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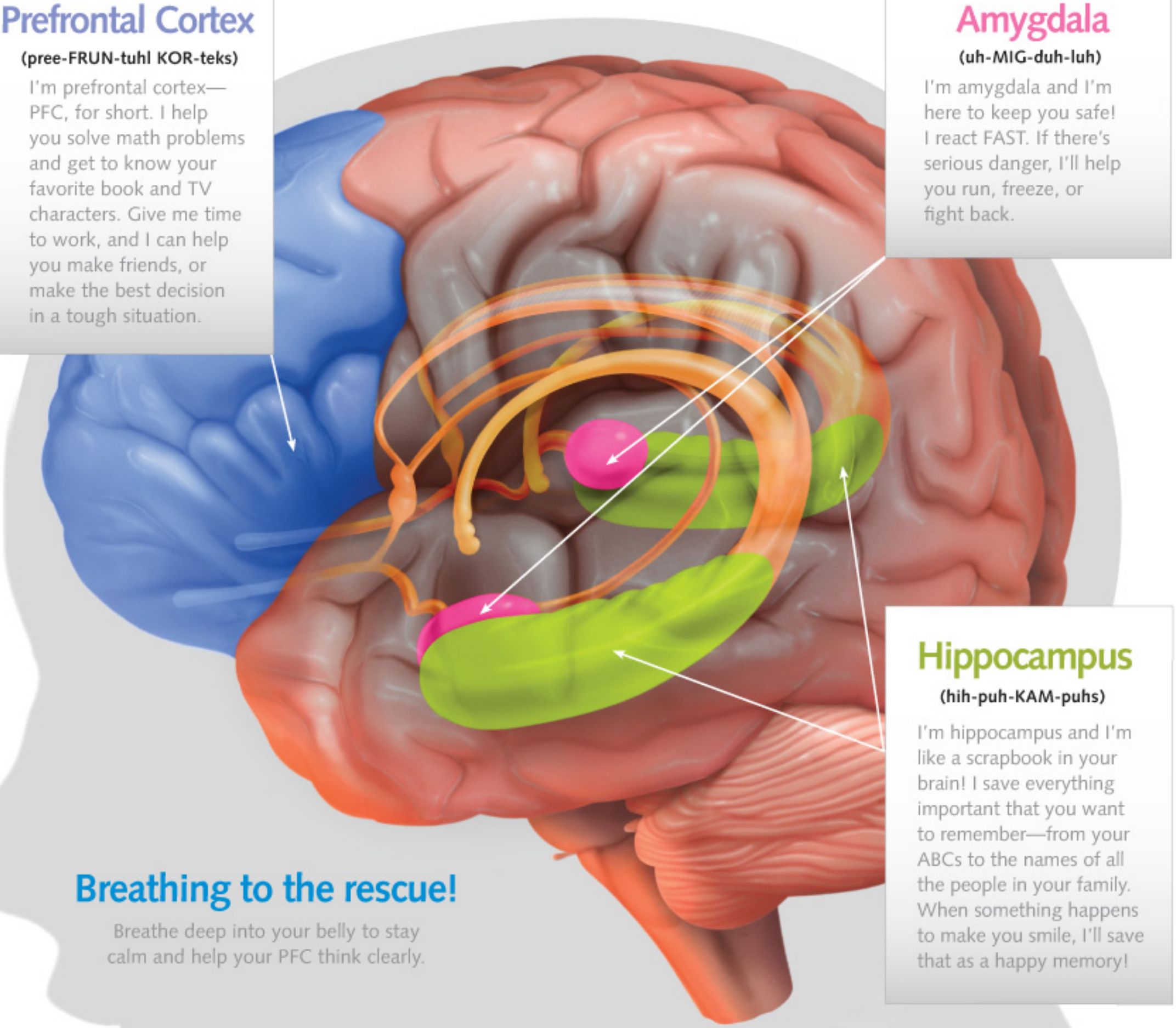
Getting to Know and Love Your Brain

There are three big helpers in your brain.
One helps you make smart choices. One helps protect you from danger. And one saves your favorite memories and your ABCs.
Can you name the three helpers?

