

Find out more about your brain and senses...

Answers

1. The average human brain weighs 1.25kg - that's quite a bit to carry around all day!
2. Because they are the power signal that make your muscles move, like the motor of a car.
3. It is difficult to see colours when it becomes dark because our cone cells only work in bright light.
4. Pouring a glass of milk or threading a needle would be difficult without binocular vision - you can probably think of many more! Rabbits and horses have eyes that are further apart so they don't share the same view. But just think how much more they are able to see without moving their head!
5. Touch experiment - The skin on your finger is more sensitive than on your arm. This is because there are more of the special receptor cells in your finger than in your arm and more of your brain is used to 'look' at your finger than your arm (look at the picture of the man on the previous page).

Visit The Science for Life exhibition at The Manchester Museum, Oxford Road, Manchester M13 9PL
0161 275 2634

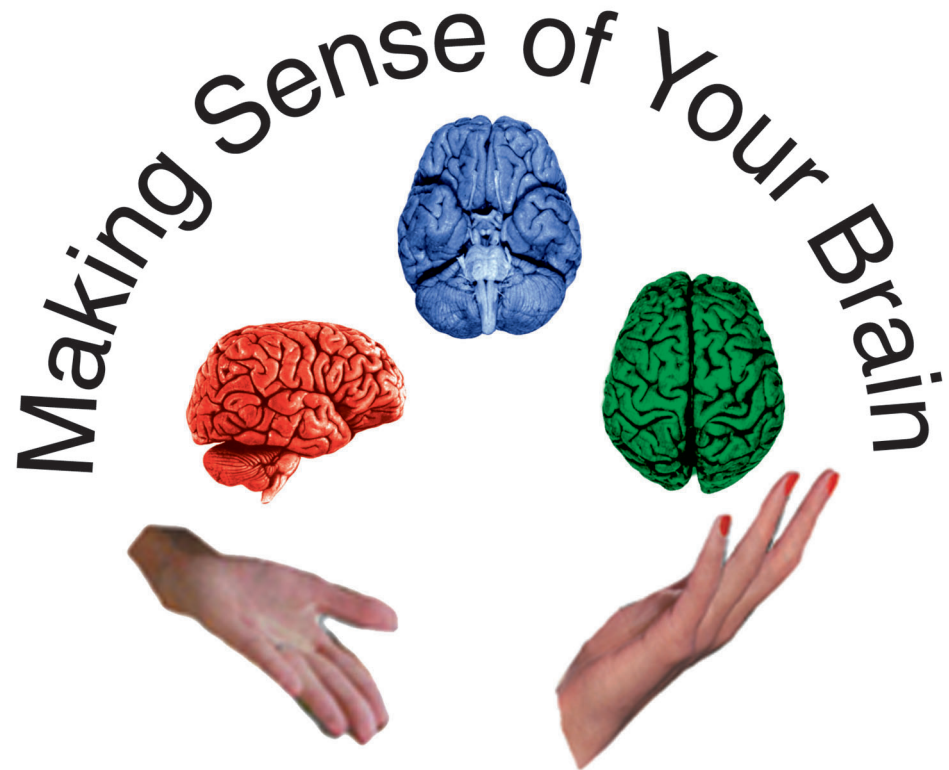
Neuroscience for Kids' web page:
<http://faculty.washington.edu/chudler/neurok.html>
<http://www.youramazingbrain.org.uk/>

More experiments online: www.bbc.co.uk/science/human-body
<http://www.yorku.ca/eye/toc.htm>

Images of the human brain were downloaded, with permission, from: <http://www.vislab.ucl.ac.uk/>

Acknowledgments:

Rigmor C Baraas,
Graham Barnes,
Noel Bayley,
Philippa Cotton,
Vicki Hillyard,
Angie McVeigh,
Ellen Poliakoff,
Ingo Schiessl &
BBSRC.



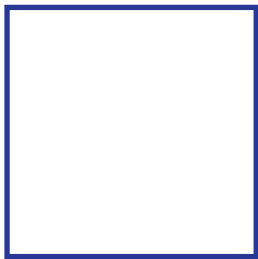
Two eyes are better than one!

Find out for yourself - Do you have two good eyes? Hold your thumb up at arms length in front of your eyes. Close one eye; look at your thumb while you try to hold the thumb as still as you can. Now, close your open eye and open the other. Could you see that the object behind your thumb jumped? That is because the eyes have two different views!

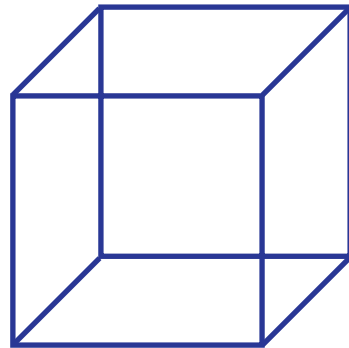
Our eyes are close together at the front of our heads. Each eye sees almost the same view of the world but, importantly, the views are slightly different. This small difference means that when the views from both eyes are combined in the brain, we can see object as 3-dimensional (3D) rather than just 2-dimensional (2D). This is called binocular vision.

