Title: bio-medi English

Neuro science

- ✓ **Instructor: 트래비스 피터**
- ✓ **Institution: 충남대학교**
- ✓ **Dictated: 박주영, 이윤상, 이호영, 이한빛, 이동현**

[00:00]

Okay. So today we'll talk about neuroscience.

We're going to be talking about the brain and very basic stuff I think you should understand well, much of this probably learned in high school or even before that.

But of course, in English, so little difficult.

So today we're going to talk about different parts in the nervous system, going to talk about different types of nerve cells, and we're going to talk about some neurotransmitters which are chemicals, chemicals in the brain.

What they do and what they are responsible for.

Okay. Looking at the overview.

One of the strangest and wondrous things in the universe is the wrinkled lump in every person's head.

Okay, if you look at a brain you can see that it has wrinkles on it, right?

That is the special part of the human brain.

And that part of the human brain is called neocortex.

And that is what, that part of the brain is what allows us to do things that other creatures cannot do.

Think. Reason. Speak. Languages.

Okay? So it makes us higher, more higher evolved than other animals.

The brain ways about 3 pounds.
Okay, in Korea, you don't use pounds, right?

Kilo. So, 3 pounds. Anybody? How many kilos?

You go to the gym, you left 3 pounds...

Can you, can you lift up 3 pounds? I hope so, yes...

Uh... Anybody?

1 point... 6? 5? 4? Ah, roughly half, okay, roughly half.

So, 3 pounds... hmm. Like a big piece of hamburger. Ha-ha.

Okay. Anyway that's the average weight.

In your brain, also, in your nervous system, nervous system is composed of a hundred billion neuron, or nerve cells.

[03:06]

We are talking about those today.

They give you ability to see, to smell, to move and think, reason.

Everything that we experience, everything we remember is thanks to our nervous system.

Everything we do, everything that makes us who we are, our behaviors, our emotions is thanks to our brain.

Which is, well. All thanks to the neocortex, which we'll be talking about today.

We'll talk about the other parts of the brain quickly today, but uh, animals, all animals have similar brain parts as we do, but we just have the neocortex, which is different, and we'll talk about the cerebrum, which allows us to do special, the special things that we can, humans can do.

Okay, um, objectives today. What do I want you to learn.

First one. Understand basic functions for the different areas of the human brain.

Identify different types of nerve cells, Including their properties and functions, we'll talk about those today.

Explain how the nervous system operates, when sending signals throughout the body. Very basic stuff.

And describe functions, and importance of certain neurotransmitters.

We'll be today talking about 4 or 5 neurotransmitters. Found in the human brain.

Okay. So. We'll start lecture notes, only 4 pages today.

Should be finished pretty quickly, at the end of, when we finish the notes, we'll do an activity.

And, total class activity, um, it's a game, if you guys, if this class scores the most points, I teach 6 biomedical classes, if you guys win, then you get one homework assignment dropped.

So the next homework assignment, I give you free pass.

So, that is if you score the most points.

So you need to concentrate today.

Okay. Starting off. How your brain works, the human brain.

Very good. So you can see, of course you guys know, your brain controls all these different things.

And different areas of the brain control these different parts.

For example, here at the brainstem, this part of the brain is responsible for your breathing, for your life, for maintaining your life, Okay?

So breathing, organs, making your heart beat, things like that all controlled by brainstem.

[06:07]

Whereas, the more advanced, well, like any animal have that type of brain, right? But the more advanced things we do like reasoning, thinking and problem solving, speaking, language is all controlled by the cortex.

Which is the top area in neocortex of the brain.

Okay. So today we're just going to do basic... Touch very lightly on the subject, basic things, um, tells you here, brain spinal cord and peripheral nerves, we'll talk about that, that is (what) makes up your nervous system.
All controlled by an organ, size of a small head of cauliflower.

Cauliflower, what is cauliflower? Anybody know?

It's a vegetable, you eat it.

What color is cauliflower?

(student speaks)

Yes. It's kind of whitish, whitish yellow.

Looks like broccoli. Not very popular in Korea, but in America you see more cauliflower.

Anyway, you can, if you see cauliflower, cauliflower looks a little like a brain.

Right? 'Cause it's bumpy on the outside, and it's hard.

But, anyway, the brain is about a little bit bigger than your fist, when you close it.

Okay. So. three parts. Forebrain. Midbrain. Hindbrain. Okay.

Forebrain, Yellow part. Midbrain. Middle part. Hindbrain. Bottom part.

Okay. So, basically composed of three main parts.

