ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

BIOLOGY 9190/1

PAPER 1 Multiple Choice

JUNE 2017 SESSION 1 hour

Additional materials:
- Multiple Choice answer sheet
- Soft clean eraser
- Soft pencil (type B or HB is recommended)
- Ruler

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in this paper. Answer **all** questions. For each question there are four possible answers, **A, B, C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

Each correct answer will score **one** mark. A mark will **not** be deducted for a wrong answer.

This question paper consists of 13 printed pages and 3 blank pages.

[Turn over

1 Light microscopes are important in cell studies because

A living material can be viewed.
B objects smaller than 200 nm are visible.
C they are portable.
D they use visible light.

2 What is the function of the smooth endoplasmic reticulum (SER)?

A synthesis of antibodies
B synthesis of glycoproteins
C synthesis of enzymes
D synthesis of cholesterol

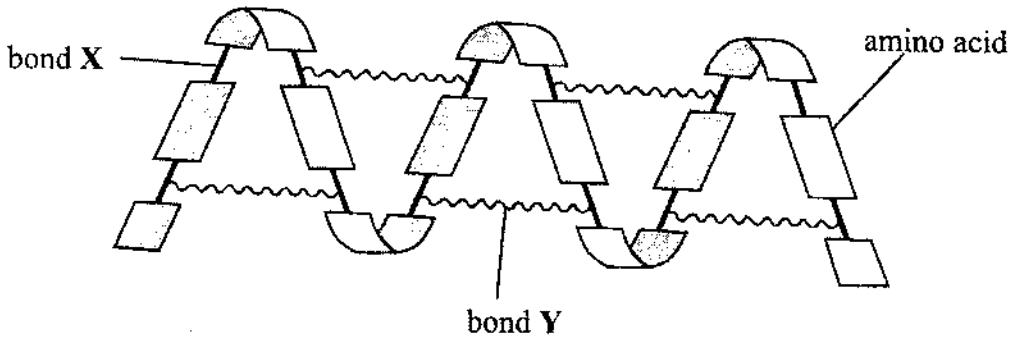
3 Which row correctly shows the order of size of cell organelles?

	largest →			**smallest**
A	centrioles	ribosomes	lysosomes	nucleoli
B	lysosomes	nucleoli	centrioles	ribosomes
C	nucleoli	lysosomes	centrioles	ribosomes
D	nucleoli	centrioles	ribosomes	lysosomes

4 Phospholipids differ from triglycerides in that phospholipids

A are non-polar and triglycerides are polar.
B contain phosphate and triglycerides have glycerine.
C are saturated and triglycerides are unsaturated.
D have two hydrocarbon tails and triglycerides have three.

5 The diagram shows part of a protein molecule.



Which row correctly identifies bonds **X** and **Y**?

	X	Y
A	hydrogen	peptide
B	hydrogen	hydrogen
C	peptide	hydrogen
D	peptide	peptide

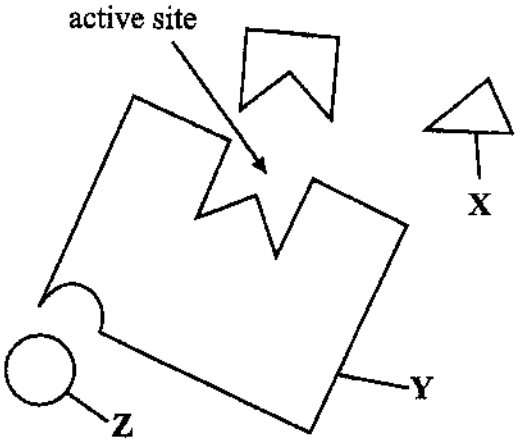
6 Which statement is correct about glycogen and amylopectin?

A amylopectin molecules have 1,4 branches while glycogen molecules have 1,6 branches
B glycogen molecules are more branched than amylopectin molecules
C both have branches formed by 1,4 glycosidic bonds
D both are polymers of β-glucose

7 Which bond temporarily holds the enzyme-substrate complex?

A disulphide
B glycosidic
C ionic
D peptide

8 The diagram represents the molecules involved in an enzyme-controlled reaction.



Which row correctly identifies the molecules **X**, **Y** and **Z**?