Prefrontal Cortex

(pree-FRUN-tuhl KOR-teks)

I'm prefrontal cortex—PFC, for short. I help you solve math problems and get to know your favorite book and TV characters. Give me time to work, and I can help you make friends, or make the best decision in a tough situation.



Amygdala

(uh-MIG-duh-luh)

I'm amygdala and I'm here to keep you safe! I react FAST. If there's serious danger, I'll help you run, freeze, or fight back.

Hippocampus

(hih-puh-KAM-puhs)

I'm hippocampus and I'm like a scrapbook in your brain! I save everything important that you want to remember—from your ABCs to the names of all the people in your family. When something happens to make you smile, I'll save that as a happy memory!

Breathing to the rescue!

Breathe deep into your belly to stay calm and help your PFC think clearly.

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Sweet dreams!

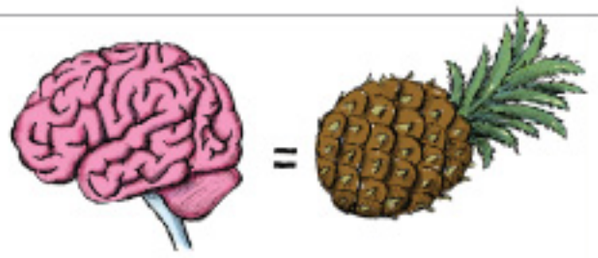
What's your bedtime? What time do you wake up? Count the hours between to find out how long you sleep.

If you counted 9, 10, or 11 hours, your brain is getting enough sleep to help it think and grow. If you counted fewer, you need to get more rest to help your brain do its job.

A neuron at work

Your brain has 100 billion—that's 100,000,000,000—brain cells, called **neurons**. Neurons pass along messages in a web, like the Internet! Those messages to help you think, feel, and remember.

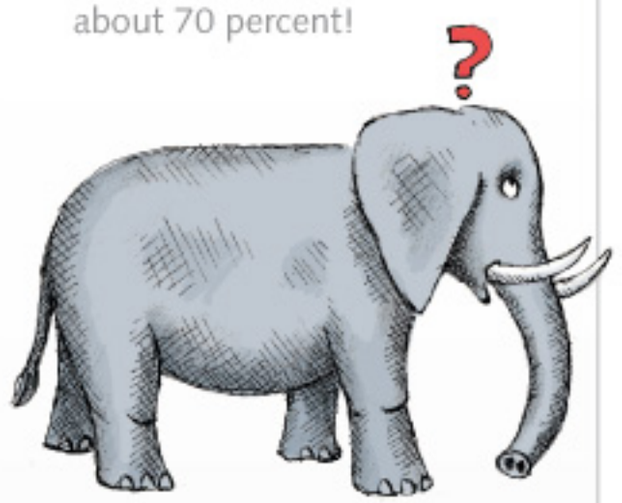
neuron



Food for thought

Here's a fun way to get to know your brain: Compare it to foods you eat!

- **How is my brain like a pineapple?**
  It weighs about 3 pounds.
- **How is my brain like bowl of spaghetti?**
  The surface of your brain has many folds, turns, and tunnel shapes.
- **How is my brain like a grape?**
  It's mostly made of water—about 70 percent!



Is a bigger brain a smarter brain? Look at these brain weights to help you decide:

Dog brain: less than 1 pound
Human brain: about 3 pounds
Elephant brain: 13 pounds

Sure, elephant brains are big, but they can't solve math problems!

What really makes a brain smart is the parts it has and the way those parts work. Human brains have a large prefrontal cortex (PFC). Our PFC helps us think carefully, problem solve, and plan.

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Amazing Facts About Your Brain

What kind of storm does your mind like best?. . . A brainstorm, of course! See if you can feel your brain growing as you learn about how it works!

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Read-aloud reference poster

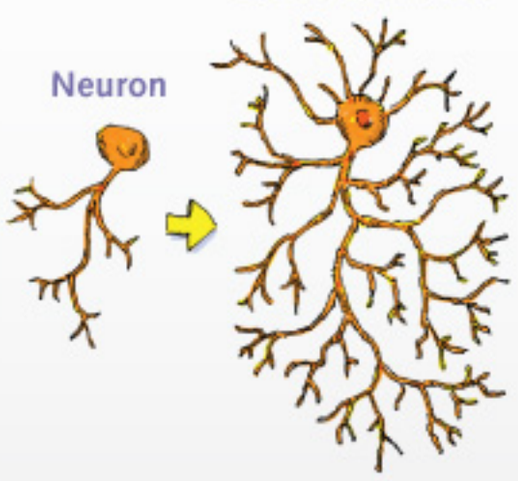
Do you have an adult-size brain?

