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**Fill below blocks.**

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**Q (01):**

 **Write anterior compartment of thigh and posterior compartment of leg muscles with origin, insertion and action. (10)**

**Answer:**

**Anterior Compartment of Thigh:**

The anterior compartment contains the Sartorius muscle (the longest muscle in the body) and the quadriceps femoris group, which consists of the rectus femoris muscle and the three vasti muscles—the vactus lateralis, vactus intermedius, and the vactus medialis

**The anterior compartment of thigh contains muscles which extend the knee and flex the hip.**

**Structure:**

The anterior compartment is one of the facial compartments of the thigh that contains groups of muscles together with their nerves and blood supply. The Anterior compartment of thigh contains the saitous muscle (the longest muscle in the body) and the Quadriceps femoris group, which consist of the rectus femoris muscle and the three vasti muscles-

The iliopsoas is sometimes considered a member of the anterior compartment muscles as the articularis genus muscle.

**Nerve Supply**:

The nerve of the anterior compartment of thigh is the femoral nerve innervation for the quadriceps muscles come from the posterior division of the femoral nerve, while the anterior division (which contains cutaneous as well as muscular components) gives a lateral and a medial branch, the second being responsible for the innervation of the Sartorius muscle. The illiacus and the psoas major and psoas minor muscles, sometimes considered part of the anterior compartment, do not share the same innervation. Whenever the illacius is innervated by the femoral nerve, the psoas is innervated by ventral rami of L1-L3.

**Blood supply:**

When the external iliac artery crosses the inguinal ligament, it becomes the femoral artery, which supplies blood to the anterior compartment and is the largest blood vessel of the inferior member.

**Muscles of anterior compartment:**

1. **Tensor fascia lata**
2. **Sartorius**
3. **Quadriceps femoris:**

**It is further divide into four sub types which are as follows:**

* Rectus femoris
* Vastus lateralis
* Vastus medialis
* Vastus intermedius
1. **Articularis genus**

**Posterior compartment of leg:**

The posterior compartment of the leg is one of the fascial compartments of the leg and is divided into deep and superficial compartments.

**Muscles:**

**Flexor hallucis longus muscle:**

* **Origin:**

 inferior two-third ofposterior surface of fibula; inferior part of the interosseous membrane.

* **Insertion:**

 base of distal phalanx of big toe(hallux).

* **Action:**

flexes big toe at all joints; weakly plantar flexes ankle; supports medial longitudinal arch of foot

**Tibialis posterior muscle:**

* **Origin:**

 interosseous membrane; surface of tibia inferior to soleal line; posterior surface of fibula.

* **Insertion:**

 tuberosity of navicular cuneiform, cuboid, an sustentaculum tali of calcaneus; bases of 2nd, 3rd and 4th metatarsals.

* **Action:**

 plantar flexes ankle; inverts foot.

**Flexor digitorum longus muscle:**

* **Origin:**

 medial part of posterior surface of tibia; by a broad tendon to fibula.

* **Insertion:**

basis of distal phalanges of lateral four digits.

* **Action:**

flexes lateral four digits; plantar flexes ankle; supports longitudinal arches of foot.

**Popliteus muscle:**

* **Origin:**

 lateral surface of lateral condyle of femur and lateral meniscus.

* **Insertion:**

 animation posterior surface of tibia, superior to soleal line.

* **Action:**

 weekly flexes knee and unlocks it by rotating femur 5 deg on fixed tibia; medially rotates tibia of unplanted limb.

**Q (02):**

 **Define the following (10).**

1. **Endocrine gland**
2. **Exocrine gland**
3. **Thalamus**
4. **femoral triangle**

**Answer:**

 **Endocrine gland:**

**Definition:**

 An organ that makes hormones that are released directly into the blood and travel to tissues and organs all over the body. Endocrine glands help control many body functions, including growth and development, metabolism, and fertility is known as endocrine gland.

**Examples:**

Some examples of the endocrine glands are the pituitary thyroid and adrenal glands.

**Exocrine gland:**

**Definition:**

A gland that makes substances such as sweat, tears, saliva, milk, and digestive juices, and release them through a duct or opening to a body surface.

**Examples:**

 Some examples of exocrine glands are sweat glands, lacrimal glands, salivary glands, and digestive glands in the stomach, pancreas, and intestines.

