

Lesson 1

Video Description

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| Grade Level: 3rd-6th | Time Frame: 60 minutes | Content Areas: Science, Reading, Math |
| What are we learning? The brain has around 100 billion neurons. | Why are we learning this? To understand that the brain is very complex. | |
| Introduction (5 minutes) -Share what students will be learning and why. -Go through slides 1, 2, and 3 on the presentation. | Materials -Presentation for class -Complexity of the Brain worksheet printed -Bookmarks printed | |
| Reading (25 minutes) <u>Before Reading:</u> -Review 'Words Worth Knowing' from the PowerPoint. (<i>optional</i>) -Pass out Complexity of the Brain paper. -Decide if you want students to read in partners, groups, or independently. <u>During Reading:</u> -Encourage students to use reading strategies as they read. (Asking questions, making connections, close reading, etc.) <u>After Reading:</u> -Review the text (slide 11, 12, 13, and 14) and allow students to ask clarifying questions. Slide 13 and 14 show a visual of the comparison of vehicle:neuron and package:neurotransmitter. | | |
| Helpful Hints -Show students how to use online calculator and check their answers -Bookmarks can be printed on card stock | | |
| Activity (15-20 minutes) -Complete Step 1 and 2 on the back side of Complexity of the Brain paper. -Before Step 3 and 4, model to students how to type the numbers into the calculator, use commas, and decimals. -Students can work independently or with partners, but before moving to Step 4, they must stop and get their answer checked. -Walk around the room to monitor their work for Step 4. When they finish, you can check their work and hand them a bookmark to fill out. | | |
| Closure -Ask students to come to the carpet with their bookmark. Allow students to share how many years it would take them. -"Show me on your hands how big your brain is. Now think, what is the only way it's possible to fit all those neurons inside the brain?" (The neurons have to be really, really, really tiny) | | |

COMPLEXITY OF THE BRAIN

Name: _____

Date: _____

Words Worth Knowing

Brain: Organ that controls all body functions of a human being.

Nervous system: System that helps all the parts of your body communicate with each other.

Neurotransmitter: Special chemicals that carry information around the brain and body.

Neuron: A nerve cell or basic unit of the nervous system

Imagine ordering a new pair of sneakers. Easy, right? You click a button, and soon they're at your door. But have you ever thought about what happens in between? Once you click 'order,' a warehouse gets a message to find, pack, and send a pair of size 7 Air Jordans to you. Someone hops on a forklift to grab your shoes from a shelf and put them in a shipping container. Then, they load the container onto a truck. The truck takes it to the airport, where a team unloads it and loads it onto a plane. The plane flies across the country to a nearby city. Another team unloads the plane and loads it onto a truck to bring it to your local post office. From there, it goes into a van and heads to your house. When you see the delivery person, you jump on your scooter to get your package. You quickly put on your new Air Jordans and scoot back home. That's a lot of steps, right? It takes a ton of planning, teamwork, and coordination.

Now, what if we told you that your brain works kind of like this? Not with sneakers, of course, but with messages. Your **brain** is always sending messages to different parts of your brain and body. This lets you do everything, from breathing to kicking a soccer ball, eating your favorite candy, dancing to your favorite song, laughing at a funny movie, learning multiplication, and saying "I love you." This communication system is called your **nervous system**, and it's controlled by your brain. Now, make a fist with your right hand and cover it with your left hand. That's about the size of your brain. It's sending lots of messages all the time. In fact, there are so many messages that it's hard for us humans to understand just how much is going on.

Thinking back to ordering your new sneakers, we can think of them as packages. These packages are passed between different vehicles, like a forklift, truck, plane, van, and scooter. In the brain, we call these packages **neurotransmitters**, and they're passed between different vehicles called **neurons**. We can imagine the packages moving between vehicles in a city, just like neurotransmitters moving between neurons in the brain. How many vehicles, or neurons, does our brain have? Ten? Not quite. One thousand? Think bigger! One million? Bigger! One billion? Getting closer... Scientists estimate that the human brain has around 100 billion neurons. Let's try to wrap our heads around just how many neurons are packed into our three-pound brain.