	X	Y	Z
A	competitive inhibitor	enzyme	non-competitive inhibitor
B	competitive inhibitor	substrate	non-competitive inhibitor
C	non-competitive inhibitor	enzyme	competitive inhibitor
D	non-competitive inhibitor	substrate	competitive inhibitor

9 Which statement is correct for **all** enzymes?

A They are globular proteins.
B They are inhibited by competitive inhibitors.
C They are found in the smooth endoplasmic reticulum.
D They catalyse the hydrolysis of large molecules.

10 Which is the longest phase of the cell cycle?

A anaphase
B cytokinesis
C interphase
D prophase

11 How many possible combinations can be formed as a result of independent assortment if a diploid cell (2n = 20) divides by meiosis?

A 10
B 100
C 1 000
D 1 024

12 The explanation for using mRNA rather than DNA in the production of insulin by genetic engineering is that mRNA is

A produced in large quantities as compared to DNA.
B highly stable as compared to DNA
C easy to extract and DNA is difficult to extract.
D made up of a single strand whereas DNA has two strands.

13 In domestic cats, the genes for yellow and black fur are sex-linked and co-dominant.

Which one is the expected proportion of heterozygous offsprings when black females are crossed with yellow males?

A 0.75
B 0.50
C 0.25
D 0.00

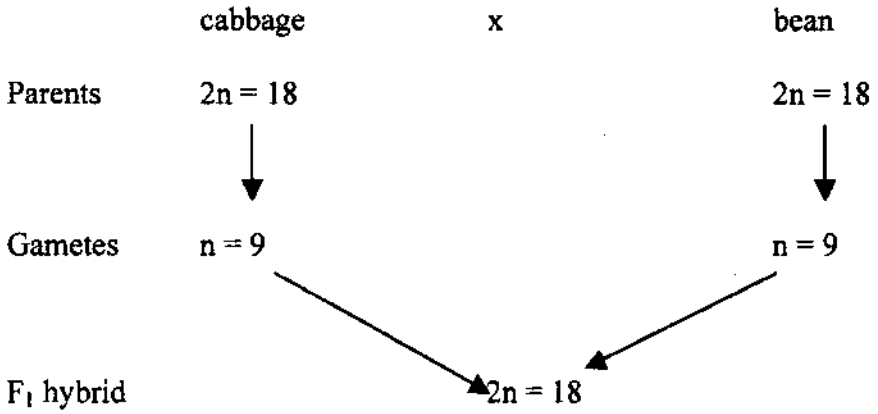
14 The following statements are from Darwin's theory of evolution by natural selection in random order.

1. Population numbers remain constant.
2. There is a struggle for existence.
3. Variation is shown in all populations.
4. Individuals show great reproductive potential.

In which order should the statements be placed in order to bring about evolution?

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

15 The diagram shows a genetic cross performed between cabbage and bean plants.



The F_1 hybrid was found to be sterile.

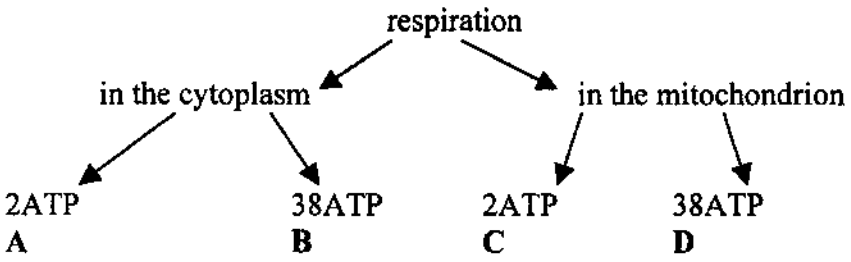
Which statement best explains why the F_1 hybrid plant was sterile?

A Non-disjunction occurred during parental gamete formation.
B There was an odd number of chromosomes in the gametes.
C The chromosomes of the F_1 hybrid could not form homologous pairs during meiosis.
D The F_1 hybrid was polyploidy and could not undergo gametogenesis.

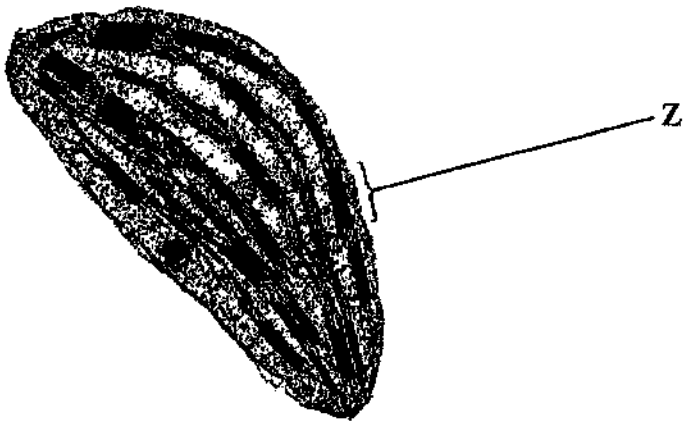
16 A codon has three bases on

A small nuclear RNA molecule.
B messenger RNA molecule.
C ribosomal RNA molecule.
D transfer RNA molecule.

