



EMIRATES SCHOOLS
ESTABLISHMENT



BIOLOGY END OF TERM2 REVISION

GRADE 9 ADVANCE -INSPIRE



**MLEIH Cycle 3 Girls School ,ABU DHABI
2023-2024**

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Cycle 3 Biology**

Examiners Year	2023/2024
العام الدراسي	
Term	2
الفصل	
Subject	Biology/Immunology
المادة	البيولوجيا / المناعة
Grade	9
الصف	
Stream	Advanced
النوع	المتقدم
Number of MCQ	20
عدد الأسئلة المتعددة الخيارات	
Marks of MCQ	8
درجة الأسئلة المتعددة الخيارات	
Type of All Questions	MCQ's
نوع الأسئلة	الأسئلة المتعددة الخيارات
Maximum Overall Grade	100
الدرجة القصوى الإجمالية	
Exam Duration	120 minutes
مدة الامتحان	
Mode of Implementation	Paper-Based
طريقة التطبيق	
Calculator	Not Allowed
المحاسبة	غير مسموحة

Question/	Learning Outcomes/Performance Objectives/	Reference(s) in the Student Book	
		Example/Exemplar	Page
السؤال/	المخرجات التعليمية/مخرجات الأداء/	مثال/نموذج	الصفحة
الأسئلة المتعددة الخيارات MCQ's	1	Identify the direction that impulses travel through a neuron	132
	2	Differentiate between the central nervous system (CNS) and the peripheral nervous system (PNS) in terms of associated structures	Figure 10 140
	3	Identify the different sensory structures and their corresponding sensory receptors and stimuli	146
	4	Identify the nephron as the functional unit of the kidney, to include its anatomy and function in waste excretion	174
	5	Identify the anatomy of the ear and function	Figure 15 146
	6	Identify the anatomy of the eye and function	Figure 16 147
	7	Differentiate between the types of sensory receptors in the skin (temperature, pressure, pain)	Figure 16 147
	8	Explain the main structure and function of the excretory system	173
	9	Identify the anatomy of the kidney	Figure 18 174
	10	Compare and contrast, using visuals, the two different types of hormone actions: Steroid hormones and amino acid hormones	193
	11	Identify the major glands of the endocrine system and their related hormones	Figure 20 200
	12	Describe the three types of neurons (sensory, motor, and interneurons) and their involvement in the reflex arc	133
	13	Explain how a nerve impulse is transmitted through the neuron and through the synapse between the three types of neurons	Figure 8 134
	14	Differentiate between the two types of sensory receptors in the eye (rods and cones)	147
	15	Compare and contrast, using visuals, the two different types of hormone actions: Steroid hormones and amino acid hormones	Figure 15 193
	16	Identify the anatomy of the ear and function	146
	17	Differentiate between the central nervous system (CNS) and the peripheral nervous system (PNS) in terms of associated structures and functions	142
	18	Identify the anatomy of the kidney	Figure 18 174
	19	Explain how negative feedback is important in maintaining homeostasis	Figure 18 198
	20	Identify the major glands of the endocrine system and their related hormones	199
* As it appears in the textbook, IBL, and (Main_P)			

9 ADVANCE BIOLOGY TERM 2 EXAM CONTENT

☐ Unit6 /Module 23

NERVOUS SYSTEM

Lesson 1: Structure of nervous system

Lesson 2: Organization of nervous system

Lesson 3: The Senses

Lesson 4: Effect of Drugs

☐ Unit6 /Module 24

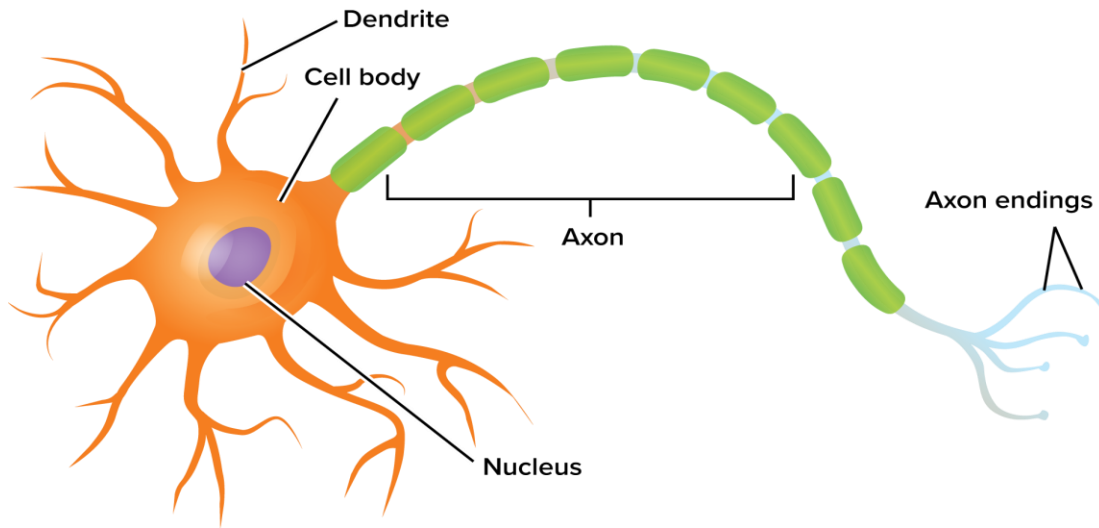
CIRCULATORY, RESPIRATORY, EXCRETORY SYSTEM

Lesson 3: EXCRETORY SYSTEM

☐ CHAPTER 3/MODULE 25

DIGESTIVE & ENDOCRINE SYSTEM

Lesson 3: ENDOCRINE SYSTEM



- **Dendrites** receive impulses from other neurons and conduct impulses to the **cell body**, which contains the nucleus and other organelles.
- The **axon** passes those impulses on to the other neurons or muscles.

Pathway of impulse through neuron



Figure 1 There are three main parts of a neuron: the dendrites, a cell body, and an axon. Neurons are highly specialized cells that are organized to form complex networks.

Neuron has 3 parts:

DENDRITE
CELLBODY
AXON

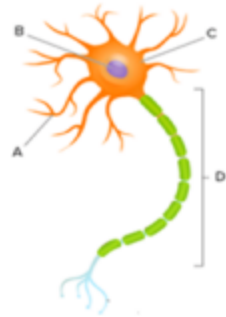
Kareem is completing a project about drug addiction as part of his requirements to be a scout. Part of the project involves learning about the neurons that make up the human nervous system. Which does Kareem learn about neurons?

- ☐ Neurons are tissues in the body that carry electrical messages.
- ☐ Specialized cells, called neurons, receive and transmit impulses.
- ☐ Neurons are cells that look like most other cells of the body.
- ☐ Specialized nerves, called neurons, relay pleasure and pain sensations.

Correct Answer

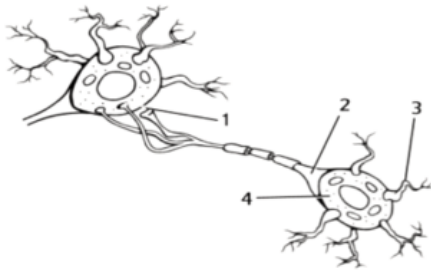
Specialized cells, called neurons, receive and transmit impulses.

Which of the following letters **receive** signals in the below picture?



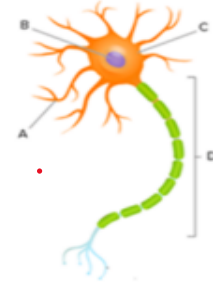
- a. A
- b. B
- c. C
- d. D

The diagram below represents an illustration of neural cells, in which part would you expect to find the nucleus and many of the cell organelles?



- a. 4
- b. 1
- c. 2
- d. 3

Which of the following letters represents the **axon** in the below picture?



Learning Outcomes Covered

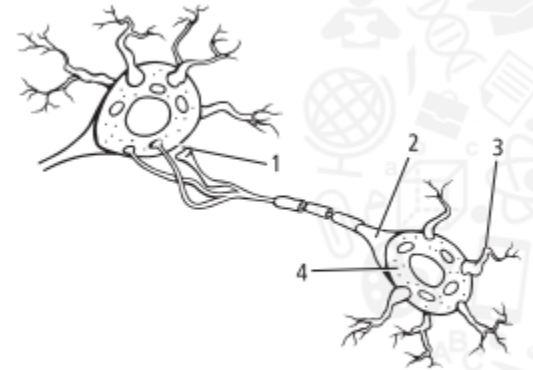
- BIO.3.1.01.086

- a. A
- b. B
- c. C
- d. D

A(n) **axon** carries nerve impulses from the cell body to other neurons and muscles.
(Blank 1)

Blank 1 options

- axon
- dendrite
- nucleus



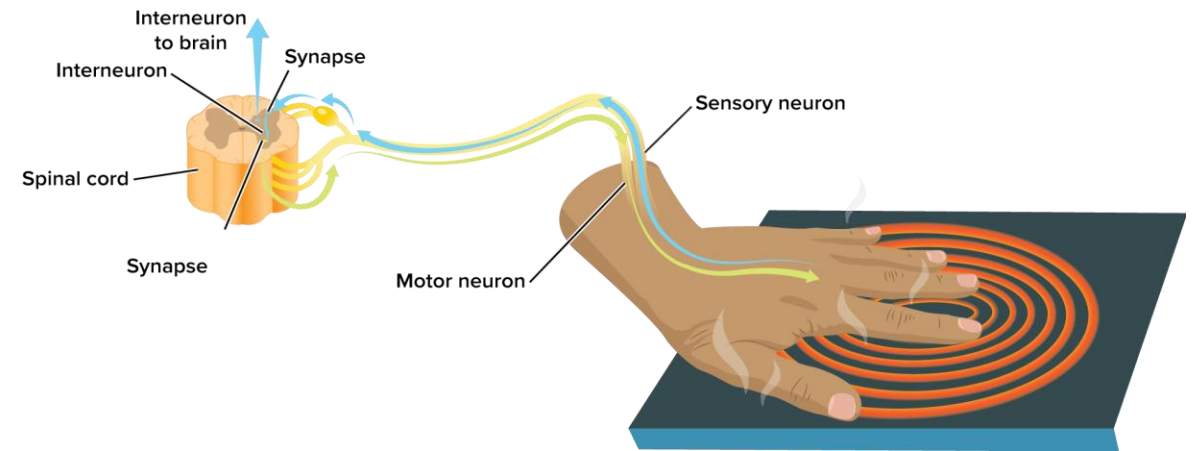
2. In which part of the diagram above would you expect to find myelin?

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

3. In which part of the diagram above would you expect to find neurotransmitters when an action potential reaches the end of the neuron?

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

The nerve impulse completes a **reflex arc**, or a nerve pathway that consists of a **sensory neuron**, an **interneuron**, and a **motor neuron**. It does not involve brain



- **Sensory neurons** send impulses from receptors in the skin and sense organs to the brain and spinal cord.
- **Interneurons** (in brain and spinal cord) carry impulses to motor organs.
- **Motor neurons** carry impulses away from the brain and spinal cord to a gland or muscles, resulting in a secretion or movement.

Which is the correct path that a nerve impulse will follow in a reflex arc?

- ☐ motor neuron → sensory neuron → interneuron
- ☐ motor neuron → interneuron → sensory neuron
- ☐ interneuron → motor neuron → sensory neuron
- ☒ sensory neuron → interneuron → motor neuron

What would be the hypothetical result if a person lacked motor neurons?

- ☐ would be unable to feel a hot plate
- ☒ would be unable to swing hammer
- ☐ would be unable to breath
- ☐ would be unable to feel a deep cut

Correct Answer

would be unable to swing hammer

What would be the hypothetical result if a person lacks the motor neurons?

Learning Outcomes Covered

◦ BIO.3.1.01.086

- a. Would be unable to breath
- b. Would be unable to feel a deep cut
- c. Would be unable to feel a hot plate
- d. Would be unable to catch his pen

Which is the correct path that a nerve impulse will follow in a reflex arc?

