SL Paper 1

What is the purpose of pulmonary surfactant?

A. Promotes capillary growth
B. Decreases surface tension
C. Adheres alveoli and capillaries
D. Stretches the inside surface of the alveoli

Which feature increases the absorption of glucose in the small intestine?

A. Villi
B. Lacteal
C. Cilia
D. Goblet cells

Celiac disease causes the destruction of the villi cells. Which of the following is most likely to happen to people with celiac disease?

A. Incomplete digestion of fats
B. Poor absorption of calcium
C. Increased levels of glucose in blood
D. Damage in the esophagus caused by increase in acid content of the stomach

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What changes take place in the thorax during inhalation?

	External Intercostal Muscles	Pressure
A.	contract	increases
B.	contract	decreases
C.	relax	increases
D.	relax	decreases

What are two effects of HIV on the immune system?

A. Reduction in antibody production and increase in active lymphocytes
B. Increase in antibody production and decrease in red blood cells
C. Reduction in antibody production and decrease in active lymphocytes
D. Increase in antibody production and increase in red blood cells

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Colonic irrigation involves regularly flushing the large intestine with water. Why should this practice be avoided?

A. The large intestine absorbs water.

B. Vitamin-producing bacteria are eliminated.

C. It will stimulate the production of toxins.

D. Undigested remains of food are removed.

Which words from the table below complete the sentence correctly?

In the pancreas, ____I__ *secrete glucagon*, *which* ____II____ *blood glucose levels*.

	I	II
A.	α cells	raises
B.	β cells	raises
C.	α cells	lowers
D.	β cells	lowers

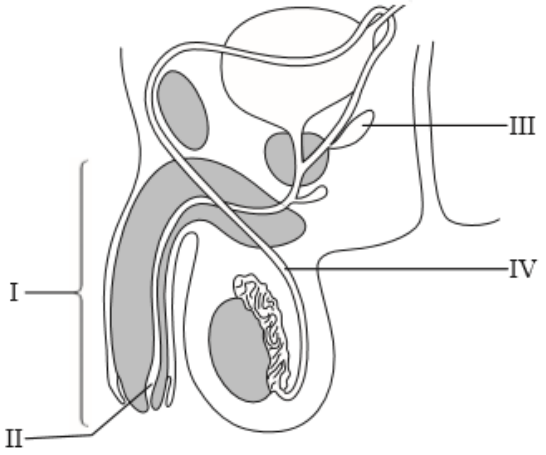
Which statement describes the movements of the rib cage during inhalation of air?

A. External intercostal muscles contract moving the ribs up and outwards.
B. Internal intercostal muscles contract moving the ribs down and inwards.
C. External intercostal muscles relax moving ribs down and inwards.
D. Internal intercostal muscles relax moving ribs up and outwards.

What are functions of the stomach, small intestine and large intestine?

	Stomach	Small intestine	Large intestine
A.	digest proteins	absorb glucose	absorb water
B.	digest starch	digest proteins	digest lipids
C.	digest proteins	assimilate glucose	excrete cellulose
D.	assimilate alcohol	digest starch	absorb water

What structures are indicated on the diagram?



	I	II	III	IV
A.	penis	urethra	seminal vesicles	sperm duct
B.	erectile tissue	ureter	prostate	sperm duct
C.	penis	sperm duct	prostate	seminal vesicles
D.	penis	urethra	sperm duct	seminal vesicles

Which of the following statements about antibodies is correct?

A. Antibodies are polypeptides.
B. Antibodies are produced by the bone marrow.
C. Antibodies are pathogenic foreign substances.
D. Antibodies kill bacteria but not viruses.

What is the position of heart valves when blood pressure is highest in the aorta?

	Atrioventricular valves	Semilunar valves
A.	open	closed
B.	closed	open
C.	closed	closed
D.	open	open

Which term describes a molecule capable of triggering an immune response?

A. Antibody
B. Antigen
C. Pathogen
D. Antibiotic

What is placed into the uterus after the process of *in vitro* fertilization (IVF)?

A. Eggs
B. Sperm
C. Embryos
D. Fetuses

Which of the following are controlled by homeostasis?

I. Blood pH
II. Water balance
III. Blood glucose concentration

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

What is dissolved in blood plasma?

A. carbon dioxide, erythrocytes and platelets

B. amino acids, glucose and urea

C. carbon dioxide, oxygen and heat

D. glycogen, antibodies and urea

Which element or ion is required for transmission of a nerve impulse?

A. Phosphorous
B. Sodium
C. Sulfur
D. Iron

Which vessel carries deoxygenated blood from the heart to the lungs?

A. Vena cava

B. Coronary vein

C. Pulmonary artery

D. Pulmonary vein

Which hormone triggers ovulation?

A. FSH
B. Testosterone
C. Progesterone
D. LH

What is a function of LH (luteinizing hormone)?

A. It stimulates the release of an egg from the follicle.
B. It stimulates the development of corpus luteum into a follicle.
C. It causes an increase in the production of estrogen by the follicle.
D. It causes a decrease in the production of progesterone by the follicle.

What route does blood follow to supply oxygen to heart muscle?

A. pulmonary vein → left atrium → left ventricle → aorta → coronary artery

B. pulmonary vein → right atrium → right ventricle → aorta → coronary artery

C. pulmonary artery → left atrium → left ventricle → aorta → coronary artery

D. pulmonary artery → right atrium → right ventricle → aorta → coronary artery

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What is a consequence of AIDS?

A. Excess production of lymphocytes to help fight disease
B. Excess erythrocytes in capillaries
C. Loss of ability to produce antibodies
D. Loss of ability to produce antigens

Why are antibiotics effective against pathogenic bacteria?

A. Bacteria have a high rate of mutation

B. Bacterial cell processes are blocked

C. Bacteria have a slow metabolism

D. Bacteria assimilate antibiotics

What causes heart ventricles to fill with blood?

I. Atrial contraction

II. Closing of atrioventricular valves

III. Opening of semilunar valves

A. I only

B. I and II only

C. II and III only

D. III only

In which blood vessel connected to the heart does blood have the lowest carbon dioxide concentration?

A. Pulmonary vein

B. Vena cava

C. Pulmonary artery

D. Coronary vein

Between which structures do sensory neurons carry nerve impulses?

A. From effectors to the central nervous system (CNS)
B. From effectors to receptors
C. From receptors to effectors
D. From receptors to the central nervous system (CNS)

Which event directly leads to an action potential?

A. Fusion of vesicles with the pre-synaptic membrane
B. Diffusion of neurotransmitter across the synaptic cleft
C. Membrane potential reaches the threshold potential
D. Breakdown of the neurotransmitter

What helps to keep blood flowing onwards away from the heart in an artery?

A. Valves

B. Elastic fibres

C. Contraction of skeletal muscles

D. Having a wide lumen

What can protect the body from blood loss?

A. Antibodies

B. Fibrin

C. Histamines

D. Hemophilia

Which conditions are correct for inspiration?

	Muscles contracted	Pressure in thorax
A.	external intercostal	decreases
B.	internal intercostal	increases
C.	diaphragm	increases
D.	abdominal	decreases

Which hormone inhibits appetite?

A. Epinephrine

B. Leptin

C. Thyroxin

D. Glucagon

Which vessel directly supplies the heart muscle with blood?

A. The aorta
B. The pulmonary artery
C. The coronary artery
D. The pulmonary vein

What is the main method of transport of monosaccharides such as fructose across the intestinal epithelium?

A. Osmosis
B. Facilitated diffusion
C. Endocytosis
D. Active transport

What is a feature of the left atrium?

A. Epinephrine decreases its rate of contraction.

B. It contracts as the left ventricle contracts.

C. It receives blood from the left pulmonary artery.

D. Its pressure decreases as the left ventricle fills up.

Which of the following is/are a role of testosterone in males?

I. Pre-natal development of male genitalia
II. Maintenance of sex drive
III. Increase in mental development

A. II only
B. I and II only
C. II and III only
D. I, II and III

How does the hypothalamus respond to a very high body temperature?

