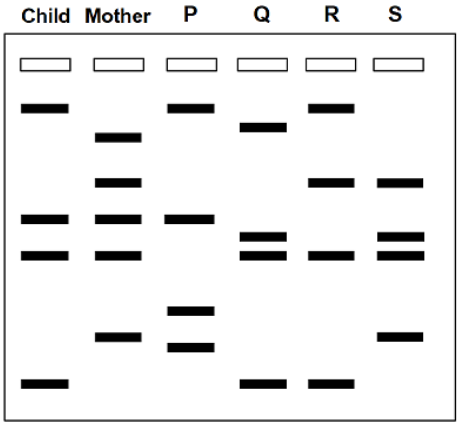
33. The graph below shows the changes in relative DNA content in a cell:



Which of the following correctly identifies process X?
A. DNA replication
B. Fertilisation
C. Mitosis
D. Meiosis

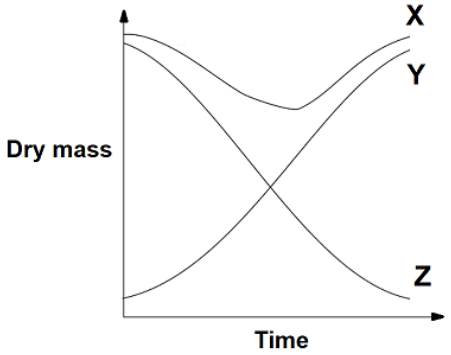
34. Which of the following best explains why fusion of ear bones may lead to hearing loss?
A. Nerve impulses cannot be generated in the ear.
B. Nerve impulses cannot be transmitted to the cerebrum.
C. Vibrations cannot be amplified in the inner ear.
D. Vibrations cannot be transmitted in the middle ear.

35. The DNA fingerprints of a biological child, his biological mother and four men, P, Q, R and S, are shown below:



Which of the four men is most likely the biological father of the child?
A. P
B. Q
C. R
D. S

36. The graph below shows the changes in dry mass of different parts of a seedling during germination:



Which of the following combinations correctly identifies X, Y and X?

	X	***Y***	***Z***
A.	cotyledon	whole seedling	radicle
B.	plumule	cotyledon	radicle
C.	radicle	plumule	cotyledon
D.	whole seedling	radicle	cotyledon

END OF SECTION A

Go on to Questions-Answer Book B for questions in Section B