Just about! Your brain is almost the same size now as it will be when you are 50 years old. But as you think and learn more, your neurons will grow bigger and thicker, filling in the space.

Help your brain cells grow!

What do you get when you cross a family's vehicle with a family's animal?

Did you guess the answer to this riddle? Just puzzling over it can make your neurons stronger and thicker!



Your brain adds new information pathways each time you solve problems or learn something new.

Answer: carpet

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Getting to Know and Love Your Brain

Three important parts of your brain help you think and react to everything that happens around you: the prefrontal cortex, the amygdala, and the hippocampus. Learn how to help these parts work together to become a happier, healthier, brighter you!

Prefrontal Cortex

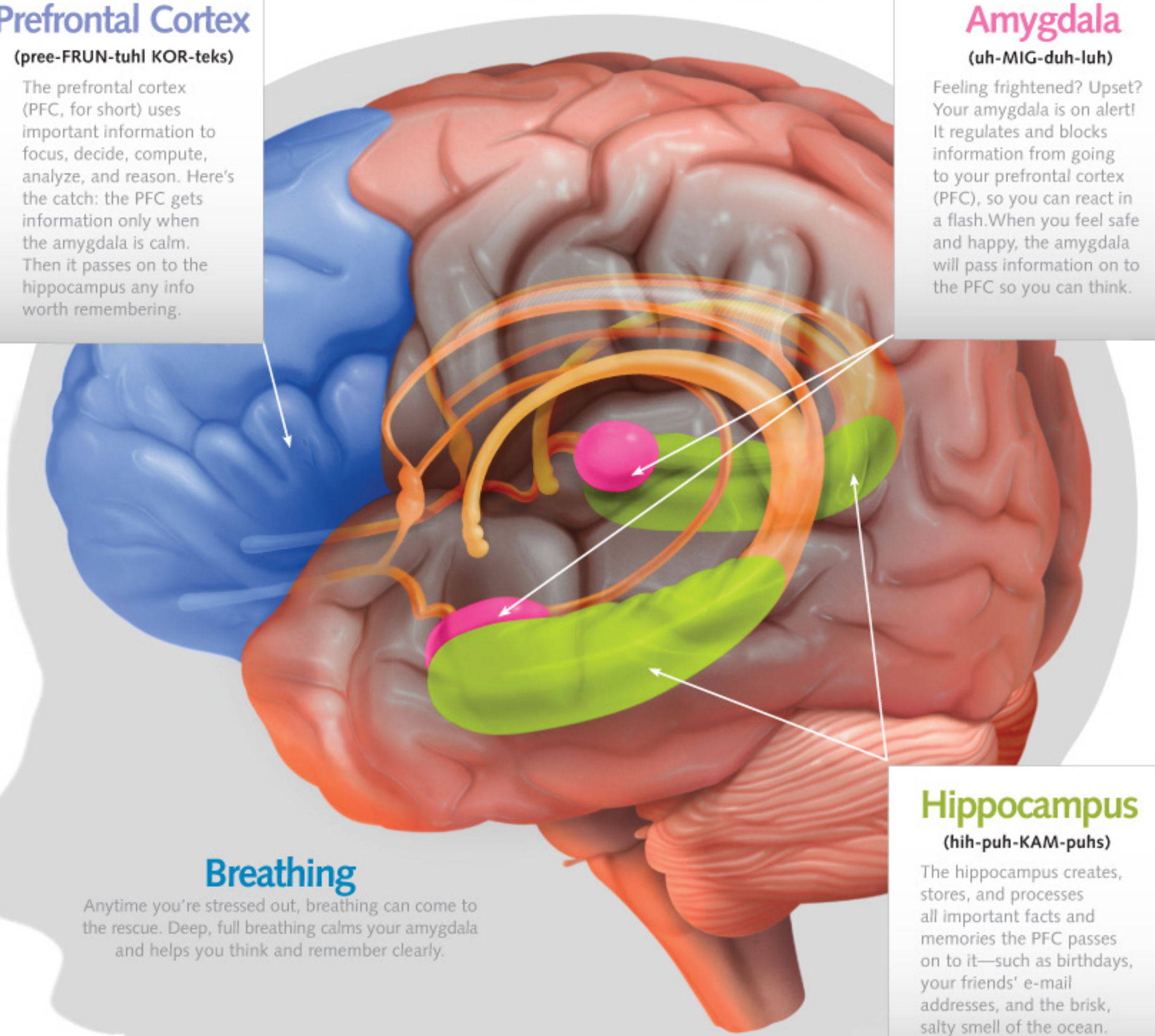
(pree-FRUN-tuhl KOR-teks)