A. Increases muscle contraction

B. Stops receiving sensory input

C. Causes dilation of skin arterioles

D. Slows the heart rate

Where does gas exchange occur in the lungs?

A. In type I pneumocytes

B. In the bronchioles

C. In the veins surrounding the alveoli

D. In the surfactants

What is a correct pathway for blood flowing through the heart?

A. right atrium, tricuspid valve, right ventricle, aorta
B. left atrium, tricuspid valve, left ventricle, pulmonary artery
C. right atrium, tricuspid valve, right ventricle, pulmonary artery
D. left atrium, left ventricle, bicuspid valve, aorta

How does the body respond to an increase in body temperature?

I. Vasoconstriction of skin arterioles

II. Shivering

III. Vasodilation of skin arterioles

A. I only
B. I and II only
C. II and III only
D. III only

Between which structures do sensory neurons carry nerve impulses?

A. From receptors to muscles
B. From effectors to the central nervous system (CNS)
C. From the central nervous system (CNS) to receptors
D. From receptors to the central nervous system (CNS)

How is epinephrine (adrenaline) carried to the pacemaker of the heart and what effect does it have on heartbeat rate?

	Epinephrine carried to the pacemaker	Effect of epinephrine on heartbeat rate
A.	in the bloodstream	increases it
B.	in the bloodstream	decreases it
C.	by nerves	increases it
D.	by nerves	decreases it

What is an important function of the lacteal in the villus?

A. Secretion of mucus
B. Secretion of enzymes
C. Transport of glucose
D. Transport of fats

LH causes the rupture of a follicle and release of an egg cell. What is this process called?

A. Conception
B. Fertilization
C. Menstruation
D. Ovulation

What normally prevents the membranes of the alveoli from sticking together during expiration?

A. The thickness of the single-cell layer of alveoli membranes
B. The secretion of fluids in the inner surface of the alveoli
C. The pressure within the thoracic cavity
D. The dense net of capillaries covering the alveoli

Why are antibiotics effective against bacteria?

A. They can produce specific antibodies.
B. They can engulf foreign matter.
C. They can block specific metabolic pathways.
D. They can act as a vaccine.

What role does the medulla of the brain have in controlling heart rate?

A. To secrete adrenaline to speed up the heart.

B. To stimulate myogenic heart muscle contraction.

C. To block pacemaker activity.

D. To adjust heart rate to changing blood pressure.

Which hormone controls circadian rhythms?

A. Thyroxin
B. Melatonin
C. Leptin
D. Glucagon

If schizophrenia is caused by an overabundance of the neurotransmitters dopamine and serotonin in the synapses of some areas of the brain, which drug action could work in treating the symptoms?

A. Release of cholinesterase into the synaptic cleft

B. Increased re-uptake of dopamine and serotonin by presynaptic neurons

C. Increased permeability of the presynaptic neuron to sodium

D. Blockage of dopamine and serotonin receptors on presynaptic neurons

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What is a similarity between arteries and capillaries?

A. They both have elastic tissue.
B. They both have smooth muscle cells.
C. Neither has collagen fibres in their walls.
D. Neither has valves.

Why is penicillin **not** used in the treatment of human immunodeficiency virus (HIV)?

A. HIV patients may be allergic to penicillin.
B. Penicillin does not affect viruses.
C. Penicillin affects helper T-cell metabolism.
D. Penicillin causes antibiotic resistance.

What is the state of the atrio-ventricular and semilunar valves when the left ventricle contracts?

	Atrio-ventricular valves	Semilunar valves
A.	open	closed
B.	open	open
C.	closed	closed
D.	closed	open

What is a role of the hypothalamus in homeostasis?

A. Monitoring body temperature

B. Monitoring blood glucose concentration

C. Secretion of glucagon

D. Secretion of sweat

What is a role of the coronary arteries?

A. To supply information about blood temperature to the hypothalamus

B. To supply the heart muscle with oxygen and nutrients

C. To carry blood away from the heart

D. To monitor blood pH

What are features of the enzyme amylase?

	Substrate	Source	Optimum pH
A.	starch	salivary glands	7
B.	lignin	pancreas	1.5
C.	cellulose	liver	4
D.	glycogen	kidney	9

What feature of alveoli adapts them to efficient gas exchange?

A. They have muscles which pump air in and out regularly.
B. Their membranes are more permeable to gases than water.
C. A constant blood supply flows through them.
D. A dense network of capillaries surrounds them.

What is a characteristic of antigens?

A. They recognize foreign substances

B. They are produced in bone marrow

C. They cause disease in humans

D. They stimulate the production of antibodies

What is a characteristic of type II diabetes?

A. Insufficient insulin

B. Insulin insensitivity

C. Excess glucagon

D. Low white blood cell count

What changes occur in the thorax of a mammal when the external intercostal muscles and diaphragm muscles contract?

A. Pressure increases and volume decreases.
B. Pressure and volume both increase.
C. Pressure and volume both decrease.
D. Pressure decreases and volume increases.

Which of the following is a characteristic of type I but **not** type II diabetes?

A. β cells in the pancreas are destroyed.
B. Insulin injections are required.
C. α cells in the pancreas are destroyed.
D. Sugar intake control is required.

Which hormone promotes the thickening of the endometrium and also inhibits the hormone that promotes the development of the follicle wall into the corpus luteum?

A. LH

B. Progesterone

C. FSH

D. Estrogen

During expiration, how does air pressure in the lungs compare with atmospheric pressure?

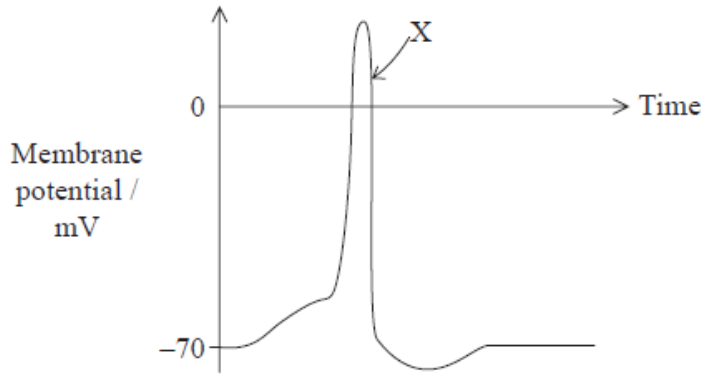
A. Lung air pressure is greater than atmospheric pressure.

B. Lung air pressure is less than atmospheric pressure.

C. Lung air pressure starts below atmospheric pressure and rises above it.

D. Lung air pressure starts above atmospheric pressure and falls below it.

The graph below shows changes in membrane potential in an axon during the passage of an action potential. What is causing the decrease in membrane potential at point X?



A. Sodium ions entering the axon
B. Potassium ions entering the axon
C. Sodium ions leaving the axon

D. Potassium ions leaving the axon

Which is a negative feedback mechanism in the menstrual cycle?

A. Follicle stimulating hormone inhibits estrogen
B. Estrogen inhibits luteinizing hormone
C. Estrogen inhibits follicle stimulating hormone
D. Progesterone inhibits estrogen

When the left ventricle is relaxed, what is the state of the valves?

	Atrioventricular valve	Semilunar valve
A.	closed	closed
B.	closed	open
C.	open	closed
D.	open	open

What change occurs to the pressure and volume of the lungs when the external intercostal muscles contract?

A. Both pressure and volume increase.

B. Pressure increases and volume decreases.

C. Pressure decreases and volume increases.

D. Both pressure and volume decrease.

What stimulates the production of antibodies?

A. AIDS

B. Antibiotics

C. Anticodons

D. Antigens

Which is a long-term effect of the human immunodeficiency virus (HIV) on the immune system?

A. Fewer bacterial infections

B. Fewer active lymphocytes

C. More antibody production

D. More antigen recognition

What happens when human body temperature rises during exercise?

A. The arterioles move closer to the skin.

B. The hypothalamus decreases cell respiration.

C. The skin capillaries close up.

D. The water from sweat evaporates to cool the body.

What is an effect of the HIV virus on the immune system?

