



Cambridge O Level

BIOLOGY

5090/11

Paper 1 Multiple Choice

October/November 2024

1 hour

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **20** pages. Any blank pages are indicated.



1 Which structures are present in plant cells but **not** in animal cells?

- A cell membrane, cytoplasm, chloroplasts
- B cellulose cell wall, chloroplasts, sap vacuole
- C cellulose cell wall, cell membrane, cytoplasm
- D cytoplasm, nucleus, chloroplasts

2 The wobbegong, or carpet shark, is a type of shark that spends its time resting on the sea floor. There are twelve different species of wobbegong. The largest is *Orectolobus maculatus*, the spotted wobbegong, growing to about three metres in length.

What is the genus name of the largest wobbegong?

- A carpet shark
- B *maculatus*
- C *Orectolobus*
- D wobbegong

3 The bacterium *Vibrio cholerae* that causes the disease cholera acts on the cells of the intestinal wall. It causes chloride ions to move out of the cells into the small intestine.

Which process will then lead to the production of dangerously high amounts of watery diarrhoea?

- A active transport
- B active uptake
- C diffusion
- D osmosis

4 Which movement of a substance in a plant requires the plant to provide energy?

- A absorption of carbon dioxide by a palisade cell
- B absorption of oxygen by a mesophyll cell
- C nitrate uptake by root hair cells
- D transport of water up through the xylem

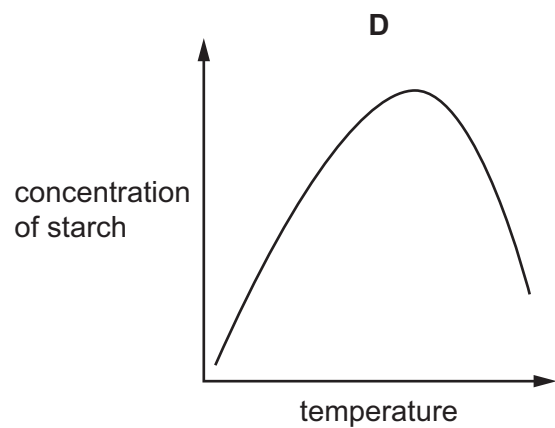
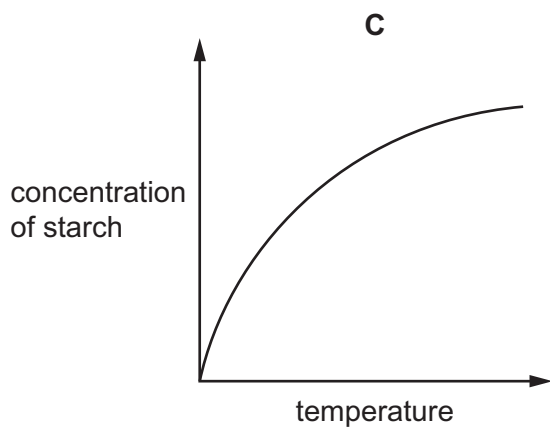
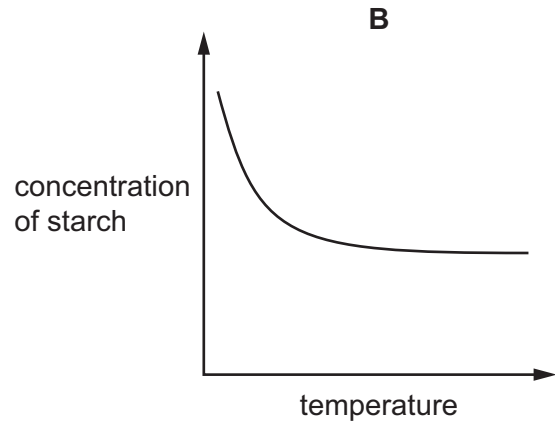
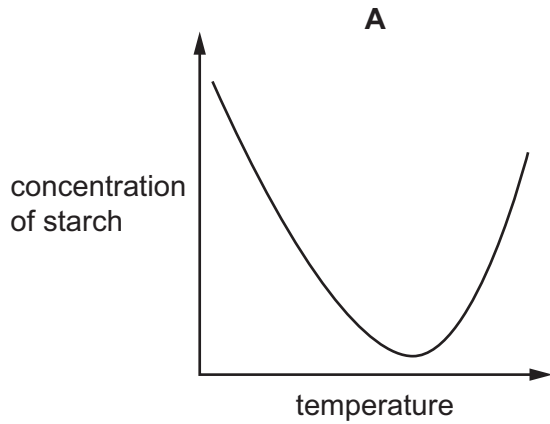
5 Which statements are correct?

- 1 A molecule of DNA consists of many nucleotides.
- 2 A molecule of glycogen consists of many glucose molecules.
- 3 A molecule of lipid consists of glycerol and amino acid molecules.