And you can see the forebrain is the cerebrum. We'll be talking about that soon.

Thalamus, Hypothalamus, you can see part of the limbic system. You can see here...

Um. The midbrain, the tectum and tegmentum, and the hindbrain we talked about down below the brain system controlling your reading and your keeping, keeping you, uh, basically what keeps you alive.

Okay. Very good. Next we'll talk about the cerebrum.

Okay. The cortex. 4 lobes. Lobes, meaning a... lobe, meaning like area. Okay?

So there are 4 areas of the cortex, or the cerebrum.

[09:07]

And, uh... These are, repeat, frontal lobe, 따라하세요, frontal lobe, parietal lobe, occipital lobe and temporal lobe.

Okay. These are the 4 areas of... of the cerebrum.

And you can see them here, you can see picture on your notes.

All right. These different areas control different things that you do.

You can see here, the occipital lobe located in the rear part of the brain . Okay.

The occipital lobe is responsible for vision. Okay?

Mainly, responsible for vision.

The frontal lobe, okay, which is here, in the front of your brain, the frontal lobe responsible for problem solving and planning, intelligence, reasoning and things like

that all in this area.

Also in this area here, is language, it's responsible for language.

So you can see here word production in the deep frontal lobe. And word understanding in the top part of the temporal lobe.

So in this area is language.

Okay. Also in the frontal lobe here you can see behavior control or emotions, okay?

So some of your emotions, controlling your emotions. So this is kind of like a reasoning. Right. How you reason your emotions.

The temporal lobe, which is here, okay. The temporal lobe controls your memory and your emotion.

This area of the brain is damaged, people who have Alzheimer's disease. Okay? People with Alzheimer's disease, older people, they get Alzheimer's disease and they get damage in their brain and deep inside this area called the amygdala but it is inside the temporal lobe.

Controls their memory, so they lose memory.

Like I said, the temporal lobe is also responsible for language, part of the temporal lobe, so people with Alzheimer's disease also get that language problems.

And then the parietal lobe, which is… doesn't say on here, but you see on your notes is associated with movement and your orientation with things that are around you.

So some of your muscle control and how you perceive different stimuli. Stimulus, stimuli. That is all the parietal lobe.

[12:03]

Okay. Very good. Let's move on to the nervous system. Okay good.

So two main parts, central nervous system, CNS, which is your brain, and your spinal cord, okay?

And then your peripheral nervous system, or PMS, and that are the nerves of your… are your extremities, your arms, your legs, or the nerves that go to your organs, okay?

The nerves that go to your senses.

Okay. Peripheral, that word peripheral, it means outside.

On the outside.

So central, the center, so the brain and the spinal cord.

Spinal cord is your backbone, right? Basically.

And then the peripheral is just every other outside part. The nervous system.

Okay. Very easy.

Neural networks. So, what they're talking here.

Anything you do is controlled by your nervous system and there are different networks of nerves that go through your body that control your hearing, your vision, and all the other things.

Just a bunch of nerves that work together in a network.

Today we're going to talk about how… what's happening when the nerves are talking to each other.

How do they communicate? How are you able to do these things? Okay. So…

Of course, neuroscience is just studying all these different things about the nervous system, so how, what causes you to feel the way that you feel?

And what causes you…why do you act certain ways, your behavior. Why do people get angry?

What is happening when people get angry? Okay?

What chemicals are found in peoples' brains, or what chemicals are produced more?

All of this is what they do, what neuroscientists are studying.

They use computers and they use special dyes. DYE. What is that, a dye?

Some people go get their hair dyed. Colored, right?

So they put a special dye into the person's nervous system and they can track what's happening between the neurons.

The signals that are being sent. Okay.

So they can find out what… how things are working normally and then how things are working when things aren't working normally, abnormally, so they can track different brain disorders, like, we're talking about Alzheimer's disease, or last week we talked about Parkinson's disease.

So what's happening in a person's brain unraveled.

[15:03]

They're solving these mysteries. What is the mind?

That's a very difficult question.

We still don't know exactly what our mind can do.

Why do we feel emotions? We talked about that.

What causes these diseases? We talked about that.

Okay. Now we're going to move on.

What the different parts of the nervous system, so like what I already said, a hundred million brain cells in your brain.

These nerve cells are called neurons, and they send electrochemical signals. All of you probably know that, right?

So there's electricity going through your body, sending these signals and along with , when the electricity passed from one neuron to another, these chemicals are released from the cell.

These chemicals called neurotransmitters.

And these neurotransmitters are what makes you feel the way you feel or act the way you do.

These chemicals can change the way we feel, think, or act. Okay.