A. Reduction of the number of phagocytes
B. Reduction of the number of lymphocytes
C. Increase in the ability to form antibodies
D. Decrease in the ability to produce antigens

How can knowledge about the pineal gland function be applied?

A. To restore sleep time by the use of melatonin
B. To trigger ovulation during an IVF treatment
C. To reduce sperm production in male contraception
D. To regulate blood sugar in type I diabetes

What happens to the external and internal intercostal muscles and diaphragm when inhaling?

	External intercostal muscles	Internal intercostal muscles	Diaphragm
A.	relax	relax	relaxes
B.	contract	relax	relaxes
C.	relax	contract	contracts
D.	contract	relax	contracts

A structure has a thin epithelium of one cell layer and contains a lacteal and blood capillaries. It has protein channels and mitochondria to aid absorption. What is this structure?

A. Alveolus
B. Gastric gland
C. Pancreas
D. Villus

What characterizes type I diabetes?

A. It can be controlled by diet alone.

B. Risk factors such as obesity increase its frequency.

C. The alpha cells of the pancreas are destroyed, usually during adulthood.

D. The beta cells of the pancreas are destroyed, usually during childhood.

What is the body’s response to low blood glucose levels?

A. Alpha cells in the pancreas secrete glucagon

B. Beta cells in the pancreas secrete insulin

C. Alpha cells in the pancreas secrete insulin

D. Beta cells in the pancreas secrete glucagon

Pancreatic gland cells produce and secrete large amounts of digestive enzymes. Which organelles would you expect to be present in higher than normal amounts in such cells?

A. Free ribosomes and Golgi apparatus
B. Rough endoplasmic reticulum and lysosomes
C. Rough endoplasmic reticulum and Golgi apparatus
D. Free ribosomes and lysosomes

Neurotransmitters are released into the synaptic cleft from the presynaptic neuron and travel to a receptor on the postsynaptic neuron membrane. Which processes are required for this to happen?

	Release into synaptic cleft	Travel to postsynaptic neuron membrane
A.	exocytosis	diffusion
B.	active transport	diffusion
C.	exocytosis	active transport
D.	active transport	active transport

Is the blood in the aorta, left ventricle and pulmonary artery oxygenated or deoxygenated?

	Aorta	Left ventricle	Pulmonary artery
A.	oxygenated	deoxygenated	deoxygenated
B.	deoxygenated	oxygenated	oxygenated
C.	oxygenated	oxygenated	deoxygenated
D.	oxygenated	oxygenated	oxygenated

Which of the following is correct for lipase?

	Substrate	Source	pH optimum
A.	triglycerides	pancreas	pH = 7
B.	fatty acids	small intestine	pH = 7
C.	triglycerides	small intestine	pH = 9
D.	fatty acids	pancreas	pH = 9

What is the sequence of operations during IVF treatment?

A. egg collection → FSH injections → fertilization

B. egg collection → fertilization → FSH injections

C. FSH injections → egg collection → fertilization

D. FSH injections → fertilization → egg collection

Which is the correct statement concerning HIV and AIDS?

A. All HIV patients have AIDS.

B. HIV and AIDS are transmitted on the sex chromosomes.

C. All AIDS patients have HIV.

D. HIV and AIDS neutralize antibodies.

What structures in the small intestine transport most fats?

A. Collecting ducts

B. Capillaries

C. Veins

D. Lacteals

Where do motor neurons conduct impulses from and to?

A. From effectors to the central nervous system.

B. From receptors to the central nervous system.

C. From neurons to other neurons.

D. From the central nervous system to effectors.

Oral contraceptives taken by women contain the hormone progesterone. How does this prevent pregnancy?

A. It stops menstruation.
B. It inhibits the secretion of FSH.
C. It blocks the fallopian tubes (oviducts).
D. It stimulates the production of estrogen.

What are increasing levels of progesterone responsible for during the female menstrual cycle?

A. Stimulating ovulation

B. Development of the follicle

C. Thickening of the endometrium

D. Menstruation

Which two hormones promote thickening of the endometrium?

A. FSH and LH

B. Estrogen and FSH

C. LH and estrogen

D. Progesterone and estrogen

Which of the following features of the alveoli adapt them to gaseous exchange?

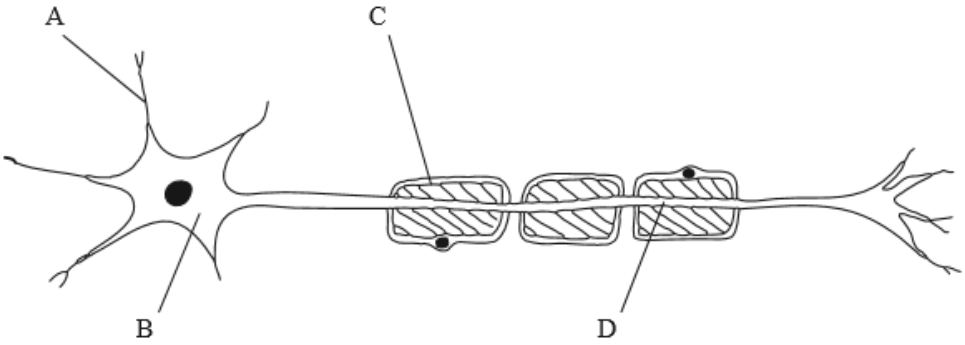
I. Single layer of cells
II. Film of moisture
III. Dense network of capillaries

A. I and II only
B. II only
C. II and III only
D. I, II and III

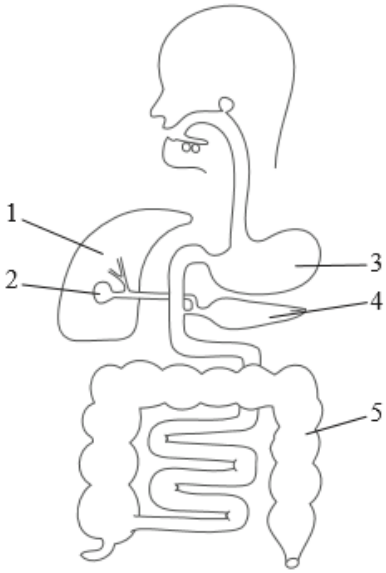
Which is a process occurring in the small intestine?

	Substrate	Digesting enzyme	Final product absorbed
A.	fatty acids	lipase from the liver	glycerol
B.	nucleic acids	endopeptidase from the pancreas	nucleotides
C.	maltose	glucagon from α cells of the pancreas	glucose
D.	starch	amylase from the pancreas	glucose

On the diagram of the motor neurone shown below, which label identifies a dendrite?



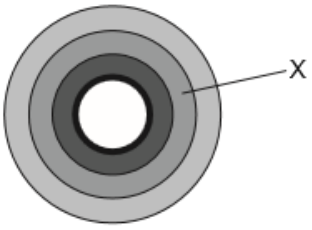
Questions 9 and 10 refer to the following diagram of the human digestive system.



Which organs are associated with the transformation of glucose into glycogen?

