

**Aim: SWBAT talk about how
the CNS controls our body
and minds.**

Do Now: What is the value of our nervous system?



**Meet your
nervous
system**

CNS main jobs

- | Relays messages
- | Processes information
- | Analyzes information

Parts of CNS

- Brain
- Spinal Cord

Protections

Skull and Vertebrae

3 protective layers called **meninges**

1. **Dura Mater** (outer layer): consists of connective tissues, blood vessels, and nerves.

2. **Arachnoid Layer** (middle layer): elastic and weblike

3. **Pia Mater** (inner layer): contains nerves and blood vessels.

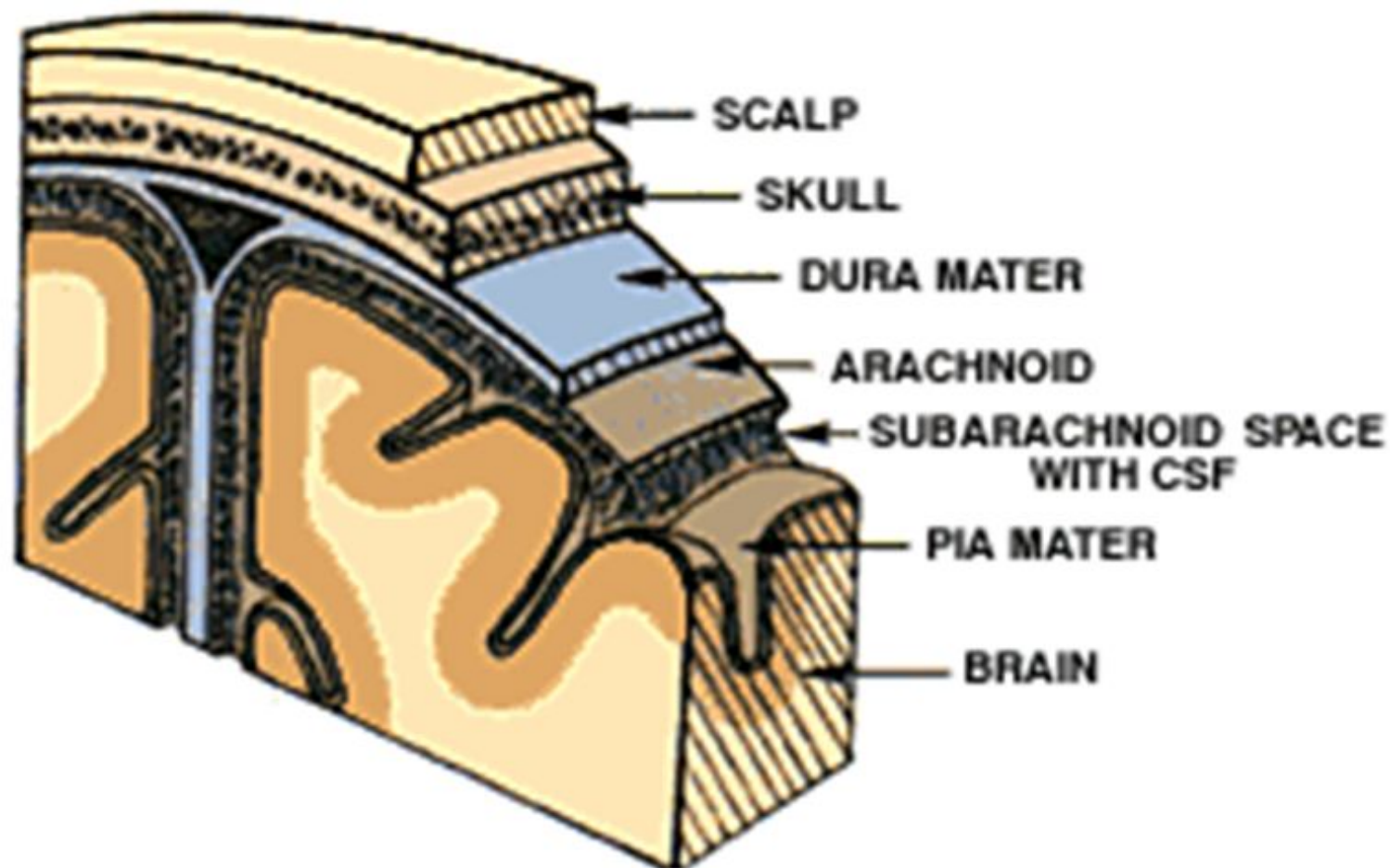
4. **Cerebrospinal fluid**

| a clear watery liquid

| separates the middle and inner layers

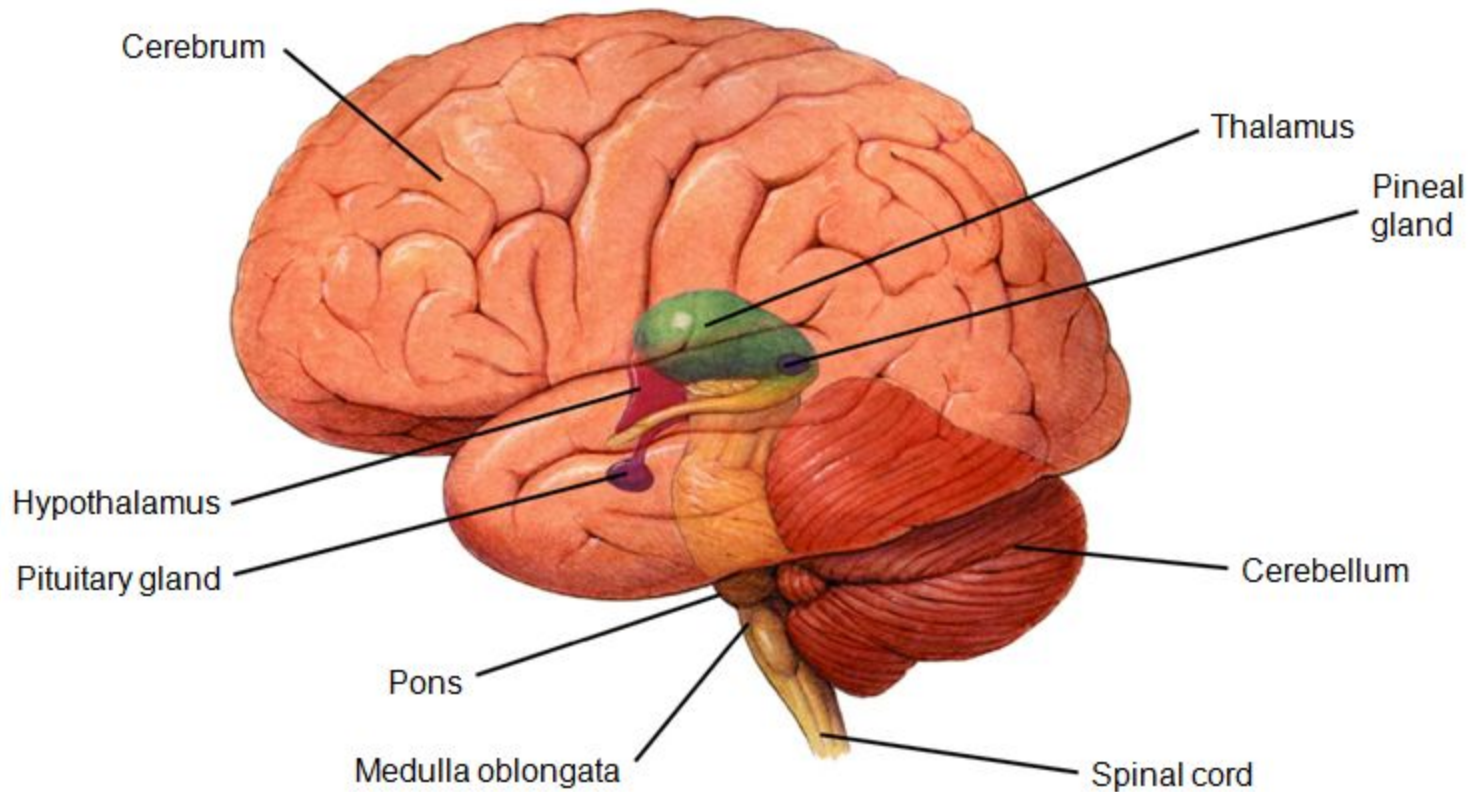
| Acts as shock absorber

| exchange of nutrients between blood and nervous system



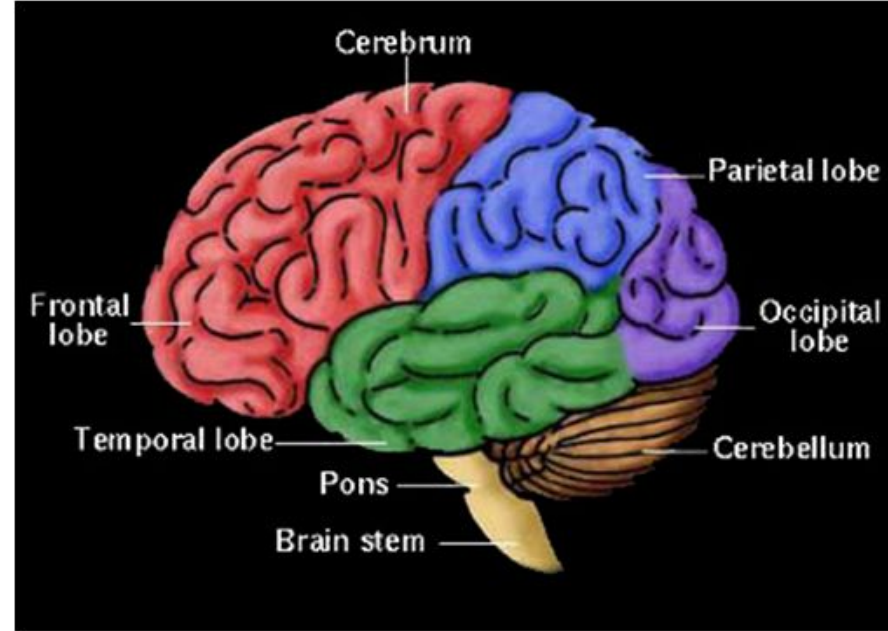
The brain's protective barriers (Section shown is from top, center of head)

Section 35-3



The brain is the **control center** of the **body**

It is about **2%** of your body **weight** and uses **20%** of your body's **oxygen**