The prefrontal cortex (PFC, for short) uses important information to focus, decide, compute, analyze, and reason. Here's the catch: the PFC gets information only when the amygdala is calm. Then it passes on to the hippocampus any info worth remembering.

Amygdala

(uh-MIG-duh-luh)

Feeling frightened? Upset? Your amygdala is on alert! It regulates and blocks information from going to your prefrontal cortex (PFC), so you can react in a flash. When you feel safe and happy, the amygdala will pass information on to the PFC so you can think.



Breathing

Anytime you're stressed out, breathing can come to the rescue. Deep, full breathing calms your amygdala and helps you think and remember clearly.

Hippocampus

(hih-puh-KAM-puhs)

The hippocampus creates, stores, and processes all important facts and memories the PFC passes on to it—such as birthdays, your friends' e-mail addresses, and the brisk, salty smell of the ocean.

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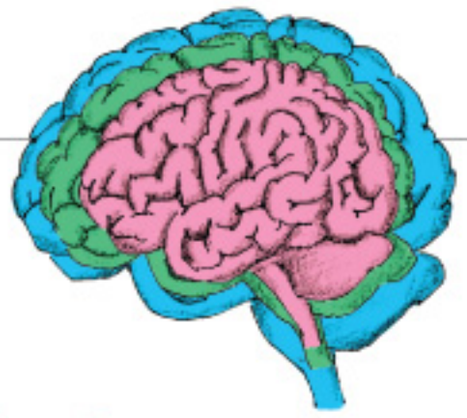
How big is a brain?

Make two fists and put them together. That's about the size of your brain. Your skull—a thick, protective "helmet" of 22 bones—surrounds your brain.

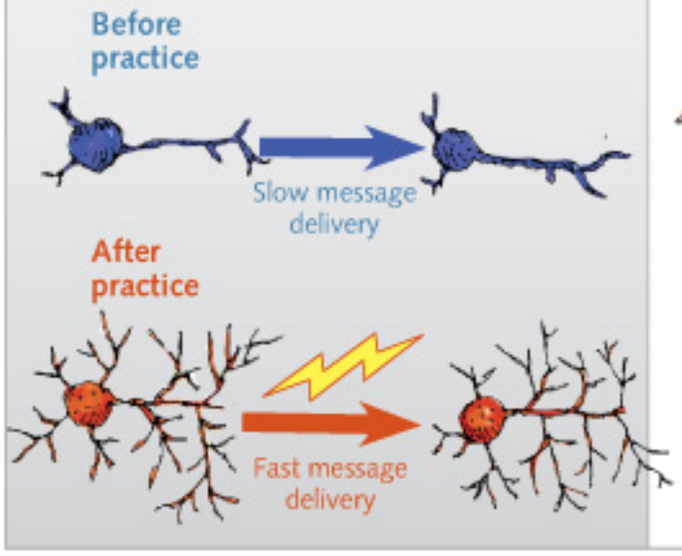


Brains can change.

Your brain is more like plastic than cement. It will change with each experience you have—and it will grow! That's called neuroplasticity (nur-oh-pla-STIH-city).

How does your brain get smarter?