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

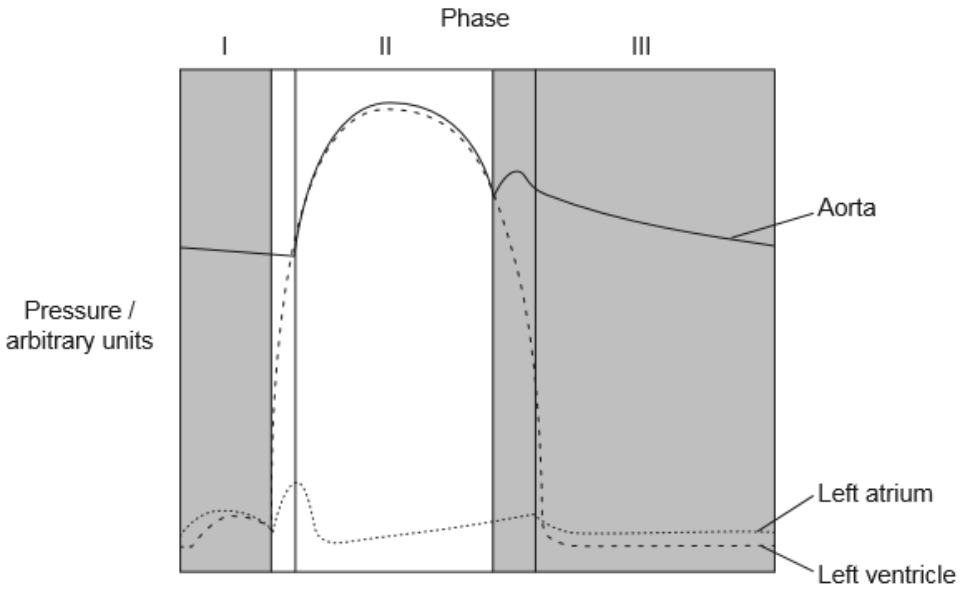
The diagram shows the layers of the tissues in a transverse section of the human small intestine.



Which is the layer labelled with the letter X?

A. Mucosa
B. Circular muscle
C. Epithelium
D. Longitudinal muscle

The diagram shows changes of pressure during the cardiac cycle.



[Source: adapted from G J Tortora, J Parent, S Reynolds, (1994), *Principes d'anatomie et de physiologie*, Centre Éducatif et Culturel, Montréal, page 640]

Which is an explanation of the processes happening?

A. During phase I, pressure in the left ventricle decreases while it increases in the aorta during contraction of the left atrium.
B. In phase II, pressure rises in the aorta because the left ventricle is contracting.
C. In phase III, pressure decreases in the aorta because the left atrium is relaxing.
D. In phase III, there is a constant increase of pressure in the aorta as both left atrium and ventricle are at rest.

What is the name and source of the hormone that regulates basal metabolic rate?

	Name	Source
A.	ADH	kidneys
B.	melatonin	pineal gland
C.	thyroxin	thyroid gland
D.	glucagon	pancreas

What is the correct sequence of events used in IVF?

A. collection of oocytes and sperms → stimulation of ovarian follicles → incubation of oocytes and sperms → implantation

B. stimulation of ovarian follicles → collection of oocytes and sperms → incubation of oocytes and sperms → implantation

C. stimulation of ovarian follicles → incubation of oocytes and sperms → collection of oocytes and sperms → implantation

D. collection of oocytes and sperms → incubation of oocytes and sperms → stimulation of ovarian follicles → implantation

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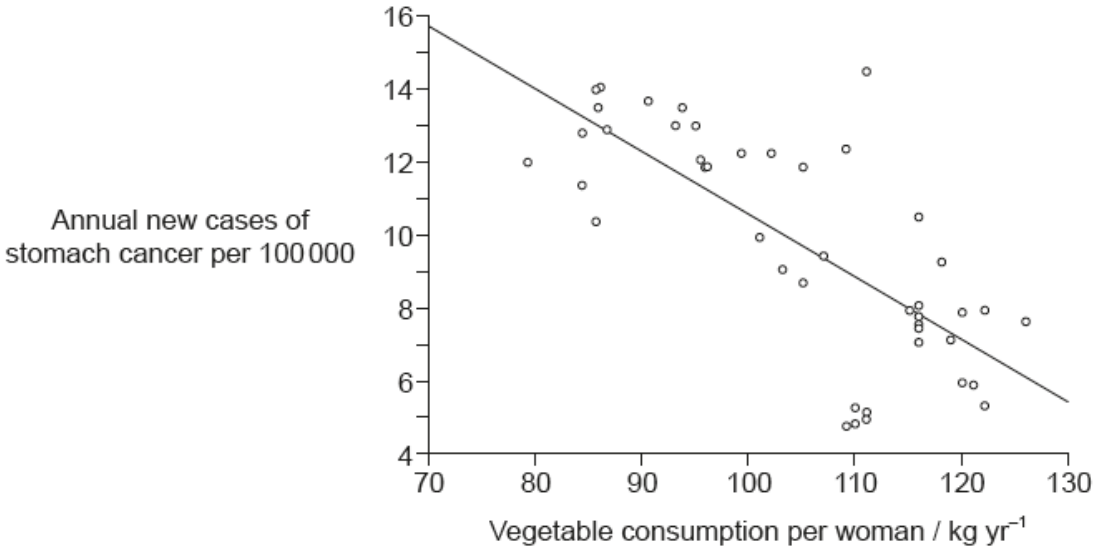
The graph shows a correlation between the number of new cases of stomach cancer and vegetable consumption for women in Poland.



[Source: "Impact of diet on long-term decline in gastric cancer incidence in Poland", Miroslaw Jarosz, Wlodzimierz Sekula, Ewa Rychlik and Katarzyna Figurska. *World J Gastroenterol*, **17**(1): 89–97. Figure 4. Published online 2011 January 07. doi:10.3748/wjg.v17.i1.89.]

What can be stated from the graph?
A. Vegetable consumption causes stomach cancer
B. 68 % of the data are gathered around the trend line
C. Causality cannot be stated from the graph alone
D. Only that the correlation is positive

What are causes of type I and type II diabetes?

	Type I	Type II
A.	autoimmune disease leading to reduced insulin secretion	decreased responsiveness of the body to insulin
B.	decreased responsiveness of the body to insulin	autoimmune disease leading to reduced insulin secretion
C.	increased responsiveness of the body to insulin	autoimmune disease leading to increased insulin secretion
D.	autoimmune disease leading to increased insulin secretion	increased responsiveness of the body to insulin

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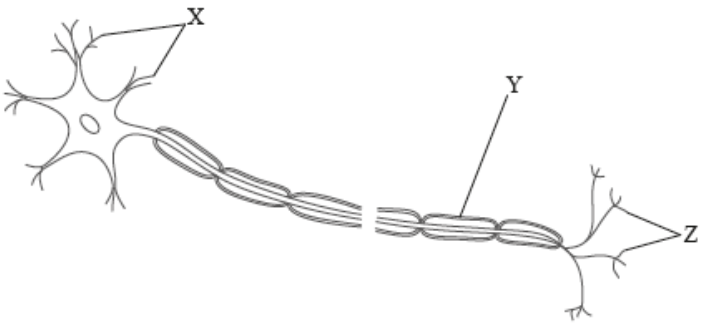
The diagram below shows a motor neuron.

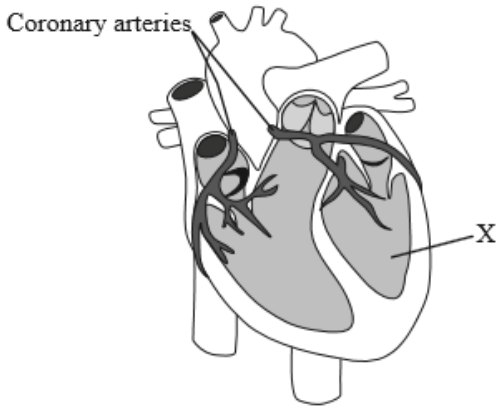


[Source: International Baccalaureate Organization 2014]

What are the structures indicated by X, Y and Z?

	X	Y	Z
A.	motor end plates	myelin sheath	dendrites
B.	dendrites	cell body	motor end plates
C.	dendrites	myelin sheath	motor end plates
D.	motor end plates	cell body	dendrites

This question refers to the following diagram of the heart.



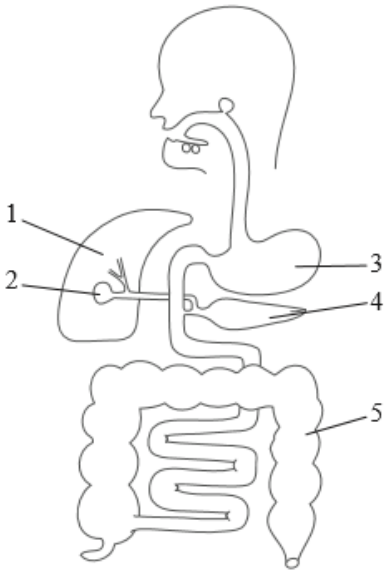
What is the structure labelled X?

