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No. 59425

Junior Optometrist Eye Charts

Use our fun charts to identify vision issues before they become a problem! Four fun vision tests help measure your students' nearsightedness, farsightedness, contrast differentiation and color vision. Learn about each of the eye charts while developing an understanding about the parts of the eye and common vision problems.

Note: While each of the charts are intended to introduce students to a basic knowledge of optometry, they are not meant to treat or officially diagnose any vision condition. If you suspect a student of having an issue with his or her vision, contact the student's parents to communicate your concerns and ensure that the student is properly tested by a trained optometrist or ophthalmologist.

There are 24 reusable charts in total so that all students can try out the different activities.

Divide the class into pairs. One student plays the optometrist while the other student is the patient. Identify vision issues early to help students learn to the best of their abilities. Use this great approach to modify classroom learning and teaching strategies! Perfect for pre-literate children. Each kid-friendly chart features cute animal characters for kids to identify. All of the charts are based on actual existing optometry testing charts. Discuss each of the chart types with students before hanging them up in the classroom. Use loops of masking tape or reusable poster adhesive such as Blu-Tack® to hang up the classroom posters.

Note: Students who are already being treated for vision problems can try out the various testing charts to explore a range of vision abilities. Do not single anyone out. Try to encourage an environment in which all children feel comfortable using the different charts. Some students may find that they do very well in one chart and poorly in another—this is perfectly normal! About 40 percent of the world's population experiences some kind of vision impairment, from blindness to moderate myopia or hyperopia. Use the following charts to educate children about the different types of vision abilities and impairments and learn about how important our eyes are to the rest of our functioning bodies.

Tumbling Animal Face Chart:

The first vision test is the nearsightedness test. This chart consists of a rotating animal face. The row of images at the top of the chart are larger than the ones at the bottom. This chart tests to see how well a person can see the row of small images at the very bottom. This chart is very similar to the Snellen eye test. The Snellen eye chart features a row of letters that gradually decrease in size towards the bottom of the chart. These charts can be found in almost any eye doctor's office. One version of the Snellen chart is the Tumbling E chart, which is what our nearsightedness chart is based on. The Tumbling E chart is meant for young children who aren't fluent with the whole alphabet. The optometrist will ask the child to point in the direction that the E is facing. When the child can't indicate the direction any longer, the optometrist can determine how well the child sees at a distance.

Place the Tumbling Animal Face Chart on the wall. Stand at a distance of 20' (6 m) away from the chart. One child can point to an animal face, starting from the top left and work their way to the bottom right corner. Wait for the other student or the patient to call out the direction that the animal is facing before moving onto the next image. Alternatively, if children are still learning to define directions, provide the 'patient' with an animal button that resembles the animal on the chart. That way the patient can orient the button in the direction indicated.

Use the figures below as a guideline.

If the patient can perfectly see all the rows up to row 8, this means they have perfect vision (or 20/20 vision—we'll discuss these numbers further on in the guide). If the patient can see up to rows 6-8, they have average vision, which means they can see well enough without too many problems. If the patient can only see up to row 5, it is important that his or her vision gets checked by a specialist.

Close-up Animal Cards:

How well can you see up close? This chart measures if a person has farsightedness or how well a person can see an image right in front of them. These charts are featured on small cards and are based on the Snellen chart. Give the chart to a student along with a pack of Animal Face buttons. Instruct the student to place the Animal Face buttons in the order they see in each row. Complete one row before moving onto the next.

If the student is unable to see rows 5-8, it is important that his or her vision is checked by a specialist.

Contrast Chart:

The contrast chart measures how well people see different values of a color. If a child stumbles on stairs, he or she may have a problem seeing contrast in colors. A color's value is based on how bright or dark the color is. The color is the same, but the addition of white or black is what changes the color's value. As a result, the darker the color is against a background of white, the more contrast it has. The lighter the color is, the less contrast it has and the harder it is to see.

