

No. 59270

My Body In Action



Take your students on a tour of the human body! 10 beautifully illustrated animation cards depict the intricate details of body systems. Move the cards from side to side to observe the processes of various organs, from light entering the eye to blood flowing through the arteries, veins and heart valves!

Learning Objectives:

- Discover details of human body systems
- Provide an introduction to life sciences
- Identify major body organs and processes
- Discover how body systems are integrated
- Observe beautiful cross-section illustrations

You'll Need:

- R75401 Giant Paper Kids
- Paper human cutout
- Masking tape

My Body in Action cards were developed with special tilt-motion graphics, called lenticular motion, that change as you move them around. Each card shows an important human body system or function in full detail, and feature arrows or other signifiers to show the flow of the process. For instance, in the card depicting the stomach, there are purple arrows designating how food travels out of the stomach and through the smaller and larger intestines. Students can visually trace the path as the card is tilted.

The card animation can best be seen when tilted from side to side. They are the perfect size for referencing by placing the cards against students' bodies! As students observe the movements in the cards, ask them questions to further their thinking. Why does the food pass down instead of up? Why is the tongue important for chewing food? Why is the brain so important to us? The more questions you ask, the more students will start to make connections between the action graphics on the cards and what's inside their own bodies.

To introduce your students to the cards, first lay them in a pile and ask your class to identify which card belongs to which part of the human body. Hold each card up systematically and collectively, as a group, identify the images being displayed and where these body systems or parts are located. When you have identified the image, talk about why that specific process is important to the function of the whole body. You can refer to the facts later on in this guide for further details.

Here's a good activity to test your students' understanding of the human body. Pin up on the wall a cutout of a human body or use our R75401 Giant Paper Kids. Roll some tape into a loop and apply to the back of each Action card. Ask students to

paste the card in the correct spot on the paper human. Your class might need a couple of tries before they get it right, but it's great to see how much knowledge they have of the human body.

Later, you can ask students to reference the images on the cards and draw various body systems onto the paper body shape. Test your students' knowledge of the organs and ask them to name the systems they are illustrating.

HUMAN BODY FACTS

Card #1: Brain



The human brain is a fascinating organ! It controls everything that our bodies do inside and out. It helps us feel, think and do things. The brain is a large mass of tissue inside the skull that consists of many important parts; the largest part

of the brain is the cerebrum, which is divided into two halves and controls most body functions. Other parts include:

- The hypothalamus, which keeps and measures the body's internal temperature.
- The cerebellum, which is at the back of the brain and helps to coordinate the muscles in the body.
- The cerebral cortex, which is the outer layer of the brain assumed to handle consciousness.
- The brain stem, which is connected to all the nerves in the body, receiving and sending nerve impulses that help to generate activity in the body. It is responsible for all automatic or involuntary actions, such as breathing and heart rate.

The brain is enclosed inside the skull, which is also called the cranium. When viewing the card, the brain is shown in a cross-section. The animation depicts nerve impulses moving up along the brain stem and into the brain matter. Nerve impulses are little "messages" sent from parts of the body to the brain, notifying the brain about how things are functioning. In return, the brain sends out impulses to let other parts of the body know how to function. The brain is like an information hub—it knows everything and anything about the body!

Card #2: Chewing/Mouth



What happens to food when we eat? Most students will say it goes straight to your belly! While this is somewhat correct, the food first has to be broken down into smaller pieces so the stomach can digest it properly. Where does this happen? In your mouth! Your mouth is composed of upper and lower teeth and multiple muscles, the largest being your tongue. The tongue is flexible enough to move food around and controls how the voice

box produces sound. It contains special nerves, known commonly as taste buds, which pick up on the “tastants” or chemicals in the food that determine if the food is salty, sweet, bitter, sour or umami (savory). As the teeth break down the food together with saliva, the tongue reaches up and pushes the food bits to the back of the throat. The throat and surrounding muscles, referred to as the pharynx, further continue to move the chewed food down to the stomach. While the food is passing through the pharynx, a small flap of cartilage, called the epiglottis, moves down to block the food from entering the windpipe. The windpipe is a separate opening in your throat that continues all the way down to your lungs. This is why people say to stop talking while chewing, because while talking, the epiglottis opens up to allow air to pass in and out of the lungs. If some food gets trapped in the windpipe, this can present some serious trouble! In the picture card, the epiglottis is the blue flap that pushes down when the food passes through.



Card #3: Hearing/Ears

Hearing is something that many people take for granted. For most people, the ability to hear is not something we consciously do. It requires no effort. For instance, if something makes a sound, like when

a pen drops or a horn honks, our ears automatically register the sound. Let's start with sound. What is it exactly? Sound travels through vibrations in the air known as sound waves. These sound waves are depicted in the cards as the yellow markers traveling along the ear canal. The outer ear or pinna catches the waves and passes them inside the ear canal. The ear canal is lined with ear wax, which protects the inner ear from infections and dirt. As the sound waves travel through the canal, they eventually reach the ear drum, which is a small patch of skin that has been stretched tight to turn the sounds into vibrations as they enter into the ear. The vibrations then pass through the three smallest bones in the body, altogether known as the ossicles. These are the names for each one:

- The first ossicle is the hammer or malleus.
- The second ossicle is the anvil or incus.
- The third ossicle is the stirrup or stapes.