A. Right ventricle
B. Right atrium
C. Left atrium
D. Left ventricle

What processes occur during assimilation and absorption of lipids?

	Assimilation	Absorption
A.	lipids are broken down by enzymes	lipids are egested
B.	lipids are incorporated into new membranes	lipids pass into the lacteal
C.	lipids pass into the lacteal	lipids are incorporated into new membranes
D.	lipids are egested	lipids are broken down by enzymes

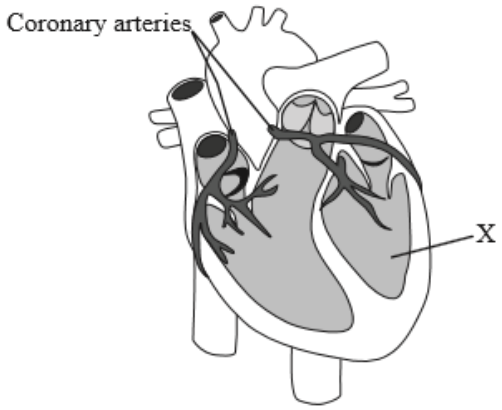
Questions 9 and 10 refer to the following diagram of the human digestive system.



Which structure produces lipase?

A. 1
B. 2
C. 4
D. 5

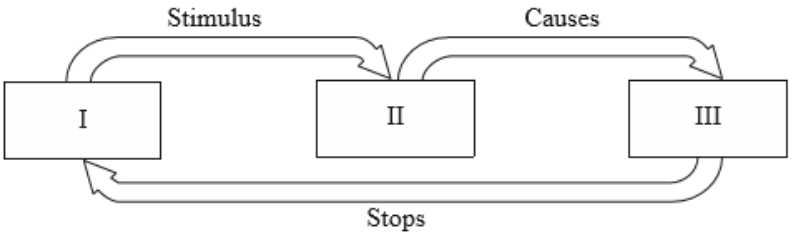
This question refers to the following diagram of the heart.



What is a role of the coronary arteries?

A. To transport oxygen from the lungs directly to the heart muscle
B. To remove deoxygenated blood from the heart muscle
C. To supply the heart muscle with nutrients
D. To remove cholesterol from the heart muscle

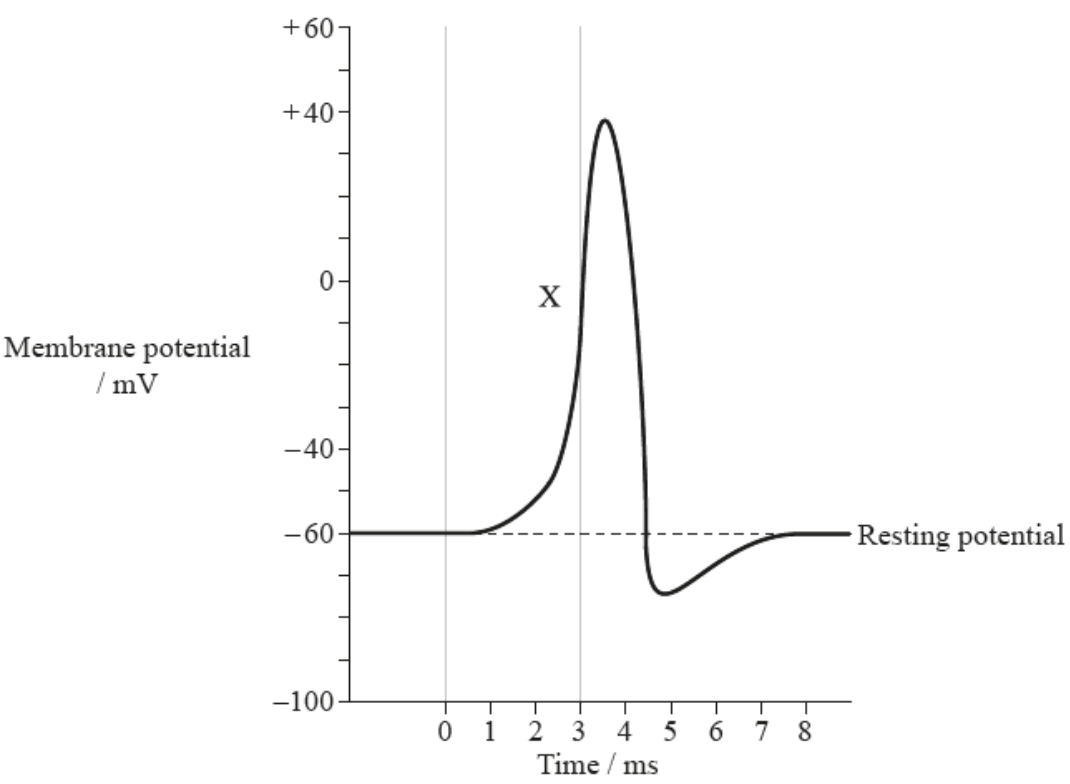
The diagram shows a feedback pathway.



Which sequence is an example of the pathway?

	I	II	III
A.	high blood sugar	alpha cells	secretion of insulin
B.	low blood sugar	alpha cells	secretion of glucagon
C.	high blood sugar	beta cells	secretion of glucagon
D.	low blood sugar	beta cells	secretion of insulin

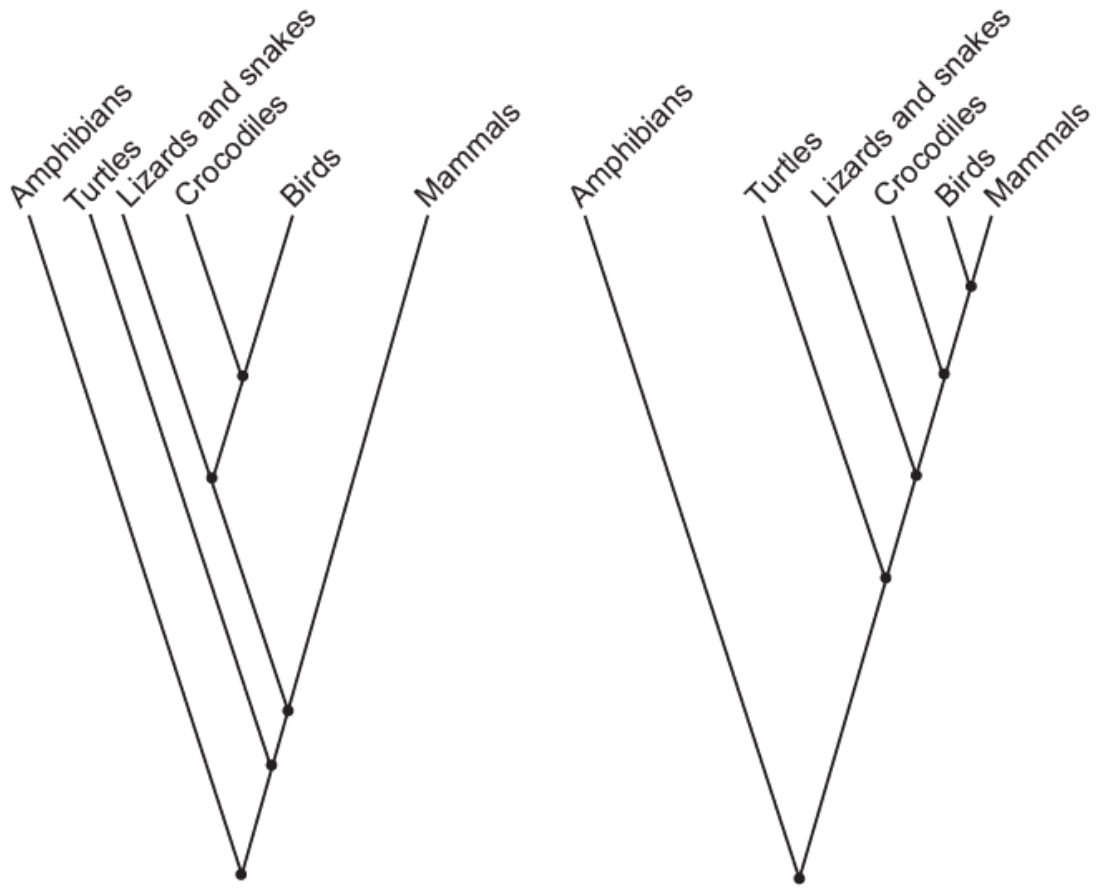
The diagram below shows the changes in membrane potential during an action potential.