17 Which of the following shows the correct location and number of ATP molecules released from a molecule of glucose during respiration?



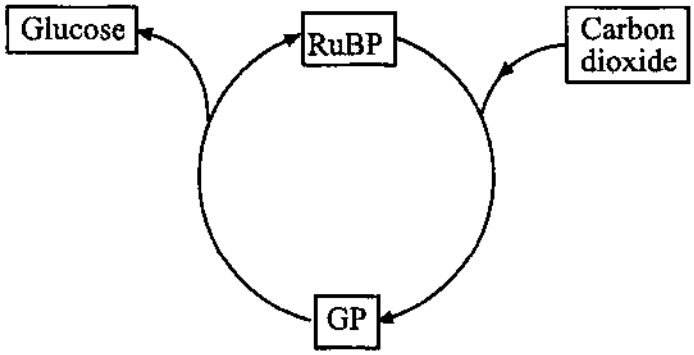
18 The electromicrograph shows a chloroplast.



The structure labelled **Z** is

A starch grain
B ribosome
C stroma
D granum

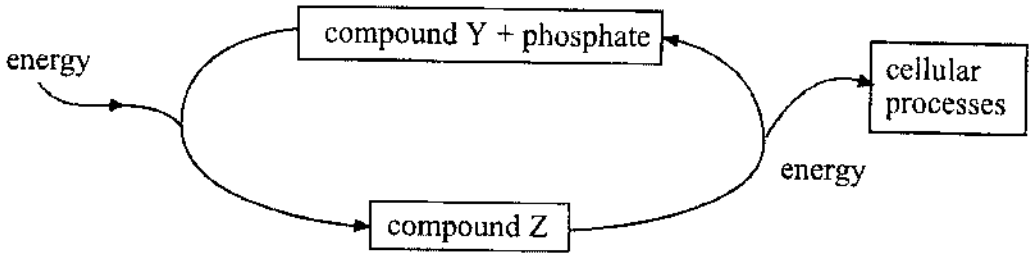
19 The diagram represents part of the Calvin cycle within a chloroplast.



Which row correctly describes the effect of decreasing carbon dioxide availability on the concentrations of RuBP and GP in the cycle?

	RuBP concentration	**GP concentration**
A	decreases	increases
B	decreases	decreases
C	increases	decreases
D	increase	increase

20 The diagram shows energy transfer within a cell.



Which row, **A**, **B**, **C** or **D** correctly identifies compounds **Y** and **Z**?

	Y	Z
A	glucose	CO_2
B	ADP	ATP
C	ATP	glucose
D	ADP	CO_2

21 If an actively transpiring plant is cut near the base, water oozes out of the cut stem due to

A root pressure.
B transpiration.
C osmosis.
D guttation.

22 Which statement correctly describes the behaviour of haemoglobin as pH of blood changes from 5.2 to 3.2?

A The affinity of haemoglobin for oxygen increases.
B The affinity of haemoglobin for carbon dioxide decreases.
C The affinity of haemoglobin for oxygen decreases.
D The affinity of haemoglobin for carbon dioxide remains the same.

23 The function of a thick elastic layer in the walls of arteries is to

A educe friction.
B decrease volume of blood flowing.
C increase volume of blood flowing.
D prevent bursting of the wall.

24 In healthy individuals, there is no glucose in the filtrate in the Loop of Henle because glucose

A is too large to pass across the basement membrane.
B is passively absorbed by the cells lining the descending loop of Henle.
C diffuses out of the interstitial cells.
D is actively absorbed by the proximal tubule cells.