The ossicles all vibrate and pass the sound waves onto the cochlea, which is a spiraling tube covered with liquid and microscopic hairs on the inside. These hairs move when sound hits them, causing them to produce nerve signals that move into the rest of the brain. This allows your brain to understand the sounds that the ear receives. The signals produced from the cochlea are depicted as the blue markers passing through the nerves up into the brain.



Card #4: Seeing/Eyes

Seeing things with our eyes is not as simple as it sounds! The eyes are made of complex layers that view, convert and process visual information. The eye is like a mini camera, taking snapshots of everything it sees for as long as it is open and viewing. In the

card, the eye is protected by the eyelids. At the end of the eyelids are eyelashes, which trap dust and dirt before they get into the eye. You can see that the eyelids close over top of the eyeball. The interior of the eyelid contains a tear duct which

periodically releases liquid to wash the surface of the eyeball. This is an automatic action that the eye does when it senses it is dry or if there is dirt trapped on the surface of the eye, known as the cornea. The eyelids close to keep out the light too!

The cornea covers the iris, which is the colored part of your eye and the pupil, which is the inner black part that allows light to enter the eye. Behind the pupil and iris, there is a large flat white part called the lens. The lens adjusts its shape so that the back of the eyeball, or the retina, receives the clearest image. When we see an image, it's drawn into the eye as waves of light. The retina is a thick mass of rods and cones, special cells that process black, white and the colors of the rainbow. The retina processes the information and sends nerve signals along the optical nerve. The optical nerve then passes on this information to the brain.

Here is something interesting that you may not have known. The eyes reverse the way that the image is processed! The eyes see things in a similar way as a camera. When the image is brought into the eye as a light wave, it is flipped upside down! In this way, the eye can perceive a larger image. If the image is perceived straight into the eye, it has a smaller viewing range and a lack of peripheral views. Peripherals are what you see on the outer edges of your vision. You don't look directly at it, but you are always aware of it. This is why it's important for people who are driving to pay attention to their surroundings and notice what is happening in their peripherals! As the light enters the eye, it bends and twists into a cone shape that is reflected on the opposite side. To see what this looks like, draw a flattened X on a sheet of paper. The light coming in is represented by the left side of the X while the light being flipped and projected to the back of the eyeball is the right side. When the image reaches the brain, it is received as an upside down image. But thanks to the amazing power of the brain, it flips it for you right side up!



Card #5: Heart

The heart is a powerhouse that pumps blood to all parts of the body. Blood carries essential nutrients that keep all the organs healthy and constantly working. The heart is composed of two large chambers called the atria. Both are attached to tubes called ventricles, which pump blood in and out of the heart chambers. Heart valves within the atria direct the flow of blood. From there, the

blood travels out into arteries, which pass the blood along with nutrients and oxygen to all parts of the body. Blood that enters the heart comes from veins, which carry back the blood that has already been to all the parts of the body and is now empty of nutrients and oxygen. When the blood passes through the heart, it gets redirected to the lungs where all the oxygen is transferred and carbon dioxide is removed. The blood is then pumped out to all the areas of the body.

The heart pumps because of the muscle that surrounds it. This special type of muscle houses a natural pacemaker or a connection of nerve cells that automatically fire off electrical impulses to “shock” the heart. This is what causes contraction or the tightening of the heart's muscles. When the muscles

relax, the pacemaker releases another electrical impulse to send the heart pumping once again. This is why paramedics use a defibrillator with an electrical charge to “jumpstart” a patient's heart when it has stopped. The charge makes the heart pump again.



Card #6: Stomach

Digestion is what happens to food once it is broken down in the mouth and passed through the pharynx into the stomach. However, digestion is a large process that requires multiple organs to work together. One of the first organs that food meets on its journey after the mouth is the stomach. The stomach is a large sac-like muscle, lined with a special mucous layer and filled with acid! The acid is a concentrated version of the saliva that works to break down the food and make it easier for the food to pass through the small intestine. Inside the stomach, the layer of mucous prevents the acid from burning straight through! Once the food is broken down to a smaller form, known as chyme, it is pushed into the small intestine.

When the stomach is empty, it is only large enough to hold about 1 cup of mashed food. However, as we eat, the stomach stretches until it is able to hold up to 8 cups of food! When our stomachs get hungry they begin to contract or tighten then loosen until we eat again and give it something to digest. This is felt as hunger pangs!



