

Name:		Index Number:		Class:	
-------	--	---------------	--	--------	--



# CATHOLIC HIGH SCHOOL

## Preliminary Examination 3

### Secondary 4

---

## BIOLOGY

**5158/01**

Paper 1 Multiple Choice

**Friday 16 September 2016**

**1 hour**

Additional Materials: Multiple Choice Answer Sheet

---

### READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, index number and class on the Answer Sheet in the spaces provided unless this has been done for you.

**DO NOT** WRITE ON THE MARGINS.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answer **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

For examiner's use only:

Paper 1	/ 40
---------	------

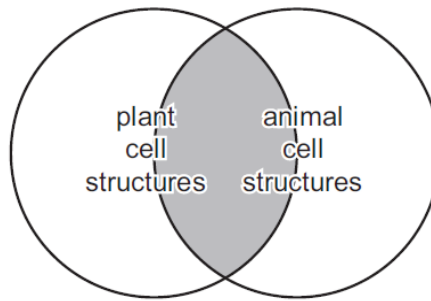
The number of marks is given in brackets [ ] at the end of each question or part question.

---

This paper consists of **15** printed pages.

**[Turn over**

- 1 The shaded area of the diagram represents structures found in both plant and animal cells.



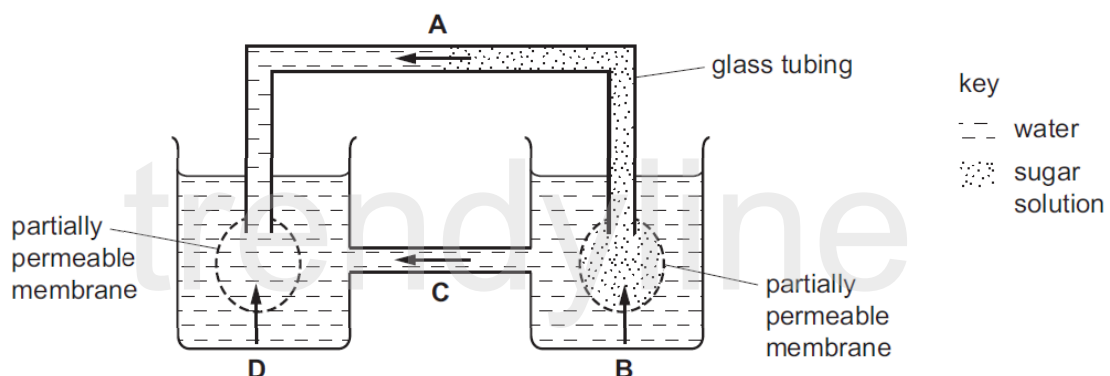
Which cell structure is from the shaded area?

- A** cell membrane  
**B** cell wall  
**C** chloroplast  
**D** large vacuole
- 2 What is the correct order of increasing size of the following structures, from smallest to largest?
- A** chromosome → liver → white blood cell  
**B** chromosome → white blood cell → liver  
**C** liver → chromosome → white blood cell  
**D** white blood cell → liver → chromosome
- 3 Which row describes a root hair cell?

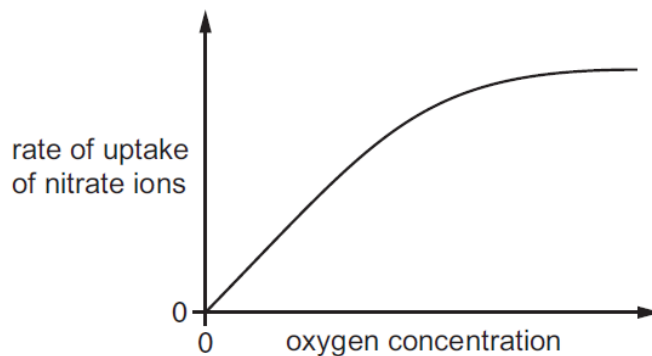
	allows water to pass into the plant	increases the surface area of the root	loses water by transpiration
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✓

- 4 The diagram shows an experiment on osmosis.

Which arrow shows the direction of the net movement of water at the start of the experiment?



- 5 The graph shows the effect of oxygen concentration on the uptake of nitrate ions from the soil into a root hair cell.