Parts of Brain

- Divided into **three** parts
 - | Cerebrum
 - | Cerebellum
 - | Brain Stem

Cerebrum

1 **Largest** part of the brain

Learning and Senses

2 **hemispheres**- Right and Left

Connected by the **Corpus Callosum**

L **Right side** controls- **left side**

Left side controls – right side of body

Four sections - **LOBES**

1. **Frontal** Lobe

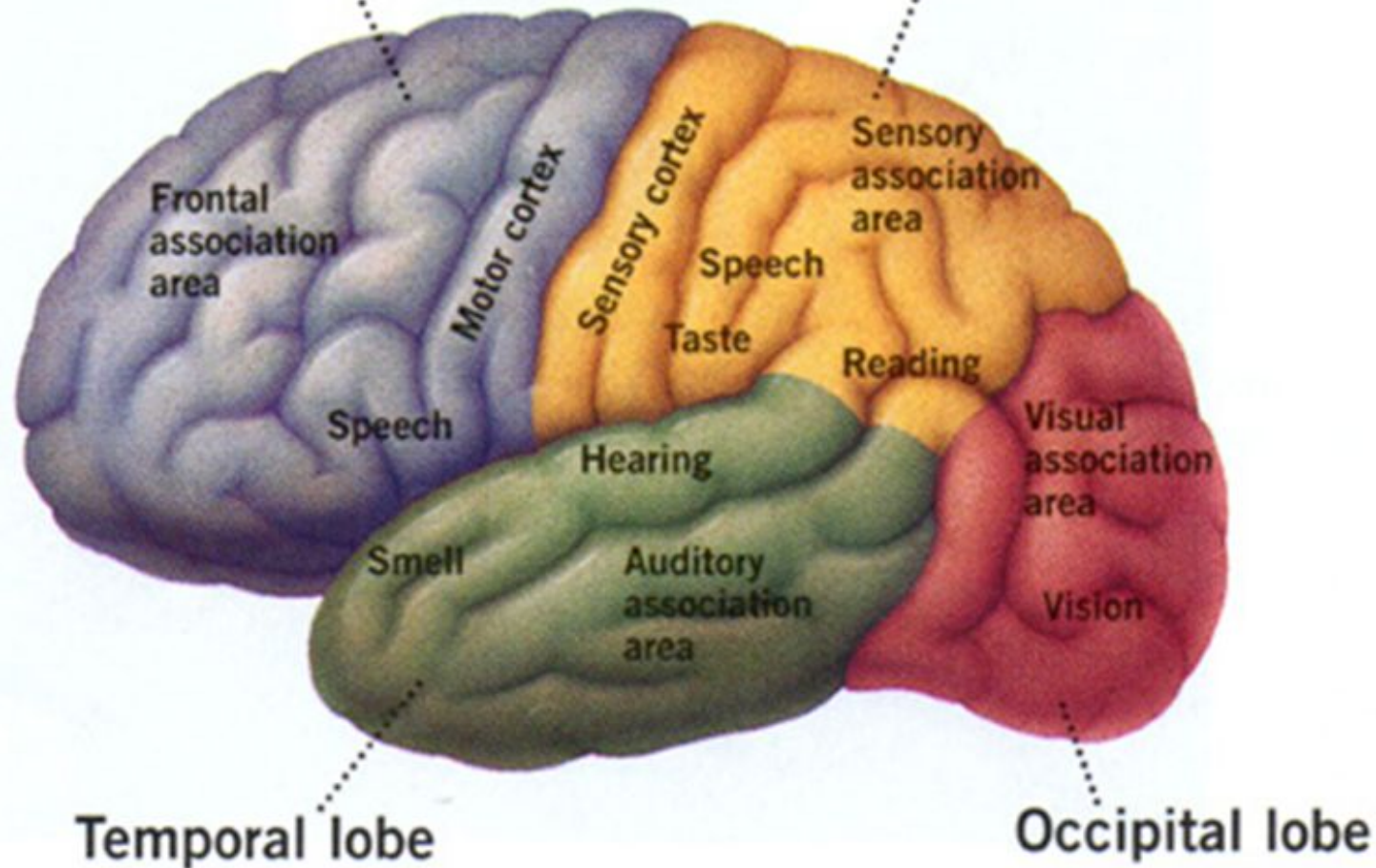
2. **Parietal** Lobe

3. **Occipital** Lobe

4. **Temporal** Lobe

Frontal lobe

Parietal lobe



Temporal lobe

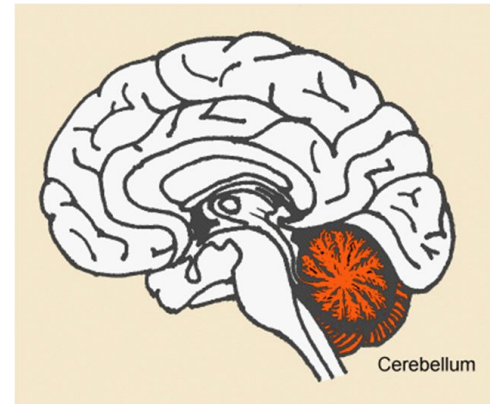
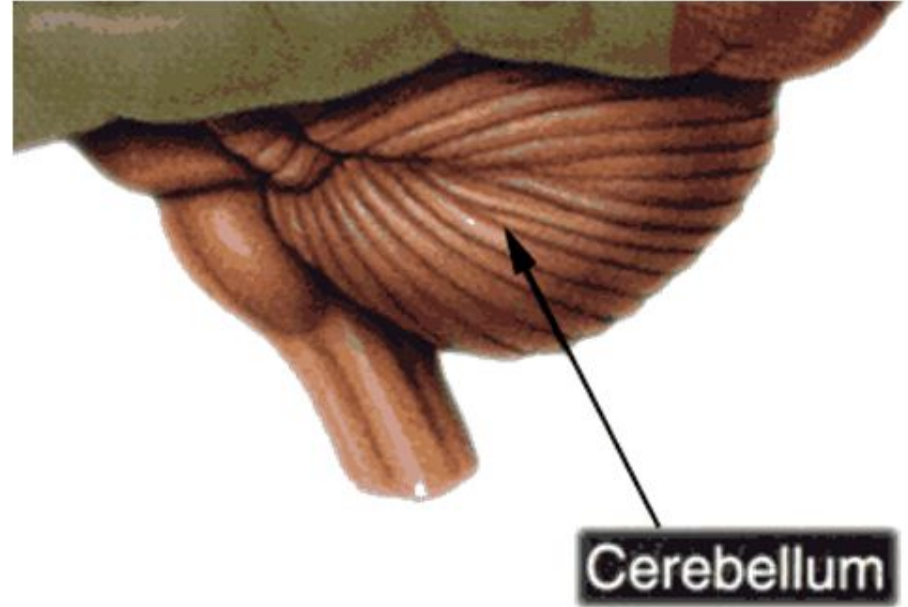
Occipital lobe