في القوس الانعكاسي؟

Learning Outcomes Covered

◦ BIO.3.1.01.086

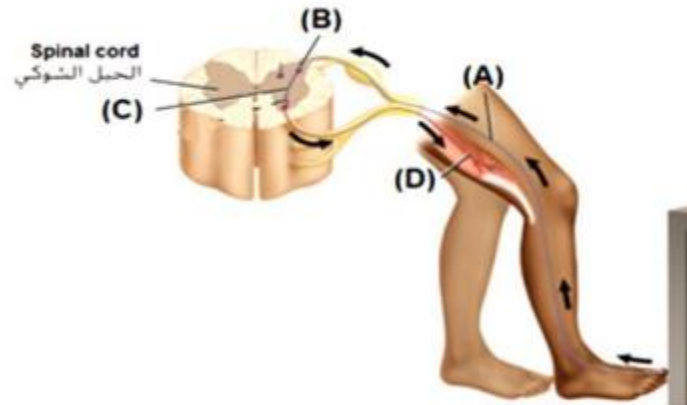
- a. Sensory neuron → interneuron → motor neuron
- b. Motor neuron → sensory neuron → interneuron
- c. Interneuron → motor neuron → sensory neuron
- d. Motor neuron → interneuron → sensory neuron

Which is a nerve pathway that consists of a sensory neuron, an interneuron, and a motor neuron?

- ☐ Potential arc
- ☐ Threshold arc
- ☒ Reflex arc

In the figure below, which of the following letters represents the sensory neuron?

إلى الخلية العصبية الحسية؟



- a. B
- b. C
- c. D
- d. A

13 What transmits impulses from pain, heat, and touch receptors in the skin and other body organs?

- A interneurons
- B motor neurons
- C sensory neurons
- D free nerve endings

In the figure below, a simple reflex involves a sensory neuron, an interneuron, and a motor neuron.

بواسطة خلية حسية وخلية

To which organ does the nerve impulse, indicated by the blue arrow, go?

هم الأذن؟



Learning Outcomes Covered

o BIO.3.1.01.059

- a. The heart
- b. The brain
- c. The muscles
- d. The bones

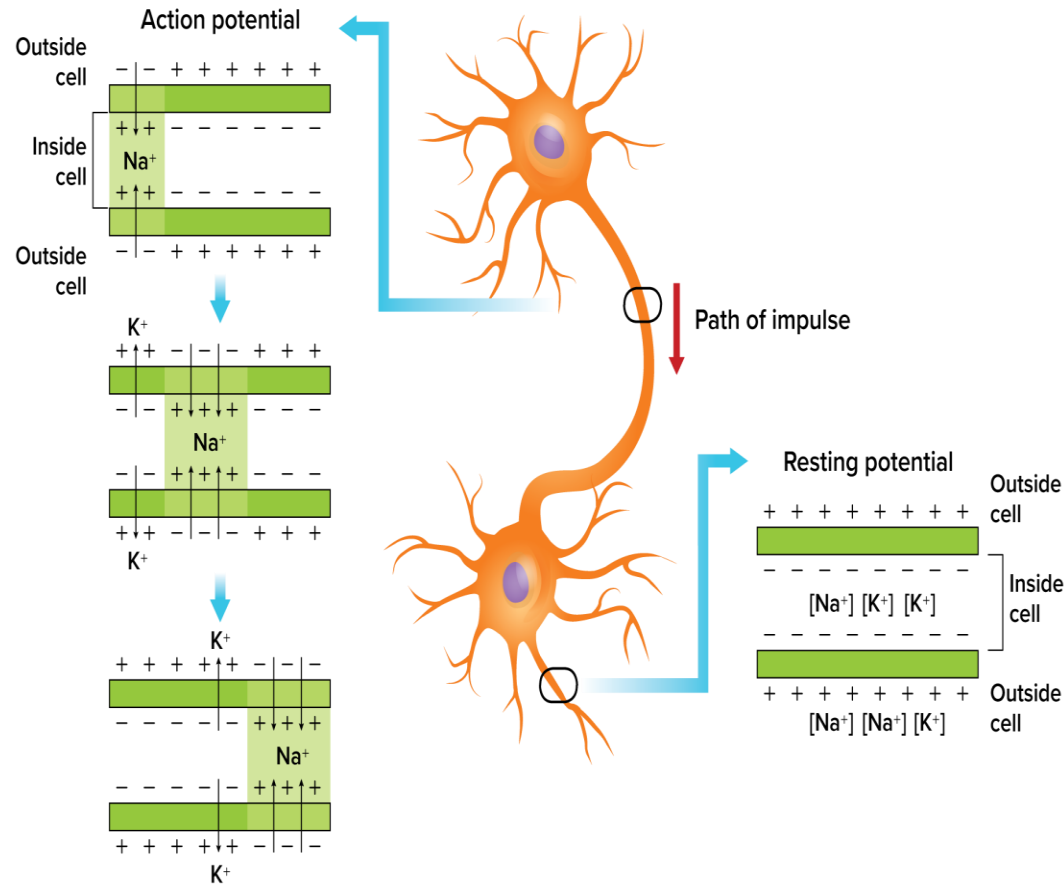


Figure 4 Follow as an action potential moves along an axon from left to right. Notice what happens to the Na^+ and K^+ and how this changes the relative electrical charges inside and outside the neuron.

An Action Potential

- A nerve impulse is also known as an **action potential**.
- The minimum stimulus to cause an action potential to be produced is called a **threshold**.
- When a stimulus reaches the threshold, channels open in the plasma membrane.
 - **Sodium ions are rapidly pumped into cytoplasm**
 - **More positive charges are now inside the membrane.**
 - **The more positive charge inside causes other channels to open and the **potassium is quickly pumped out of the cell.****
 - **The potassium restores the positive charge outside the cell.**

What happens when an action potential is produced with a signal that is stronger than threshold?

- ☐ no action potential generated
- ☒ action potential has same strength as threshold
- ☐ weaker action potential generated
- ☐ stronger action potential generated

Which is the result of the actions of the sodium-potassium pump?

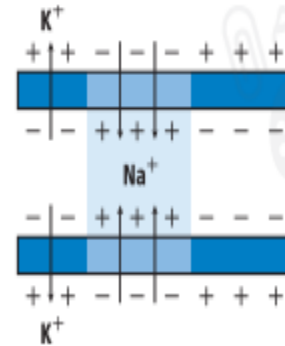
- ☐ positive charge inside a neuron
- ☐ no charge inside the neuron
- ☒ negative charge inside a neuron
- ☐ no charge outside the neuron

Which of the following descriptions is correct regarding synapses?

- ☐ synapse travels through a neurotransmitter
- ☐ muscle contraction produces neurotransmitters
- ☒ action potential causes neurotransmitter release
- ☐ action potential causes dendrite release

1. Which happens first after the threshold is reached for an action potential?

- ☒ K⁺ ions enter the neuron.
- ☒ Negatively charged proteins leave the neuron.
- ☒ Na⁺ ions enter the neuron. **CORRECT**
- ☒ The myelin coat breaks down, allowing ions to freely cross the plasma membrane.

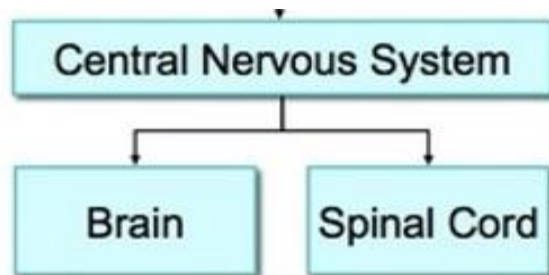
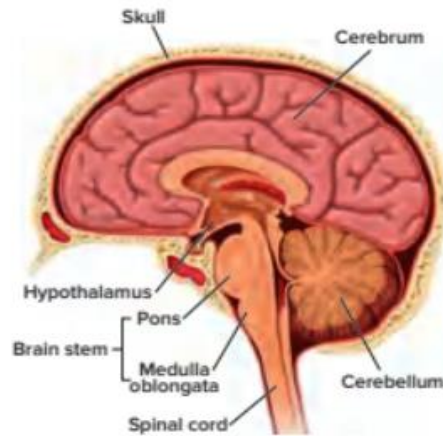


4. What is occurring in the diagram above?

- ☐ A. K⁺ ions are entering the neuron.
- ☒ B. Negatively charged proteins are leaving the neuron.
- ☒ C. Na⁺ ions are entering the neuron.
- ☐ D. The myelin coat has broken down, allowing ions to freely cross the plasma membrane.

2. Which is true about action potentials?

- ☒ A They move faster on neurons that have myelin. **CORRECT**
- ☒ They move at one speed on all neurons.
- ☒ They move only on neurons that do not have myelin.
- ☒ They cannot move between nodes on neurons.



The **cerebrum** is the **largest** part of the brain. It carries out thought processes involved with **learning, memory, language, speech, voluntary body movements, and sensory perception.**

The **cerebellum** controls **balance, posture, and coordination.**

Brainstem- connects brain to spinal cord. It has **two regions:**
Pons
Medulla oblongata

The **medulla oblongata** relays signals between the brain and the spinal cord. It also helps control breathing rate, heart rate, and blood pressure.

The **pons** relays signals between the cerebrum and the cerebellum and helps control the rate of breathing.

- The **hypothalamus**- maintains homeostasis regulates body temperature, thirst, appetite, and water balance.

Part which control voluntary actions , thinking and learning?

CEREBRUM

Part responsible for muscle coordination, balance, motor skills like writing , playing musical instrument.

CEREBELLUM

Part responsible for controlling breathing, coughing, sneezing

MEDULLA oblongata

What regulates body temperature , thirst ?

HYPOTHALAMUS

1. Which part of the brain controls homeostasis of the body?

- ☒ A hypothalamus **CORRECT**
- ☐ pons
- ☐ cerebrum
- ☐ medulla oblongata

All reflex signals must go to the brain.

- ☐ True
- ☒ False

4. Which part of the brain controls balance, posture, and coordination?

☐ brain stem

☒ C cerebellum **CORRECT**

☐ cerebrum

☐ hypothalamus

What is the cause of loss of balance and decreased coordination of muscles for a person with brain cancer?

Learning Outcomes Covered

◦ BIO.3.1.01.086

- a. Because the cancer has damaged hypothalamus
- b. Because the cancer has damaged pons
- c. Because the cancer has damaged cerebellum
- d. Because the cancer has damaged pons and hypothalamus

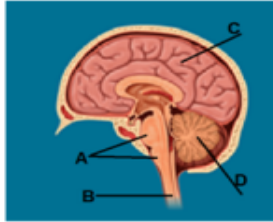
The spinal cord is part of a major division of the nervous system called thenervous system

Learning Outcomes Covered

◦ BIO.3.1.01.086

- a. somatic
- b. central
- c. autonomic
- d. peripheral

In the below picture, which letter of the following refers to the structure that helps to control the rate of breathing؟ الذي



Learning Outcomes Covered

- o BIO.3.1.01.086

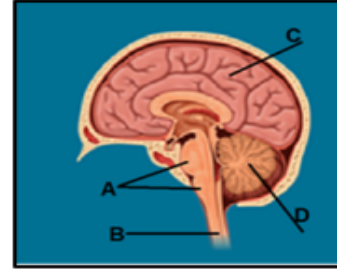
- a. B
- b. C
- c. D
- d. A

What is the large brain structure just below the skull?



- ☐ pons
- ☒ cerebrum
- ☐ medulla oblongata
- ☐ hypothalamus

Which letter of the following refers to the spinal cord?

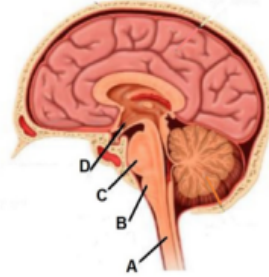


Learning Outcomes Covered

- o BIO.3.1.01.086

- a. A
- b. C
- c. D
- d. B

maintaining homeostasis by serving as a link between the nervous system and the endocrine system?



