

**Directions:** Read the information below.

## The Science of Sensation and Perception

Consider your favorite place to be. Is it at home? The mall? A favorite vacation spot? Now really think about what it feels like to be there — the smells of that place, the sounds you hear. Those memories are made by your brain. But how does your brain get those memories? To answer this question, we need to explore the concepts of sensation and perception.

### Sensation

Sensation is how your body physically becomes aware of its surroundings. It's an unconscious process, meaning humans are not aware of it. It is strictly the interaction of environmental information reaching your senses. We all know the body has five senses: hearing, seeing, touching, tasting and smelling. There are three main ways your senses gather information: chemically, mechanically, and electromagnetically. These are the three types of input, or incoming information, that your senses use to understand the world around you.

#### *Chemical Inputs*

Taste and scent are both senses that rely on chemical inputs. In this context, chemical does not mean a harmful substance, like what you clean your house with; rather, it means anything that is made of chemical substances, whether it is harmful or safe. When you are in a kitchen, the chemicals in the food reach your nose's scent receptors. When you eat food, the chemicals in the food relay information to your taste receptors to give you feedback on what you are eating. If you have ever smelled something gross and it left a bad taste in your mouth, that's because scent and taste are very closely related senses. Try tasting food while briefly holding your nose. You will find it's impossible.

#### *Mechanical Inputs*

Touching and hearing are senses that use mechanical information. Sound is just a pattern of vibrations traveling through the air. The pressure of the vibrations reaches our ears and lets us know there is sound nearby. When we touch something the physical pressure against our skin is what gives us information about our surroundings. This makes sense because we don't feel something unless we touch it.

#### *Electromagnetic Inputs*

The final sense, sight, is possible because of processing electromagnetic information. Our eyes can pick up on and sense electromagnetic energy, which is present across a spectrum. Humans only perceive a portion of the electromagnetic energy. At one end of the spectrum are gamma rays and x-rays. These have a short wave lengths. At the other end of the spectrum are radio waves and microwaves, which have the longest wavelengths. Humans are able to detect light in the middle of the two extremes, although the portion of the electromagnetic spectrum that is visible to us is relatively small compared to the size of the entire spectrum.