With practice! When you learn something new, like the words to a song, you make new connections between the message-carrying cells of your brain, or neurons. As you practice, the neurons carrying that message grow branch-like structures (dendrites) that act like antennae. They pick up the message more quickly and clearly each time. With enough practice, those song-learning neurons help you remember the words without even hearing the music!



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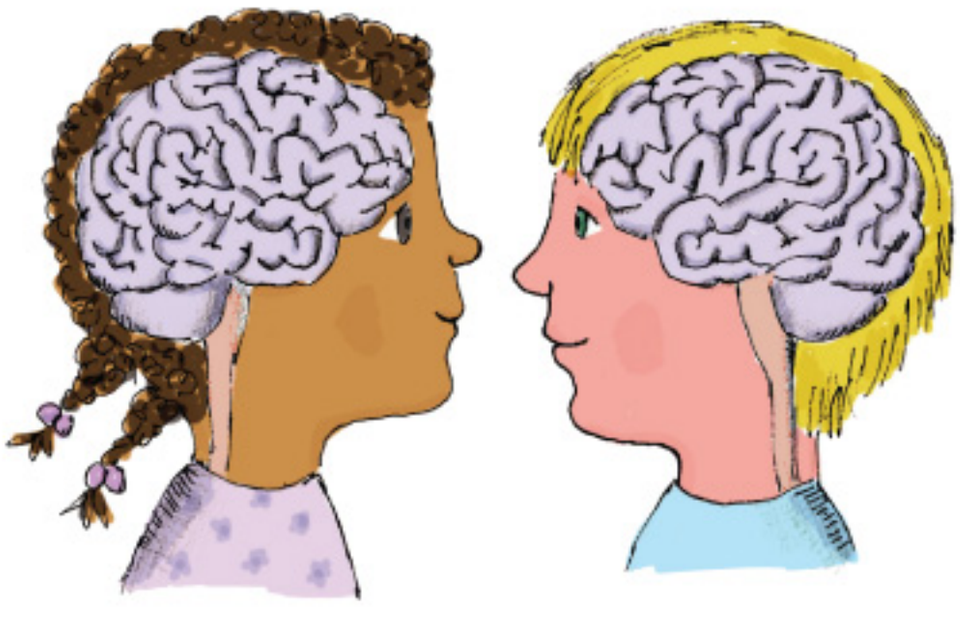
Amazing Facts About Your Brain

How is your brain like mine? Our brains are the same color, no matter how different we look on the outside. Our brains are also about the same size if we're the same age. In what other ways do you think all of our brains are similar?



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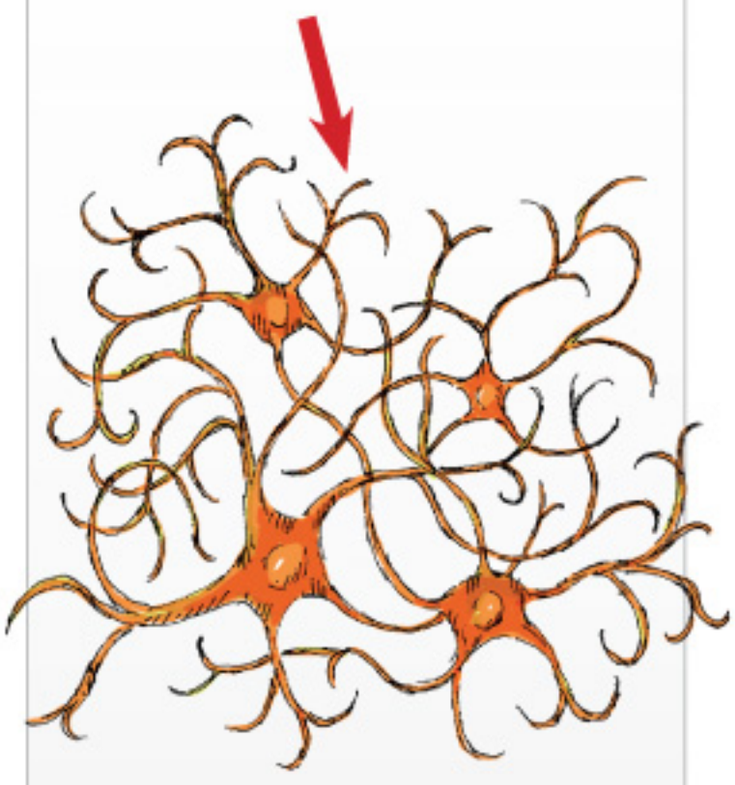
Give it a rest!