Learning Outcomes Covered

- o BIO.3.1.01.070
- o BIO.3.1.01.086

- a. A
- b. B
- c. C
- d. D

Which is *not* part of the central nervous system?

- A. brain
- B. spinal cord
- C. interneurons
- ☒ D. sensory neurons

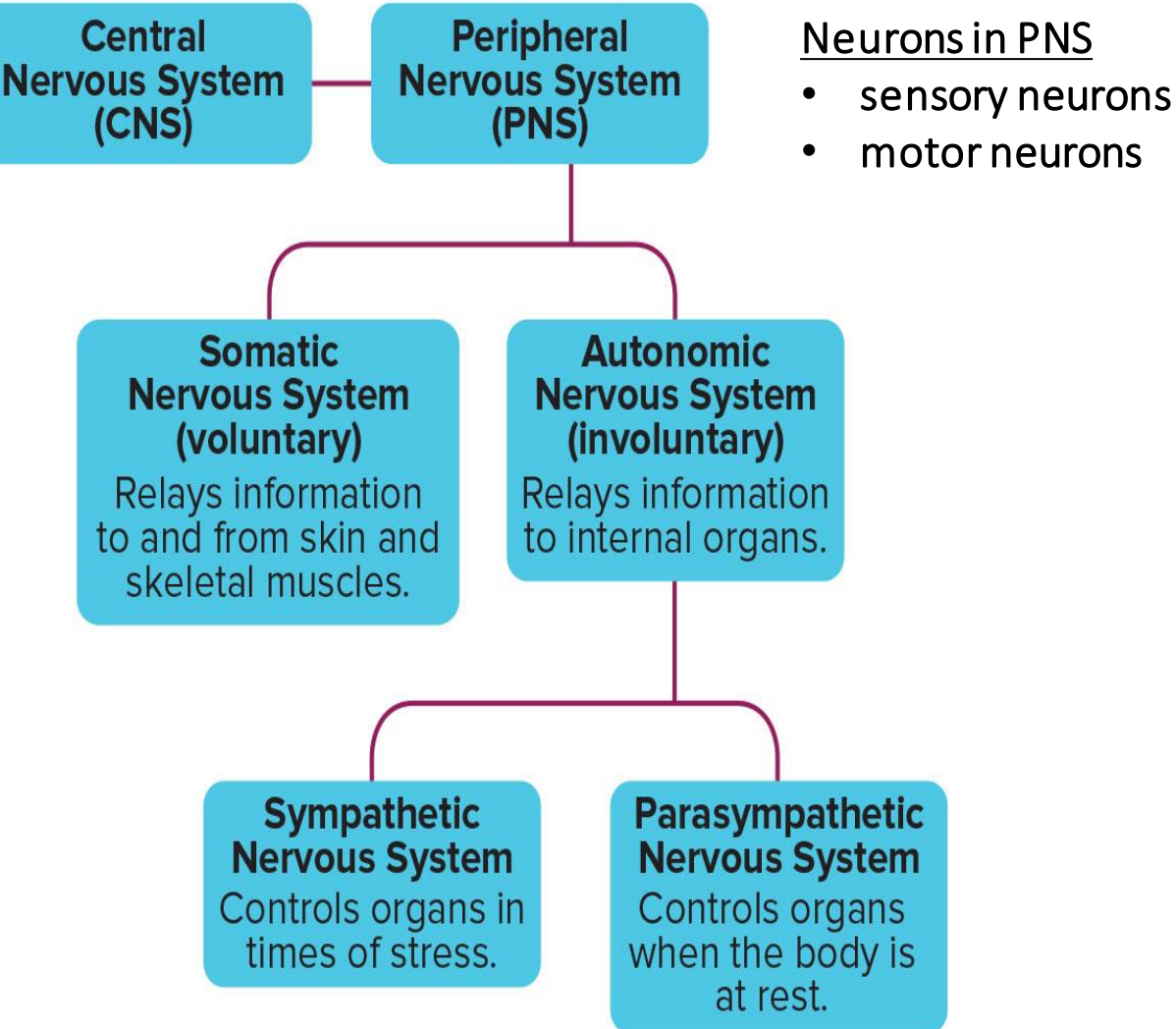
Name the part of the brain that is responsible for memory.

- A. hypothalamus
- B. medulla oblongata
- ☒ C. cerebrum
- D. cerebellum

What does the cerebrum regulate?

- A. breathing and heart rates
- B. complex motor skills
- C. sleep, aggression, and fear
- ☒ D. voluntary body movements

Nervous System



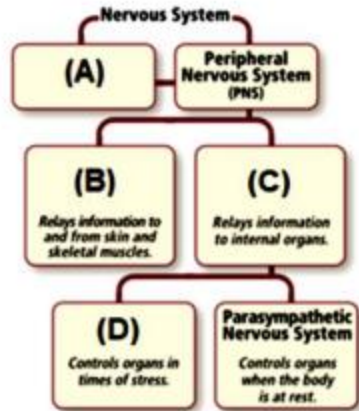
Nerves in the **somatic nervous system** relay information from external sensory receptors to the CNS, and somatic motor nerves relay information from the CNS to skeletal muscles

Voluntary movements and reflexes are a part of the somatic nervous system.

The **autonomic nervous system** carries impulses from the central nervous system to the heart and other internal organs.

The body responds **involuntarily, not under conscious control.**

The figure below shows a mind map of the nervous system, each division of the nervous system takes part in the control of the body and the communication within the body. Which part of the nervous system does the letter (A) refer to?



- a. Sympathetic nervous system جهاز العصبي السمبثاوي
- b. Somatic nervous system جهاز العصبي الجسدي
- c. Autonomic nervous system الجهاز العصبي الذاتي
- d. Central nervous system الجهاز العصبي المركزي

The human cerebrum is disproportionately large compared to the cerebrum of other animals. What advantage does this give to humans?

- a. Increased ability to learn
- b. The heart works more efficiently
- c. Greater breathing rate
- d. Increase human lifespan

Which of the following is a nerve column that extends from the brain to the lower back, and it is protected by the vertebrae?

- ☒ Spinal cord
- ☐ Cerebellum
- ☐ Brain stem
- ☐ The midbrain




What part of the nervous system is usually under voluntary control?

- A. autonomic nervous system
- B. somatic nervous system**
- C. sympathetic nervous system
- D. parasympathetic nervous system

How do the sympathetic and parasympathetic nervous systems act together?




- A. They send and receive neurotransmitters.
- B. They send opposing signals to the same organs.**
- C. They balance voluntary and involuntary responses.
- D. They receive the same impulses from different receptors.

2. Which term best describes the nerves that relay information from external sensory receptors to the central nervous system?

-  parasympathetic
-  sympathetic
- C somatic**
-  autonomic

CORRECT

3. Which is a characteristic of the sympathetic division of the autonomic system?

-  stimulates digestion
- B dilates the bronchi**
-  slows the heart rate
-  converts glucose to glycogen

CORRECT

The sympathetic nervous system is most active in times of emergency or stress, when the heart rate and breathing rate increase. The parasympathetic nervous system is most active when the body is relaxed.

Blank 1 options

- somatic
- autonomic
- sympathetic
- parasympathetic

Blank 2 options

- somatic
- autonomic
- sympathetic
- parasympathetic

The ___ nervous system carries impulses from the central nervous system to the heart and other organs.

- ☐ somatic
- ☐ muscular
- ☒ autonomic
- ☐ cerebral

6	Identify the anatomy of the eye and function	Figure 14	145
14	Differentiate between the two types of sensory receptors in the eye (rods and cones)		145



• Path of stimulus(light)

Light enters the eye through **cornea**



Cornea focus light through an opening called **pupil to the lens**



the lens projects an **inverted image** in **retina**



Receptor cells in retina sends action potential to **brain** through **optic nerve**

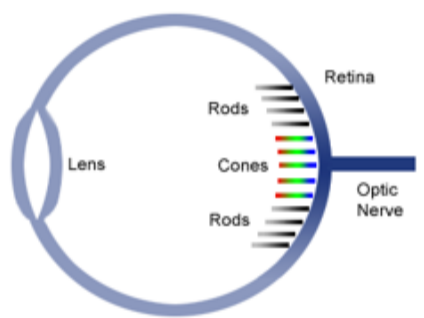
LIGHT RECEPTORS IN RETINA

RODS

- very sensitive to light and can be excited by low levels of light.

CONS

- function best in bright light and are responsible for color vision.



retina thin layer of tissue found at the back of the eye made up of light

receptors and sensory neurons

rod receptor cell in the retina that is adapted for vision in dim light; also

helps detect shape and movement

cone receptor cell in the retina that is adapted for vision in bright light;

provides information about color to the brain

Beth volunteers at the vision center of a local hospital. As part of the orientation process, Beth learns how different structures of the eye function. Which does she learn?

- ☐ Cones and rods in the retina collect information from incoming light.
- ☐ The eye lens captures an image of light and sends it to the brain.
- ☐ The pupil focuses incoming light and images onto the lens of the eye.
- ☒ Light-sensitive cells, called rods, provide information about colors.

Which of the following receives the vision and hearing impulses in the central nervous system?

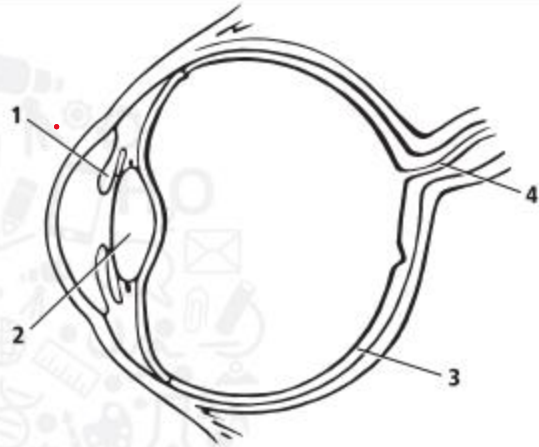
- a. Spinal cord
- b. Brain stem
- c. The pons
- d. The midbrain

Which **part of the eye** provide information about color to the brain?

Learning Outcomes Covered

o BIO.3.1.01.086

- a. Iris
- b. Rods
- c. Pupil
- d. Cones



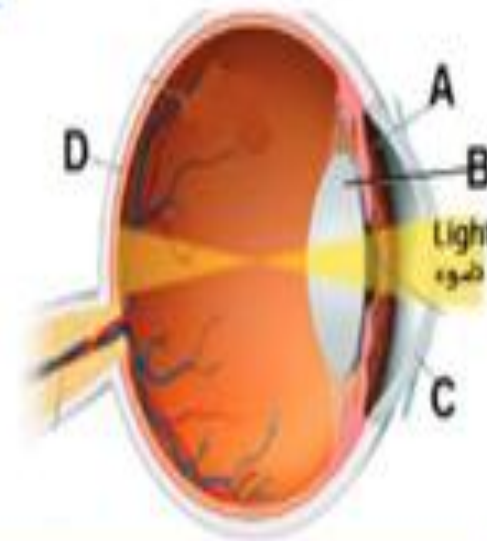
6. Which part of the eye is made of muscles that respond to stimuli?
- A. 1
 - B. 2**
 - C. 3
 - D. 4
7. If a person cannot see certain colors, what part of the eye might be damaged?
- A. 1
 - B. 2
 - C. 3
 - D. 4**

What is the function of the optic nerve?

- A. It forms a visual image.
- B. It controls the muscles of the iris.
- C. It interprets light intensity and colors.
- D. It sends action potentials to the brain.**

Which of the following letters represent
the lens in the below picture?

أي الصورة أعلاه؟



- a.
- b.
- c.
- d.

1. If there was a power outage in a movie theater and only a few dim emergency lights were lit, which cells of the retina would be most important for seeing your way to the exit?