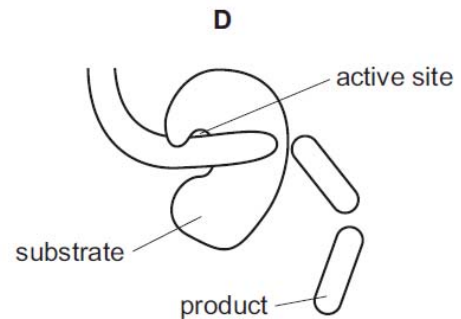
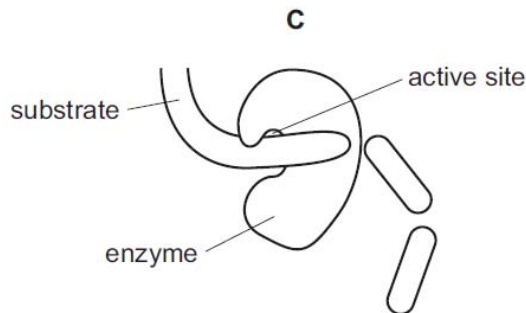
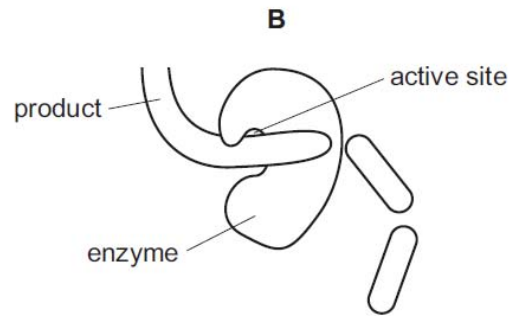
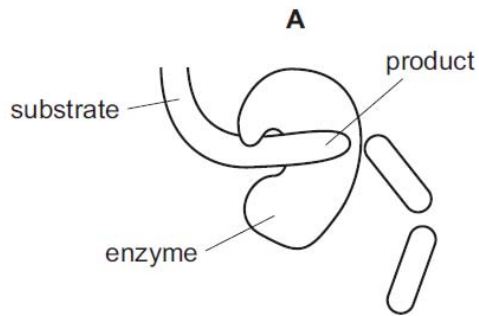


What can be concluded from this information?

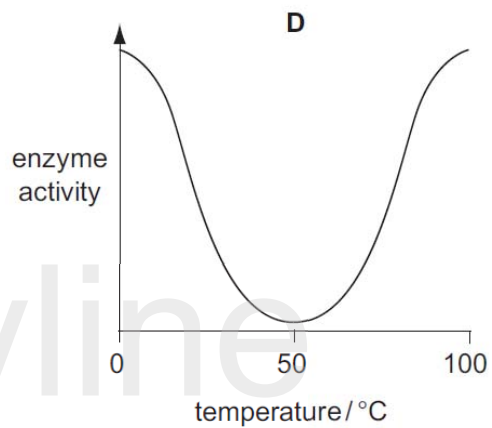
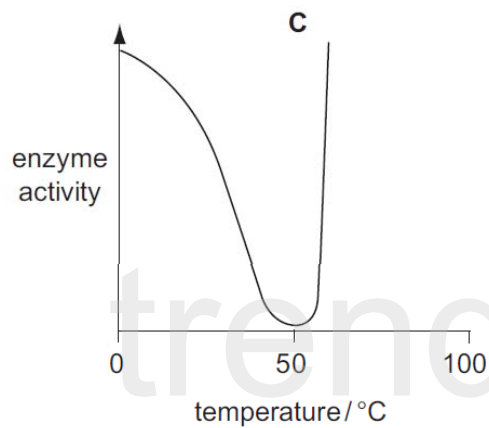
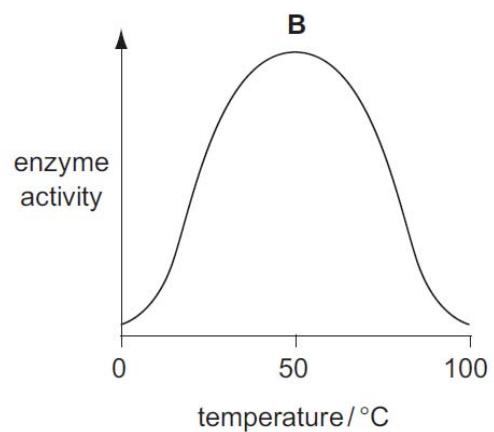
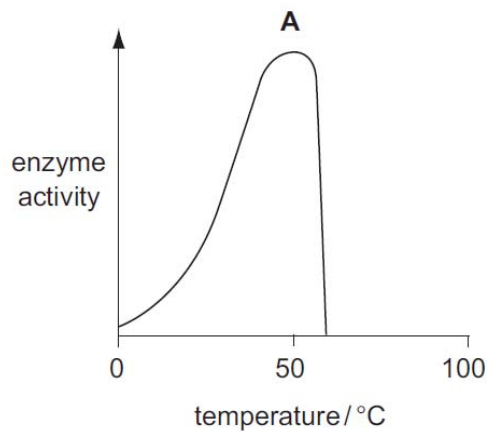
- A** Nitrate ions enter the root hair cell by active transport.  
**B** Nitrate ions enter the root hair cell by osmosis.  
**C** Nitrate ions leave the root hair cell by diffusion.  
**D** Nitrate ions leave the root hair cell in low oxygen concentrations.
- 6 Which biological molecules always contain the element nitrogen?
- A** amino acids, cellulose, DNA  
**B** amino acids, DNA, lipids  
**C** enzymes, plasma proteins, DNA  
**D** membrane proteins, starch, lipids
- 7 Amylase solution is tested with Benedict's solution, biuret solution and iodine solution. Which colours are obtained?