Hang up a contrast chart on a

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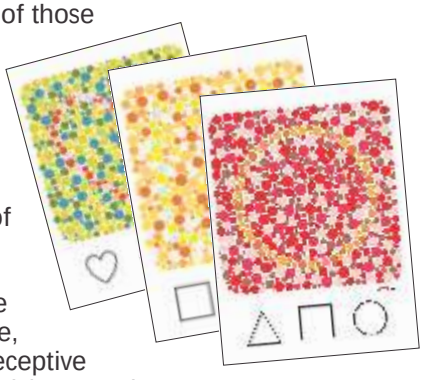
wall. Instruct students to stand about 20' (6 m) away and try to describe the order of the animals in each row. Provide the Animal Face buttons for the children to rearrange.

Most students should be able to recognize the shapes and colors of each row of animals. The original contrast sensitivity test used by optometrists features big bold black letters in the top row and gradually fades to grey then white with each successive row.

Color Blindness Cards:

These cards are specially designed to test the spectrum of colors that a person is capable of seeing. Each card features a picture of colored dots. The colored dots are close together and are mostly monochromatic or colors that are different values of each other. In the white space below the image, the card shows three different shapes. One of those shapes is concealed inside the picture. The shape will be outlined with a different color of dots. Although the color of the dots looks different, it actually contains a mixture of the color values of the dots around it in the rest of the picture. If you can see all the dots and make out the shape, you have the all the photo-receptive cones in your eyes that can pick up on those specific colors.



Some students may not be able to distinguish the shape from the rest of the dots. This is not surprising as many people are born without the necessary red, blue or green cones in their eyes to pick up subtle differences in these colors. Other people could have all the cones, but lack the strength in them to see colors vividly.

If you suspect that one of your students is having trouble recognizing the colors, make a note to inform the parents about setting up an appointment with an eye specialist.

Discover the brilliance of the human eye with these engaging charts and activities!

CURRICULUM CONNECTIONS

- Test vision abilities in a safe, fun way
- Provide students with multiple activities
- Record and analyze results
- Indicate directions such as up, down, left, right
- Explore human vision
- Learn the history of vision tests
- Learn basic medical definitions
- Exercise fine motor skills through sequencing
- Learn to define colors and shapes
- Discover contrast and values of colors

Optometrists or eye doctors use many different types of charts and special equipment to evaluate and treat the ability of the eyes to see. Optometrists look for any defects in the eyes that could affect the way people see. Some defects do not significantly affect people. In many cases, for instance, people who cannot see objects at a distance with crystal-clear vision are still able to read signs and recognize objects while driving. However, if his or her vision is bad enough that it impairs the person from reading a sign properly, it is important that they get their vision checked. Without clear vision, a person could get in an accident or get frustrated or injured because they were unable to see properly.

Optometrists will treat a vision problem with many different tools. Some eye doctors will prescribe glasses to correct the vision impairments of a person who cannot see objects that are far away or objects that are near to them. Some people may require surgery to correct any problems or diseases of the eye, such as glaucoma.

Let's start with a basic overview of the eye.

The eye is an integral part of the human body. It allows us to interact with the people, objects and places around us. About 80 percent of all the things we perceive are channeled through our vision.

The eye is made up of eye muscles, the cornea, iris, pupil, lens, retina and sclera. Each part works together to produce a perfect image that the brain then makes sense of.

The eye muscles surround the eyes and keep them in place while moving them up, down, left and right. Both sets of eye muscles are perfectly coordinated so that they move at the same time. If one set of muscles is not as strong as the other set, this may cause the eye to "turn" or to display extreme lazy eye, called strabismus.

Everything we see is due to the science of light rays. Light rays bounce off objects in a spectrum of colors that our eyes take in and send to our brain through a special nerve called the optic nerve. The brain can perceive over 10 million colors.

What else can eyes do besides help us see things? The eyes sometimes push out tears to help protect the outer layer of the eye or to respond when emotions overload the brain.

The cornea is like the front lens of a professional camera. 70% of the focusing and adjusting needed to process the amount of light that enters into the eye is handled by the cornea. It is the clear part of the eye that covers the pupil and it looks like a slight bump at the front of the eyeball.

The iris is the colored ring around the pupil. This is the part that people refer to when saying that someone has green, blue, gray or brown eyes. When you look closely at an iris, it has a variety of flecks and 'spokes' going around it. These are all made of tissue or a muscle that opens and closes around the pupil in the middle. This helps to control the amount of light that passes through the pupil.