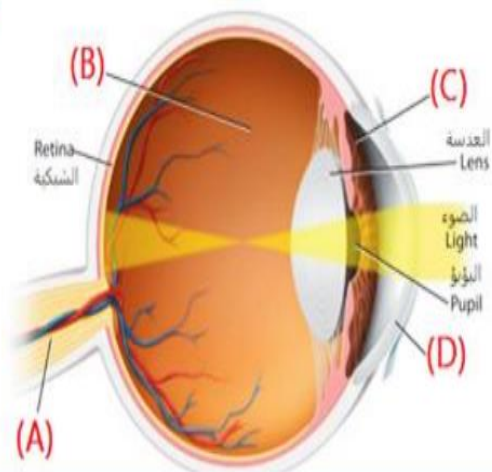
A rods **CORRECT**

~~B~~ cones

~~C~~ Rods and cones are equally important.

In the figure below, which of the following letters represents the colored part of the eye ?

في الشكل أدناه، أي حرف مما يلي يشير إلى الجزء الملون من العين؟



- ☐ A
- ☐ B
- ☒ C
- ☐ D

In the figure below, which of the following letters refers to a colorless, gelatinlike liquid between the lens and the retina?

مسائل جيلاتيني عديم اللون في الرسم أدناه؟



Learning Outcomes Covered

o BIO.3.1.03.034

a. A

b. B

c. C

d. D

5	Identify the anatomy of the ear and function	Figure 15	146
16	Identify the anatomy of the ear and function		146

What makes ?

Outer Ear:

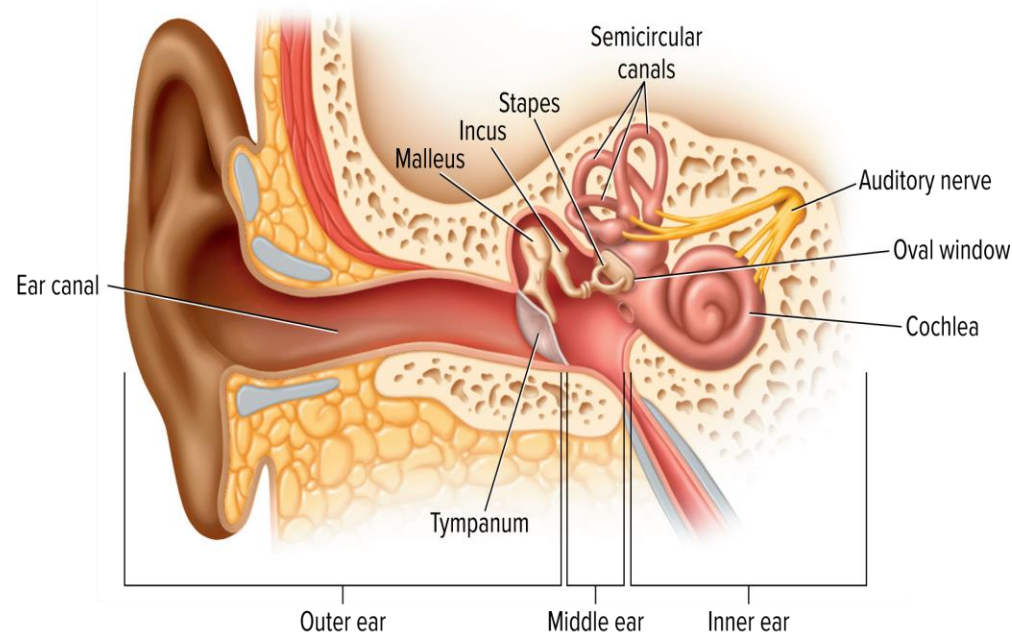
Ear canal

Middle Ear :

- three tiny bones - malleus , incus, stapes,
- ear drum

Inner Ear:

Cochlea , semicircular canal



2. Which represents the correct sequence as sound waves travel in the ear to trigger an impulse?

☒ cochlea, incus, staple, eardrum

☒ auditory canal, tympanum, hair cells, cochlea

☒ B tympanum, bones in the middle ear, cochlea, hair cells

☒ hair cells, auditory canal, cochlea, malleus

CORRECT

• **Pathway of stimulus (sound) in ear**

Sound waves enter your ear and travel through the **ear canal.**



The sound waves hit the **eardrum** and cause it to **vibrate.**



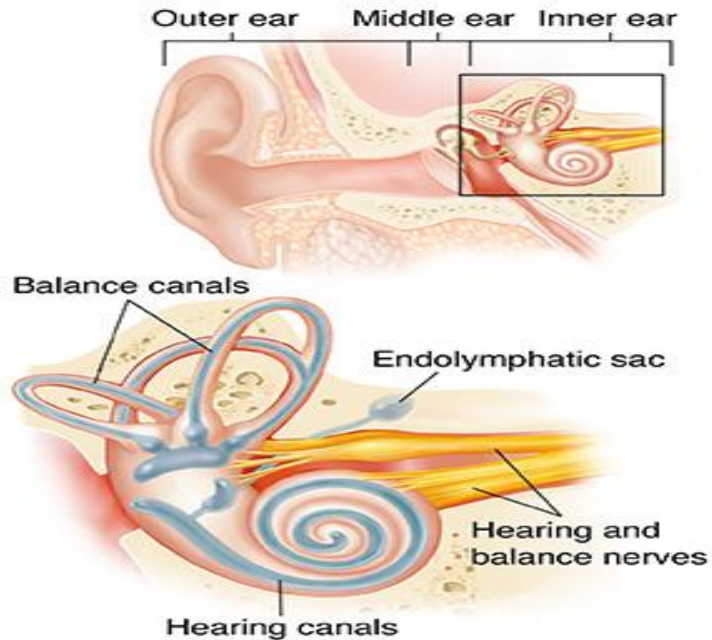
The vibrations pass into the three bones in the **middle ear**, the **malleus, incus, and stapes.**



Vibrations pass to the fluid in the **cochlea**



The **hair cells** in cochlea produce **nerve impulses** in the **auditory nerve** and transmit to **brain.**

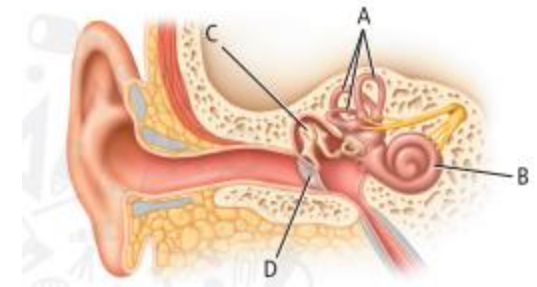


cochlea snail-shaped structure in the inner ear containing fluid and hairs;
 produces nerve impulses that the brain interprets as sound

semicircular canal structure in the inner ear containing fluid and
 hairs that help the body maintain balance

How does ear help in balancing?

- In the inner ear **Semicircular canals** filled with fluid and lined with tiny hair cells help you keep your balance.
- When your head moves around, the fluid inside the semicircular canals moves. This causes the tiny hair cells to bend and send nerve impulses to the brain. The brain uses the information from each canal to determine your position and whether your body is moving or not.



4. Some rides at amusement parks cause a person to become dizzy when the ride stops. Which ear structure is most likely involved with the dizzy feeling?

☒ A semicircular canals **CORRECT**

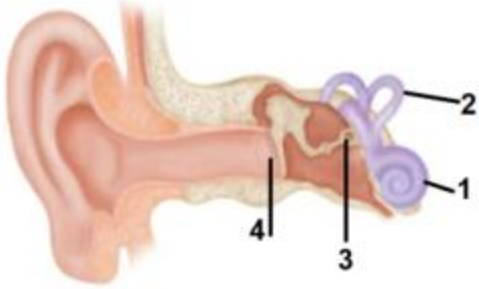
☐ ear canal

☐ cochlea

☐ ear drum

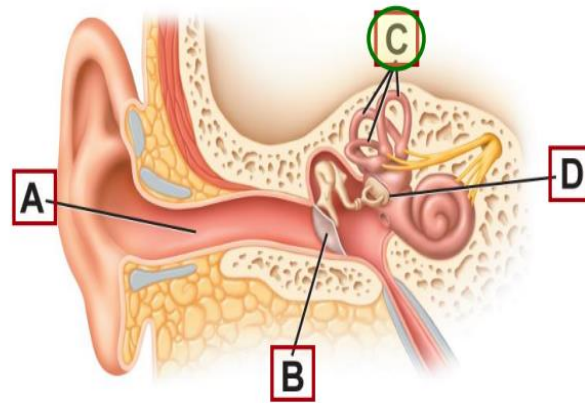
Which of the following numbers represent the **cochlea** in the below picture?

توقع في الصورة أذناه؟



- a. 1
- b. 2
- c. 3
- d. 4

Where are the sensory receptors that detect your body's position and motion?



Which part of the ear receives vibrations from the eardrum?

- ☒ middle ear or malleus
- ☐ cochlea
- ☐ semicircular canals
- ☐ oval window

The **Select Choice** is part of the inner ear.

- Select Choice
- incus
- malleus
- cochlea

Sequence the steps in how your sense of hearing works, by writing the numbers 1 to 5 in the squares to the left of the steps.

5

The hairs produce electric impulses that travel to the cerebrum, where they are interpreted as sound.

3

The stapes causes the membrane of the oval window to move back and forth.

1

Sound waves enter your ear and travel down to the end of the ear canal.

2

Sound waves strike the eardrum and cause it to vibrate. The vibrations pass to the bones in the middle ear.

4

Fluid in the cochlea moves, causing the hair cells to bend.

Which part of the **ear** transmit information about body position and balance to the brain?

Learning Outcomes Covered

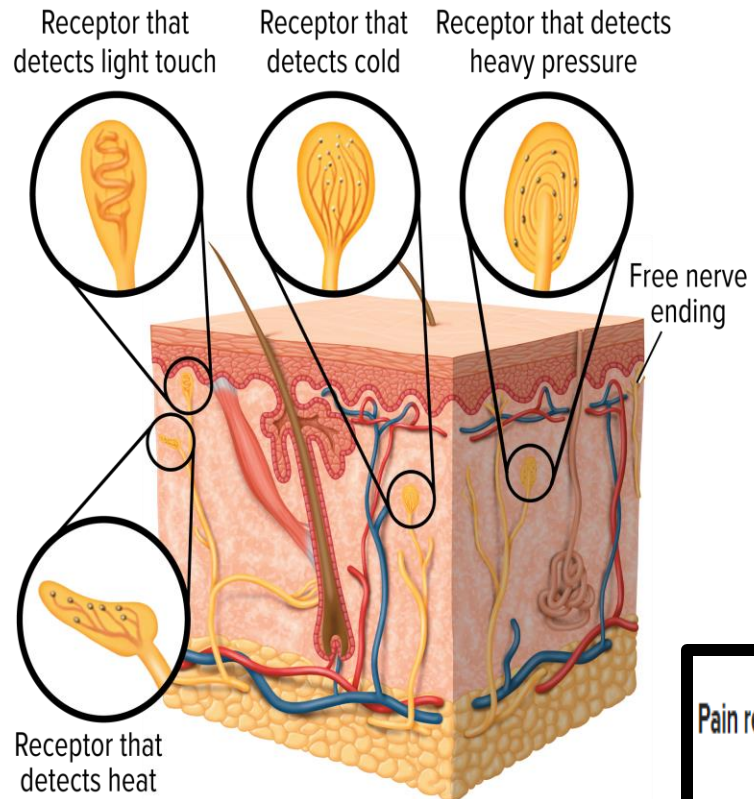
o BIO.3.1.01.086

a. Semi-circular canals

b. Cochlea

c. Middle ear

d. Oval window



What are the different receptors in the epidermis?