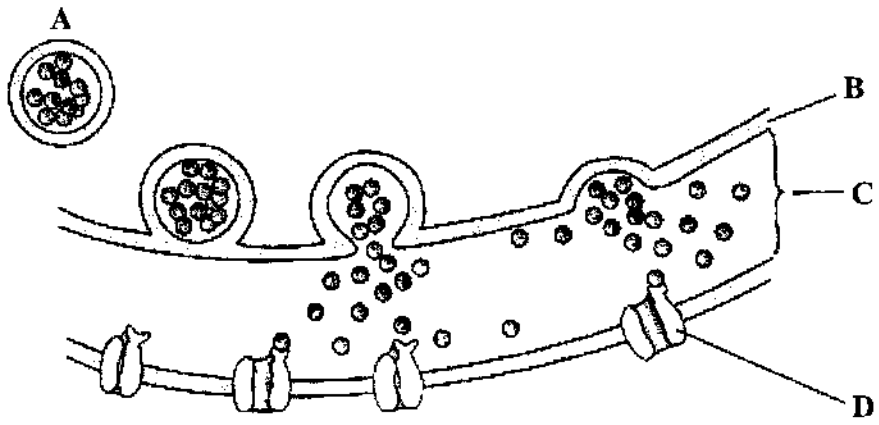
25 Cyanide poisoning reduces mitochondrial activity in kidney nephrons.

Which substance will be present in increased amounts in urine?

A ammonia
B glucose
C hydrogen carbonate
D urea

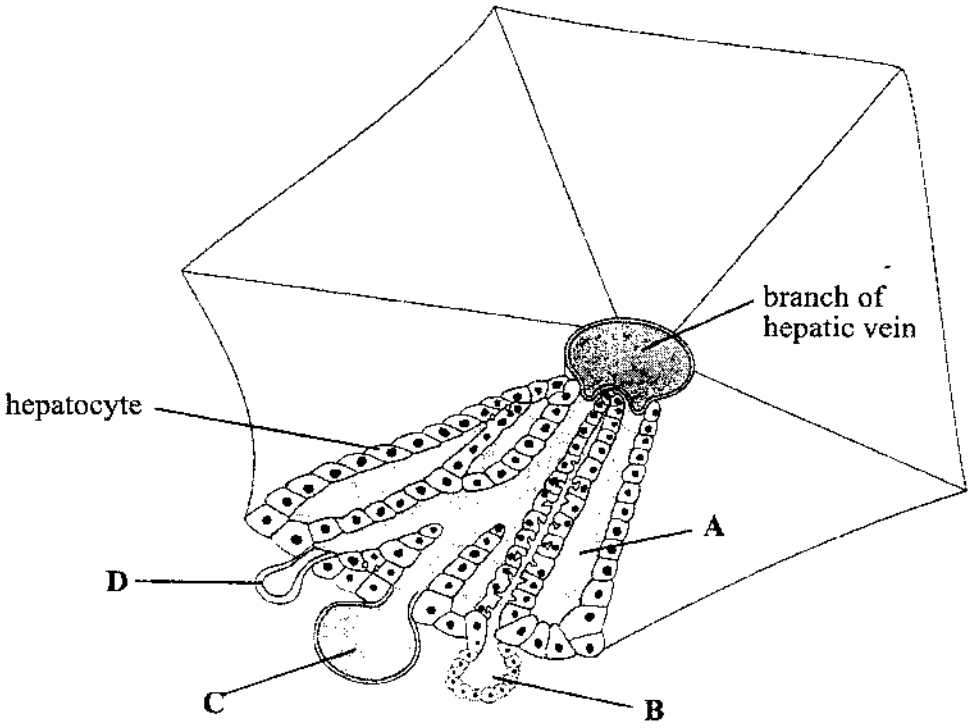
26 The diagram shows the structure of a synapse.

Which of the labelled structures, **A**, **B**, **C** or **D**, can produce a hyperpolarisation in response to a chemical stimulus?



27 The diagram shows a section of a liver lobule and its associated blood vessels.

Which structure, **A**, **B**, **C** or **D**, contains blood from the ileum?



28 Which function of the liver results in the production of bile pigments?

A breakdown of haemoglobin
B deamination of amino acids
C release of stored vitamin A
D detoxification of metabolic poisons

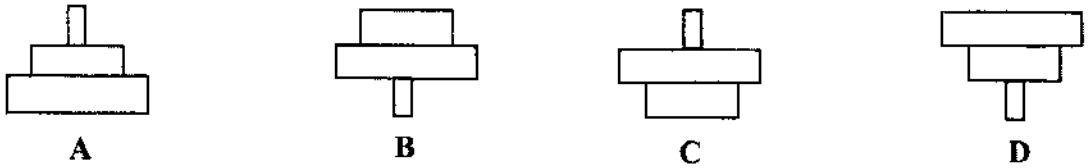
29 Two species cannot permanently occupy the same ecological niche because the two species

A would compete for the same resources.
B would have different nutritional requirements.
C may be part of separate food chains.
D would not interbreed.