All right. Very good.

Let's go on to the basic parts.

Now this is just like any cell in your body, right?

There's a cell body, and that's where the nucleus is, that's where the DNA is.

Neurons are the same like that.

The different part about neurons is that neurons have the ability to send the electrochemical signal, right? Other cells can't do that.

But inside the cell body of a neuron are all the same things you would find in any other cell.

In like he was reading, the organelles, nucleus, the endoplasmic reticulum, the

ribosomes or building proteins, mitochondria which makes the energy for ourselves… Okay.

All of these are found inside the cell body.

If the cell body dies, then the neuron will die.

Okay. All right. The axon. Many of you probably know this.

Here we have a neuron.

This is one type of neuron. This long extension here is called the axon.

Neurons have axons. Why?

The axon is what is taking that message, the electrochemical message, it takes it from the cell body and it brings it down and sends it out to another cell, okay, to the next neuron. So the axon is just passing, taking the message from here and bringing it down to here.

This is called the synapse. We'll talk about it today. So the message comes down to the synapse and then it jumps to the next neuron. All right.

The electro-chemical signal that is being sent, another name for that is called the action potential.

Okay. So that is the electro-chemical signal coming from the cell body.

[18:04]

All right. What you started to read next, you can see these dark red pieces here, this is called what?

Begins with M. Myelin.

Myelin covers the axon in neurons that are in a peripheral nervous system the PNS.

Neurons have myelin on the axon. Okay? They are called myelinated neurons.

Why do they have myelin on the axon?

I told you, the message is coming down on the axon, right? So the myelin is kind of like protecting the… it serves as protection for the neuron or the axon, but also it makes the signal more clear, okay? And keeps it… it makes it faster and clearer, not being lost in the environment.

Okay. Next. You can start with the myelin is made…

All right. Dendrites, so. We talked about the axon, that's a special part of a nerve cell, another part, the dendrites. Here you can see the dendrites. Okay.

What are dendrites? What do they do?

They perceive the environment.

They sense the environment, that means they pick up the signals, right?

If there's a signal being passed, the dendrites pick it up, and they bring it into the cell body.

So here's perceiving, and the message comes in here, okay.

It brings in the chemicals; the neurotransmitters and then once it is ready to passed down the axon and jump Dendrites can be a both ends of the cell; some cells we see today.

Some nerve cells have dendrites and both cells. Okay. So now starting to talk about, you can here, motor neurons, sensory neurons.

Okay. We are hearing a lot about motor neurons and sensory neurons. We'll talk about those little bit. Also there are interneurons.

Different types of neurons you can see in this chat in here. "Basic neuron types".

First you can see there are Bipolar, Unipolar, Multipolar and Pyramidal cell.

Okay. Pyramidal cell just, you can see, looks like a pyramid. So we call this pyramidal cell.

Um, Uipolar, Multipolar, Bipolar, What is 'Bi' means? 'Bi' means two. 'Uni' one, 'Multi', many.

[21:00]

So why are they named like this? Oh you can see. One, two, there are two extensions from the cell body.

So we call this bipolar neurons.

Bipolar neurons are usually interneurons. What is an interneuron?

You can see here an inter neurons. They connect between neurons with in the brain and spinal cord.

So interneurons are connecting neurons. They connect between other neurons. Inter means between.

Okay, and so that's why you have two, you can see you have dendrites at both ends of the cell.

Okay, Unipolar neurons, you can see there is just one extension from the body.

Right here. Only one extension so we call unipolar.

These are sensory neurons. Again you can see you can see dendrite at both ends of the axon.

Okay, So these sensory neurons what are they do?

They are from the outer parts. They bring information to your CNS; your central neuron system.

So from the peripheral nervous system sensory neurons sense your five senses. Right?

See, hear, smell, taste and touch.

So these neurons, they sense information. They bring it to your brain.

Okay. Alright, the other one is multipolar neurons.

Multi. Many extensions from cell body. One, two, three, four, five, six extensions.

Here we have a dendrite and here you can see axon. Here we have synapses.

Okay these are called multipolar because there are many extensions from the cell body.

These are usually motor neurons. 'Motor' we found out last week, motor means movement.

So these neurons are connected to your muscles.

How is the, with sensory neurons, we know sensory neurons work from the peripheral nervous system.

They bring information to the central nervous system.

From our senses to our brain. Motor neurons are opposite direction, right?

Because the information starts in our brain and it goes to our muscles.

I want to move over there first I think it, then I do it. Right?

So the information from the motor neuron reverses.

Very good.

