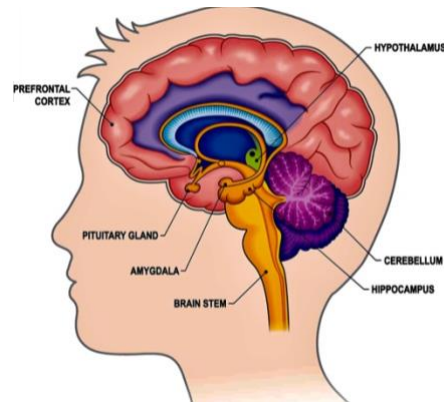




INTRODUCTION TO THE BRAIN



Part 1:

What do you think of when someone mentions the BRAIN? Do you think of a wrinkly pink ball that looks like a big glob of chewed gum? Or maybe you think of zombies, running through an APOCALYPTIC (*catastrophic*) world screaming “BRAAAAINS!” But what really is the BRAIN? The brain is an ORGAN, just like your liver, heart, kidneys, or stomach. Unlike other organs, however, your brain controls all of what you do - from breathing, to walking, to sleeping, to swimming. The brain holds all your memories, helps you to problem solve, and allows you to act quickly in the face of danger. Even though the brain is an incredibly powerful and important part of our bodies, it only weighs about THREE pounds - roughly the same weight as a laptop, a small toaster, or half a gallon of milk. These seemingly small three pounds are capable of changing the world, building meaningful connections with others, and producing new ideas that have never been shared before.

Spell BRAIN ORGAN

K: What word meant catastrophic? APOCALYPTIC

SO: The brain is considered an organ. What’s another organ found in the human body? (LIVER, HEART, KIDNEY, STOMACH, etc.)

M: The brain weighs about _____ pounds. (THREE)

PK: Is the brain LIGHT or HEAVY? (LIGHT)



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Here's a mind-blowing fact: your brain creates enough ELECTRICITY to power a lightbulb! Yes, - your brain produces electricity! Just like the electricity that flows through your house or causes lightning bolts. The brain works by firing off electrical SIGNALS that tells the rest of your body exactly what to do. These electrical signals travel through your brain between MICROSCOPIC (*unable to be seen with the human eye*) cells called NEURONS. How many neurons do you think one person has in their brain? One hundred? One thousand? A hundred thousand? A million? Believe it or not, your brain contains 100 BILLION neurons! Using electrical signals, these neurons are constantly sending messages to each other about your body, your environment, your past experiences, your present moment, and your future plans. In fact, the neurons in your brain send more messages to each other than all the phones in all the world! As your brain works to understand this paragraph, neurons are sending messages throughout your brain like billions of tiny electric ping-pong balls bouncing around at hyper speed. Some neurons control your breathing, some control your senses, and some are processing the words you hear and what they mean. That's a lot of work for a three-pound organ!

Spell: ELECTRICITY SIGNALS NEURON

K: Does the brain contain millions or billions of neurons? BILLIONS

M: How many billions of neurons does the brain contain? 100

K: What word means "unseen by the human eye"? MICROSCOPIC

K: Electrical signals travel through your brain between neurons. Neurons are microscopic ____? CELLS

SO: Name one thing neurons control. (BREATHING, SENSES, PROCESSING WORDS)

Another fascinating fact about the brain is that it is MALLEABLE, meaning it can *physically change*. While the brain itself will always stay the same size and shape, the neurons inside the brain can create new connections, change the way they communicate, or even disappear entirely. This is all based on our EXPERIENCES and NEW INFORMATION that we learn. Think of something you used to not be able to do – maybe riding a bike? Holding a pencil? Even walking? Now, you can do many things without having to think about exactly how to do them. Through

Known, Prior Knowledge, Semi – Open, Open, Math, VAKT



REPETITION and PRACTICE, your brain creates special PATHWAYS for different skills. Now your neurons can send messages on how to “ride a bike” or “hold a pencil” with the new pathways created. You barely even have to think about doing these skills anymore. These changes and rewiring in the brain from learning new skills is called NEUROPLASTICITY.