What best describes events indicated by the label X?

A.	sodium ions diffuse out of the neuron	the inside of the neuron becomes more negative
B.	potassium ions diffuse out of the neuron	the inside of the neuron becomes more negative
C.	potassium ions diffuse into the neuron	the inside of the neuron becomes more positive
D.	sodium ions diffuse into the neuron	the inside of the neuron becomes more positive

Cladograms can be created by comparing DNA or protein sequences. The cladogram on the left is based on DNA sequences and the cladogram on the right is based on comparing protein sequences.



What is the reason that cladograms based on DNA sequences are more reliable predictors of the phylogenetic relationship of species than cladograms based on protein sequences?

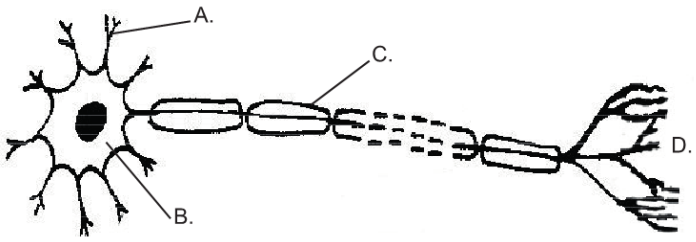
A. Amino acids are not as chemically stable as DNA nucleotides.

B. DNA mutates but amino acids do not.

C. Several different triplets of bases can code for the same amino acid.

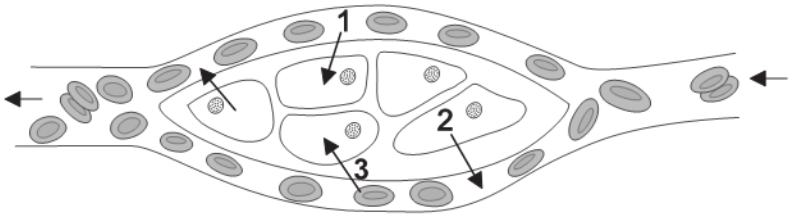
D. There are 20 different amino acids but only 4 nucleotides.

Which structure in the motor neuron is required for saltatory conduction?



[Source: https://commons.wikimedia.org/wiki/File:Anatomy_and_physiology_of_animals_Motor_neuron.jpg] (https://commons.wikimedia.org/wiki/File:Anatomy_and_physiology_of_animals_Motor_neuron.jpg])

The diagram shows red blood cells and undifferentiated tissue cells.

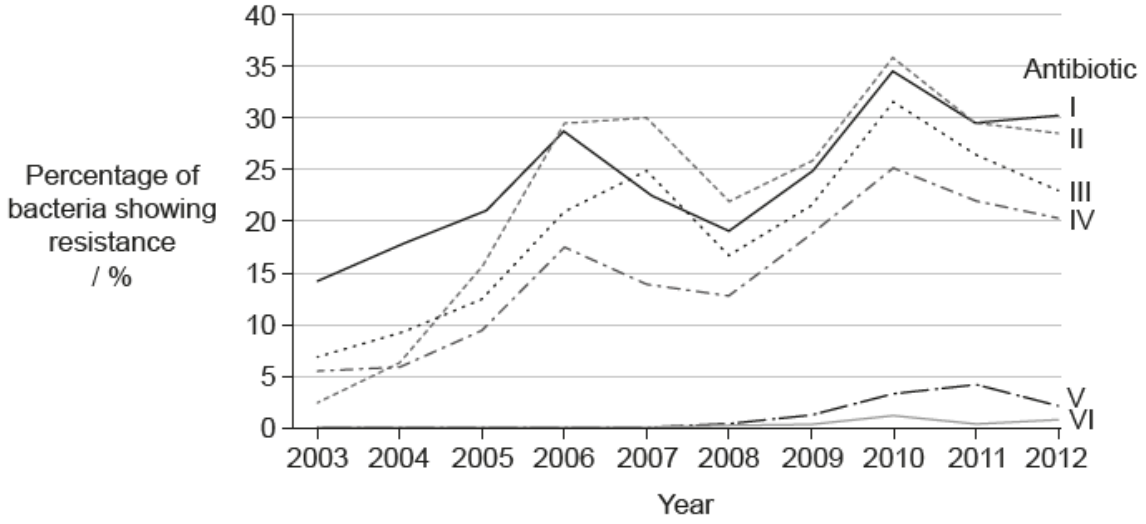


[Source: © International Baccalaureate Organization 2017]

Diffusion of oxygen from blood cells to tissue cells is represented by arrow 3 in the diagram.
What molecules are shown diffusing by arrow 1 and arrow 2?

	Arrow 1	Arrow 2
A.	carbon dioxide	urea
B.	water	glucose
C.	glucose	carbon dioxide
D.	fatty acids	amino acids

The bacterium *Neisseria gonorrhoeae* causes infections related to the human reproductive system. The graph shows the percentage of samples in which this bacterium showed resistance to six antibiotics over a period of ten years.



[Source: © All rights reserved. National Surveillance of Antimicrobial Susceptibilities of *Neisseria gonorrhoeae* Annual Summary 2012. Public Health Agency of Canada, 2012. Translated, adapted and reproduced with permission from the Minister of Health, 2017.]

What is a possible explanation for the total percentage resistance being larger than 100% in 2010?

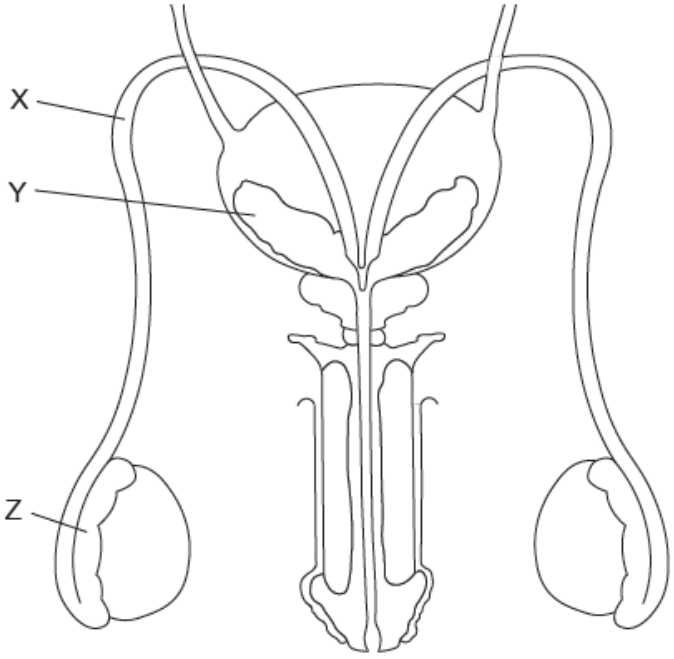
A. People do not take the antibiotics as prescribed.

B. More people have been sampled in that year.

C. There was an epidemic of *Neisseria gonorrhoeae* in that year.

D. Some bacteria are resistant to more than one antibiotic.

The diagram shows the male reproductive organs in front view.