	Benedict's solution	biuret solution	iodine solution
<b>A</b>	blue	blue	blue-black
<b>B</b>	blue	blue	brown
<b>C</b>	blue	purple	brown
<b>D</b>	red	purple	blue-black

- 8 The diagrams show a protease enzyme catalysing the breaking of part of a protein molecule into smaller pieces. Which diagram has three **correct** labels?



- 9 Which graph shows the effect of temperature on the activity of an enzyme?



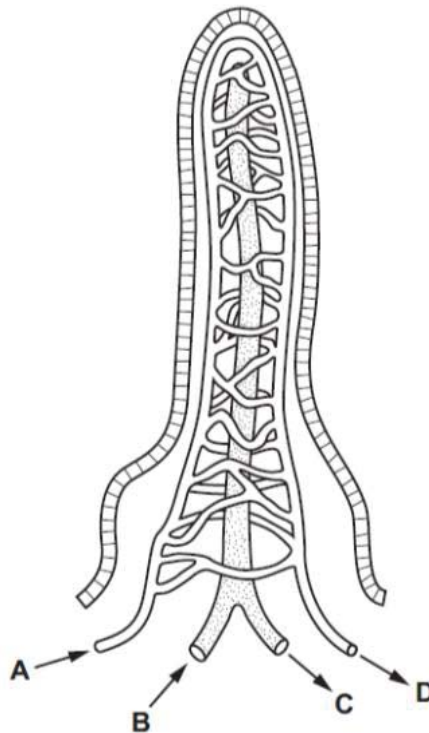
- 10 The diagram shows a fat globule (P) in one part of the alimentary canal and the same globule (Q) as it appears in another part of the alimentary canal.



In which parts of the alimentary canal are P and Q found?

	P	Q
A	duodenum	stomach
B	ileum	oesophagus
C	oesophagus	ileum
D	rectum	ileum

- 11 The diagram shows a villus. The arrows show the direction of flow within vessels associated with the villus. Which vessel carries blood to the liver?



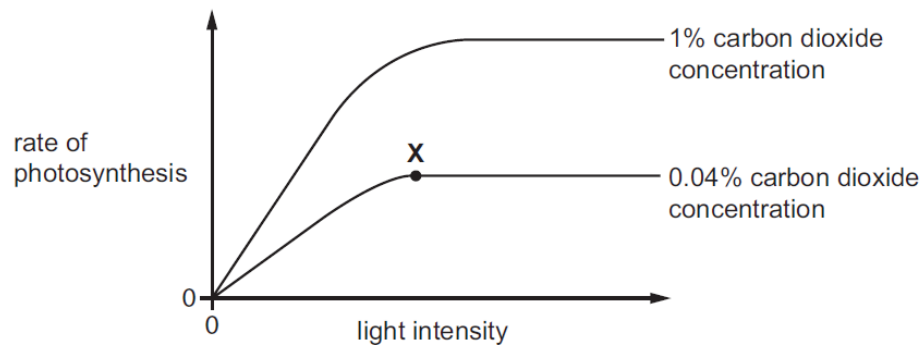
- 12 Which row shows what happens in photosynthesis?