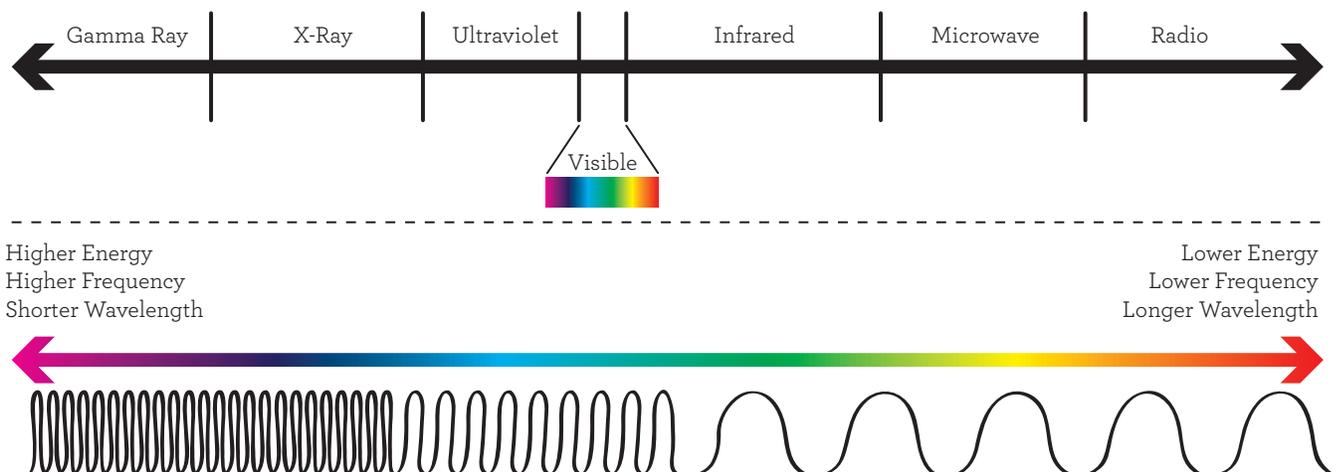
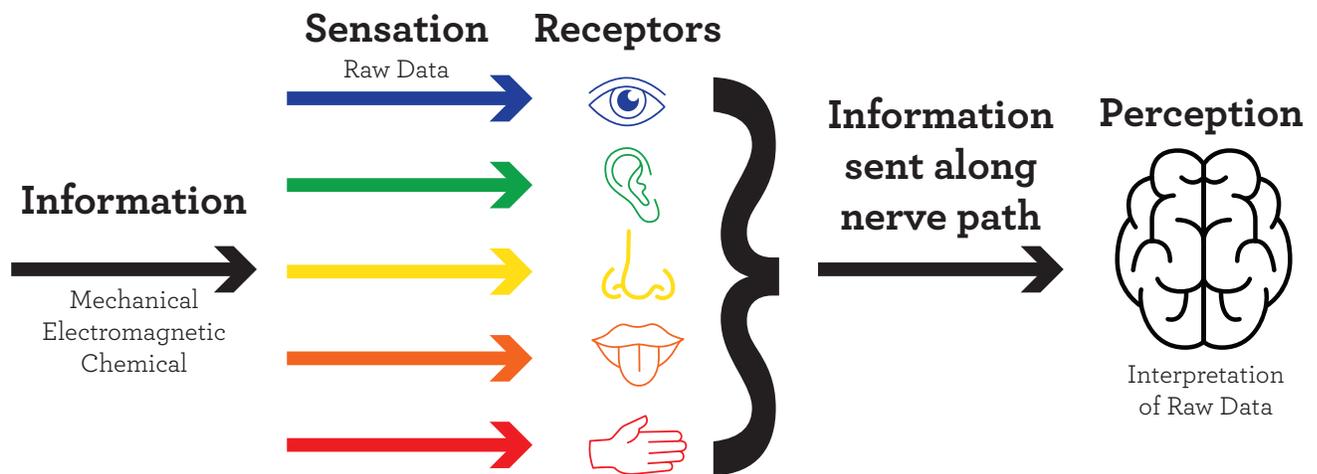
### Perception

We mentioned earlier that sensation is unconscious. Strictly speaking, we don't know when our body senses something until the information travels from our sensation receptors to our brain. Perception is the process by which our body becomes aware of a sensation and is able to use the information to take action or create a memory. Our sensory receptors transmit the information to our brain by traveling along our body's nerve cells.

This process happens very fast, and for a good reason. If we put our hand on a hot stove, our touch receptors must send the information to our brain quickly so that we can avoid being burned. If we cross the street, our eyes must send the visual information to our brains quickly in case a car does not stop for us.

Doctors are able to alter our sense of perception. If you have ever had a broken bone, you may have taken a pain reliever to help you feel better. The pain reliever pill did not fix the broken bone, but it did help stop your brain from perceiving the pain. Patients who undergo surgery are given anesthesia. It would be too painful to feel a doctor working on you during surgery, but anesthesia is able to suppress your brain from perceiving information from your sensory receptors.

Sensation and perception work together to help us build memories, but also to help keep us alive. It can be used to remember an especially pleasant family vacation or to make it possible for somebody to undergo life-saving surgery.



**Directions:** Answer the question below using the passage.

1. Describe the difference between sensation and perception. Use words and a drawing to show how they are different, but related.
2. Give an example of when we need to allow our brains to perceive sensory information.
3. Give an example of when we don't want our brains to perceive sensory information.
4. Order the steps below for how we recall the memory of the first day of school. Then, under each label create an illustration to show how the message goes to our brain for processing.


The message of the chemical input travels along our sensory pathway to our brain.	We realize it's the first day of school.	The chemical input from a new box of crayons reaches our nose receptors.	Our brain receives the input and pulls a memory that matches that scent.
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