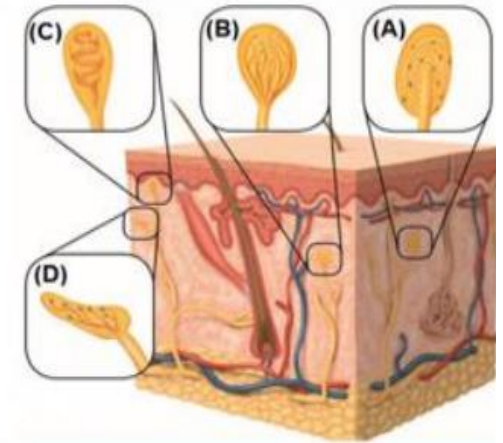
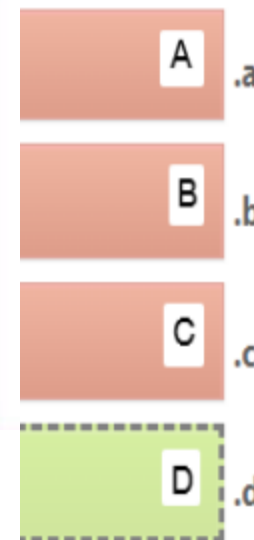
- Pain receptor
- Cold receptor
- Pressure receptor
- Heat receptor
- Touch receptor

Pain receptors are found in all body tissues except for those in the brain.

- ☒ True
- ☐ False

Many types of receptors are found in the skin. A person can tell if an object is hot or cold, sharp, or smooth. In the figure below, which of the following letters refers to the receptor that detects heat?

من أن
عملاً. أي
ل أنناه؟



3. With which sense are free nerve endings associated?

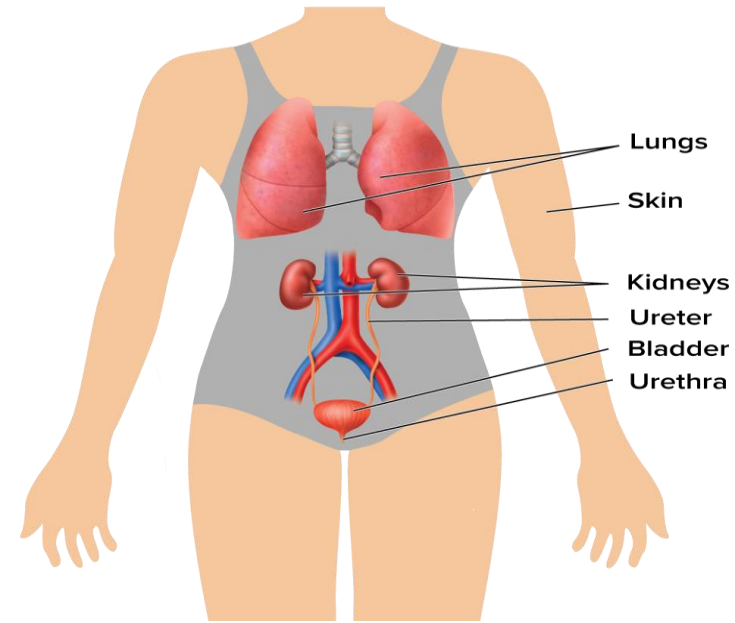
☒ taste

☒ touch

CORRECT

☒ hearing

☒ sight



- The excretory system **removes toxins and wastes from the body.**
- It **regulates fluid and salts in the body and maintains the pH of the blood.**
- It include the **lungs, skin, and kidneys.**

3. Which of the following is NOT part of the excretory system?

☒ lungs

☒ skin

☒ stomach

CORRECT

☒ kidneys

1. What is the function of kidney?

Filter the blood

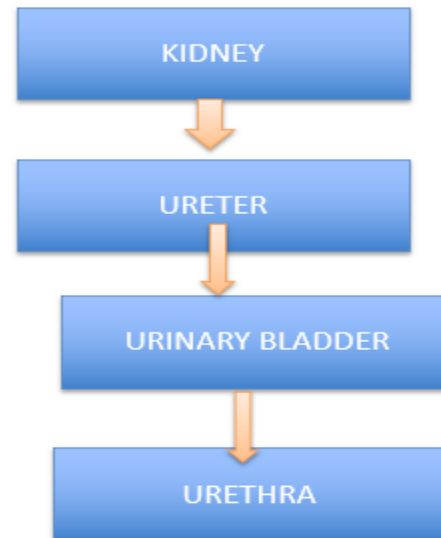
2. Which blood vessel brings blood to the kidney?

RENAL ARTERY

3. Which blood vessel carries blood away from the kidney?

RENAL VEIN

PATHWAY OF URINE



4. Which structure does urine leave a kidney through?

☒ Bowman's capsule

☒ urethra

☒ ureter

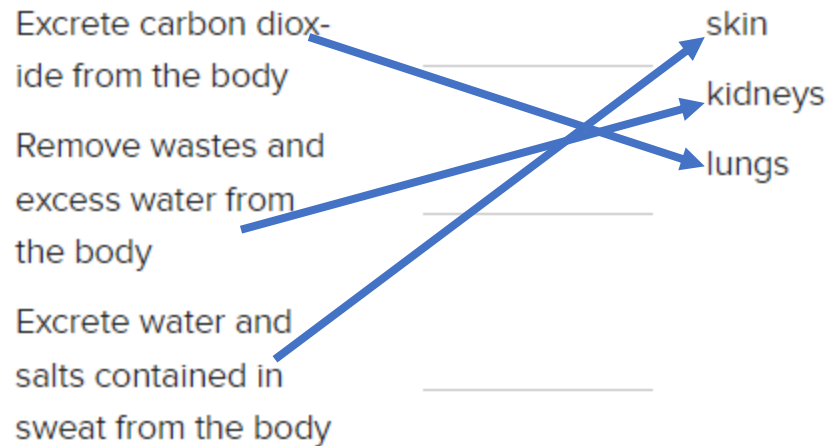
CORRECT

☒ urinary bladder

Which of the following are the main functions of the excretory system? Select all that apply.

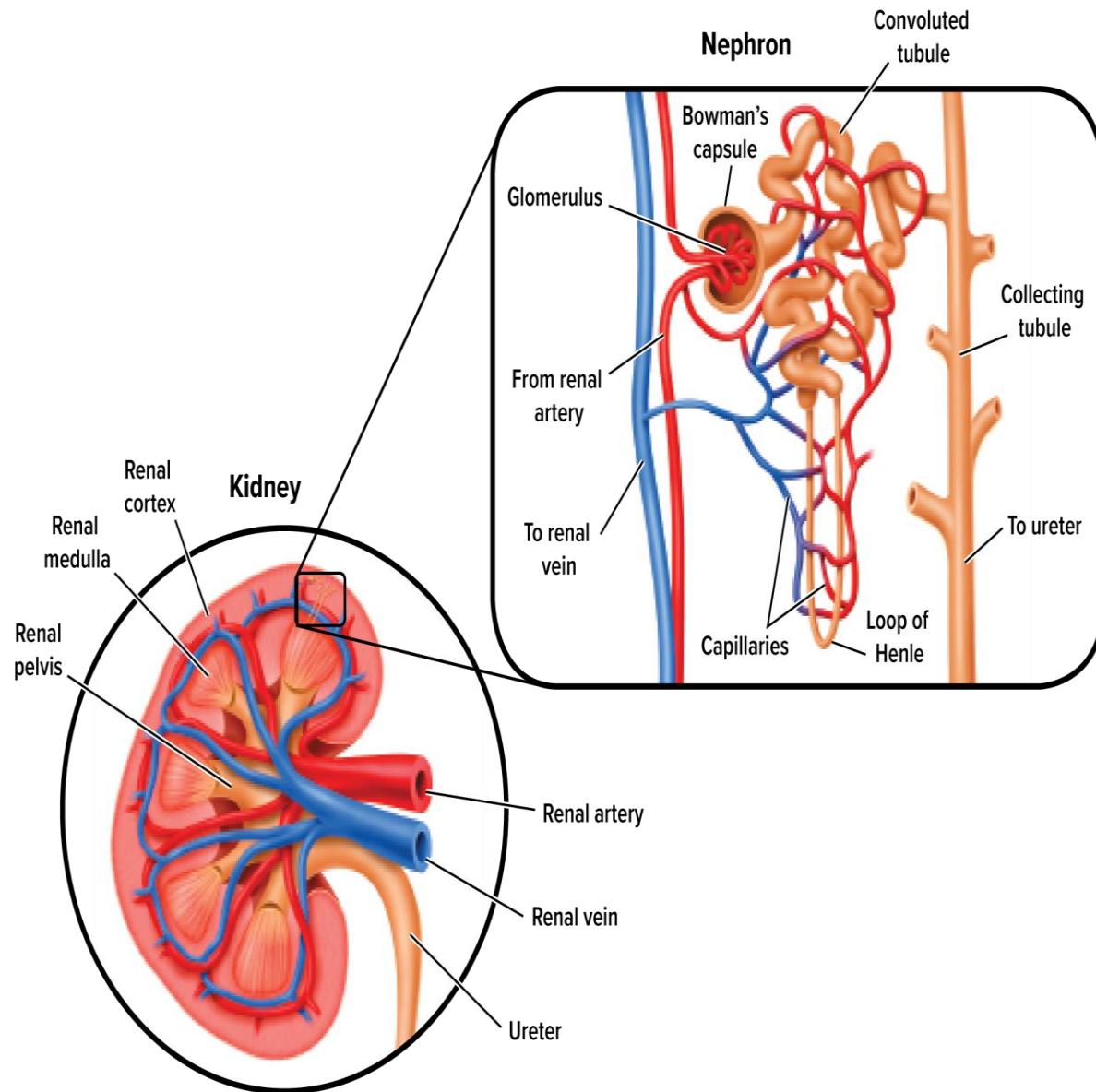
- ☒ to regulate the amount of fluid and salts in the body
- ☐ to transport carbon dioxide to body cells
- ☐ to maintain the correct amount of nutrients
- ☐ to release energy from food as ATP molecules
- ☒ to remove wastes from the body
- ☒ to maintain homeostasis
- ☒ to maintain the pH of the blood

Match the following functions to the correct structures of the excretory system.



Which of the following makes up the body's excretory system?

- ☐ skin
- ☐ kidneys
- ☒ All are part of the excretory system
- ☐ lungs



The **kidneys** are bean-shaped organs that filter out wastes, water, and salts from the blood.

The **outer portion** is called the **renal cortex**.

The **inner region** is called **the renal medulla**.

Each region contains microscopic tubes and blood vessels.

The center region, where **urine collection** occurs, is called **the renal pelvis**.

1. What is the outer portion of a kidney called?

☐ renal medulla

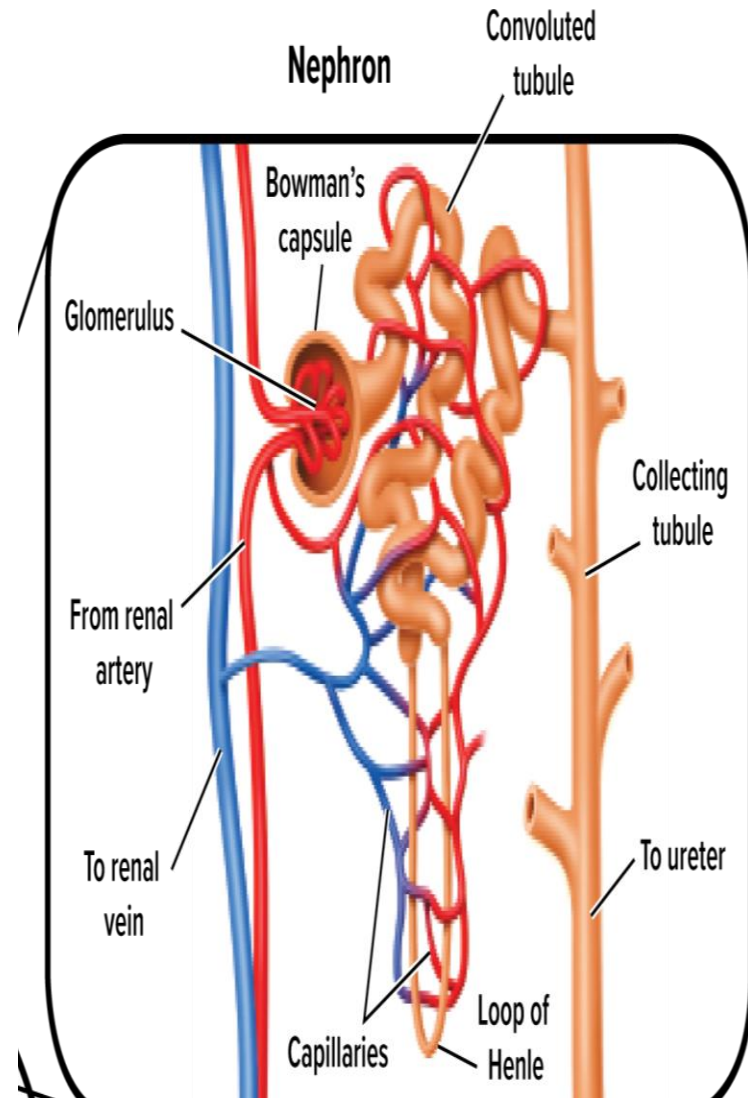
☒ renal cortex

CORRECT

☐ renal pelvis

☐ glomerulus

18	Identify the anatomy of the kidney.	Figure 18	174
4	Identify the nephron as the functional unit of the kidney, to include its anatomy and function in waste excretion		174



Nephron Filtration

- Each **kidney** contains approximately one million filtering units called **nephrons**.
- Blood** enters a nephron from the **glomerulus**, which is surrounded by the **Bowman's capsule**.
- The **renal artery** transports nutrients and wastes to the kidney. It branches into smaller vessels, eventually reaching **capillaries** in the **glomerulus**.
- Urea** is a nitrogenous waste product. It is pushed through the capillaries into the Bowman's capsule.