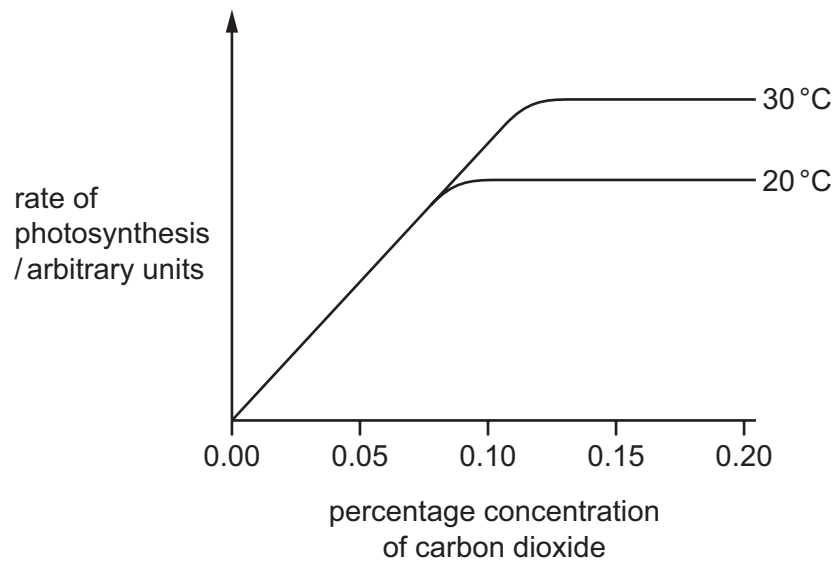
- A 1, 2 and 3 B 1 and 2 only C 1 and 3 only D 2 and 3 only

- 6 Some students investigated the effect of temperature on the digestion of starch to form maltose. They added equal volumes of amylase and starch solution to a number of test-tubes. The test-tubes were left for 30 minutes at a range of temperatures between 10°C and 60°C. They then measured the concentration of starch in each test-tube.

Which graph was produced from these results?

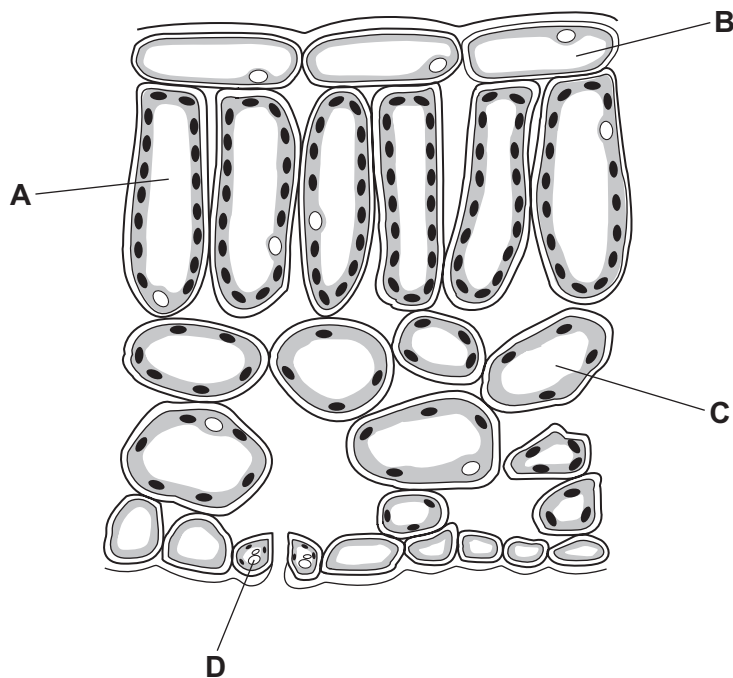


- 7 The graph shows the rate of photosynthesis in a plant in full sunlight at two different temperatures and at different concentrations of carbon dioxide.



At normal atmospheric carbon dioxide concentrations, what limits the rate of photosynthesis?

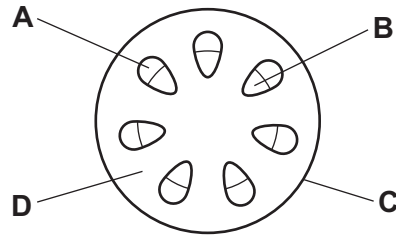
- A carbon dioxide concentration
 - B light intensity
 - C temperature
 - D water availability
- 8 The diagram shows a section through a dicotyledonous leaf.
- Which cell **cannot** photosynthesise?



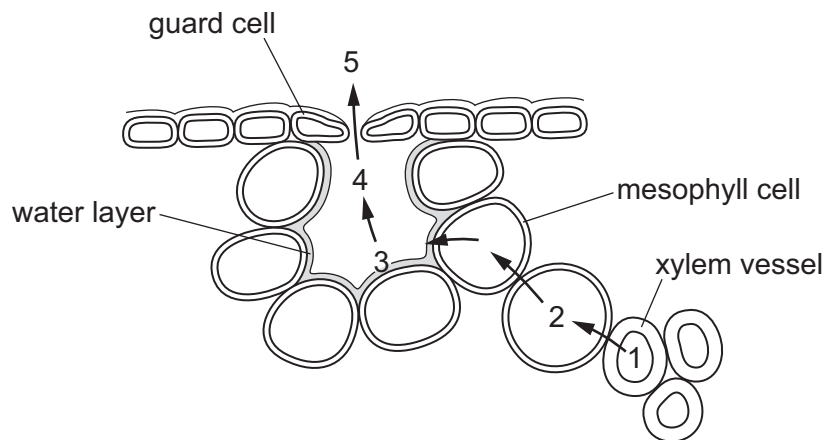
- 9 A leafy stem was cut from a plant and placed in a red dye solution for 18 hours.

The diagram shows a transverse section of the stem after 18 hours.

Which tissue will be stained red?