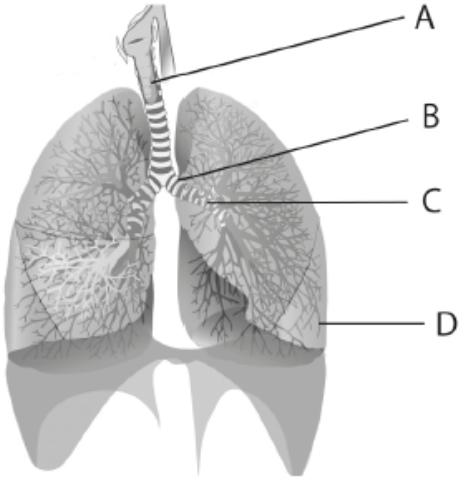


[Source: Generic diagram]

Which structures are indicated by the letters X, Y and Z?

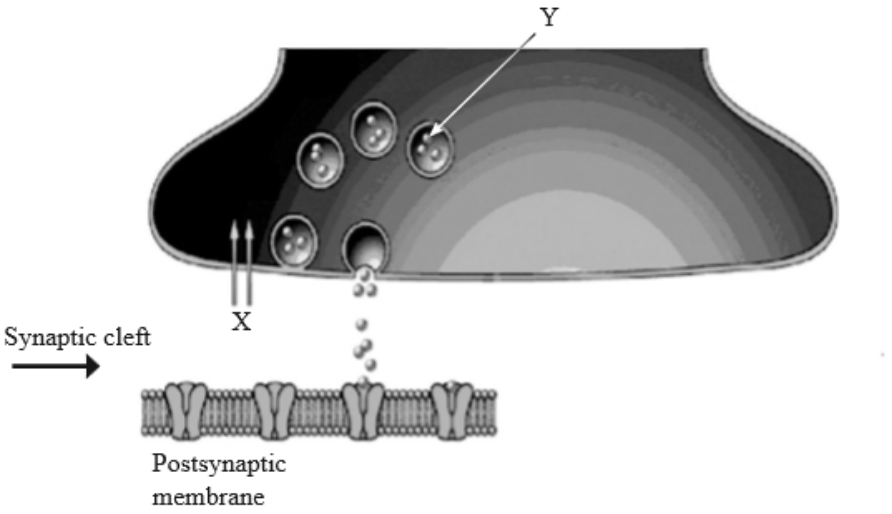
	X	Y	Z
A.	Sperm duct	Seminal vesicle	Epididymis
B.	Urethra	Prostate gland	Sperm duct
C.	Sperm duct	Prostate gland	Epididymis
D.	Urethra	Seminal vesicle	Sperm duct

The image shows a section of the human respiratory system. Which letter identifies a bronchiole?



[Source: "Respiratory system complete no labels" by Bibi Saint-Pol – en.wikipedia.org/wiki/File:Respiratory_system_complete_en.svg. Licensed under CC BY-SA 3.0 via Wikimedia Commons – https://commons.wikimedia.org/wiki/File:Respiratory_system_complete_no_labels.svg#/media/File:Respiratory_system_complete_no_labels.svg]

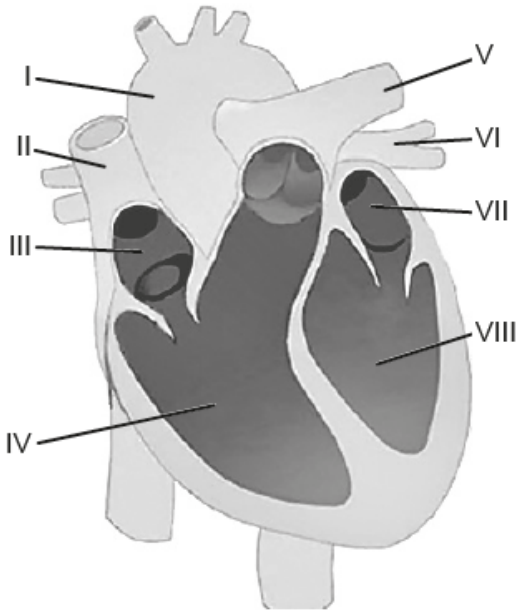
In the diagram of synaptic transmission below, what is indicated by the letters X and Y?



[Source: adapted from http://aids.hallym.ac.kr/d/kns/tutor/medical/01premed2/chapter45/nt092.gif]

	X	Y
A.	neurotransmitter enters synaptic knob	Ca^{2+} ions
B.	Ca^{2+} ions diffuse into the synaptic knob	neurotransmitter
C.	K^{+} ions diffuse into the synaptic knob	neurotransmitter
D.	Na^{+} ions diffuse into the synaptic knob	Ca^{2+} ions

The diagram shows the human heart.



[Source: Reprinted by permission from Macmillan Publishers Ltd: *Nature*, 406, Bu *et al*., page 116, copyright (2009).]

Which shows the sequence of blood flow in the heart?

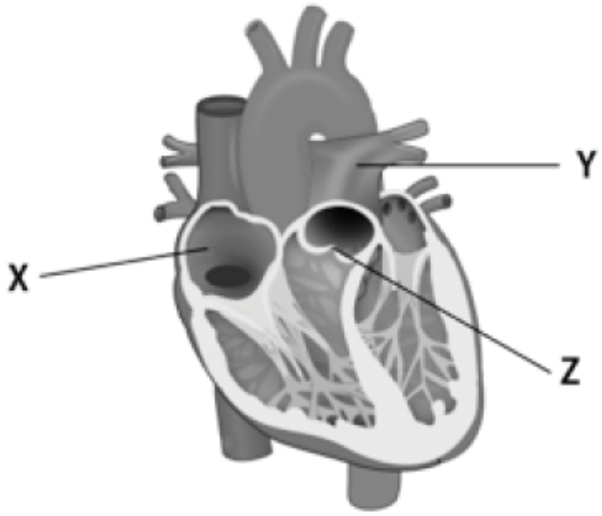
A. III IV I

B. IV III II

C. VII VIII I

D. VIII VII VI

The diagram below shows the human heart.

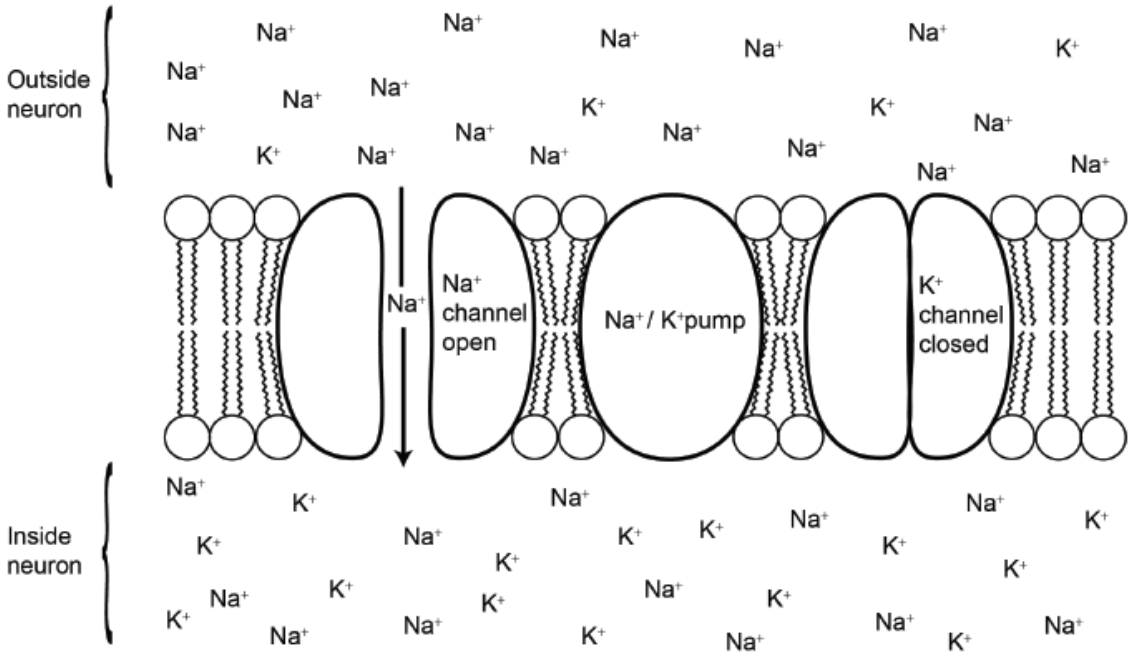


[Source: © International Baccalaureate Organization 2014]

What structures are indicated by the labels X, Y and Z?