	energy conversion	immediate product of photosynthesis	storage product of photosynthesis
A	chemical energy to light energy	glucose	starch
B	chemical energy to light energy	starch	glucose
C	light energy to chemical energy	glucose	starch
D	light energy to chemical energy	starch	glucose

- 13 For the stomata of a leaf to open, the guard cells accumulate more potassium ions than the surrounding cells. Which row describes what happens?

	movement of potassium ions	movement of water in relation to guard cells	final state of the guard cells
<b>A</b>	active transport	in	turgid
<b>B</b>	active transport	out	flaccid
<b>C</b>	diffusion	in	plasmolysed
<b>D</b>	diffusion	out	no change

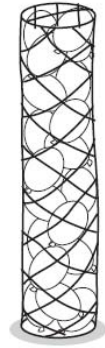
- 14 The graph shows how the rate of photosynthesis of a plant varies with light intensity at two different carbon dioxide concentrations. The temperature is kept constant at 20°C.



Which factor is limiting the rate of photosynthesis at point X?

- A** availability of chlorophyll
- B** availability of water
- C** concentration of carbon dioxide
- D** intensity of light

- 15** The diagrams show a cylindrical net packed with rubber balloons full of air. The structure is used by a teacher to explain wilting.



all the balloons  
fully inflated



the same number of balloons  
with some of the air let out

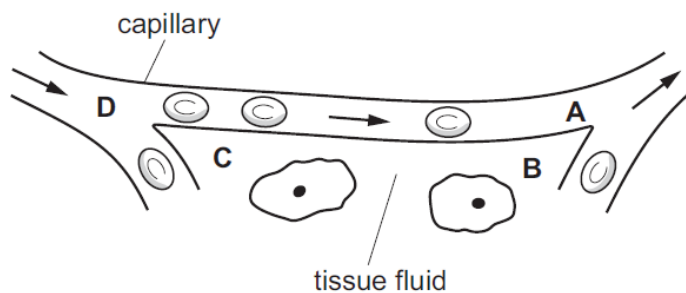
What is represented by the parts of the structure shown?

	air	balloons	net	rubber
<b>A</b>	cells	cell sap	cell walls	epidermis
<b>B</b>	cell sap	cells	epidermis	cell walls
<b>C</b>	cell walls	epidermis	cell sap	cells
<b>D</b>	epidermis	cell walls	cells	cell sap

- 16** Which feature is a leaf adaptation for living in the desert?

- A** large size
- B** many stomata
- C** rolled along its length
- D** thin waxy cuticle

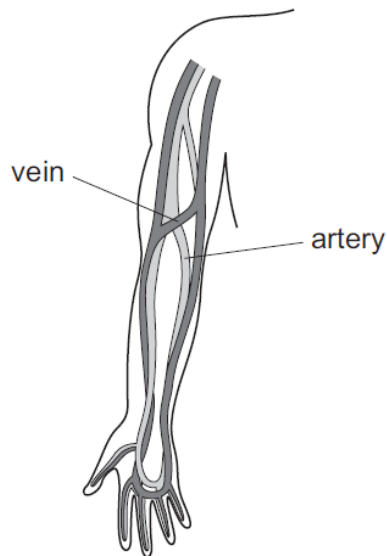
- 17** The diagram shows the movement of blood through a tissue.



At which labelled point is the pressure highest?

trendyline

- 18 The diagram shows arteries and veins in the human forearm.