Cerebellum

- Second largest

- located **below** the cerebrum
at back of skull

- This part is responsible for
the **balance** and **muscle**
coordination

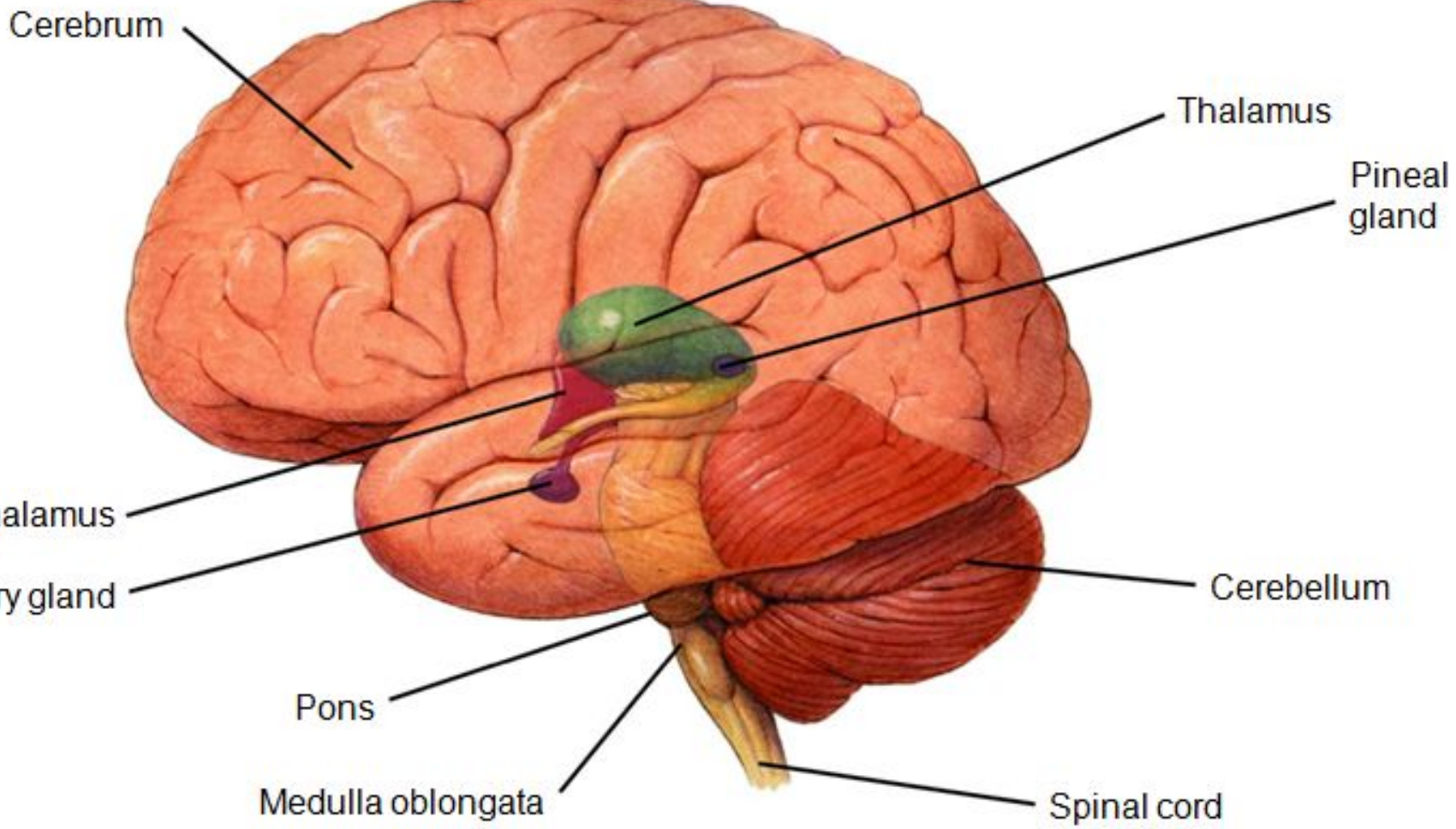


Brain Stem

- Connects the **brain to spinal cord**
 - The **Two Regions** act as “switchboard”
 - **Medulla Oblongata** – Controls heart rate, breathing rate, and flow of blood through the blood vessels.
 - **Pons** – Relays signals between the cerebrum and the cerebellum

Other Parts of Brain

- **Thalamus** – receives messages from sensory receptors; relays information to proper regions of cerebrum
- **Hypothalamus** - Regulates hunger, thirst, fatigue, anger, etc...
 - Control of pituitary for endocrine function



Cerebrum

Thalamus

Pineal gland

Hypothalamus

Pituitary gland

Cerebellum

Pons

Medulla oblongata

Spinal cord

Spinal Cord

- Link between brain and rest of body (PNS)
- 31 pairs of spinal nerves
- Reflexes processed directly by spinal cord
- **Reflex** – quick, automatic, unconscious responses
 - Result of **reflex arcs** – shortest nerve pathways

Drugs in Nervous System

- Drug – any substance, other than food that changes the structure or function of the body
- Legal
- Illegal