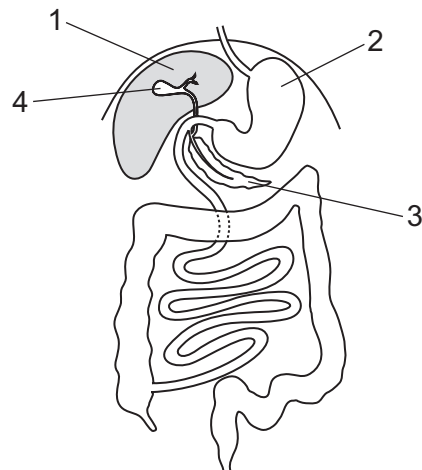
- 10 The diagram shows the movement of water through part of a leaf.



Which processes are involved in the movement of water at these stages?

	1–2	3–4	4–5
A	diffusion	evaporation	osmosis
B	evaporation	diffusion	osmosis
C	osmosis	diffusion	evaporation
D	osmosis	evaporation	diffusion

11 The diagram shows part of the human digestive system.



Which parts produce bile and store bile?

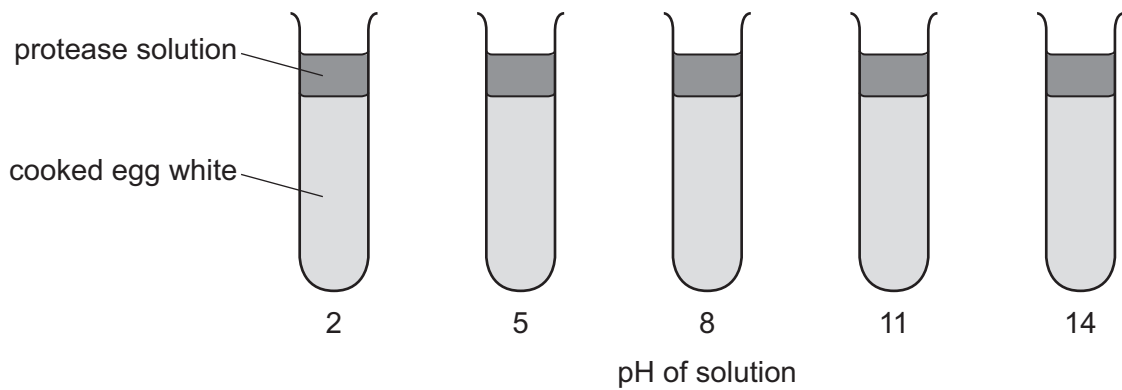
A 1 and 2

B 1 and 4

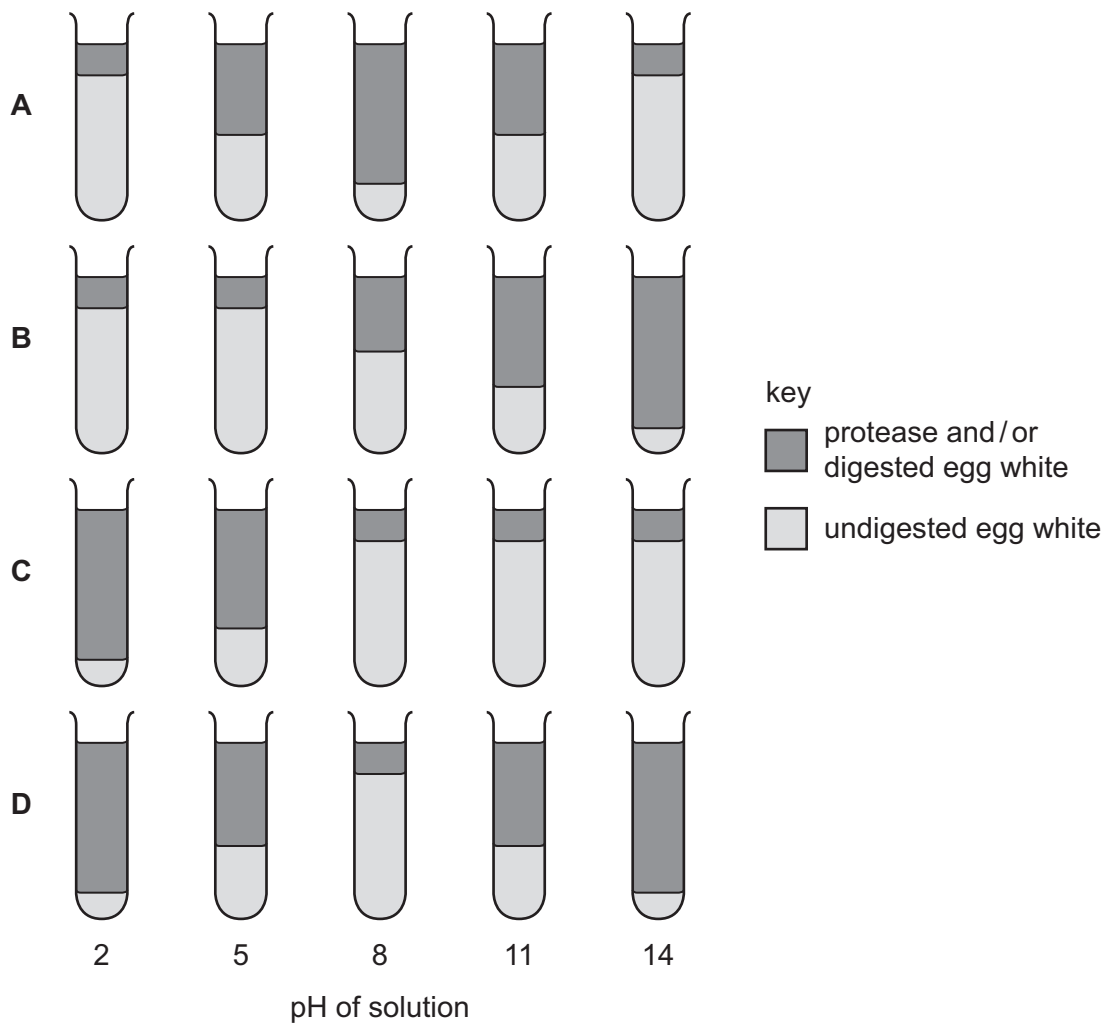
C 2 and 4

D 3 and 4

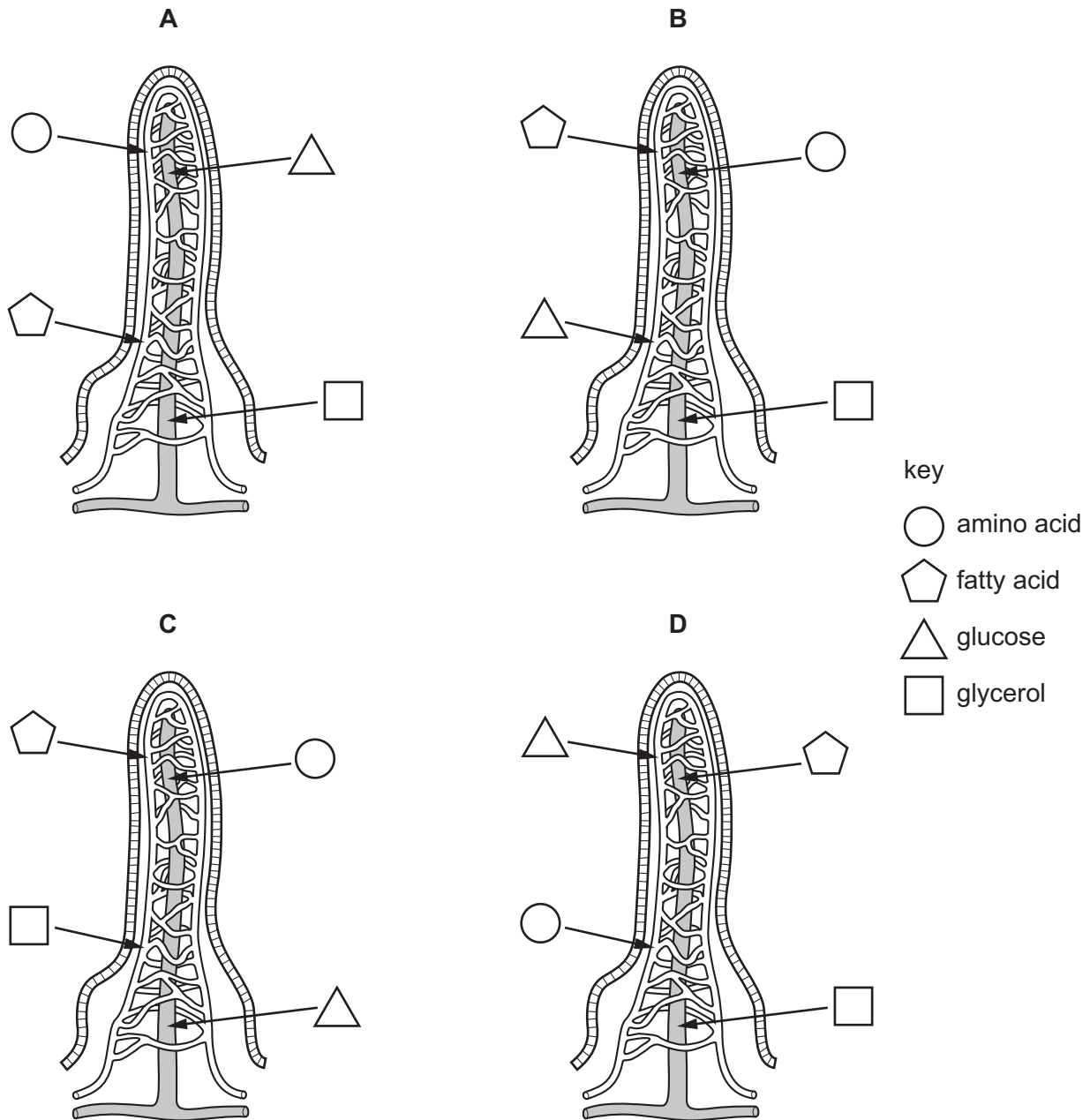
- 12** Five test-tubes containing cooked egg white are set up as shown. Cooked egg white contains a protein. Protease solutions of different pH are added to each tube.



Which diagram shows the results of this experiment for a protease from the stomach?



13 Which diagram shows the absorption of different food molecules into a villus?



14 The table shows the changes that occur in the thorax during breathing.

Which changes occur during inspiration?

	diaphragm	external intercostal muscles	internal intercostal muscles	pressure in thorax
A	contracts	contract	relax	falls and then rises
B	relaxes	relax	contract	rises and then falls
C	relaxes	contract	relax	rises and then falls
D	contracts	relax	contract	falls and then rises

- 15** Scientists have concluded that absorption of mineral ions in plants requires energy from respiration.

Which observation best supports this conclusion?