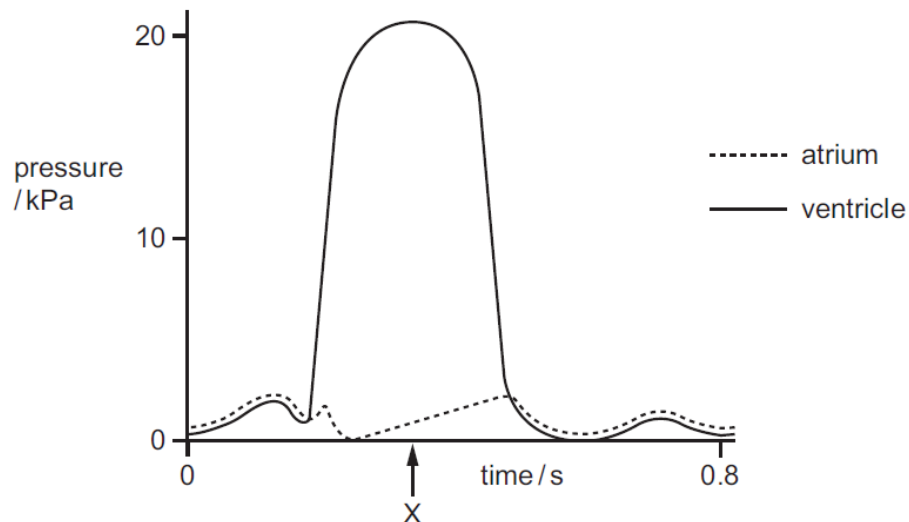


Which statements apply to a vein in the human forearm?

	carries oxygenated blood	has valves	blood is returning to the heart
<b>A</b>	✓	✓	✗
<b>B</b>	✓	✗	✗
<b>C</b>	✗	✓	✓
<b>D</b>	✗	✗	✓

key  
✓ = yes  
✗ = no

- 19 The graph shows pressure changes in the left atrium and in the left ventricle during one heartbeat.



What is the state of the valves in the heart at time X?

	left atrio-ventricular valve (bicuspid)	semi-lunar valve (in aorta)
<b>A</b>	closed	closed
<b>B</b>	closed	open
<b>C</b>	open	closed
<b>D</b>	open	open



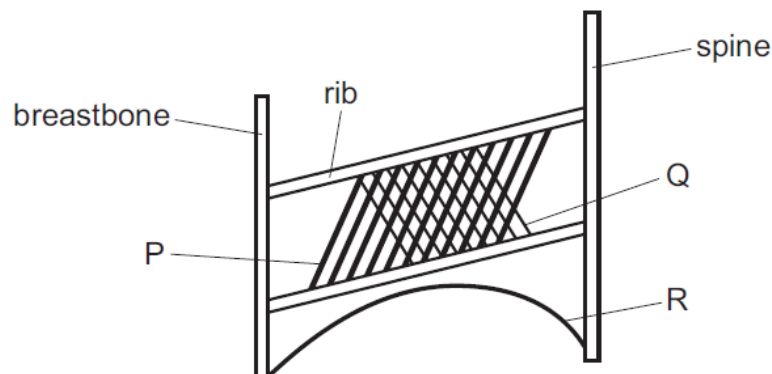
**20** Some factors associated with coronary heart disease are listed.

- 1 high blood pressure
- 2 high intake of fruit and vegetables
- 3 high intake of saturated fats
- 4 low blood cholesterol
- 5 low intake of processed foods

Which factors decrease the risk of coronary heart disease?

- A** 1, 2 and 3      **B** 1, 3 and 5      **C** 2, 3 and 4      **D** 2, 4 and 5

**21** The diagram represents some of the muscles involved with breathing.



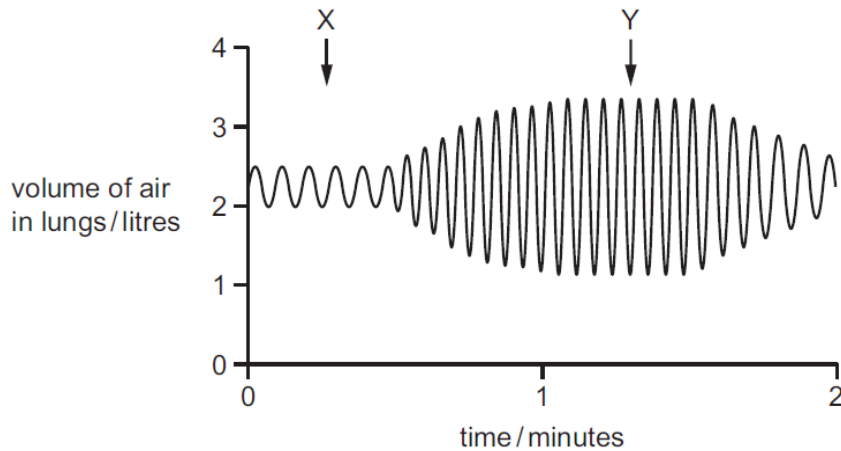
Which muscles are contracting during breathing in?