30 The following food chain was obtained from an ecosystem:

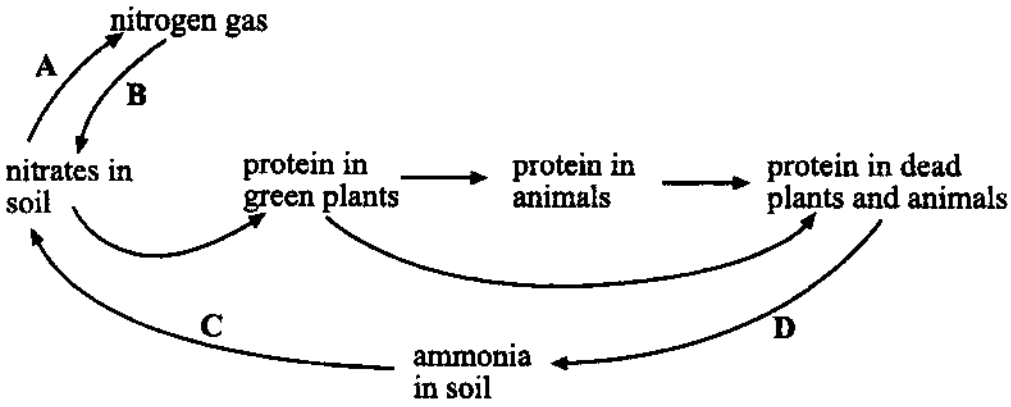
tree → aphid → lady bird

Which of the following pyramids of numbers represents the food chain?



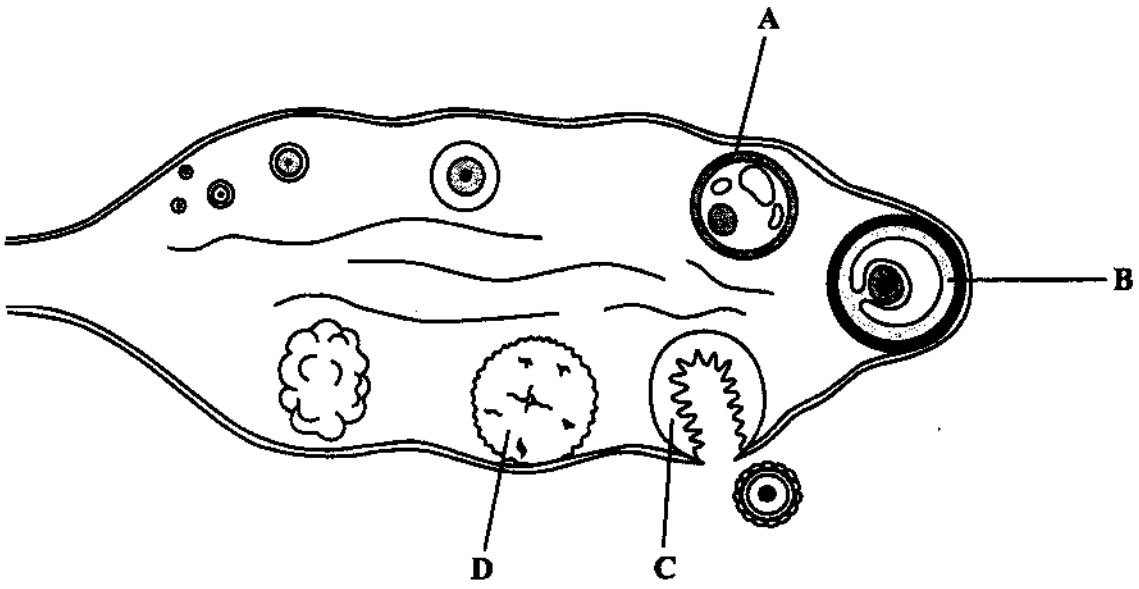
31 The diagram represents a section of the nitrogen cycle.

At which stage **A**, **B**, **C** or **D**, does decaying occur?