Drug Type	Medical Use	Examples	Effects on the body
Stimulants	Used to increase alertness, relieve fatigue	Amphetamines	Increase heart and respiratory rates; elevate blood pressure; dilate pupils; decrease appetite
Depressants	Used to relieve anxiety, irritability, tension	Barbiturates Tranquilizers	Slow down the actions of the central nervous system; small amounts cause calmness and relaxation; larger amounts cause slurred speech and impaired judgement
Opiates	Used to relieve pain	Morphine Codeine	Act as a depressant; cause drowsiness, restlessness, nausea

Stimulants

- Increase
 - Heart rate
 - Blood pressure
 - Breathing
 - Release of neurotransmitters at some synapses in the brain
- Deplete neurotransmitters and lead to:
 - Fatigue
 - Circulatory problems
 - Hallucinations
 - Depression

Depressants

- Decrease
 - Heart rate
 - Breathing rate
 - Blood pressure
 - Relax muscles
 - Relieve tension
- Enhances release of neurotransmitters that prevent nerves cells from firing
- Alcohol with depressants can lead to death – depresses CNS to a point one stops breathing

Opiates

- | Mimics endorphins
- | **Endorphin** – natural chemical in brain that helps overcome pain
- | When person stops taking
 - | Brain has adjusted to high levels of endorphins
 - | Cannot produce enough natural endorphins
 - | Suffer uncontrollable pain and sickness

Cocaine

- | Sudden release of **Dopamine**
- | Powerful Stimulant
- | Increases heart rate and blood pressure
- | First time users can have heart attack
- | **Dopamine** – neurotransmitter in brain that is released to give feeling of pleasure and satisfaction

Marijuana,

- |Active ingredient (THC) tetrahydrocannabinol
- |More destructive to lungs than cigarettes
 - 5 marijuana cigs = 120 conventional cigs
- |Results in:
 - Lower WBC count by 40% - susceptible to infections
 - |Teens –
 - |inhibits maturity
 - |Retards normal brain growth
 - |Memory loss
 - |Inability to concentrate
 - |Fall short on memory as well as math and verbal skills

Males – reduced testosterone levels and increases estrogen levels

Females –disturbs menstrual cycle and DNA damage to eggs

More Risk of Marijuana

- Impaired perception
- Loss of coordination
- Increased risk of accidents
- Impaired judgement
- Loss of motivation
- Diminished inhibitions
- Increased heart rate
- Anxiety, panic attacks, and paranoia
- Hallucinations
- Damage to the respiratory, reproductive, and immune systems
- Increased risk of CANCER
- Psychological dependency

Alcohol

- Depressant
- Slows down CNS
 - 40% of 50,000 highway deaths are caused by drinking and driving
 - 1/3 of homicides attributed to effects of alcohol
 - \$150 billion dollars of U.S. economy alcohol abuse treatment
- Fetal Alcohol Syndrome (FAS)
 - Drinking while pregnant
 - Heart defects, malformed faces, delayed growth, poor motor development

Drug abuse

- Intentional misuse of any drug for nonmedical purposes
- **Addiction** – uncontrollable dependence on a drug