- A** Carbohydrate is stored in the roots.
 - B** Living roots give off carbon dioxide.
 - C** The root hairs have a large surface area.
 - D** Uptake of mineral ions is reduced in lower oxygen concentrations.
- 16** When people travel in an aircraft and sit still in their seats for long periods of time, their lower legs may swell up.

Which statement explains why this may happen?

- A** Fewer leg muscle contractions occur to push blood along the veins.
 - B** The rate of the heartbeat is reduced as no exercise is happening.
 - C** There is little or no arterial blood pressure to force the blood upwards.
 - D** Valves in the veins do **not** fill up with blood to prevent its backflow.
- 17** The diagram shows a blood cell as seen under a light microscope.



What is the type of blood cell shown?

- A** phagocyte
 - B** lymphocyte
 - C** red blood cell
 - D** platelet
- 18** Which statements about mosquitoes are correct?

	where mosquitoes lay their eggs	sex of the adult mosquito that sucks blood
A	in decaying organic material	female
B	in decaying organic material	male
C	in stagnant water	female
D	in stagnant water	male

19 The spread of HIV was reduced in many countries between 1990 and 2010.

Which action assisted this reduction?

- A** development of an effective vaccine
- B** health education
- C** treating patients with new antibiotics
- D** using drugs that slow the appearance of symptoms of HIV

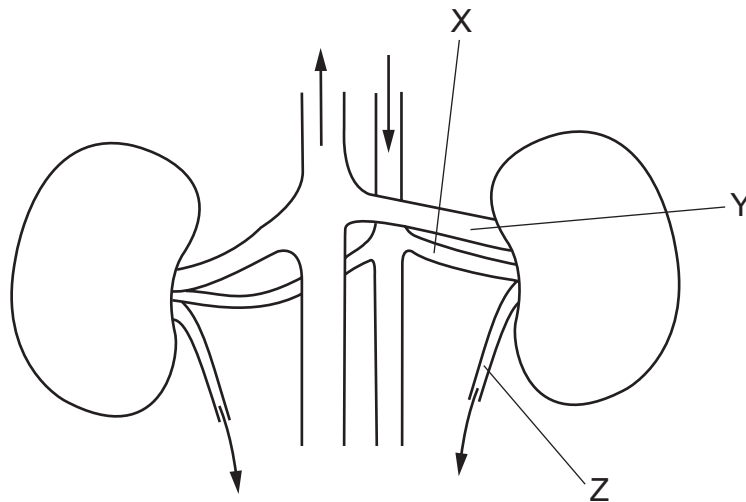
20 Which statement about the immune system is correct?

- A** A pathogen has its own antigens which will have the same shape as antibodies that bind to them.
- B** Antigens stimulate an immune response by phagocytes which produce antibodies.
- C** Active immunity involves acquiring antibodies from another individual and provides short-term protection against a pathogen.
- D** Antibodies are protein molecules that bind to antigens either leading to the destruction of pathogens or marking a pathogen for destruction by lymphocytes.

21 For which disease can antibiotics be used as an effective treatment?

- A** a bacterial infection
- B** coronary heart disease
- C** malaria
- D** a viral infection

22 The diagram shows part of the human urinary system.



What are structures X, Y and Z?

	X	Y	Z
A	artery	vein	ureter
B	artery	vein	urethra
C	vein	artery	ureter
D	vein	artery	urethra

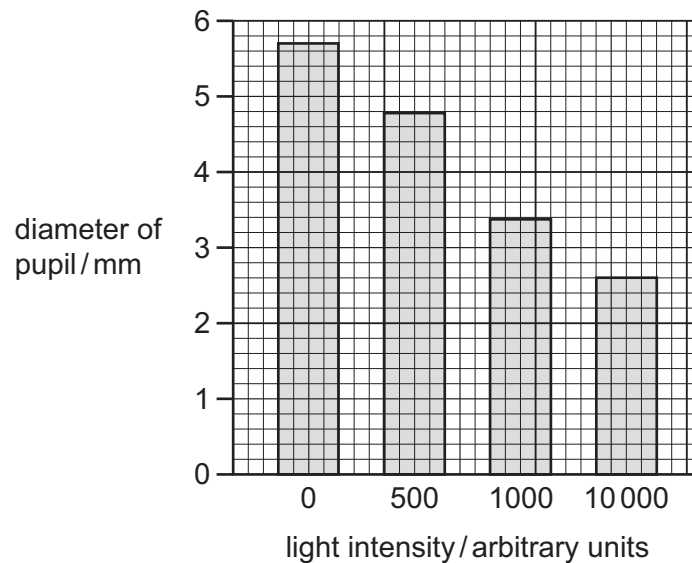
23 Nerve impulses in neurones can travel:

- 1 away from the central nervous system
- 2 towards the central nervous system
- 3 within the central nervous system.

In which direction do impulses in sensory and in relay neurones travel?

	sensory neurones	relay neurones
A	1	2
B	1	3
C	2	1
D	2	3

- 24** The diameter of the pupil of the eye was measured at a range of different light intensities.