32 The diagram shows a section through a human ovary.

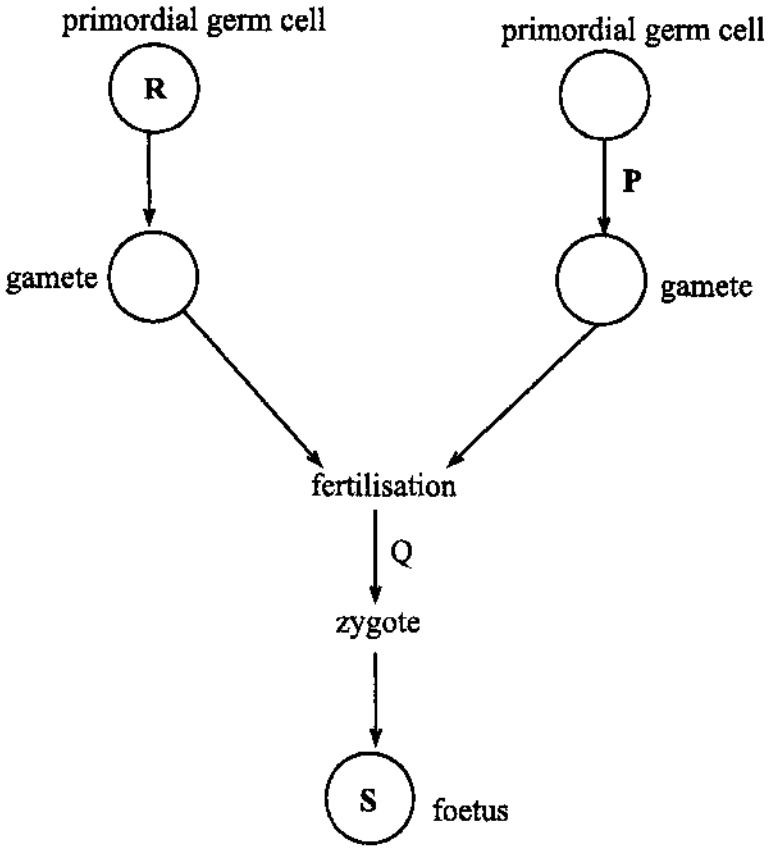
Which structure, **A**, **B**, **C** or **D**, secretes progesterone?



33 What is the function of luteinising hormone (LH)?

A to stimulate production of testosterone by interstitial cells
B to stimulate production of sperms by seminiferous tubules
C to stimulate development of primary follicles in the ovary
D to stimulate the degeneration of the corpus luteum

34 The flow diagram summarises sexual reproduction.



Which row identifies the type of cell division occurring during stages **P** and **Q**?

	P	Q
A	mitosis	mitosis
B	mitosis	meiosis
C	meiosis	mitosis
D	meiosis	meiosis

35 Which pair of hormones breaks dormancy?

A abscisic acid and auxins
B auxins and ethene
C gibberellins and abscisic acid
D gibberellins and ethene

36 Which is the correct sequence of stages in mammalian fertilization?

A acrosome reaction → cortical reaction → penetration of egg membrane

B acrosome reaction → penetration of egg membrane → cortical reaction

C cortical reaction → acrosome reaction → penetration of egg membrane

D cortical reaction → penetration of egg membrane → acrosome reaction

37 In a species of a flowering plant, 2n = 14.

What is the chromosome number of the endosperm nucleus immediately after fertilisation?

A 7
B 21
C 28
D 42

38 The organisms *Citrus lemonii* and *Citrus aurantum* share the same

A class but not the same family.
B species but not the same class.
C genus but not the same species.
D family but not the same genus.

39 Which row correctly distinguishes *Platyhelminthes* from *Annelida*.

	Platyhelminthes	**Annelida**
A	segmented body	non-segmented body
B	non-segmented body	segmented body
C	bilateral symmetry	no bilateral symmetry
D	no bilateral symmetry	bilateral symmetry

40 The dichotomous key was designed to distinguish between four kingdoms.

Which kingdom, **A**, **B**, **C** or **D**, could be Fungi?

1. members of the kingdom have cells with a nucleus and membrane bound organelles — go to 2

   members of the kingdom have cells with no nucleus and no membrane bound organelles — Kingdom **A**

2. members of the kingdoms use heterotrophic nutrition — go to 3

   members of the kingdom use autotrophic nutrition — Kingdom **B**

3. members of the kingdom show limited cell differentiation — Kingdom **C**

   members of the kingdom have cell walls made of chitin — Kingdom **D**

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