Your brain never stops thinking, even when you sleep. In fact, you need sleep so that your brain can process all the information it has collected during the day. To help your brain do this, you need about 9 or 10 hours of sleep each night!

These webs weren't spun by a spider!

Does your brain really have webs inside of it? Yes, but not spider webs! These webs are too tiny for even the smallest spider. Each thought you think goes through a web, or network, of brain cells (neurons). It looks something like this.



Think fast!

In only a fraction of a second we can recognize a friend's face or recall a math fact. The fastest thoughts racing through our neural network travel at about the same speed as the wind inside a tornado!

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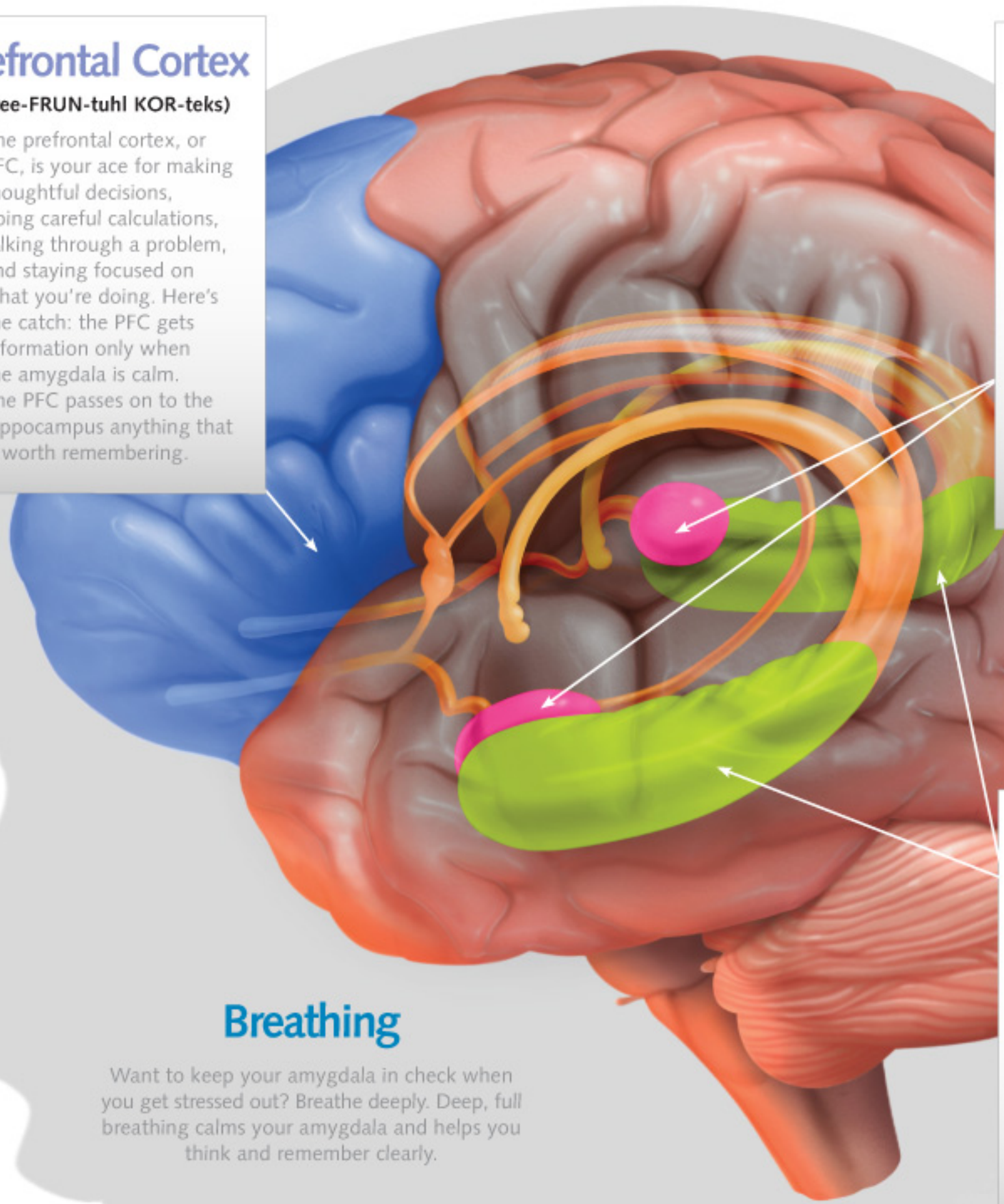
Getting to Know and Love Your Brain