https://www.ted.com/talks/allan_jones_a_map_of_the_brain#t-723233

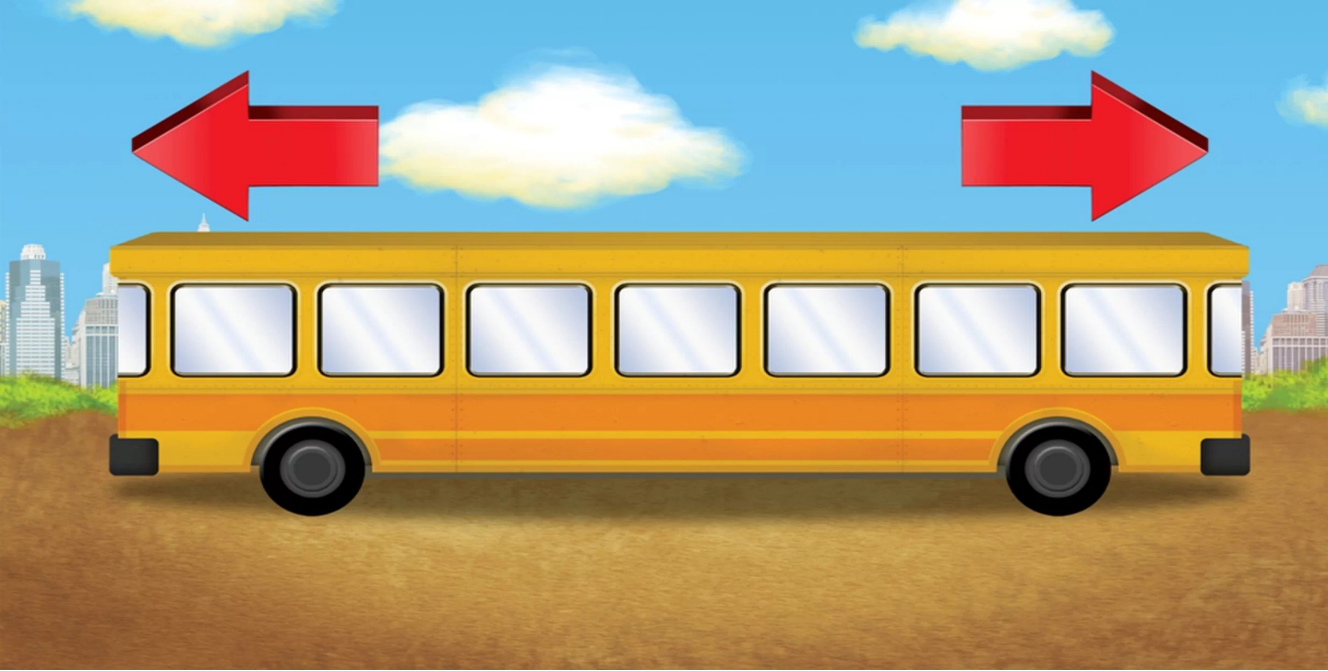
- Mary's mother has four children: April, May, June and ...?
- If you answered "July," you've been tricked. The correct answer is Mary. Your brain is built to be efficient and looks for patterns in everything, Silva said. Even though the answer is contained in the first two words of the riddle, your brain automatically goes to "July," because that's the next month. This riddle reveals your automatic, or system 1, [brain processes](#) at work. This system uses shortcuts in an effort to save the brain energy needed to do other things, like running the body and keeping a person alive.



- As you may or may not notice, the word "you" is repeated. Your brain doesn't notice this because it is unnecessary to comprehend the sentence, Kolber told LiveScience. This glossing-over reveals another automatic process that literally blinds a person to certain unnecessary, extraneous information, Kolber added.

<http://www.brainbugs.org/FlashLagEffect.php>

- The experiment shows the "difficulty in accurately detecting the position of an object at the time of another event," according to researcher and author Dean Buonomano. That's due in part to the delay between when something happens and when you fully see and realize the event has happened, Kolber said



- Which way is the bus going?
- the entrance on a bus is always on the right side, which must be facing away. Children, with more recent experience on buses, are much better at answering this question than adults. It illustrates how important cues and former experience are in interpreting a sight or situation.



Teaser #7

- ◆ O lny srmatt poelpe can raed this.
- ◆ cdnuolt blveiee taht I cluod aulacly esdnatnrd waht I was rdanieg. The phaonmneal pweor of the hmuan mnid, aoccdrnig to a rscheearch at Cmabrigde Uinervtisy,
- ◆ it deosn't mttar in waht oredr the ltteers in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat ltteer be in the rghit pclae. The rset can be a taotl mses and you can sitll raed it wouthit a porbelm.
- ◆ Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe. Amzanig huh? yaeh and I awlyas tghuhot slpeling was ipmorantt!