The pupil is in the center of the iris. It is black because it absorbs and transfers all of the colors that the eye perceives into the retina. The pupil changes sizes as different strengths of light are directed at it. For instance, if you look at someone's eyes while shining a light nearby their face their pupils will shrink. Take the light source away and their pupils will dilate or expand. This happens because the iris and the pupil work together to keep a normal amount of light projecting into the eyeball. Many doctors will test if the pupil is reacting properly by shining the light from a special medical instrument directly into the eye.

The lens, positioned behind the iris and the pupil, helps to focus our vision when we are close or far away from an object. It captures the light coming in through the pupil and changes its shape to focus on the image.

You can see the effects of the lens with this simple trick.

Stare directly at the space in front of you and hold your eyes in this position. Hold up an object such as a pencil in front of your eyes at about a distance of 4 or 5' (10-13 cm) away from your nose. Make sure the pencil goes right in front of your eyes so that you have to 'refocus' your gaze onto the object. Notice how it takes about 3 seconds for your eyes to properly adjust and make the pencil come into focus. You'll notice, too, that everything around the pencil has blurred or faded. This is the work of your ocular lenses, which have stretched their thickness to better capture the image up close. When you are looking at distant objects, your ocular lenses become thinner as they are able to take in more of the scene than just the pencil in front of your nose.

The retina is the third layer of the eye that surrounds the majority of the eyeball. It has millions of tiny sensors, or the rods and cones, that pick up on the light signals that enter in through the pupil and lens. The retina layer is connected to the optic nerve at the back of the eye, which sends all of these signals to the brain.

Rods and cones are the types of photosensitive cells that respond to different values and hues of light. Rods are mostly used at night and perceive images in black and white. The cones, meanwhile, help perceive images in the day and in a range of colors.

The part of your eye that is visibly white is called the sclera. This is the outmost layer of your eye and is surrounded with tiny blood vessels. These blood vessels provide the nutrients needed for this part of the organ and appear tiny and red. The sclera does not make up the majority of the eye, however. The largest part of the eye called the vitreous humor contains a thick layer of blood vessels and tissue that help to give the eye its shape. It forms the bulk of the eyeball.

What causes the different kinds of vision problems? As you discuss each of the charts and what they are testing for with the class, talk about the reasons for why eyes sometimes don't see perfectly.

The Snellen chart was designed by Hermann Snellen, a Dutch ophthalmologist who researched various eye problems such as glaucoma, astigmatism and others. Snellen decided that it would be easiest to generate a chart that could measure a standard for perfect eyesight. That way, other optometrists could see how and why and whether or not a patient's eyesight was lacking.

The Snellen Eye chart is made up of 11 rows of letters. The top row has the largest type size while the lowest row has the smallest type size. Each row has a fraction beside it, expressed as 20/200 to 20/20. The numerator, or the number in front of the division line refers to the distance that the patient stands away from the chart. This is 20 feet. The denominator or the number after the division line refers to the type size of each row. For instance, a person who can see 20/200 clearly is looking at a size 200 letter while standing 20 feet away from the chart. The optometrist then grades the patient's eyesight based on the last row of letters that they can see at a distance of 20 feet. The less number of rows they can see, the higher prescription of glasses the patient may need to wear. The standard eyesight for people is 20/20.

As we've mentioned before, the Tumbling Animal Face chart is based on the Snellen Eye chart found in most optometrists' offices. It tests for signs of myopia or nearsightedness. This means that a person cannot see distant objects but can see close objects perfectly fine. Myopia can occur as the result of many factors but one of the most common—and most easily treated—is that the eyeball is slightly elongated. As a result, light from a distant object cannot pass through the pupil and the lens far enough through the eye to be processed to the brain. As a result, the image is blurry. Optometrists will prescribe glasses for people with moderate to severe myopia. The glasses are made of specially designed optic lenses that help to bring the image 'closer' to the viewer's vision. This helps trick the pupil and lens into thinking that the image is closer than it actually appears and as a result, the image can be seen clearly. These lenses work like a magnifying glass for the eye. They are concave, which means that they slant inward.

The Close-up Animal cards are also based on the Snellen chart, however, this version is used to test how a person's vision fares up close. The letters on the Snellen chart get increasingly smaller; a person who has no problem focusing on objects up close will be able to read the sentence. A person who is unable to see up close will have a harder time reading the sentence and the words will become more blurry as they get smaller. This indicates that they have a condition called hyperopia or farsightedness, which means that these people can see a distant object fairly clear but not an object that is nearer to them. This occurs when the eyeball is slightly shorter than normal; the light cannot pass through the lens because the lens has less room to expand. As a result, it can't process the image.