- A** P and Q      **B** Q and R      **C** P and R      **D** P, Q and R

**22** What helps oxygen to be absorbed rapidly into the blood in the lungs?

- A** Air breathed in has less oxygen than air breathed out.  
**B** Alveoli have thick walls and a large surface area.  
**C** Alveoli have thin walls and a large surface area.  
**D** The concentration of oxygen in the blood is higher than in the alveoli.

- 23** The diagram shows changes in the volume of a person's lungs over a period of two minutes.

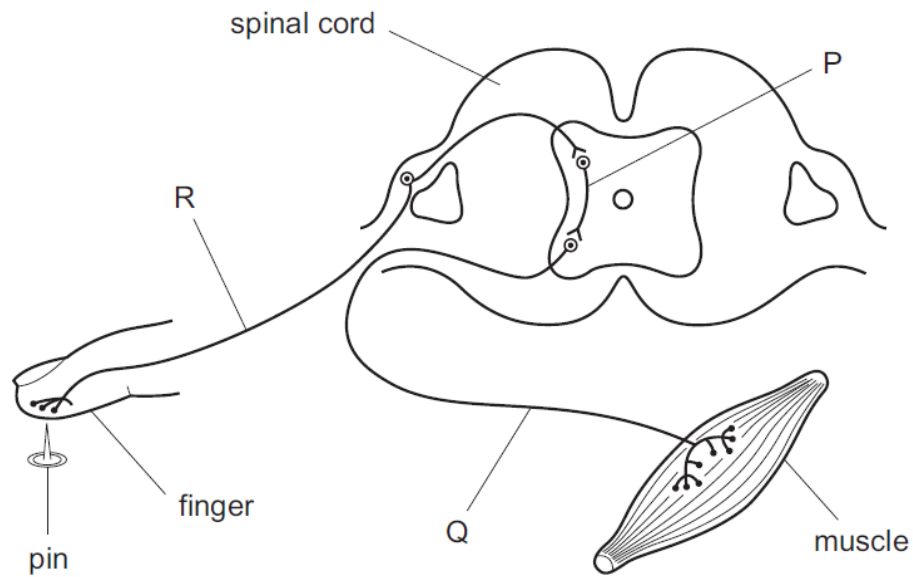


What could cause the change in the pattern of the graph between points X and Y?

- A** changing from running to walking
  - B** changing from walking to running
  - C** increased frequency of contractions of the internal intercostal muscles
  - D** increased strength of contractions of the internal intercostal muscles
- 24** During a sunny day, which substance is excreted from a leaf?
- A** carbon dioxide
  - B** nitrogen
  - C** oxygen
  - D** sucrose
- 25** Which process is **not** a result of negative feedback?
- A** A decrease in the surrounding temperature leads to a decrease in respiration rate.
  - B** A decrease in the surrounding temperature leads to a decrease in sweating.
  - C** A decrease in the surrounding temperature leads to a decrease in blood flow through the skin surface.
  - D** A decrease in the surrounding temperature leads to shivering.

trendyline

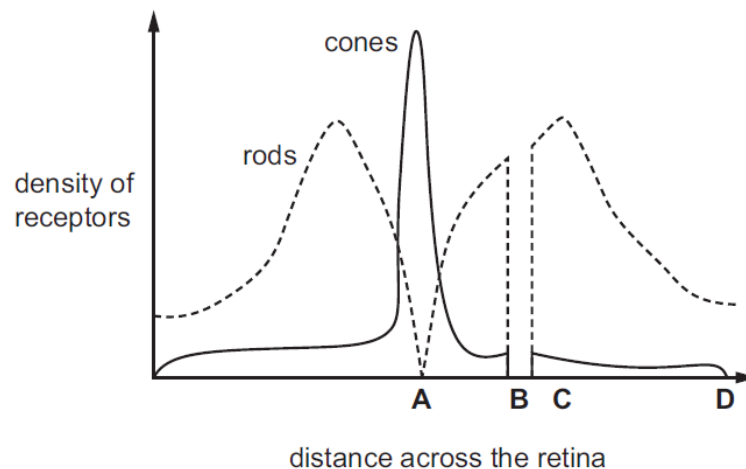
- 26 The diagram represents a simple reflex arc.