**Thalamus:**

**Definition:**

 The thalamus is a large mass of gray matter located in the dorsal part of the diencephalon (a division of the forebrain). Nerve fibers project out of the thalamus to the cerebral cortex in all directions, allowing hub-like exchanges of information. It has several functions, such as relaying of sensory signals is known as thalamus.

**Femoral triangle:**

**Definition:**

The femoral triangle is an anatomical region of the upper human thigh. It is a subfascial space which in living people appears as a triangular depression inferior to the inguinal ligament when the thigh is flexed, abducted and laterally rotated.

**Q (03):**

 **Write the Extraocular muscles. Enlist both voluntary and involuntary. (10)**

**Answer:**

**Extraocular muscles:**

**Definition:**

The extraocular muscles are located within the orbit, but are extrinsic and separate from the eyeball itself. They act to control the movements of the eyeball and the superior eyelid.

**Voluntary muscles:**

* + - Superior rectus
		- Inferior rectus
		- Medial rectus
		- Lateral rectus
		- Superior oblique
		- Inferior oblique
		- Levator palpebrae superoris.

**Involuntary muscles:**

* + - Superior tarsal or Muller’s muscle.
		- Inferior tarsal muscle.

**Q (04):**

 **Describe the arches of foot and functions of arches. (10)**

**Answer:**

**Arches of foot:**

 The arches of the foot formed by the tarsal and metatarsal bones, strengthened by ligaments and tendons, allow the foot to support the weight of the body in the erect posture with the least weight.

The foot has three arches: two longitudinal (medial and lateral) arches and one anterior transverse arch. These arches are formed by the tarsal and metatarsal bones and are supported by the ligaments and tendons in the foot.

The arches shape is designed in a similar manner to spring; bears the weight of the body and absorbs the shock that is produced with locomotion. The foot's flexibility conferred by the arches is what facilitates everyday loco-motor functions such as walking and sprinting. The energy-sparing spring theory of the foot’s arch has become central to interpretations of the foot’s mechanical function and evolution. The metabolic energy saved by the arch is largely explained by the passive-elastic work it supplies that would otherwise be done by active muscle.

**Medial Arch:**

The medial arch is the higher of the two longitudinal arches. It is made up of the [calcaneus](https://www.physio-pedia.com/Calcaneus), the [talus](https://www.physio-pedia.com/Talus), the [navicular](https://www.physio-pedia.com/Navicular_stress_syndrome), the three cuneiforms, and the first, second, and third [metatarsals](https://www.physio-pedia.com/Metatarsal_Fractures). Its summit is at the superior articular surface of the talus, and its two extremities or piers, on which it rests in standing, are the tuberosity on the plantar surface of the calcaneus posteriorly and the heads of the first, second, and third metatarsal bones anteriorly.

The chief characteristic of this arch is its elasticity, due to its height and to the number of small [joints](https://www.physio-pedia.com/Joint_Classification) between its component parts. Its weakest part, i. e., the part most liable to yield from overpressure, is the joint between the talus and navicular, but this portion is braced by the plantar calcaneonavicular ligament, which is elastic and is thus able to quickly restore the arch to its pristine condition when the disturbing force is removed.

The ligament is strengthened medially by blending with the deltoid ligament of the ankle joint and is supported inferiorly by the tendon of the [Tibialis posterior](https://www.physio-pedia.com/Tibialis_Posterior), which is spread out in a fan-shaped insertion and prevents undue tension of the ligament or such an amount of stretching as would permanently elongate it. The arch is further supported by the plantar aponeurosis, by the small muscles in the sole of the foot, by the tendons of the [Tibialis anterior](https://www.physio-pedia.com/Tibialis_Anterior) and [posterior](https://www.physio-pedia.com/Tibialis_Posterior) and [Peroneus longus](https://www.physio-pedia.com/Peroneal_%28Fibularis%29_Longus), and by the ligaments of all the articulations involved.



**Lateral Arch:**

The lateral arch is the flatter of the two longitudinal arches and lies on the ground in the standing position. It is composed of the calcaneus, the cuboid, and the fourth and fifth metatarsals. Its summit is at the talocalcaneal articulation, and its chief joint is the calcaneocuboid, which possesses a special mechanism for locking, and allows only a limited movement. The most marked features of this arch are its solidity and its slight elevation; two strong ligaments, the long plantar and the plantar calcaneocuboid, together with the Extensor tendons and the short muscles of the little toe, preserve its integrity.