To correct this, optometrists will prescribe a type of glasses lenses that are thicker than the one that people with myopia use. This helps to lengthen the image, allowing the lens to perceive the image as if it is 'far away.' These lenses are convex, or bulging outward.

The Contrast chart is based off the Pelli-Robson Contrast Sensitivity chart. This chart measures how well a patient's vision picks up on contrast between different values of the same color. As we've learned before, value is the lightness or darkness of a particular color. If you add more white to black paint, you get gray. If you add even more white to gray, you turn it light gray or a few shades darker than white. At some point for some people, it becomes almost impossible to see the difference between white and a shade of white that has a hint of gray in it. The contrast sensitivity chart measures the point when a patient's vision loses the ability to recognize contrast.

The Pelli-Robson chart features 8 rows of letters. Each row of letters is printed in one standard size. Each of the letters within the rows are divided into 'triplets' or groups of three letters that are tinted the same. Each triplet is gradually lightened as the letters progress down the chart. For instance, the first triplet of letters in the top row are completely black. The next triplet of letters in the same row are colored a dark gray. Each row gradually becomes lighter; the last triplet on the bottom row is the lightest value of black (a near-white).

People with normal vision should be able to see to the second last or last row of letters. Those who have difficulty seeing past the 5th level should see an optometrist as this may be a sign of a serious condition such as glaucoma, or an increased production of fluid in the eye that can cause blindness. Sometimes, there can be a problem with the rods and cones in a person's eyes that keep them from seeing contrast. Since rods are responsible for night vision and black and white perception, any problem with them will cause issues with viewing in day as well as night. As we mentioned before, there are a number of problems that can occur if a person

doesn't have the ability to tell the difference between tones (lights and darks) of the same color. It is harder for people to see in the dark and can often be the cause for why some people trip, fall or injure themselves more often than others. In some cases, it is hard to tell the difference between each step of a flight of stairs!

Loss of contrast sensitivity can be treated with surgery or with special corrective lenses.

Color-blindness affects less than 10% of the world's population; more so in males than females. It occurs when the cones in a person's retina fail to pick up on the light signal channeled by the lens. In a normal eye, the cones are trichromatic, or are capable on picking up a range of colors from the basic red, green and blue spectrum. Red, green and blue (or RGB) can be mixed in various degrees to provide the full spectrum of 10 million colors that a normal human eye can recognize.

If a person is dichromatic it means they are missing one of the three important basic colors. If a person is unable to see the color red, that means that any tertiary or secondary colors will appear with out red as well (i.e. purple without red is seen as blue or a red traffic light is mistaken for a yellow light).

If a person is monochromatic, this means they are only able to see the world in black and white. This type of color blindness is extremely rare.

To identify a person with color-blindness, optometrists use the Ishihara test. The test cards feature a variety of monochromatic colored dots or dots that are within the same color but in different tones. In the center of the dots, there is an image of a number. The number is also made up of dots, however these are colored differently than the dots in the rest of the picture. The patient is asked to identify the number in the card. If they are unable to see the number, it means they have a slight to severe difficulty in color perception.

Let students try out each of the activities. A pair of students can circulate and try out all of the activities together. The first 7 years of a child's life are crucial for detecting important eyesight problems. Poor eyesight can sometimes run in the family. It is not 100% fact, but if both parents of a child have a problem with their eyesight, there is an increased chance that the child could inherit some of the problems. The first set of eye tests should be administered from 2-3 years of age to help detect any problems and provide treatment early on.

Good eyesight is important because it helps increase skills in recognition, puzzle-solving, fine motor and other important mind-body coordinated functions.

Watch out for any symptoms that could signal an eye problem.

- Poor focus
- Excessive rubbing of eyes
- Excessive blinking
- Slow reaction or interaction

It is very common for children to struggle with their schoolwork if they are experiencing eye problems. As a result, many times the issues with their eyes go undetected and instead, the children are treated for learning disabilities. It is important to get a basic, complete overview of the different functions of the human eye to provide persons in need with proper treatment.