Reabsorption and the Formation of Urine

- The **filtrate** flows through the **loop of Henle** and the **collecting tubule**.
- Glucose and minerals** are **reabsorbed** back into the capillaries surrounding the renal tubule.
- Urine**, which is excess fluids and wastes, **leaves the kidneys** through ducts called the **ureters**.
- Urine is stored in the urinary bladder and exits the body through the urethra.

Fill in the blanks using the available answer choices.

filtration (Blank 1) is the process of removing wastes from the blood. **reabsorption** (Blank 2) is the process of re-turning useful materials, such as glucose and water, to the bloodstream.

Blank 1 options

- Filtration
- Excretion
- Respiration
- Reabsorption

Blank 2 options

- Filtration
- Excretion
- Respiration
- Reabsorption

1) Identify major parts of nephron:
Bowman's capsule-glomerulus-
Renal tubule-henle's loop-Collecting
tubule

2) Which part of the nephron blood
filtration takes place?

Glomerulus

3)What are reabsorbed into
capillaries from renal tubule and
Henle's loop?

- **Water ,sodium ions, glucose**

4) What are passed to collecting
tubule and forms urine?

- Toxic substance and excess fluid

4) What are the main steps in urine
formation?

nephron filtration

Tubular reabsorption

2. Which process returns glucose to the blood?

☒ excretion

☒ exhalation

☒ filtration

☒ reabsorption **CORRECT**

The mineral is placed back into the bloodstream by
the kidneys through a process called.....

a. **Filtration**

b. **Excretion**

c. **Coupled transport**

d. **Reabsorption**

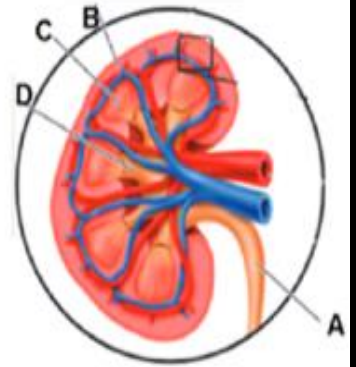
Which of the following letters represents the **ureter** in صورة أذناه؟
the below picture?

a. **A**

b. **B**

c. **C**

d. **D**



What are the **functional units** in the kidneys?

a. **Alveoli**

b. **Renal pelvis**

c. **Diaphragms**

d. **Nephrons**

How do the kidneys help maintain normal blood (pH)?

- a. By absorbing white blood cells
- b. By absorbing red blood cells
- c. By excreting dopamine into renal tubules
- ☒ d. By excreting hydrogen into renal tubules

28. Where is the loop of Henle?

- ☒ A. renal tubule
- B. glomerulus
- C. Bowman's capsule
- D. urethra

29. **THEME FOCUS Homeostasis** Which one of the kidney functions conserves water in the body?

- A. absorption
- ☒ C. reabsorption
- B. filtration
- D. breathing

30. Which process returns glucose to the blood?

- A. excretion
- ☒ C. reabsorption
- B. filtration
- D. exhalation

Reabsorption of Some Substances in the Kidneys

Chemical substance	Amount Filtered by Kidneys (g/day)	Amount Excreted by Kidneys (g/day)	Percent of Filtered Chemical Reabsorbed (per day)
Glucose	180	0	100
Urea	46.8	23.4	50
Protein	1.8	1.8	0

31. Based on the data from the table above, how much urea is reabsorbed by the kidneys?

- A. 0.50 g/day
- ☒ B. 23.4 g/day
- C. 46.8 g/day
- D. 50.0 g/day

32. Based on the table data above, what happens to glucose in the kidneys?

- ☒ A. It is reabsorbed into the blood.
 - B. It is permanently filtered out of the blood.
 - C. It is treated in the kidney like creatinine.
 - D. It is treated in the kidney like urea.
33. Infer why proteins are not removed by nephrons.
- A. The collecting ducts are too small.
 - ☒ B. Proteins cannot be filtered.
 - C. Proteins never enter the nephron.
 - D. Proteins are reabsorbed by nephrons.

The waste product that leaves through the ureters and eventually exits through the urethra is called urine.
(Blank 1)

It consists of excess fluids and toxic substances.

Blank 1 options

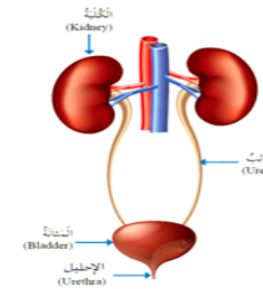
- urine
- plasma
- glomerulus

Place the process of blood filtration in the nephrons into the correct order.

- 1) **A**
- 2) **D**
- 3) **B**
- 4) **C**

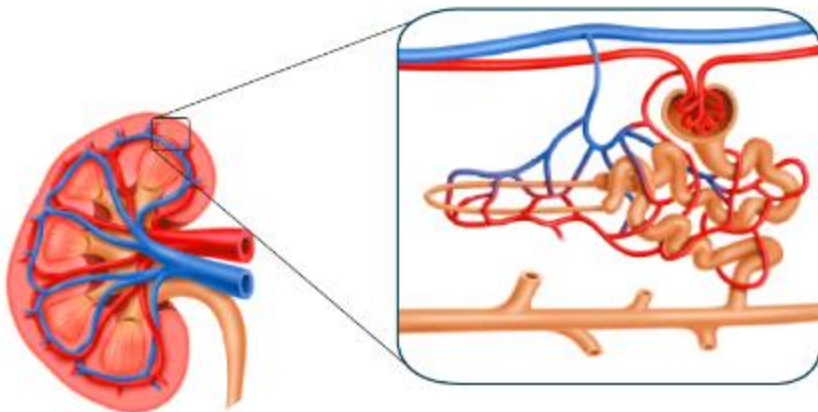
- A) Blood enters nephron units in the kidney through the renal artery.
- B) Larger molecules and red blood cells remain in the bloodstream.
- C) Blood enters the tiny capillaries in the glomerulus.
- D) Capillaries allow for water, substances, and urea to pass through the capillaries into the Bowman's capsule.

Based on the adjacent figure that demonstrates the urinary system in humans. Which of the following is a correct pathway for urine to leave the body?



- The kidneys → the bladder → the ureters → the urethra
- The kidneys → the ureters → the bladder → the urethra
- The urethra → The kidneys → the ureters → the bladder
- The urethra → the bladder → the ureters → The kidneys

What primary function do these structures have?

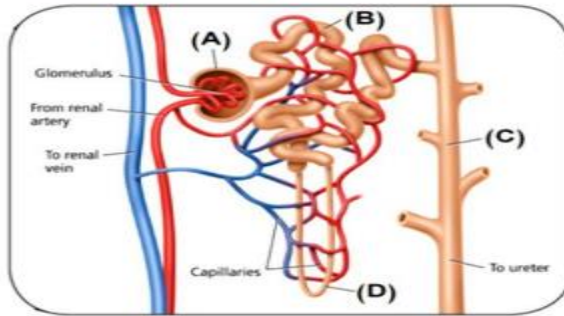


A nitrogenous waste product resulting from kidney filtration is called **urea**.

- ☐ produces blood cells
- ☐ enables external respiration
- ☐ allows water from air to be absorbed in body
- ☒ filters waste and water from body

The figure below shows the structure of the nephron, study it and answer the question:

Which letter refers to the **loop of Henle**?



- a. **A**
- b. **B**
- c. **C**
- d. **D**

Which is the function of the **excretory system**?

- a. Release energy from food as ATP molecules
- b. Transport carbon dioxide to body cells
- c. Maintain the correct amount of nutrients
- d. Remove carbon dioxide, salts, and water

Which of the following refers to a component of the **excretory system**?

مكونات الجهاز الإخراجي؟



(A)



(B)



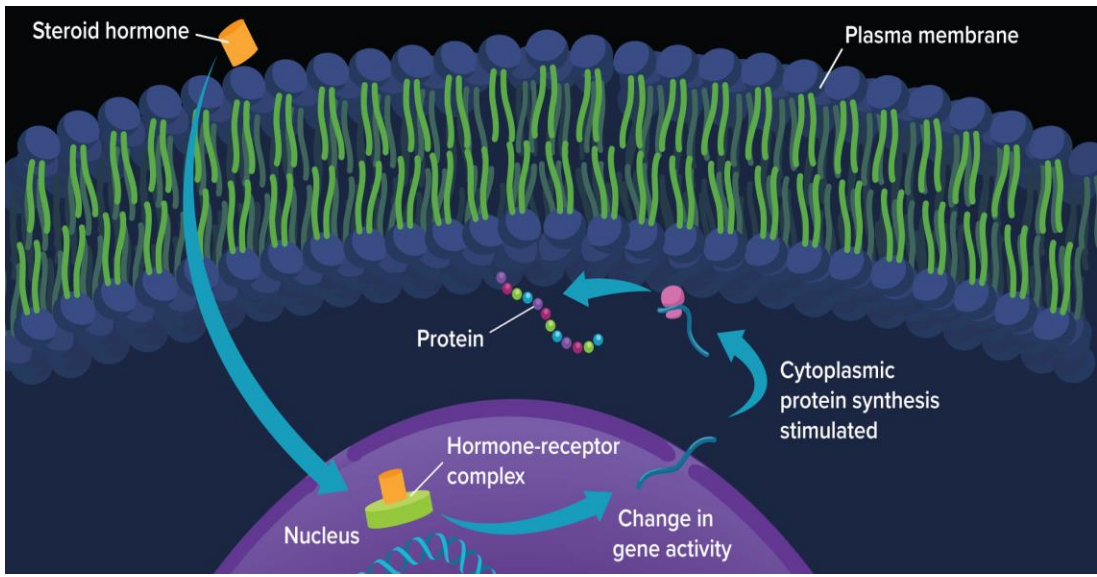
(C)



(D)

- a. **A**
- b. **B**
- c. **C**
- d. **D**

15	Compare and contrast, using visuals, the two different types of hormone actions: Steroid hormones and amino acid hormones ✓	Figure 13 ✓	195
10	Compare and contrast, using visuals, the two different types of hormone actions: Steroid hormones and amino acid hormones ✓		195