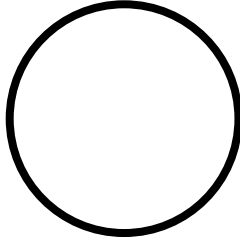
COMPLEXITY OF THE BRAIN

Name: _____

Date: _____

Step 1:

Grab a pencil. Set a timer for 1 minute. When the timer starts, begin making tiny dots with your pencil inside the circle. Count how many dots you can make in the circle before the timer goes off.



of dots in one minute: _____

Step 2:

Our brain has about one hundred billion neurons. Translate that number from words to number digits.

Estimated # of neurons: _____

Step 3:

Calculate how many minutes it would take to make one hundred billion dots. Round to the nearest whole number.

BOX 1

BOX 2

Write down your numbers
below from Step 1 & Step 2.

of dots in
one minute: _____

Estimated #
of neurons: _____



Divide the total number of neurons in the
brain by the number of neurons you drew
in one minute. You can use a calculator!

Estimated # of neurons

Number dots in one minute

How many minutes would it take you to draw the neurons in the brain? _____



Step 4:

Use your answer from Step 3 (# of minutes) to solve the questions below. Round to the nearest whole number.

How many hours
would it take you?

How many days
would it take you?

How many years
would it take you?

Hint: How many minutes are in
an hour?

Hint: How many hours are in a
day?

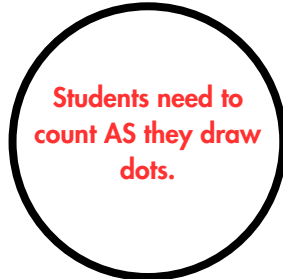
Hint: How many days are in a
year?

COMPLEXITY OF THE BRAIN

TEACHER COPY

Step 1:

Grab a pencil. Set a timer for 1 minute. When the timer starts, begin making tiny dots with your pencil inside the circle. Count how many dots you can make in the circle before the timer goes off.



of dots in one minute: Will most likely be between 50-300.

Step 2:

Our brain has about one hundred billion neurons. Translate that number from words to number digits.

Estimated # of neurons: 100,000,000,000

You can have a student volunteer to write this on the board, and the class can then copy the number.

Step 3:

Calculate how many minutes it would take to make one hundred billion dots. Round to the nearest whole number.

I **highly recommend** modeling the first division problem with students on the online calculator. Show students that they can take the decimal off, but must **CAREFULLY** write down the number. If the first number is incorrect, it will cause all the questions to be incorrect. After you model an example, have students do it using their own number and **check their answer before they can move on.**

| # of Neurons | # of Minutes | # of Hours | # of Days | # of Years |
|--------------|---------------|------------|-----------|------------|
| 50 | 2,000,000,000 | 33,333,333 | 1,388,889 | 3,805 |
| 100 | 1,000,000,000 | 16,666,667 | 694,444 | 1,903 |
| 150 | 666,666,667 | 11,111,111 | 462,963 | 1,268 |
| 200 | 500,000,000 | 8,333,333 | 347,222 | 951 |
| 250 | 400,000,000 | 6,666,667 | 277,778 | 761 |
| 300 | 333,333,333 | 5,555,556 | 231,481 | 634 |
| 350 | 285,714,286 | 4,761,905 | 198,413 | 544 |
| 400 | 250,000,000 | 4,166,667 | 173,611 | 476 |
| 450 | 222,222,222 | 3,703,704 | 154,321 | 423 |
| 500 | 200,000,000 | 3,333,333 | 138,889 | 381 |

The Amazing

BRAIN

If I drew dots
to represent
how many
neurons are in
my brain, it
would take me
_____ years
to complete!



The Amazing

BRAIN

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The Amazing

BRAIN

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Your brain makes

breathing
eating
laughing
speaking
swallowing
planning
smelling
hearing
standing
reading
listening
balancing
dancing
singing
thinking
touching
sleeping
jumping
seeing
learning
tasting
writing
watching

possible

It can be easy or natural to point out the things our brain may get 'wrong', **but can we focus our attention to what our brain is doing 'right'?**

Your brain makes

breathing
eating
laughing
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swallowing
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possible

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