Spell: MALLEABLE PATHWAYS

K: The brain stays the same size and shape. Inside the brain, what can create new connections or even disappear? NEURONS

K: Neurons can physically make changes inside the brain based on _____ and _____? EXPERIENCES, NEW INFORMATION

K: Your brain creates special pathways for different skills learned by _____ and _____. REPETITION, PRACTICE

K: The rewiring and changes from learning new skills is called _____? NEUROPLASTICITY

O: What is something you have learned to do that doesn't require a lot of thought anymore?

O: What “pathway” in your brain would you like to strengthen - that is, what is something you would like to get better at doing?

Now, let's learn three more interesting facts about the brain, then we can start to learn exactly how each part of the brain works!

1) EXERCISE helps your brain to learn! When you exercise, your brain produces a CHEMICAL that allows it to take in more information. So, the next time you're having trouble trying to learn something new, kicking a soccer ball, doing some jumping jacks, dancing, or whatever exercise you like to do might just help!

2) The brain does not stop developing until you are about 25 years old! So, as you get older, and especially as you become a teenager, you might start to feel like you know everything. But at least wait until you are 25 before you make that claim!



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3) The average person has around 4-7 DREAMS a night - even if they don't remember them! No one knows exactly why our brain causes us to dream at night, but it is generally thought to be a combination of IMAGINATION, what we thought about during the day, and what is happening around us. So, if you fall asleep watching a movie, you might dream about the characters, while also including people you saw that day and some of your brain's own creative twists!

Spell DREAM EXERCISE CHEMICAL IMAGINATION

SO: What is one way that you like to exercise or move your body?

K: The brain is fully developed at what age? 25 YEARS OLD

M: Subtract your age from 25. How many years do you have before your brain is fully developed? 15 YEARS

O: How would you generally describe your dreams? Are they boring? Weird? Silly? Scary? Funny? Or do you not remember them?

Part 2:

Now, we are going to talk about 4 major parts of the brain. The brain has lots of different parts that have UNIQUE responsibilities, but these four main parts will help us understand a little more about why we do what we do, how we feel, and the role our brain plays in our everyday life.

First, let's talk about the CEREBRUM (sr·ee·bruhm). The cerebrum is the largest part of the brain, and it controls the way our body MOVES. Think of it like our own personal basketball COACH, helping us get our ball into a hoop. It also helps us to regulate our impulses. Does it always work exactly how we would want? Nope! Think about how many times you drop something or do something without even thinking. Our cerebrum isn't perfect, and in fact, each part of our brain has imperfect moments. But don't get mad at your brain quite yet - like we talked about; our brain can change! So, if you want to be a little less clumsy or impulsive, you can work together with your cerebrum toward that goal!

Known, Prior Knowledge, Semi – Open, Open, Math, VAKT



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Spell UNIQUE

K: What is the largest part of the brain? CEREBRUM

K: The cerebrum is like a _____? COACH

K: Does the cerebrum help our bodies move or breathe? MOVE

The next part of the brain we're going to discuss is the HIPPOCAMPUS. What a silly name for such an important part of the brain! If the cerebrum is like a coach, then the hippocampus is like a history TEACHER. It helps us to remember the past! Specifically, the hippocampus controls our MEMORY. We have two main kinds of memories, SEMANTIC and EPISODIC. They give us the memory of the steps to do something, like how to ride a bike, and memories of our experiences, like the day you went swimming in the ocean! You can also remember the hippocampus like a huge hippo who is so big because he is full of all your memories!

Spell HIPPOCAMPUS

K: The hippocampus is like a _____? TEACHER

K: The hippocampus controls our _____? MEMORY

PK: Is a memory something from the past or from the future? PAST

SO: Semantic and Episodic are two types of memories that help us to remember _____? (STEPS, HOW TO DO SOMETHING, REMEMBER, EXPERIENCES)

Time to learn about another part of the brain with a silly name: the AMYGDALA. If your cerebrum is a basketball coach and the hippocampus is a history teacher, your amygdala serves a very different role. Instead of coaching or teaching, your amygdala is like your own personal GUARD DOG. This guard dog's role is to warn you of DANGER and keep you safe. Let's say a wild bear started chasing you - your amygdala's job is to send an alarm to the rest of your brain and body that you are unsafe. Your heart rate goes up, your body starts moving faster, you sweat, your muscles tense. Your whole body is now in high alert to respond to the threat. We call this your "fight or FLIGHT" response, meaning your body can either fight the threat or fly (run away) from the threat.