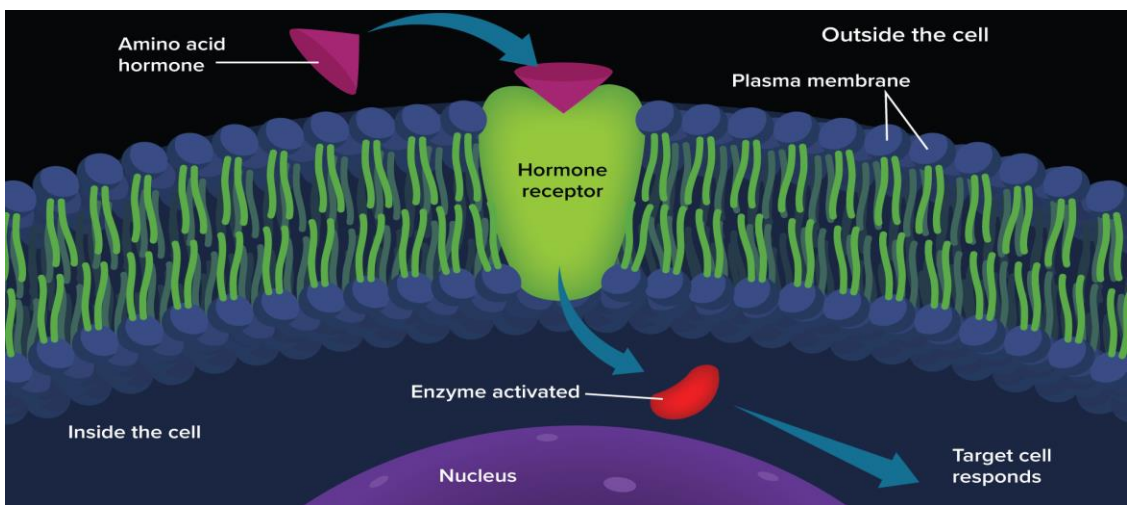
Steroid Hormones

STEROID Hormone

- Soluble in lipids
- Diffuse through plasma membrane
- Bind to receptor in the cell.
- Hormone and receptor bind to DNA in nucleus and activates the genes for protein synthesis.
- Eg: estrogen, testosterone

NONSTEROID/Amino acid hormone

- Made of amino acid.
- Cannot diffuse through plasma membrane
- Bind to receptor in plasma membrane.
- Receptor activates enzyme inside inside the membrane.
- Eg: Insulin and growth hormone



Amino Acid Hormones

Which of the following is a **structural classification** of hormones?

- a. Proteins and other nucleic acids
- ☒ b. Steroid and amino acid
- c. Nucleic acids and amino acids
- d. Steroid and other carbohydrates

What happens after the steroid hormone and its receptor bind to the DNA?

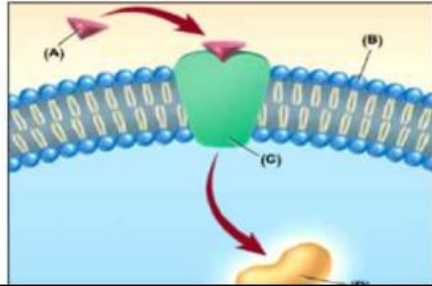
- a. The cell is destroyed.
- b. The plasma membrane is destroyed.
- ☒ c. Genes are activated.
- d. The nucleus prevents gene activation.

When do amino acid hormones bind to their receptor?

- ☐ after the target cell responds
- ☒ before entering the plasma membrane ✓
- ☐ after enzymes are activated
- ☐ after diffusing through the membrane

The figure below, shows the mechanism of action of one of the hormones, study it and then answer the following question:

Which of the following do the letters(A) and (C) refer to?



☒ (A): Amino acid hormone - ☒ (C): Hormone receptor

(C) - مستقبل الهرمون

(A): Steroid hormone - (C): Hormone receptor

(C) مستقبل الهرمون

(A): Amino acid hormone - (C): Enzymes activated

(C) - إنزيمات منشطة

(A): Steroid hormone - (C): Hormone receptor complex

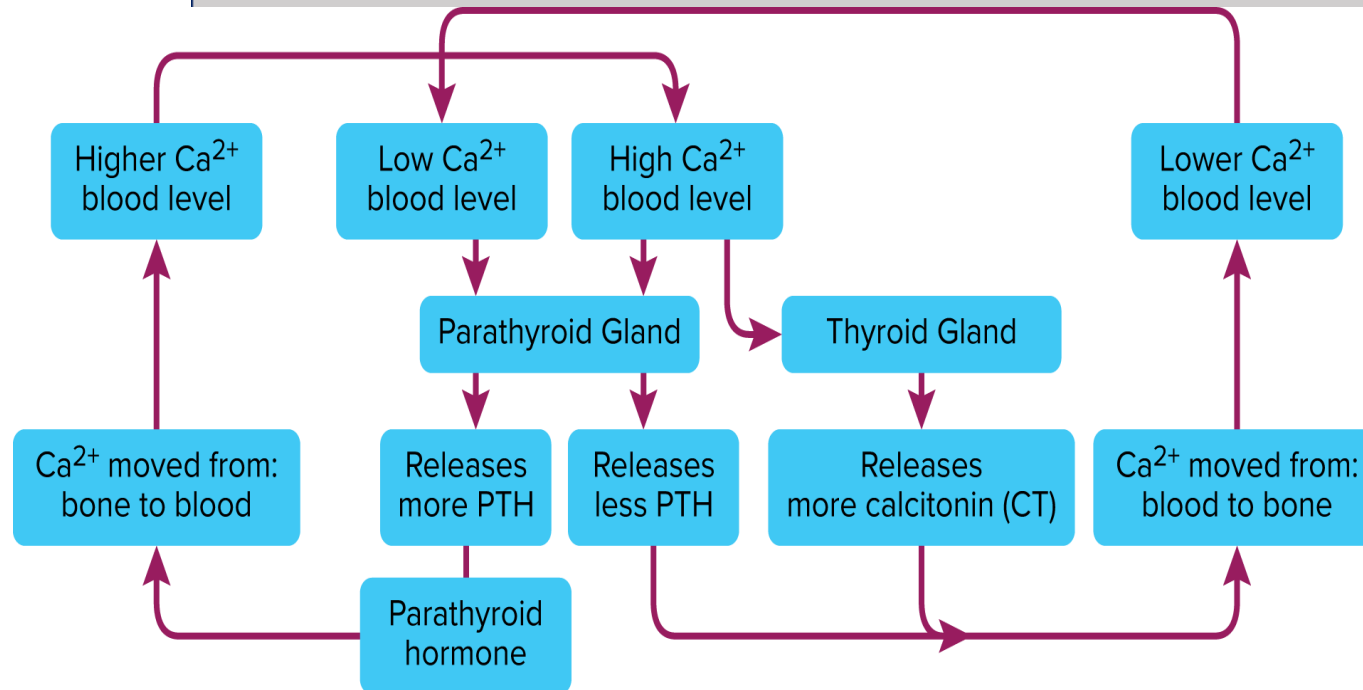
(C) مركب مستقبل الهرمون

A __ is a substance that targets specific cells to produce a response.

- ☐ gland
- ☒ hormone ✓
- ☐ mineral
- ☐ gradient

How do steroid hormones function?

- ☐ prevent binding to DNA
- ☐ prevent protein synthesis
- ☒ activate protein synthesis ✓
- ☐ strengthen the plasma membrane



Parathyroid hormone (PTH) and calcitonin (CT) regulate the level of calcium in the blood.

The thyroid and parathyroid glands have opposite effects on blood calcium levels.
As they work together they maintain **homeostasis**.

3. Which pairs of hormones have opposite effects?

A calcitonin and parathyroid hormone
CORRECT

~~epinephrine and norepinephrine~~

~~growth hormone and thyroxine~~

~~aldosterone and cortisol~~

• Parathyroid gland

Parathyroid hormone:

- ☐ increases blood calcium levels by stimulating the bones to release calcium.
- ☐ causes the kidneys to reabsorb more calcium and the intestines to absorb more calcium from food.

Thyroid gland

Calcitonin lowers blood calcium levels by signaling bones to increase calcium absorption and also signaling the kidneys to excrete more calcium.

Which of the following pairs of hormones have **opposite effects**?

Calcitonin and parathyroid hormone

Epinephrine and norepinephrine

Growth hormone and thyroxine

Aldosterone and cortisol

Which letter of the following refers to a gland that secretes the hormone thyroxine?

The letter	The gland
A	Thyroid gland
B	Para thyroid gland
C	Adrenal (the cortex)
D	Pituitary
E	Pancreas

A

B

C

D

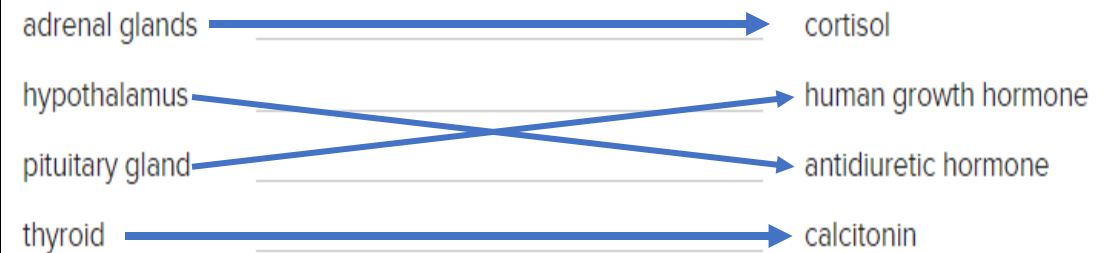
Calcitonin is a hormone that regulates calcium formation.

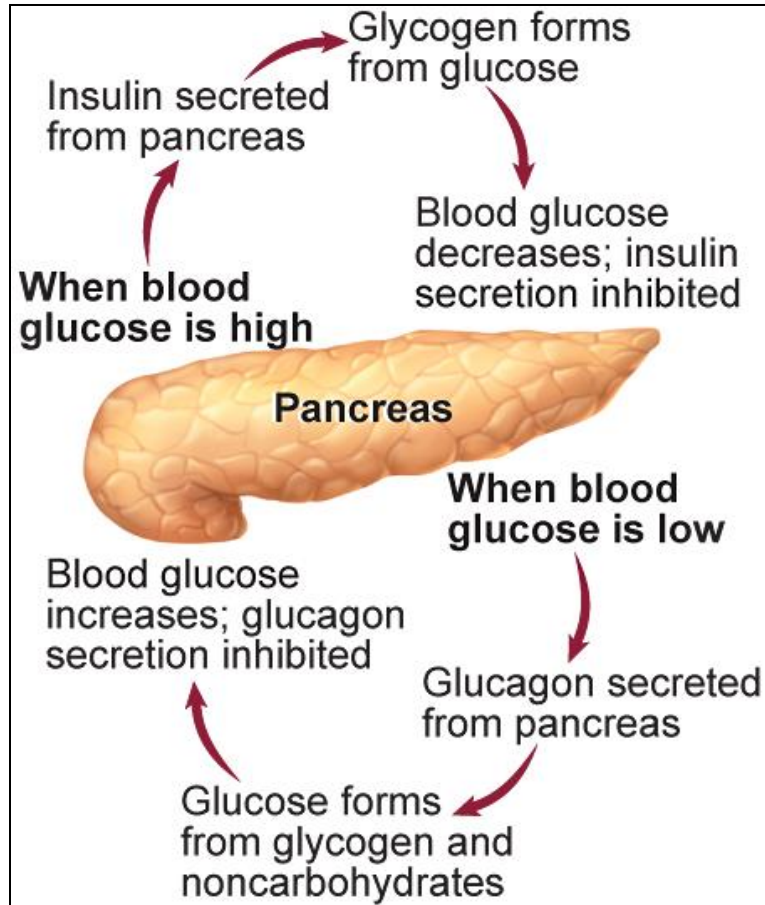
(Blank 1)

Blank 1 options

- Calcitonin
- Glucagon
- Insulin

Match the following glands with the hormones they secrete.