red blue orange purple

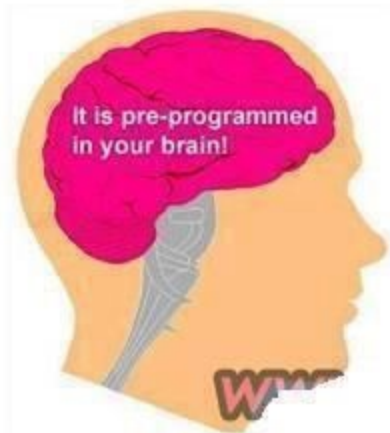
orange blue green red

blue purple green red

orange blue red green

purple orange red blue

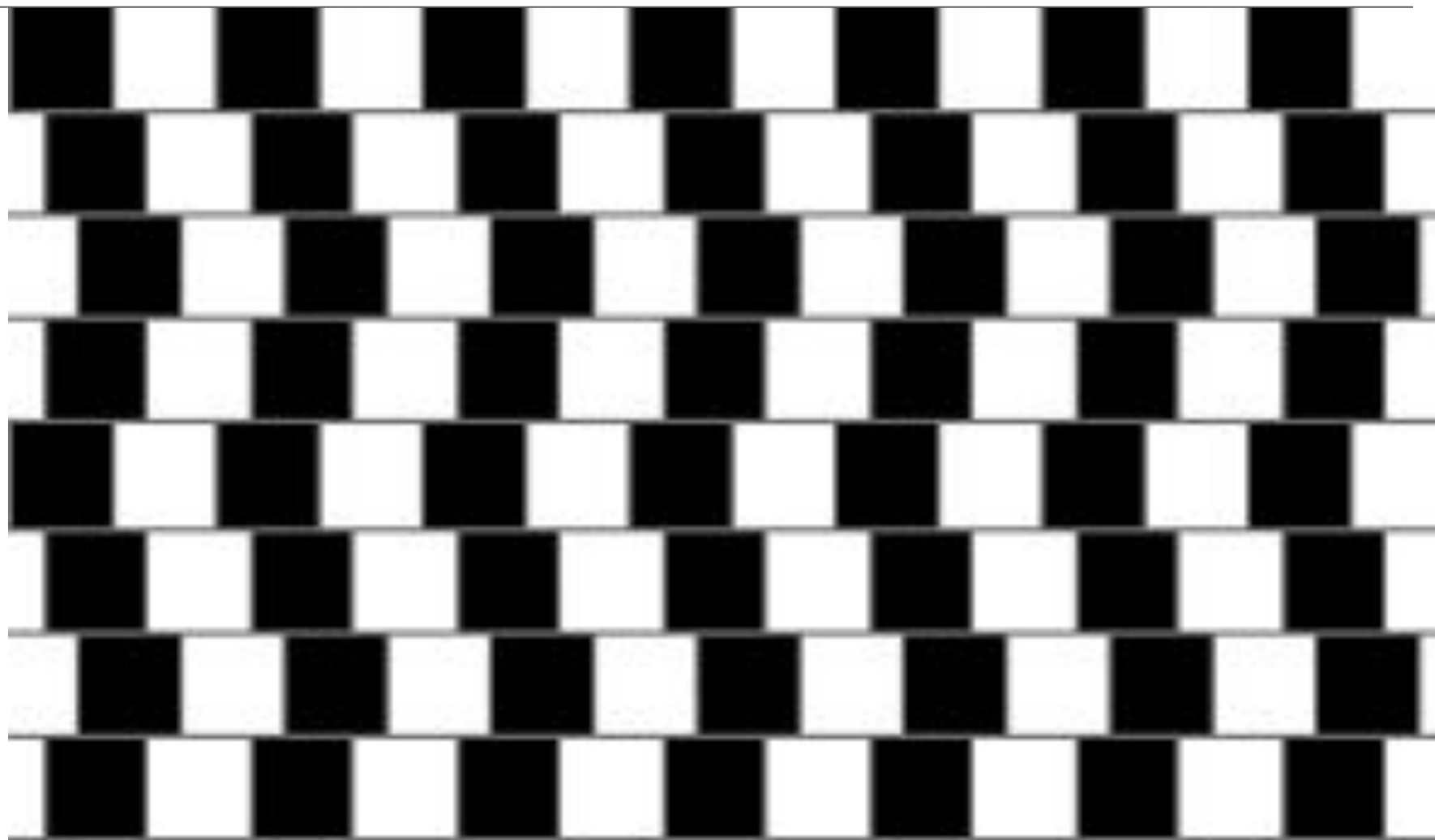
green red blue purple



Try This Out!

Its Amazing!!!

1. While sitting at your desk in front of your computer, lift your right foot off the floor and make clockwise circles.
2. Now, while doing this, draw the number '6' in the air with your right hand.



Loomings.

Call me Ishmael. Some years ago—never mind how long precisely—having little or no money in my purse and nothing particular to interest me on shore, I thought I would sail about a little and see the watery part of the world. It is a way I have of driving off the spleen and regulating the circulation. Whenever I find myself growing grim about the mouth; whenever it is a damp, drizzly November in my soul; whenever I find myself involuntarily pausing before coffin warehouses, and bringing up the rear of every funeral I meet; and especially whenever my hypos get such an upper hand of me, that it requires a strong moral principle to prevent me from deliberately stepping into the street, and methodically knocking people's hats off—then, I account it high time to get to sea as soon as I can. This is my substitute for pistol and ball. With a philosophical flourish Cato throws himself upon his sword; I quietly take to the ship. There is nothing surprising in this. If they but knew it, almost all men in their degree, some time or other, cherish very

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