What is the sequence of nerve cells through which an impulse passes during a reflex action?

	first		last
<b>A</b>	P	Q	R
<b>B</b>	Q	R	P
<b>C</b>	Q	P	R
<b>D</b>	R	P	Q

- 27 The diagram shows the density of rods and cones across a horizontal section of the retina.



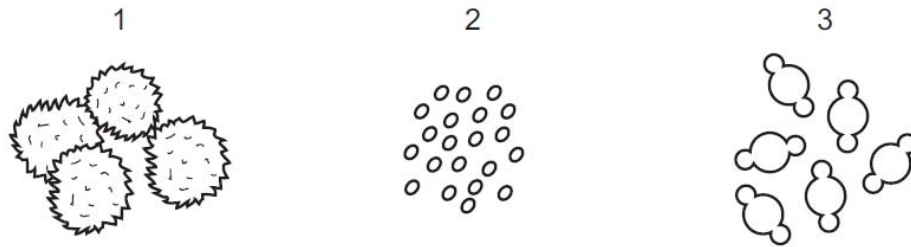
What is the position of the optic nerve?

trendyline

**28** What is **not** an effect of the hormone adrenaline?

- A** decreased production of sweat
- B** dilated pupils
- C** increased blood glucose
- D** increased pulse rate

**29** The diagrams show pollen grains from three different species of plant as they appear under the microscope. The diagrams are all to the same scale.



Which pollen grains are involved in insect-pollination?

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

**30** Where does the placenta allow the exchange of materials to take place between mother and fetus?

- A** oviduct wall
- B** umbilical cord
- C** uterus wall
- D** vagina wall

**31** When a cell divides, these events occur.

- 1 The DNA inside the cell is duplicated exactly.
- 2 Daughter cells are produced with the same chromosome number as the parent cell.

Which type of division has occurred?

- A** meiosis producing genetically different cells
- B** meiosis producing genetically identical cells
- C** mitosis producing genetically different cells
- D** mitosis producing genetically identical cells

trendyline

- 32 Two black female mice were mated with the same black male. One female had nine offspring, all of which were black. The other female had six black and two white offspring.

Which cross represents the parents of the all black family?

	female	male
<b>A</b>	bb	Bb
<b>B</b>	Bb	Bb
<b>C</b>	Bb	BB
<b>D</b>	BB	Bb

key  
B = allele for black  
b = allele for white

- 33 The whole of an island's population of short-haired bumblebees is descended from just two parents. These were introduced from the mainland.

Which statement about the island's short-haired bumblebee population, compared with that of the mainland, is **correct**?

- A** The population is less in danger of collapsing from disease.
- B** The population is more able to adapt to environmental changes.
- C** The population shows more genetic variety.
- D** The population will adapt to environmental changes more slowly.

- 34 Which statement is evidence that genes are copied and passed on to the next generation?

- A** Asexual reproduction produces genetically identical offspring.
- B** Different alleles of a gene can produce variation in phenotype.
- C** Each species of a plant or animal has a fixed number of chromosomes.
- D** Sexual reproduction produces genetically different offspring.

- 35 Which statements describe an allele?

	an alternative form of a gene	copied during cell division	part of a DNA molecule
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✓

key  
✓ = yes  
✗ = no

trendyline

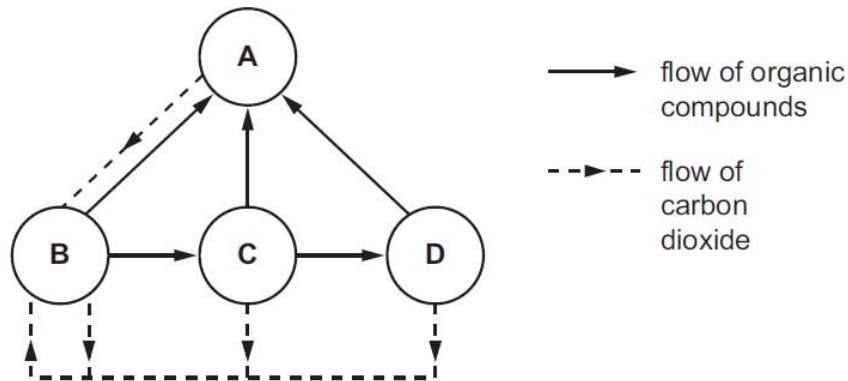
- 36 The diagram shows the order of bases along part of one strand of DNA.