If you only have one good eye, you can only see in 2D. We need **binocular vision** so we can judge precisely where objects are around us - think how difficult it would be to pick up a coin or catch a ball without being able to do this!

2D



3D

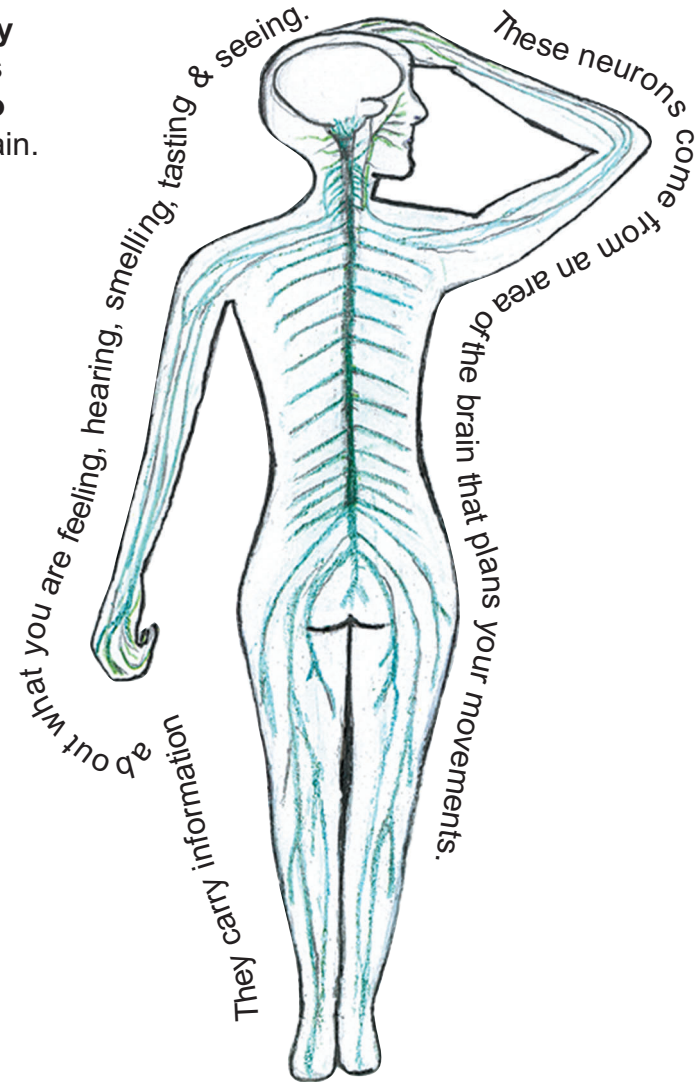


4. Can you think of some more actions that you are good at because you have binocular vision? Rabbits and horses don't have binocular vision. Why do you think this is?

Making connections...

Neurons connect your brain to your body.

Sensory neurons travel to your brain.



Other neurons are for doing things - **action**.

2. At the spinal cord, another neuron passes on the message to your muscles. These messenger neurons are known as motor neurons. Why do you think this is?

The brain and eye

The **retina** is at the back of the eye and is packed with photoreceptors (**rods** and **cones**); small sensors that detect light.

Light travels through the **cornea**, **pupil** and **lens** before hitting the **retina**.

Cones work only in bright light; and there are three different kinds: red, green and blue. They are sensitive to colours.

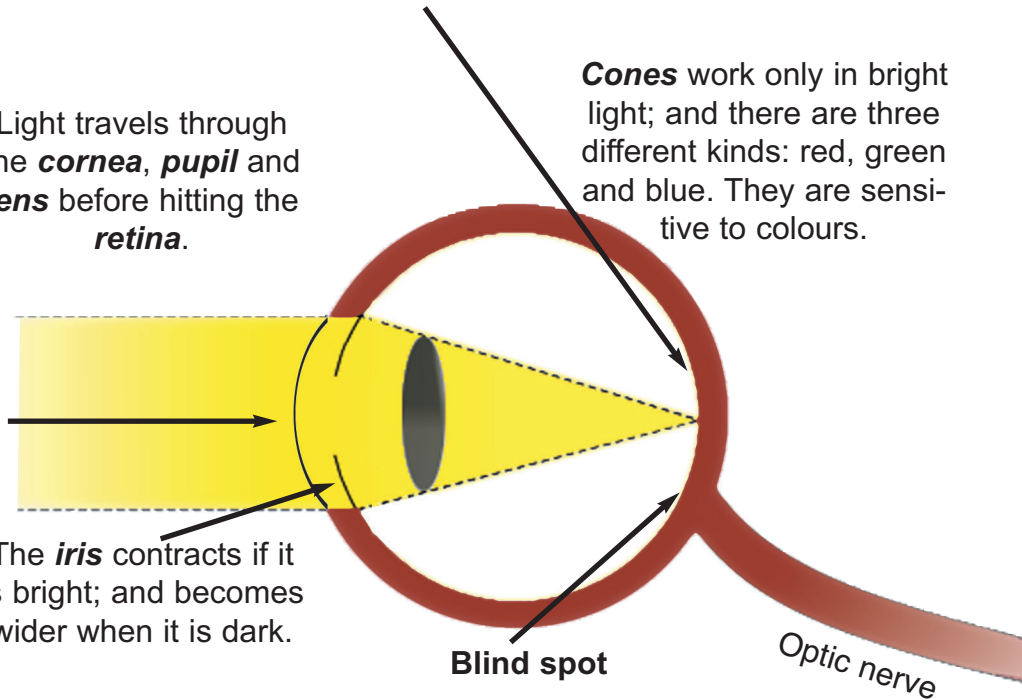
The **iris** contracts if it is bright; and becomes wider when it is dark.