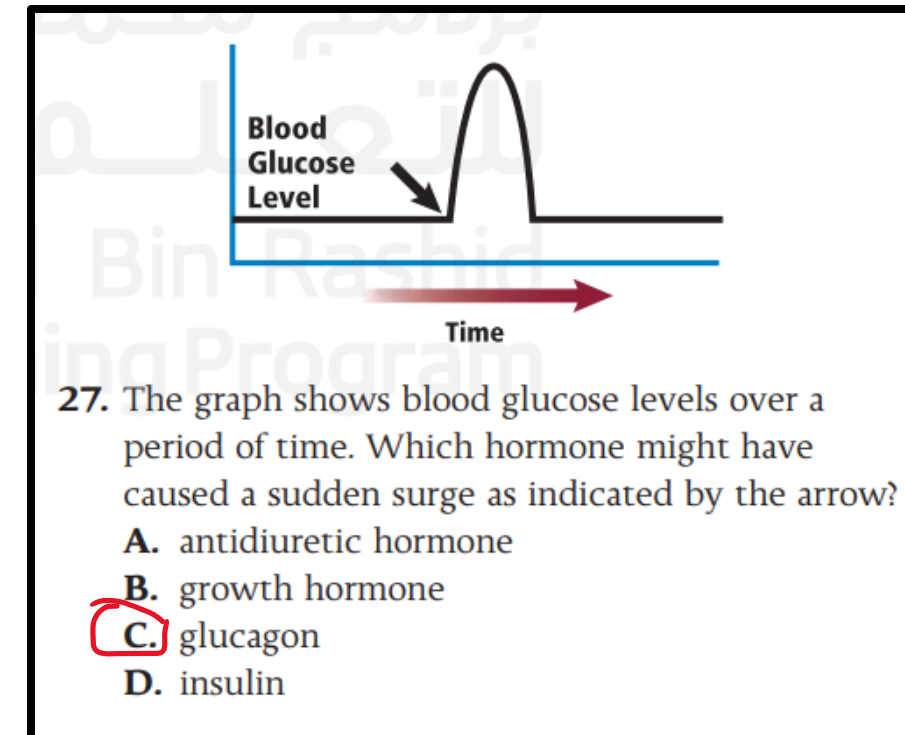


▪ **What happens when blood glucose levels are high?**

insulin signals body cells, especially liver and muscle cells, to convert glucose to glycogen, and is stored in the liver.

▪ **What happens when blood glucose levels are low?**

▪ **glucagon** is released from the pancreas. Glucagon binds to liver cells, convert glycogen to glucose and release the glucose into the blood.

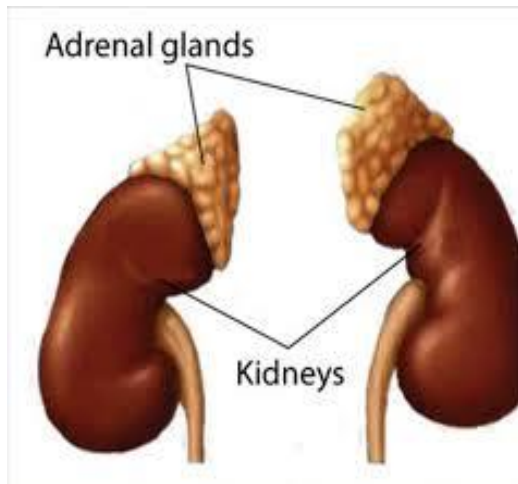


glucagon signals liver cells to produce glucose.
(Blank 1)

Blank 1 options

- Calcitonin
- Glucagon
- Pepsin

insulin is released from the pancreas when blood glucose is high.



- Located above the kidney.

Produces the following hormones called glucocorticoids:

1. **ALDOSTERONE**- Reabsorbing sodium
2. **CORTISOL**- Raise blood glucose level and reduces inflammation

At time of stress(flight or fight response) adrenal gland produces two hormones:

Epinephrine and norepinephrine -prepare body for **fight or flight response** by increasing heart rate , blood pressure, breathing rate and blood sugar



A.



B.

30. Which person is likely to have high levels of epinephrine?

- ☒ A. person A C. both persons
☐ B. person B D. neither person

Which hormones are released from nerve cells rather than from endocrine glands?

Antidiuretic hormone and oxytocin

Epinephrine and norepinephrine

Growth hormone and thyroxine

Aldosterone and cortisol

Which endocrine gland would provide a burst of energy to a person moving out of the way of a speeding bicycle?

a. Parathyroid

b. Pituitary

c. Thyroid

d. Adrenal

Which of the following hormone is released from the pancreas when blood glucose is high?

Learning Outcomes Covered

- BIO.3.1.01.062
- BIO.3.1.01.070


a. Calcitonin


b. Glucagon


c. Aldosterone


d. Insulin

4. Which person is likely to have high levels of epinephrine?


 a person who is asleep


 a person who is relaxing


 a person who is frightened **CORRECT**


 a person who is dehydrated

2. Which hormones are released from nerve cells rather than from endocrine glands?

 antidiuretic hormone and oxytocin **CORRECT**

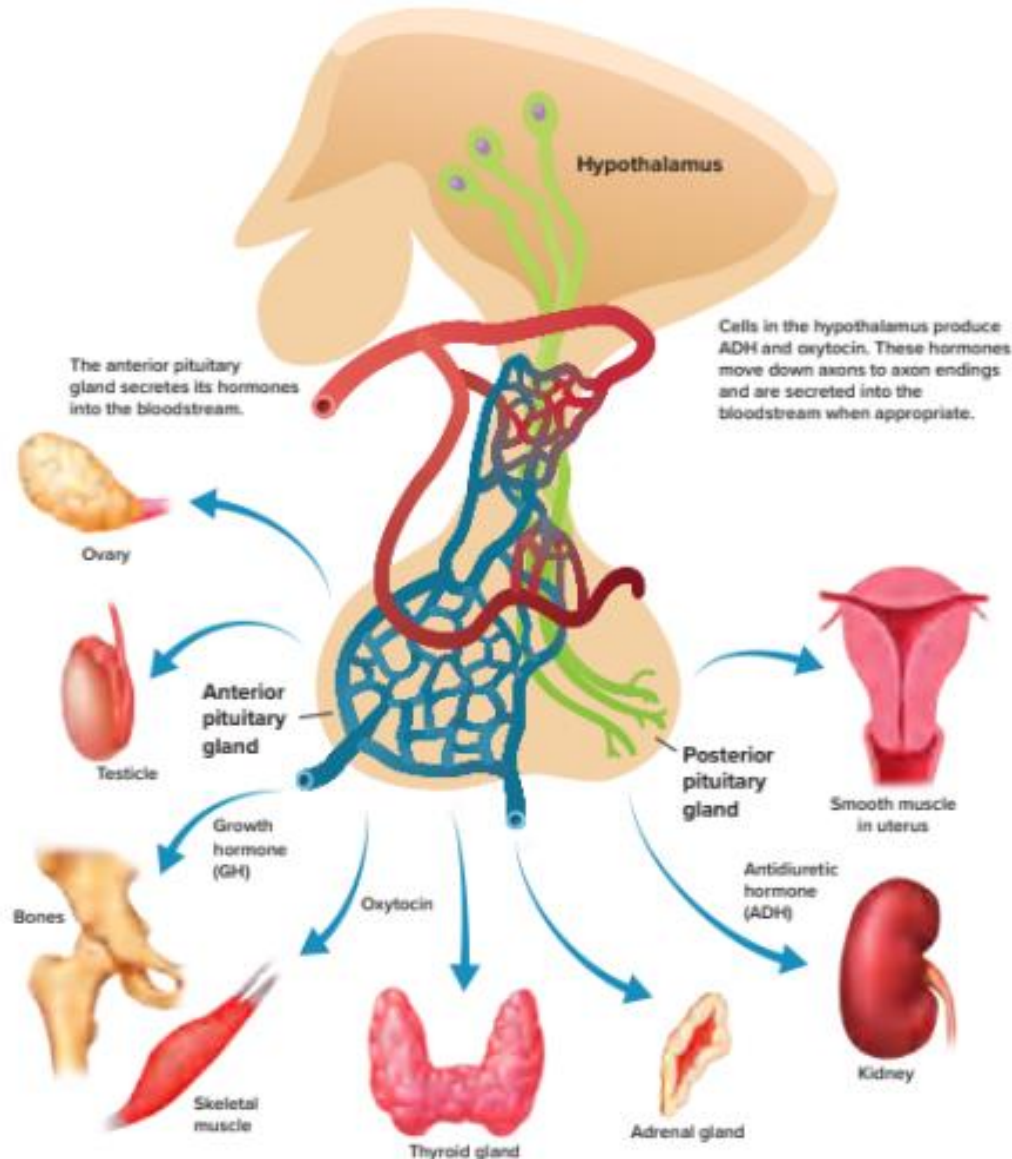
 insulin and glucagon

 growth hormone and thyroxine

 norepinephrine and epinephrine



Hypothalamus serve as a maintains homeostasis by serving as link between endocrine system and nervous system



The hypothalamus produces two hormones, **oxytocin** and **antidiuretic hormone**.

The **antidiuretic hormone (ADH)** functions in homeostasis by **regulating water balance.**

In the case of dehydration, the antidiuretic hormone binds to kidney cells **receptors** causing.....

a. The kidney to reabsorb more water and increase the amount of water in the urine

b. The kidney to excrete more water and decrease the amount of water in the urine

c. The kidney to excrete more water and increase the amount of water in the urine

d. The kidney to reabsorb more water and decrease the amount of water in the urine

البول

بول

Which of the following glands secretes hormones that regulate many body functions and is located at **the base of the brain**?

Learning Outcomes Covered

- BIO.3.1.01.070
- BIO.3.1.01.086

a. Thyroid

b. Adrenal

c. Parathyroid

d. Pituitary

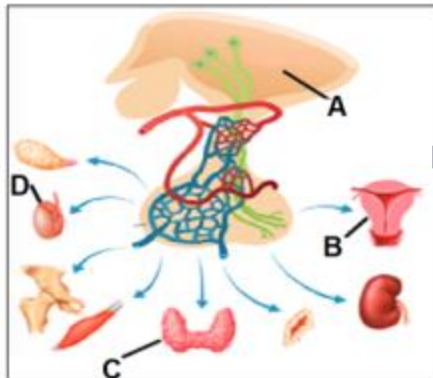
a thyroid gland in the below picture?

a. A

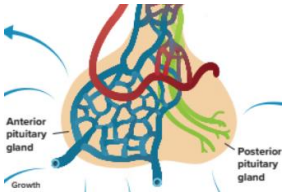
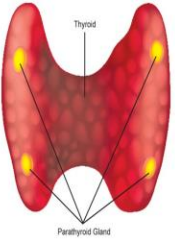
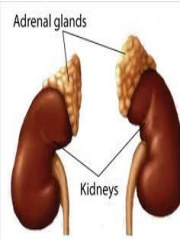

b. B

c. C

d. D



A-- hypothalamus
B - smooth muscles in uterus
C- thyroid gland
D-testes

ENDOCRINE GLANDS	HORMONES	FUNCTION
 <p>PITUITARY GLAND-master gland (base of brain)</p>	<p>-Human growth hormone(HgH)</p> <p>-</p>	Regulates physical growth by stimulating cell division in bones and muscles
 <p>THYROID (throat)</p>	Thyroxine	High rate of metabolism in cells
	Calcitonin	Lowers blood <u>calcium</u>
<p>PARATHYROID (throat)</p>	Parathyroid hormone	Increases blood <u>calcium level</u>
 <p>ADRENAL GLAND (Above kidney)</p>	Aldosterone	Reabsorbs sodium
	Cortisol	Raise blood glucose level
	Epinephrine and norepinephrine	Prepare body for <u>fight or flight</u> response
 <p>PANCREAS (below stomach)</p>	Insulin	<u>Lowers blood glucose level</u>
	Glucagon	<u>Raises blood glucose level</u>



It's Exam Time!
Here's a **BIG**

**GOOD
LUCK!**

wish to you

MLEIH Cycle 3 Girls School, Abu Dhabi

2023-2024

Prepared by : RAHNA MOHAMMED

Cycle 3 Biology