To react or to think it out … that is the question. The way you use three key players in your brain determines how you'll respond to everything that happens around you. As you learn how to help your brain tell the difference between true emergencies and stressful situations, you'll get better at handling every situation and have more time to enjoy life!

Prefrontal Cortex

(pree-FRUN-tuhl KOR-teks)

The prefrontal cortex, or PFC, is your ace for making thoughtful decisions, doing careful calculations, talking through a problem, and staying focused on what you're doing. Here's the catch: the PFC gets information only when the amygdala is calm. The PFC passes on to the hippocampus anything that is worth remembering.



Amygdala

(uh-MIG-duh-luh)

The amygdala is programmed to keep you safe at all costs. It regulates and blocks information from going to your prefrontal cortex (PFC), so you can react in a flash. The problem is, it can't tell a stressful situation from a true emergency and it can cause you to react without thinking. Mindful practice can help keep the amygdala in check so that you can think clearly.

Hippocampus

(hih-puh-KAM-puhs)

What are your favorite memories? The most useful facts you know? The hippocampus creates, stores, and processes all important facts and memories the PFC passes on to it—such as texting shortcuts, your class schedule, and the deep, warm smell of freshly baked biscuits or bread.

Breathing

Want to keep your amygdala in check when you get stressed out? Breathe deeply. Deep, full breathing calms your amygdala and helps you think and remember clearly.

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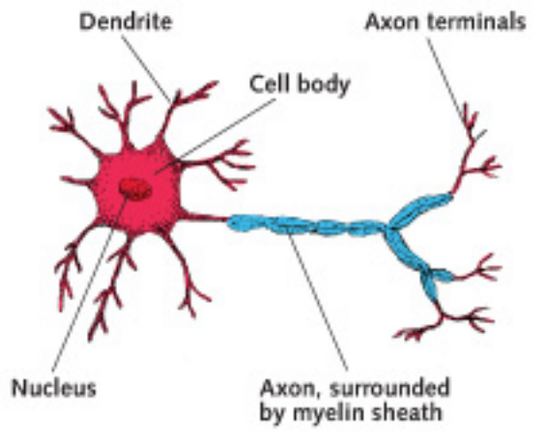
A neuron at work



Your brain has a network of neurons, or brain cells, 100 billion strong to help you think, feel, and remember. Each neuron has three important parts. Dendrites receive information—everything you sense and perceive.The nucleus regulates information signals that are sent or received. The axon sends information to other nerve cells through its terminals. Myelin is the protective coating around the axon.

The green brain?

Your brain has a special energy-efficient feature: myelin. Myelin is to an axon what plastic coating is to electrical wires. Like insulation on a wire, myelin helps the electrical impulses travel quickly and directly through the axon without losing any energy.

Growth spurts!

The brain grows rapidly at two times in our lives:

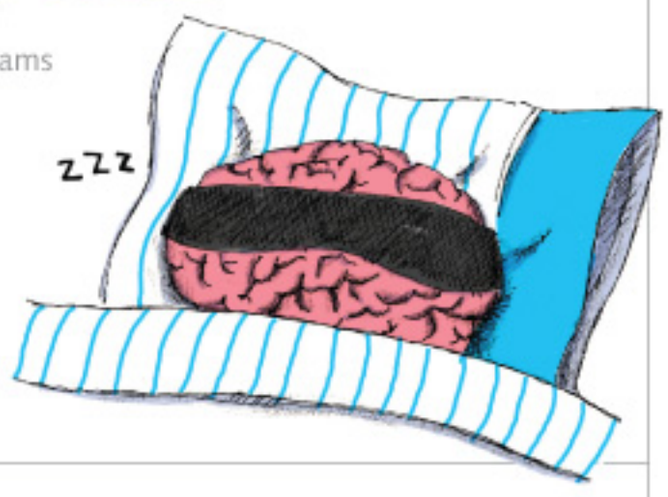
1. From before birth to 3 years old, all the neurons are rapidly growing and creating a network.
2. You're living through the second growth spurt, which peaks at 11 years old in girls and 12 years old in boys. This is when neurons are branching out and making connections.