Rods work only in dim light. They are very sensitive to light, but blind to colour.

The Photoreceptors send electrical messages along the optic nerve and out of the eye to the brain. You need a brain to "see"!

Blind spot

Optic nerve



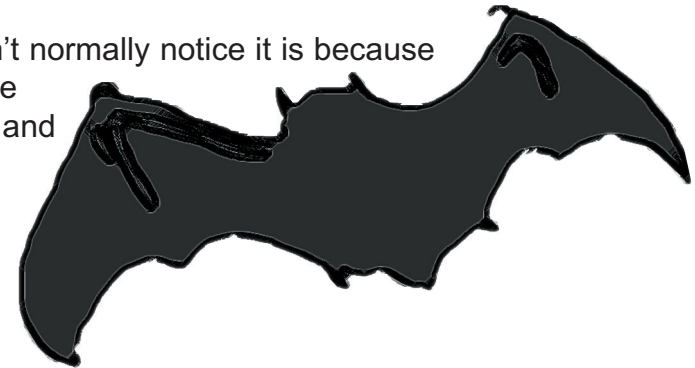
3. Why do you think it is difficult to see colours when it becomes darker?

Blind as a bat?

One part of your retina has no photoreceptors - it's where the optic nerve leaves the back of the eye, on the way to the brain. This is our blind spot and any image in this region will NOT be seen.

Do you see a blind spot anywhere? Maybe you don't notice it because it's so small? Actually it's a pretty big blind spot!

The reason you don't normally notice it is because your brain 'fills in' the missing information and guesses what you should be seeing...



Find out for yourself - Where is your blind spot? Close your left eye and hold this piece of paper about 20cm from your head. Look at the cross with your right eye and gradually move the piece of paper towards you. At a certain distance the spot will disappear from sight (it will reappear if you cheat and look directly at it or continue to move the piece of paper towards you).



Try the same with your right eye closed and look at the spot with your left eye. You'll find that you can make the cross disappear.

Get to know your brain

There are 100 billion neurons in the human brain!

These brain cells work together to make sense of what's going on around us, to **plan** what we're going to do and everything from day-dreaming to doing sums - it's a bit like a computer in your head.



Star Cleaners!

There are cells in your brain whose job it is to look after your neurons. These are called **astroglia** because of their star shape! They recycle the chemicals that neurons release, keeping the environment of your brain healthy.

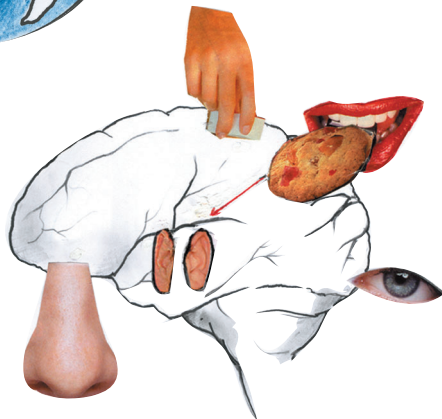


Brain Geography!

Did you know that your brain is full of maps?

Our brains have maps for:

- * Different musical notes
- * Parts of our bodies (see page 7)
- * The lines that make up the objects that we see.



1. How heavy do you think your brain is?

Touchy?

Did you know that your skin is the largest sense organ in the body?



Under your skin

Special receptor cells under your skin mean that you can feel touch as well as pain and temperature. These receptors send messages up to your brain...

The little man in the brain

Not all parts of your skin are equally sensitive. More of your brain is used to understand the sensitive parts. The man opposite shows how much of your brain is used to find out about different parts of your skin - his big lips show that your lips are sensitive and a large chunk of your brain is dedicated to finding out about them.



Find out for yourself - Which do you think is more sensitive: your finger or your arm? Find a paper fastener and open the two legs to create two points. Ask a friend to close their eyes and gently touch the skin on their finger with the two legs of the paper fastener. Ask them how many points they can feel. If they say one, keep making the legs further apart until they can feel two. If they say two, keep making the legs closer together until they say one. Measure how far apart the legs are and write it down. The smaller this distance, the more sensitive the skin. Now compare this to their arm.

5. Which is more sensitive? Why do you think that is?