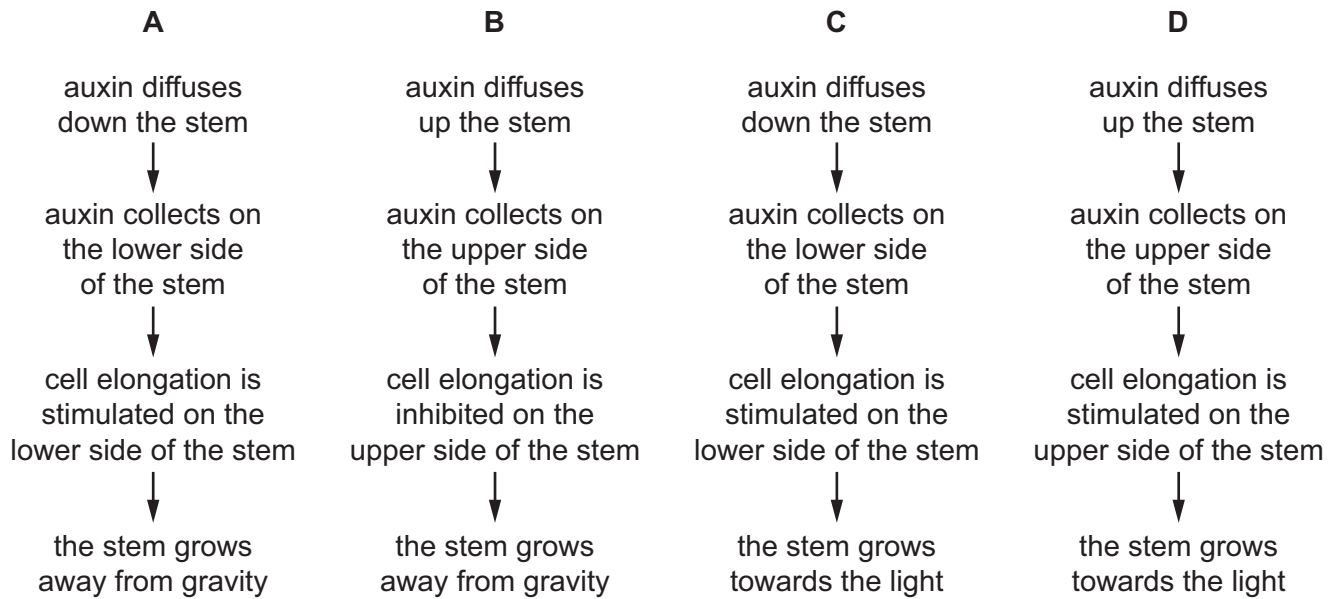
What is the percentage decrease in pupil diameter (rounded to 1 decimal place) when a person moves from an area of complete darkness to an area of light intensity 10 000 arbitrary units?

- A** 45.6% **B** 53.4% **C** 54.3% **D** 54.4%
- 25** When a person is frightened, which substance causes an increase in the blood sugar level?
- A** adrenaline
B carbon dioxide
C insulin
D lactic acid
- 26** Raynaud's syndrome is a condition that can be triggered by stress. It causes the hands and feet to react as if they were affected by extreme cold.

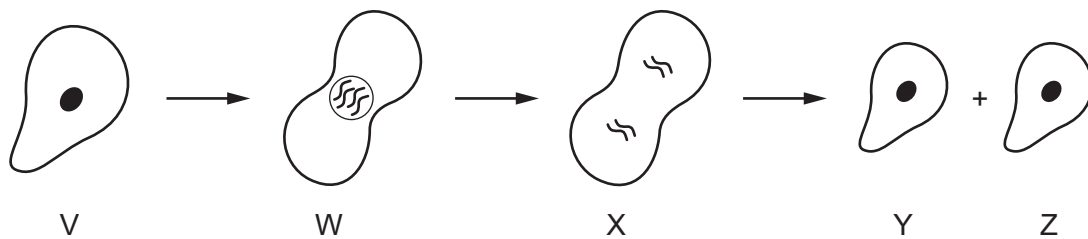
Which reaction will take place in the hands and feet of a person with Raynaud's syndrome?

- A** vasoconstriction – blood vessels at the skin surface narrow, reducing blood flow
B vasoconstriction – blood vessels at the skin surface widen, increasing blood flow
C vasodilation – blood vessels at the skin surface narrow, reducing blood flow
D vasodilation – blood vessels at the skin surface widen, increasing blood flow

27 Which flow diagram describes how auxin affects growth in negative gravitropism?



28 The diagram shows some stages during the asexual reproduction of a single-celled organism.



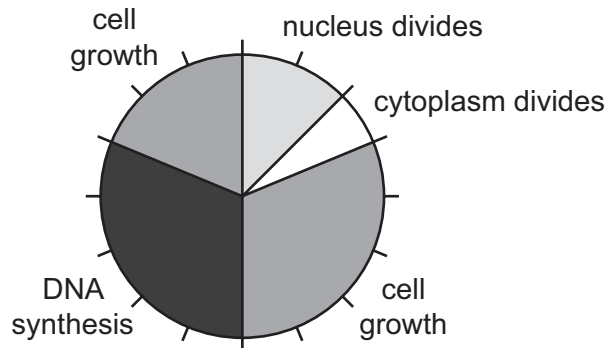
Which row shows the relative amounts of DNA in each of the cells V, W, X, Y and Z?

	V	W	X	Y	Z
A	1	1	1	2	2
B	1	1	2	1	1
C	1	2	2	1	1
D	2	1	1	2	2

- 29** Asexual reproduction involves the cell cycle in which the cell divides and then growth and DNA synthesis take place before the cell is ready to divide again.

The diagram shows the stages in one complete cell cycle.