A—C—T—T—A—G—A—T

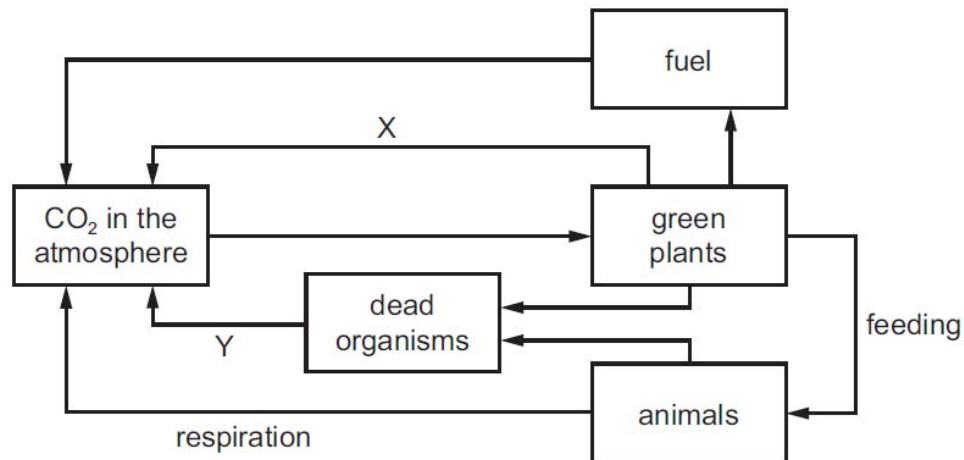
What is the order of bases on the corresponding part of the other strand?

- A** A—C—T—T—A—G—A—T  
**B** C—A—G—G—C—T—C—G  
**C** T—A—G—A—T—T—C—A  
**D** T—G—A—A—T—C—T—A

- 37 The diagram shows the flow of substances within an ecosystem. The circles represent trophic levels. Which circle represents herbivores?



- 38 The diagram shows part of the carbon cycle.



What are the processes X and Y?

	X	Y
<b>A</b>	photosynthesis	decomposition
<b>B</b>	photosynthesis	excretion
<b>C</b>	respiration	photosynthesis
<b>D</b>	respiration	respiration

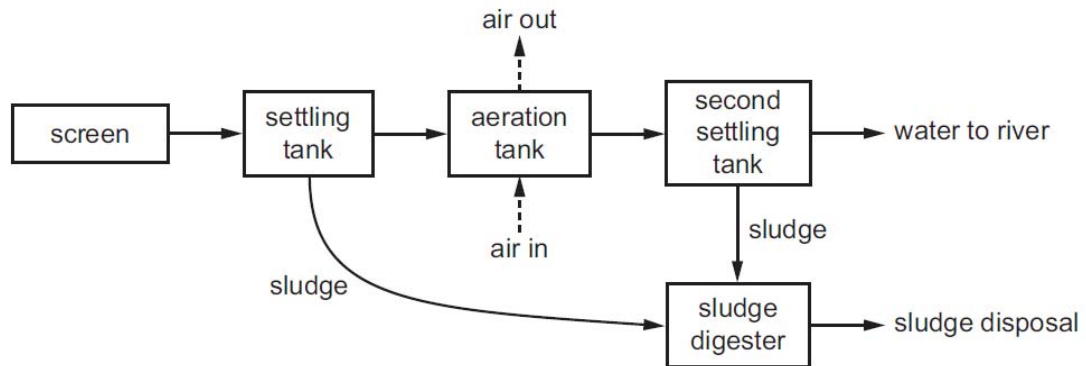
- 39** A farmer is growing wheat in a field. The farmer uses insecticides to kill insect pests and chemicals to kill weeds in the field.

Which statements about this field are **correct**?

- 1 Both the wheat and the weeds are producers.
- 2 Insects feed at the first trophic level.
- 3 Weeds may use light, water and mineral ions that the wheat plants need.

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

- 40** The diagram shows how sewage is treated.



Why is air bubbled through the aeration tank?

- A** to encourage microorganisms to reproduce quickly  
**B** to float the sludge  
**C** to settle the sludge  
**D** to stop microorganisms from reproducing too quickly

- The End -

trendyline