"Use it or lose it!"

At about age 12, our brains start pruning away all the unused branches to make our brains more efficient.

Sleep and freeze!

Do you have action-packed dreams or nightmares? Aren't you glad you don't act them out in your sleep? When you fall asleep, your brain releases a hormone that paralyzes you so that you don't move around a lot and hurt yourself.



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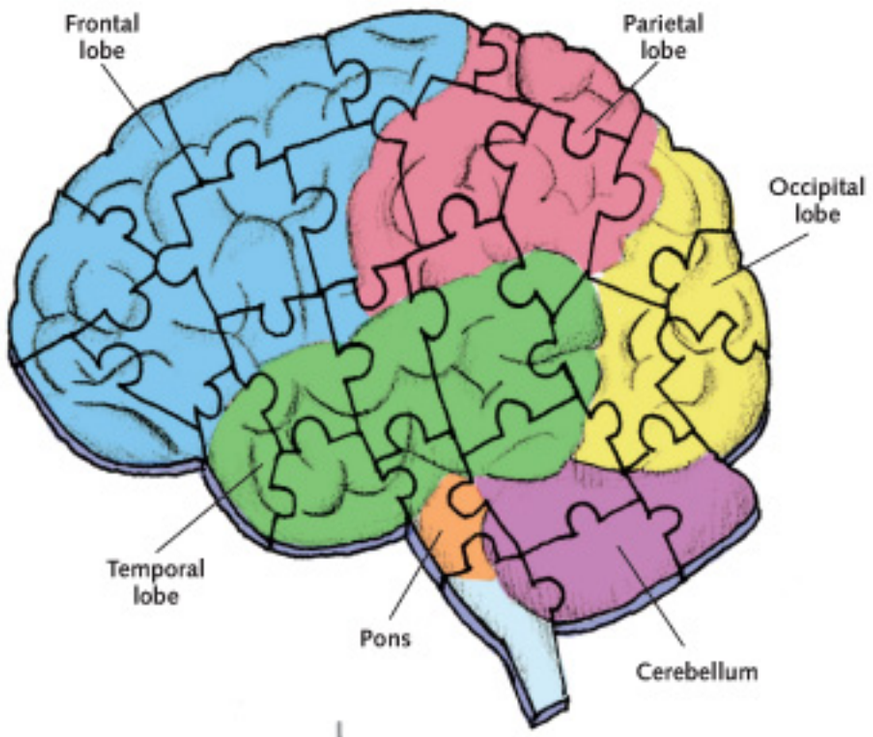
Amazing Facts About Your Brain

Do you enjoy collecting facts to store in your hippocampus? Here's more brain food for that spongy, wrinkly organ inside your skull that loves to solve riddles, puzzles, and problems.



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Powering your brain

Each day your brain generates enough energy to light a light bulb—between 10 and 23 watts! How do you keep it powered up to do all that work?

- **Get your Z's.** Getting between 8.5 and 11 hours of sleep each night helps your PFC absorb information and send it to the hippocampus. Being well rested helps your amygdala, too—studies show that alert people have fewer accidents.

- **Eat brain food.** Fuel for thinking includes food high in protein (meat, eggs, beans), omega-3 fatty acids (fish, nuts), antioxidants (berries, broccoli, spinach, whole grains), and vitamin B (clams, lamb, beef), and low in trans fats—so, limit fried foods and fatty sweets!

- **Chat it up.** Staying socially connected with friends and volunteering or playing sports are ways to keep your brain engaged and happy.

- **Protect it.** Brains are hard to fix. To dramatically reduce your chances of concussions or brain injury, wear a seatbelt whenever you ride in a car and a helmet in any high-speed or impact sports. Why take the risk?