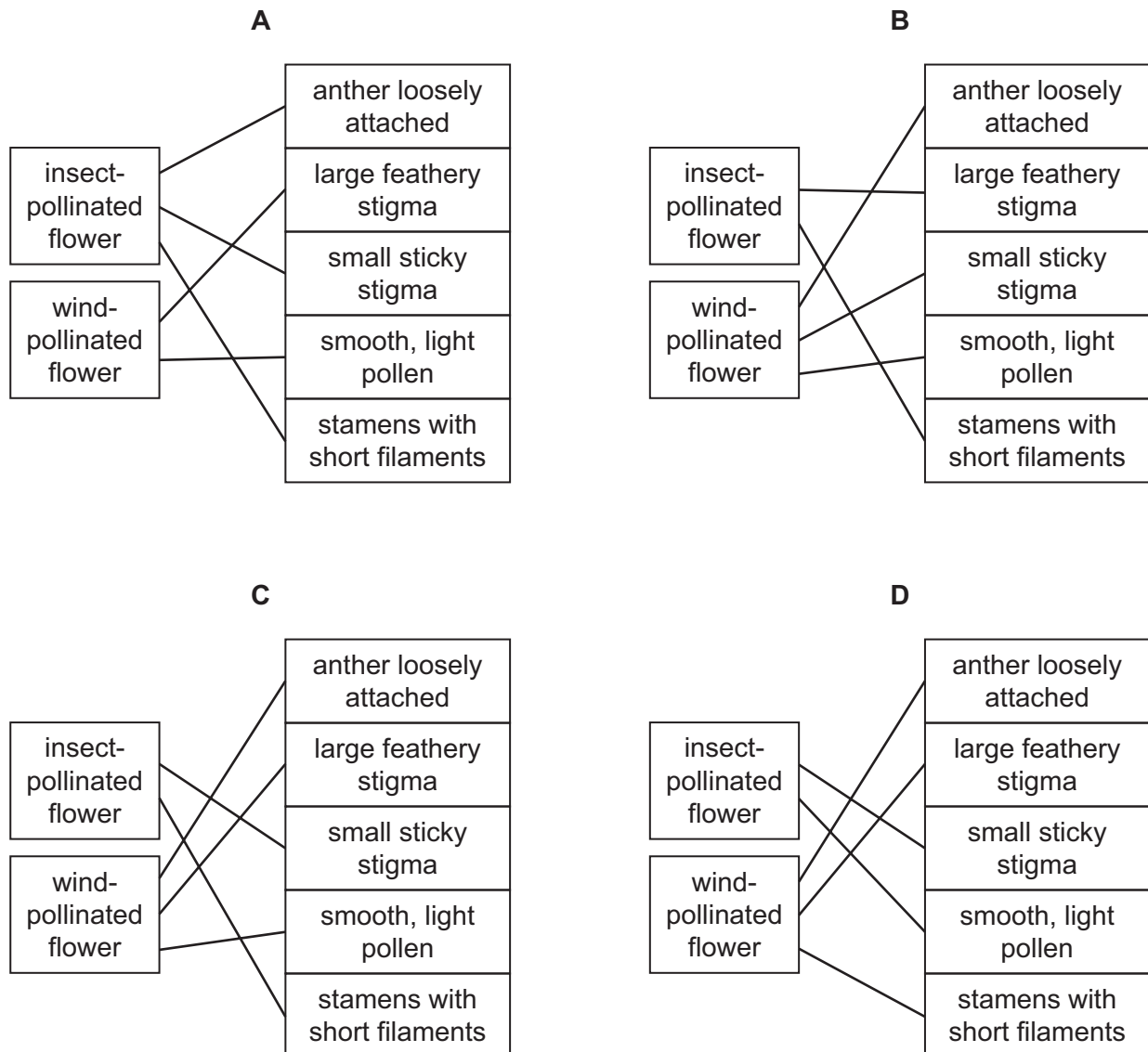
This cell cycle takes 1.75 hours to complete.



Using the diagram, which activity in the cycle takes 52.5 minutes in total?

- A** cell growth
- B** cytoplasm divides
- C** nucleus divides
- D** DNA synthesis

30 Which diagram matches each type of flower with its features?

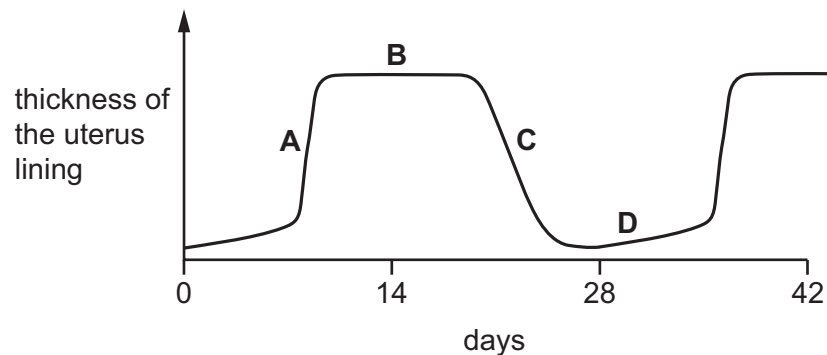


31 What is the sequence of organs that a sperm cell must pass through so it can fertilise an egg cell?

- A** sperm duct → urethra → vagina → cervix → uterus → oviduct
- B** sperm duct → vagina → urethra → oviduct → cervix → uterus
- C** uterus → sperm duct → vagina → urethra → cervix → oviduct
- D** urethra → sperm duct → uterus → vagina → oviduct → cervix

- 32 The diagram shows the changes in the thickness of the uterus lining of a woman during her menstrual cycle.