	X	Y	Z
A.	semilunar valve	pulmonary artery	right atrium
B.	right atrium	semilunar valve	pulmonary artery
C.	right atrium	pulmonary artery	semilunar valve
D.	pulmonary artery	right atrium	semilunar valve

The diagram below shows part of the membrane of a neuron. What stage of the action potential does it depict?



[Source : © International Baccalaureate Organization, 2017]

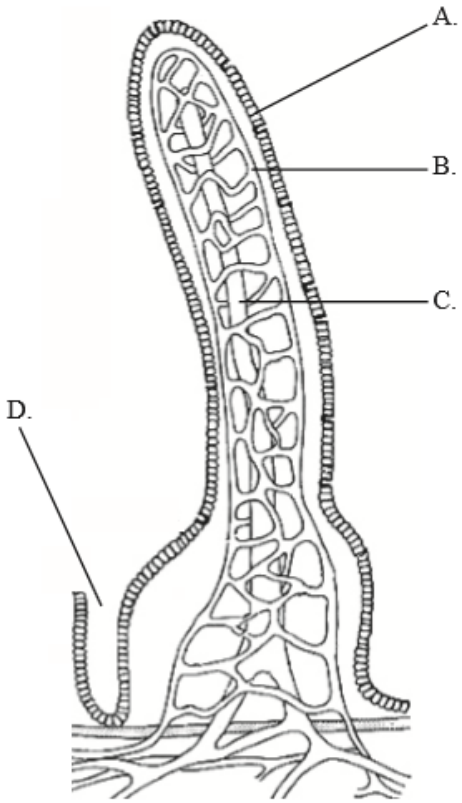
A. Depolarization

B. Repolarization

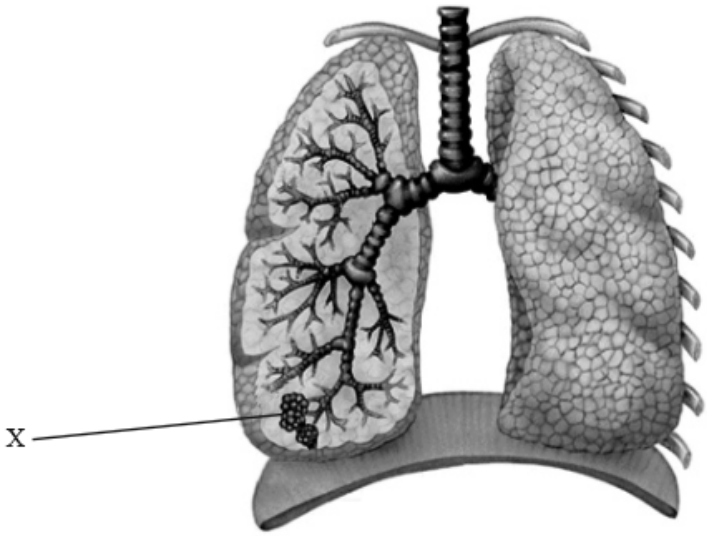
C. Resting potential

D. Hyperpolarization

Which label represents the lacteal?



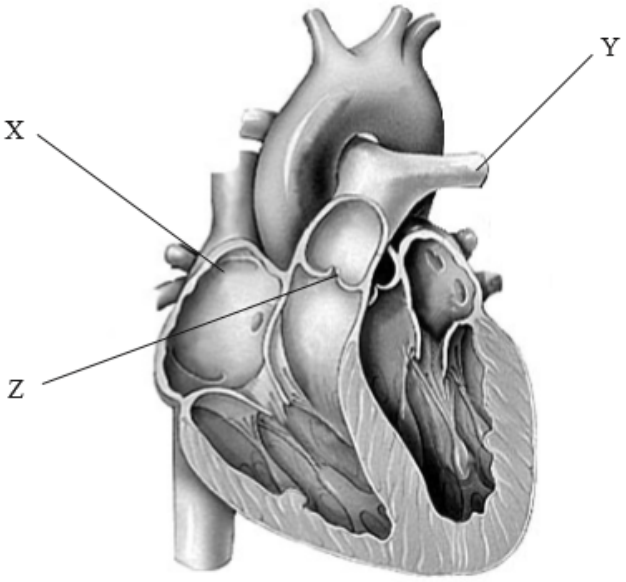
What is the function of the structure labelled X?



[Source: adapted from http://www.medicalook.com/systems_images/lungs.gif]

A. Gas exchange
B. Ventilation
C. Respiration
D. Inspiration

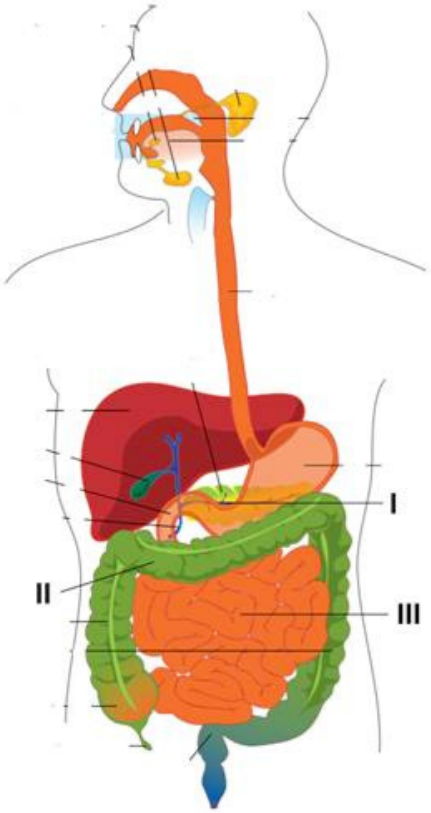
The diagram below shows the human heart. What structures are indicated by the labels X, Y and Z?



[Source: adapted from: http://whyfiles.org/102spareparts/images/heart2.gif]

	X	Y	Z
A.	left atrium	aorta	semi-lunar valve
B.	left atrium	aorta	atrio-ventricular valve
C.	right atrium	pulmonary artery	atrio-ventricular valve
D.	right atrium	pulmonary artery	semi-lunar valve

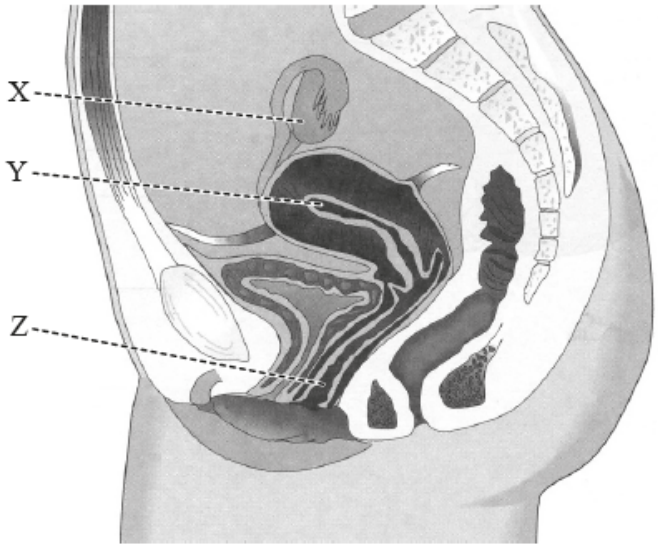
The diagram below shows the human digestive system.



In which parts of the digestive system are most water and glucose absorbed?

	Water	Glucose
A.	II	I
B.	II	III
C.	III	II
D.	III	III

The diagram below shows the female reproductive system.



[Source: © International Baccalaureate Organization 2014]

What are the structures indicated by X, Y and Z?

	X	Y	Z
A.	oviduct	cervix	vagina
B.	ovary	uterus	vagina
C.	oviduct	bladder	cervix
D.	ovary	uterus	cervix