While these medial and lateral arches may be readily demonstrated as the component anterior-posterior arches of the foot, yet the fundamental longitudinal arch is contributed to by both, and consists of the calcaneus, cuboid, third cuneiform, and third metatarsal: all the other bones of the foot may be removed without destroying this arch.

 **Transverse Arch:**

In addition to the longitudinal arches the foot presents a series of transverse arches. The transverse arch is located in the coronal plane of the foot. At the posterior part of the metatarsus and the anterior part of the tarsus the arches are complete, but in the middle of the tarsus they present more the characters of half-domes the concavities of which are directed downward and medial, so that when the medial borders of the feet are placed in apposition a complete tarsal dome is formed. The transverse arches are strengthened by the interosseous, plantar, and dorsal ligaments, by the short muscles of the first and fifth toes (especially the transverse head of the Adductor hallucis), and by the Peroneous longus, whose tendon stretches across between the piers of the arches.

**Functions of arches:**

**Weight bearing**:

 The arches of the foot have an important role in weight bearing during standing the weight of the body is distributed throughout the bones in the foot by the arches. The weight is transmitted from the tibia to the talus, before being transmitted posteriorly t the calcaneus. It is also transitted anteriorly to the navicular cuneiforms and metatarsals. The lateral longitudinal arch is mostly involved I transmitting this weight and makes more contact with the ground than the medial one.

**Movement:**

The medial longitudinal arch also has an important role in shock absorption and propulsion during walking, running and jumping. The arch acts like a springboard, as its anterior pillar is point of take-off during these activities. The process of walking is referred to as the gait cycle and this consist of two phases; a stance phase, the forefoot pronates which flattens and the medial longitudinal arch and the transverse arch. During the swing phase the hind foot supinates which causes the medial longitudinal arch to elevate. This high arch acts as a rigid lever for propulsion.

**Q (05):**

**Write a note on cerebrum, its lobes and functions. (10)**

**Answer:**

**Cerebrum:**

**Definition:**

The cerebrum or telencephalon is the largest part of the brain containing the cerebral cortex (of the two cerebral hemispheres), as well as several subcortical structures, including the hippocampus, basal ganglia, and olfactory bulb.

In human brain cerebrum is the uppermost region of the central nervous system. The prosencephalon or forebrain is the embryonic structure from which the cerebrum develops prenatally. In mammals, the dorsal telencephalon, or pallium, develops into cerebral cortex and the ventral telencephalon, or sub pallium because the basal ganglia. The cerebrum is also divided into approximately symmetric left and right cerebral hemispheres

**Structure:**

The cerebrum is the largest part of the brain. Depending upon the position of the animal it lies in front or on top of the brainstem. In humans, the cerebrum is the largest and best-developed of the five major divisions of the brain.

 The cerebrum is made up of the two cerebral hemispheres and their cortices (the outer layers of grey matter), and the underlying regions of the white matter. Its subcortical structures include the hippocampus, basal ganglia and olfactory bulbs.

The cerebrum consists of two C-shaped cerebral hemispheres, separated from each other by a deep fissure called as the longitudinal fissure.

**Lobes and functions of the cerebrum:**

The cerebrum is divided into four regions called lobes that control senses, thoughts, and movements. The four lobes are the occipital, temporal, frontal, and parietal lobes. Although each lobe has a different task to perform, they all must work together**.**

**Occipital lobe:**

**Definition:**

It is the posterior lobe of each cerebral hemisphere that bears the visual cortex and has the form of a 3-sided pyramid. The occipital lobe is one of four major brain lobe pairs in the human brain. The occipital lobe is so named because it rests below the occipital bone of the skull. It is also the smallest of the lobes.

There are actually two occipital lobes — one on each hemisphere of the brain. The central cerebral fissure divides and separates the lobes. The occipital lobes are located on the rear part of the upper brain. They sit behind the temporal and parietal lobes and above the cerebellum, separated from the cerebellum by a membrane called the tentorium cerebelli.

The surface of the occipital lobe is a series of folds, including ridges called gyri and depressions called sulci. Because there is no ordered structure to the occipital lobe, scientists use these sulci and gyri to identify the area of the lobe. Apart from these, there are no structural distinctions in the lobes. Scientists separate the lobes further based on basic function.