At which time is the woman most likely to be fertile?



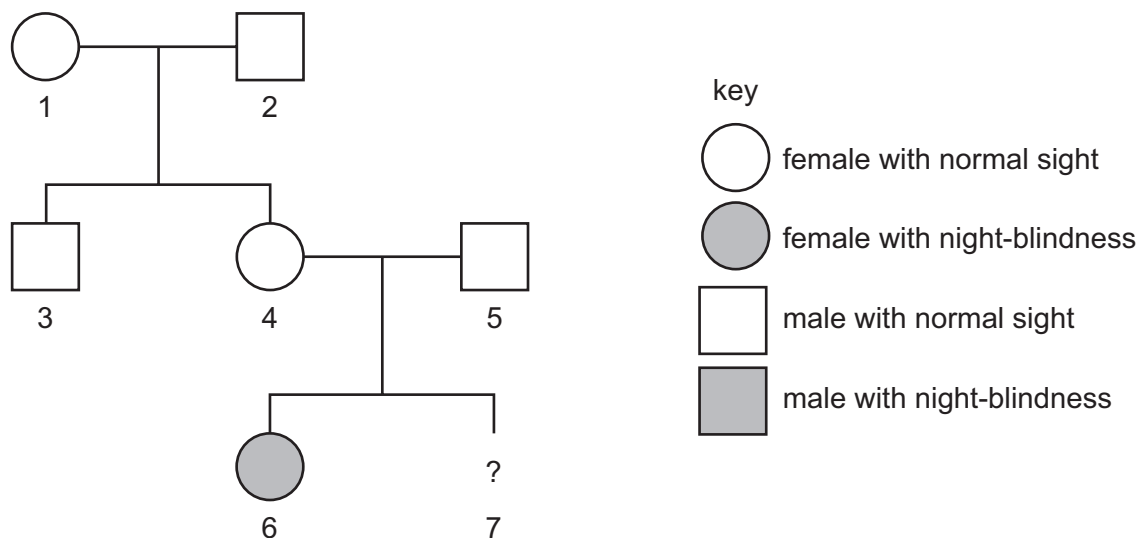
- 33 What is an example of discontinuous variation in humans?

- A body weight
- B height
- C blood group
- D skin colour

- 34 Night-blindness is an inherited condition in which people have unusually poor vision when light levels are low.

The diagram shows the inheritance of night-blindness in three generations of a family.

Couple 4 and 5 are expecting their second child, individual 7.



What is the probability that individual 7 will be a male and will also show night-blindness as his phenotype?

- A 0.500
- B 0.300
- C 0.250
- D 0.125

35 What is essential for natural selection to occur?

	competition	variation	
A	✓	✓	key
B	✓	x	✓ = yes
C	x	✓	x = no
D	x	x	

36 The gene for human insulin production can be inserted into bacterial DNA to enable the industrial production of insulin.

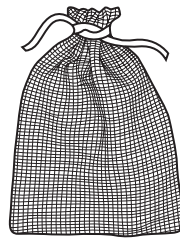
What is an advantage of using this type of insulin to treat a patient with diabetes?

- A** Any offspring of the patient will be protected against developing diabetes.
- B** The patient's pancreas will start producing insulin when it is needed by the body.
- C** The insulin gene will be replaced in the patient's DNA in cells in the pancreas.
- D** The patient will **not** suffer any side effects from using insulin produced in animals.

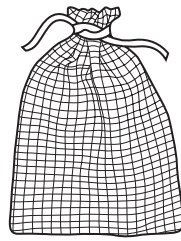
37 Which row identifies the organisms in a food chain?

	producer	herbivore	carnivore
A	rabbit	cat	dog
B	dog	plant	cat
C	plant	dog	rabbit
D	plant	rabbit	dog

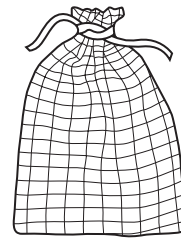
- 38** Some students set up an experiment to study the decay of leaves in garden soil. They put leaves in bags of different mesh sizes, sealed them and then buried them.



mesh size
0.1 mm



mesh size
1.0 mm



mesh size
5.0 mm

Each month for 5 months the bags were dug up and the total percentage loss in mass from the start of the experiment was calculated.

The results are shown.

	total percentage loss in mass				
mesh size /mm	month 1	month 2	month 3	month 4	month 5
0.1	5	11	16	20	31
1.0	13	23	26	42	48
5.0	21	32	36	54	60

What can the students conclude from these results?

- A** Decay is dependent on access to oxygen for the decomposers.
 - B** The larger the mesh size the faster the rate of decay.
 - C** Decay depends on how much water can get to the leaves.
 - D** Nutrients diffuse away from the leaves more easily when mesh size increases.
- 39** Populations of animals are affected by disease, numbers of predators and the supply of food.

Which row would lead to the most growth in population size?

	disease	number of predators	supply of food
A	decrease	increase	increase
B	decrease	decrease	increase
C	increase	decrease	decrease
D	increase	increase	decrease

40 Which human activity has caused most damage to tropical rainforests?

- A** burning fossil fuels
- B** flooding of land
- C** cutting down trees for industrial use
- D** searching for plants that can be used in medicine

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