Known, Prior Knowledge, Semi – Open, Open, Math, VAKT



Spell AMYGDALA

K: The amygdala is like your own ____? GUARD DOG

K: The role of the guard dog is to warn you of ____? DANGER

SO: When your body is feeling unsafe, tell me one thing you can sense in your body. (HEART RATE, MOVE FASTER, SWEAT, TENSE MUSCLES)

K: The amygdala triggers your fight or _____ response.

The amygdala is also responsible for something called ANXIETY. You may have heard of anxiety before, but let's learn about what anxiety is in your brain. Anxiety happens when your brain is on high ALERT for long periods of time, or when your amygdala is a little too quick to send out an ALARM. Anxiety also happens when your amygdala MISINTERPRETS something HARMLESS as a threat. For example, an overactive amygdala might send out an alarm when lights are too bright or there is a lot of noise. You're not really in danger, but your amygdala may act like you are. Your brain may activate your fight or flight RESPONSE, just as if there was a bear chasing you. Anxiety can be exhausting!

Spell ANXIETY HARMLESS MISINTERPRETS

K: Anxiety happens when your brain is on high _____. ALERT

PK: What is another word for signal? ALARM

K: Your fight or flight is a _____ to anxiety. RESPONSE

Everyone deals with anxiety, whether it's SCARY thoughts, panic attacks, trauma, or stress. When this anxiety begins to impact daily life, it may be diagnosed as an anxiety disorder. Anxiety starts in the amygdala, a TEENY TINY, peanut-sized part of your brain. This little FRIGHTENED guard dog can learn to CALM down because your amygdala can change, just like the rest of your brain. Research shows that diet, EXERCISE, MEDITATION, THERAPY, and nature can all teach this amygdala how to rest and relax.

K: Is a threat feel scary or safe? SCARY

SO: What size is the amygdala? (TEENY TINY, PEANUT-SIZED)

K: The little guard dog can learn to be _____? CALM



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SO: What is one way to teach the amygdala how to relax? (DIET, EXERCISE, MEDITATION, THERAPY, NATURE)

TRUE or FALSE: Your amygdala can change. TRUE

The last major part of the brain that we're going to learn about is the PREFRONTAL CORTEX. From the name alone, we can tell that part of the prefrontal cortex is located in the FRONT of the brain. If the amygdala is like a frightened guard dog, the prefrontal cortex is like a WISE old owl. The prefrontal cortex is the LAST part of the brain to develop. It allows us to make RATIONAL (*sensible*,) smart, and calm decisions. We use our prefrontal cortex to REASON, think things through, and decide what is the best for us to do. Unfortunately, because the prefrontal cortex is the last part of our brain to develop, it is also the part of our brain with the WEAKEST connections. Our amygdala, for example, develops much earlier in our life and has much stronger connections. This is why we may be quicker to react emotionally or out of fear, than to think through our decisions. The guard dog starts barking before the wise old owl swoops in! But just like we can help calm our amygdala, we can also strengthen connections to our prefrontal cortex through learning new skills like reading, yoga, communicating, or sports.

Spell PREFRONTAL CORTEX REASON

K: If the amygdala is a guard dog, the prefrontal cortex is like a ____ old owl. WISE

K: Is it the first or the last part of our brain to develop? LAST

K: The prefrontal cortex allows us to make smart, calm, and _____ decisions?
RATIONAL

K: Because the prefrontal cortex develops last, the connections are the _____.
WEAKEST

O: What new skill would you like to learn to strengthen your prefrontal cortex?



PARTS OF THE BRAIN MATCH

Match each part of the brain to its primary function!

CEREBRUM

FIGHT OR FLIGHT

HIPPOCAMPUS

MOVE

AMYGDALA

PROBLEM SOLVING

PREFRONTAL CORTEX

MEMORY