The occipital lobe itself contains different sections, or areas, and each of these has a different set of functions. These include:

* the lateral geniculate bodies
* the lingula
* the primary visual cortex, known as Brodmann area 17 or V1
* the secondary visual cortex, known as Brodmann areas 18 and 19 or V2, V3, V4, V5, which surrounds the primary cortex.
* the dorsomedial stream

**Function:**

The occipital lobe, found in the back of your cerebrum, plays a role in processing visual information. It can be related to oculus, the Latin word for eye.

In general, the occipital lobe deals with aspects of vision, including:

* distance
* depth perception
* color determination
* object recognition
* movement
* face recognition
* memory information

Humans also have binocular perception due to the fact that the occipital lobes on either hemisphere also receive visual information from both of the retinas. Because this combines two images into one image in the brain, it helps give more depth and provide spatial awareness of the environment. That said, the visual world is highly complex. Because of this, the process of decoding this information is also very complex.

**Temporal lobe:**

**Definition:**

The temporal lobe is one of the four major lobes of the cortex. The temporal lobe sits at the bottom middle portion of the brain, just behind the temples within the skull, which is also where it gets its name. It also sits above the brain stem and cerebellum. The frontal and parietal lobes are above the temporal lobe. The occipital lobe sits just behind it.

**Key structures that are part of the temporal lobe include:**

* Wernicke’s area
* Broca’s area
* limbic system

These structures also span other lobes. For example, Wernicke’s area extends into the parietal lobe, and Broca’s area is part of the frontal lobe.

**Functions:**

The function of the temporal lobe centers around auditory stimuli, memory, and emotion. The temporal lobe contains the primary auditory complex. This is the first area responsible for interpreting information in the form of sounds from the ears. The temporal lobe receives different frequencies, sounds, and pitches from the ears, and gives them meaning.

As part of this process, the temporal lobe is responsible for selective hearing in humans. Selective hearing helps filter out the unnecessary frequencies so that a person can focus on the important sounds from the environment. There is a visual aspect to the temporal lobe as well. The temporal lobe helps establish object recognition, including complex objects, such as faces.

Lastly, the temporal lobe plays a role in understanding and giving meaning to language. This makes language distinguishable and understandable.

There are two temporal lobes, one in each hemisphere- close to where your ears are. Its primarily functions in auditory processing. However, it may also be involved in emotion, learning and pronunciation/learning a new language. If you hear a loud tempo or beat, you may cover your eyes, thus blocking the sounds from getting to your temporal lobe.

**Frontal lobe:**

**Definition:**

The largest foremost part of the brain. This part constitutes about one third of the brain and is much more fully developed than in any other primate. Damage to the frontal lobe causes general disturbance of thinking, impairment of initiative and spontaneity, loss of strength of personality, and it the rear part of the lobe is affected, paralysis**.**

**Some important structures in frontal lobe:**

Most neuroscientists divide the frontal lobe into four distinct regions, each containing a number of vital structures. Those include:

* **Medial frontal lobe:** This region contains the cingulate gyrus, which is a part of the limbic system. It also contains the superior frontal gyrus; which research suggests plays a role in self-awareness.
* **Lateral frontal lobe:** This region contains the superior frontal gyrus, which aids in self-awareness, as well as the middle frontal and inferior frontal gyrus. The inferior frontal gyrus plays a role in language processing.
* **Polar region:** This region is home to the front marginal gyrus, as well as the transverse frontopolar gyri.
* **The orbital frontal lobe**: It contains a number of structures, including the anterior orbital gyrus, medial orbital gyrus, posterior orbital gyrus, and gyrus rectus. The orbital gyri is connected to the vagus nerve, an important part of the limbic system that coordinates and controls emotional and automatic reactions.

**Functions:**

Some of the many functions of the frontal lobe include:

* Coordinating voluntary movements, such as walking and reaching for objects. The frontal lobe is home to the primary motor cortex.
* Assessing future consequences of current actions. Thus the frontal lobe plays a vital role in impulse control, including decisions about when to spend money and eat, and whether a particular decision is morally or socially acceptable.
* Assessing similarities and differences between two objects.
* Formation and retention of long-term memories, particularly emotional memories derived from the limbic system.
* Language: The frontal lobe plays a role in understanding language, linguistic memories, and speaking.
* Emotional expression and regulation, in addition to understanding the emotions of others; empathy may derive from the frontal lobe.
* The development of personality. Because of the frontal lobe's roles in memory, emotional regulation, expression, impulse control, and other key functions, it plays a key role in personality. Damage to the frontal lobe can spur sudden and immediate alterations in personality.
* Managing reward. Dopamine, a neurotransmitter that plays a role in reward and motivation, is heavily active in the frontal lobe because most of the brain's dopamine-sensitive neurons located here.
* Attention regulation, including selective attention. Frontal lobe difficulties can lead to executive functioning issues, as well as disorders such as ADHD.