Card #7: Digestion

Liver, Gallbladder and Pancreas

The liver is the largest gland in the body. Glands secrete or release special kinds of chemicals in the body that cause organs to have various reactions. For instance, the liver

secretes bile. Bile is a type of green chemical that helps to break down the fat content and reduces the acidity of the chyme that exits in the stomach. The liver does much more including cleanse our blood of toxins, regulate hormones and store energy for the body to use! There are two major bloodstreams that enter the liver. There, the blood gets processed and filtered of all the bad chemicals inside.

As the liver produces bile, however, it needs somewhere to store it. This is the function of the gallbladder. The gallbladder is a tiny sac-like pouch that rests inside the liver. It holds the excess bile and releases it once the chyme has passed through the stomach and is about to enter the intestines.

Below both the liver and the gallbladder lies the pancreas. It actually sits under the stomach. It produces a special chemical called insulin that controls how much sugar is in the blood. This is important because insulin assists in transferring the sugar to organs that require energy. Without insulin, the sugar would stay in the blood and organs would stop functioning properly. This happens when the body suffers from diabetes or the inability for the pancreas to produce its own insulin.



Card #8: Intestines

The intestines are connected to the stomach through a thickly-lined tube called the duodenum. The duodenum is responsible for transferring the chyme or partially-processed food bits from the stomach to the intestines for further digestion. In addition, the liver, pancreas and gallbladder all connect to the duodenum so as the chyme passes through it is mixed with all the secretions from these organs, making it easier to digest in the intestines.

The chyme passes first into the small intestine. The small intestine is roughly 20 feet (7 m) long in a fully grown adult! That's an incredible amount when you consider that it all fits inside of the belly area. But that's not all! Once the food passes through the small intestine, it hits the large intestine. The large intestine is shorter than the small intestine, but gets its name because of the width of the opening. Inside both sets of intestines are clusters of cells called villi which are the main driving force for digestion. As the chyme passes through, the villi draw out all the essential nutrients and vitamins from the food. The villi are connected to multiple blood vessels known as capillaries. These vessels help to diffuse all the nutrients to the blood cells and to the rest of the body.

Once most of the nutrients in the food are absorbed, the remainder passes into the large intestine. The large intestine is also known as the colon, or the final part of the digestive tract. It is about 3 feet (1 m) long. It makes sure that any water remaining in the food is absorbed. The large intestine is instrumental in forming the stool, or compacted, indigestible material that is left over from the long process of digestion. The stool is pushed through the colon and finally released as waste from the rectum. It may take up to 8 hours for food to move from the stomach to the large intestine. Once the food has reached the large intestine, it sits there for about a day and a half as all the water is being absorbed.



Card #9: Smelling/Nose

It's pretty easy to guess that the nose is responsible for smelling and breathing. But how does it work? The nose is part of a larger organ known as the nasal cavity. The whole process starts with our nostrils. These two openings take in air. The air passes through the nasal cavity, which acts as a kind of filter. It traps dust and warms the air coming in so that it is moist and easy for the lungs to distribute to the rest of the body. The filtered air then transfers into the trachea, or the part of the throat that leads directly to the lungs.

As the air passes the nasal cavity it comes across the olfactory bulb, which is embedded at the top. It is made up of millions of tiny sensors that detect all different kinds of scents. The olfactory bulb is connected to parts of the brain which register the types of smells the sensors pick up on. The connection between the olfactory bulb and the brain allows you to feel good when smelling flowers or to say, “Ugh!” when you smell something stinky!

At the same time that the brain receives information about the smell, the olfactory bulb picks up on “odorants” which are airborne smells from food that allow the brain to get a full sense of taste. Since the taste buds in our tongues only pick up on whether something is sweet, sour, bitter or salty, there is a need for the olfactory bulb to produce an “all-over” sensation. This means that you don't just “taste” the food—you sense the flavor and savor it!



Card #10: Breathing/Lungs

The lungs are large masses of tissue that enable you to breathe! You have one on the left and one on the right side of your chest. The left lung is slightly smaller than the right lung. This allows the lung to fit in front of the heart. The trachea, which branches off from the esophagus and leads from our throats to our lungs, splits into smaller tubes called bronchioles. These tubes spread into the lungs, and are connected to capillaries, which are tiny blood vessels that encircle the lungs and allow oxygen that you inhale to be transferred to cells in your body. As the lungs expand to fill with oxygen, a large flat organ, called the diaphragm, flattens itself to allow the lungs to puff out. In addition, the lungs are contained inside of the rib cage, and push out at the same time as the lungs expand.

When the oxygen is absorbed by the lungs, an exchange happens. The blood vessels that were previously filled with oxygen have returned to the lungs filled with carbon dioxide and other wastes that have been picked up along the way. These wastes have to be expelled... and this is why we breathe out! When we breathe out, the diaphragm pushes up on the lungs and forces them to contract or squeeze. This pushes out the carbon dioxide, which is diffused back through the bronchioles, the trachea and out into the open.

You can feel your lungs move when you breathe in and out. Just put your hand on your chest to feel the movement!

The Body in Action cards are endless resources to help teach your students about the body. Explore the body systems in full color animations and easy-to-follow steps.