It allows you to solve a complex task, undergo voluntary movement of your body parts, from complete sentences, and is responsible for your personality traits. Think about the last time you had a difficult exam, what was your first reaction? You probably put you elbow on the table and your hand on your forehead. Precisely where your frontal lobe is located.

**Parietal lobe;**

**Definition:**

The parietal lobe is one of the four major lobes of the cerebral cortex in humans. It sits near the upper back portion of the skull, close to the parietal bone. In the brain, the parietal lobe is located behind the frontal lobe. A boundary called the central sulcus separates the two lobes. The parietal lobe also sits above the temporal lobe, with the Sylvian fissure, or lateral sulcus, separating the two.

The occipital lobe is behind and slightly underneath the parietal lobe. The parieto-occipital sulcus divides these two lobes. Like the brain itself, the parietal lobe is divided into two hemispheres by the central furrow, or medial longitudinal fissure. The parietal lobe relies heavily on many other areas of the body to receive information.

**For Example:**

For example, the skin and nerves in the skin play a large part in detecting sensory information and delivering it to the parietal lobe. The parietal lobe itself also sends this information to other parts of the brain for interpretation. Many everyday functions require the use of multiple lobes in the brain.

## **Anatomy:**

The following are some key areas of the parietal lobe:

### **Somatosensory cortex:**

The somatosensory cortex in the front part of the parietal lobe resides in two areas: the postcentral gyrus and the posterior paracentral lobule. It helps process and interpret touch sensations and helps discriminate between them. For example, it helps with telling the difference between something that is cold and something that is painful.

### **Superior parietal lobule:**

This area of the brain is involved in memory. It also includes the parietal association cortex, which coordinates and integrates information from all the senses.

### **Super marginal gyrus:**

This part of the brain contains part of Wernicke’s area, which is important for speech.

### **Angular gyrus:**

The angular gyrus is a small, triangular area in the parietal lobe. It helps the brain associate symbols and meaning and assists with word recognition. This gives the brain the ability to assign meaning and name objects in the environment. It also helps use symbols and language, thus playing a role in abilities such as drawing, reading, and reasoning. This helps a person understand written words and mathematical equations.

Damage to the angular gyrus, on the dominant side, can cause Gerstmann’s syndrome. Gerstmann’s syndrome is characterized by:

* an inability to write
* an inability to perform arithmetic
* difficulty recognizing which finger is which
* trouble differentiating the right from the left side of the body

**Function:**

The following are some of the main functions of the parietal lobe:

**Sensory processing:**

The parietal lobe deals with many sensations, including:

* touch
* pressure
* pain
* heat
* cold
* tension

These are the somatic senses, meaning that they come from the body. The information from these senses helps a person form physical sensations taken from the world around them.

In order to carry out this function, the parietal lobe receives sensory information from all over the body.

The parietal lobe also plays a role in a person’s ability to judge size, shape, and distance. Additionally, it helps with the interpretation of symbols. This includes those in written and spoken language, mathematical problems, and codes and puzzles.

Hearing and visual perception, as well as memory, are also part of the parietal lobe’s functions.

**Navigation and control:**

The parietal lobe also plays a role in functions such as navigation and controlling the body, as well as understanding spatial orientation and direction. A person’s dominant hand will often determine which side of the parietal lobe is more active. A person who is right-handed may have a more active left hemisphere parietal lobe. The left lobe tends to deal more with numbers, letters, and symbols. The right hemisphere may be more active in people with a dominant left hand. This hemisphere is associated with image interpretation and spatial relationships.

That said, these distinctions do not limit the other side of the lobe. Everyone uses both the right and left sides of the parietal lobe and brain.

It functions in general sensations and feelings. If you stand too close to a campfire, you probably take a few steps backwards to avoid the excessive heat. Building a snowman without gloves may also bring you discomfort, but your parietal lobe helps to communicate this information with the rest of your brain. Although all sensations are not bad, it I important to point out how they help us avoid potentially harmful situations. The parietal lobe is found in between the frontal and occipital lobe.

**END**