[24:00]

So interneurons, motor neurons, sensory neurons, cortical pyramidal cell.

So the other neurons we didn't mention yet, receptors.

Receptors are just receiving information about the environment. Kind of very similar to sensory neurons.

So receptors sense the environment I say here chemical, light, sound and they bring it to your central nervous system.

So operate very similar to sensory neurons.

Okay, so those are different types of neurons.

We know there are bipolar, unipolar, multipolar, pyramidal cell.

There are also different direction of travel of the information is different between sensory and motor neurons.

Alright, getting towards the end here, good.

We're going to talk next about the synapse where the message passes.

And then we're going to talk about some neurotransmitters.

Okay so this is happening in the limbic system of our brain.

Okay we have talk about that at the beginning of the lecture a little bit.

Synapses. what's happening the signals moving through the neurons.

The signal comes down the axon.

What happens at the end of the axon. Is that these tiny sacs are stimulated.

And the only sacs are stimulated makes chemical produces some neurotransmitters.

Produce depending on what the signal is.

The sacs open and release neurotransmitter in to the space. And that can be taken in by other cells by another nerve cell or any other cells that are in that area.

There receptors will pick up the chemicals and also the electrical signal jumps over the snaps and is transmitted to the next cell.

If it is the nerve cell, process continues and this massage keeps being sensory from your brain through your body.

Okay good, so what are some of these neurotransmitters?

What are some of these chemicals and what do day to for us.

Alright, acetylcholine. Acetylcholine is an excitatory neurotransmitter.

Excitatory, it makes your sense excited. Okay? So more energetic

Alzheimer disease we talk about that, Alzheimer disease damages cells and your temporal lobe.

[27:00]

So Alzheimer disease, there is a shortage, is not enough acetylcholine in their brain.

So the brain is less excited. What does this acetylcholine do? Well, it says muscle contraction.

Contraction means tightening and loosening of your muscles.

Okay. Also Glands, different glands in your body that creates hormone are stimulated by acetylcholine productions.

Alright, GABA(gamma-aminobutyric acid) is inhibitory. And that is opposite to excitatory.

Inhibit means to stop or to slow down or to block.

So it’s inhibitory. Making cells less excited.

[30:00]

What does it do? Controls muscle activity? Important for vision?

And you can see here if we can increase, increases of GABA in the brain can help people who have epileptic seizures.

Epilepsy is a neurological disease and this disease epilepsy, people's brain, what’s happening is their brains are firing many different electro chemical signals kind of things are...

There is too many signals and too many things happening in their brain. Okay?

Going kinds of crazy and is kind of like an electrical storm in their brain.

And so the person will start to have a seizure.

Seizure is someone is moving they can't control their muscles, kind of a twitching.

And sometimes people with epilepsy they will have a seizure.

They can fall down. It's very dangerous and it's a pretty common disease.

So by increasing the neurotransmitter GABA, It can help people with these problems with their muscles; the contractions of their muscles.

Also It can help people who are having tremors. And last week we talked about tremors.

Tremors again similar to seizure.

So people with Huntington's disease have this tremor and that can be controlled by increasing GABA.

OK next one. Serotonin.

Serotonin also inhibitory.

Let's excited, making less excited.

What does it do?

It constricts, constrict means makes smaller so it can constrict blood vessels.

Make some smaller so there is not much blood pumping through your body so that's

Happening you're going to feel sleepy.

If you can't have enough oxygen.

Your blood brings you oxygen to your brain, right?

Not getting enough if your blood vessels are constricted than smaller, you are get little sleepy. So serotonin can make you sleepy.

It brings you on sleep.

Also involve temperature.

Again your last blood pumping through your body, your blood vessels are smaller; you are going to be colder.

Your body gets colder, right?

When you get cold, your blood vessels get small so serotonin can affect sleep, it can affect your temperature and also makes your blood vessels smaller.

Ok last one, dopamine.

Ok and dopamine we talked about dopamine last week with Parkinson's disease, right?

We also talked if you remember, maybe you do not, but we talked about dopamine

We had the lecture about drugs, right?

We talked about methamphetamine and people who take methamphetamine remember that chart?

Your dopamine level in the brain increases very very, gets very high and what does that do?

With methamphetamine when you get that dopamine rush or you are get so much dopamine in your brain.

Dopamine is, it says you are connected to your mood. And I told you guys dopamine makes you feel very good, so good feeling.

So it's responsible for your mood, how you feel also responsible complex movements.

If you don't have enough dopamine we found out last week this is (what) we talked about last week not enough dopamine in your brain can lead to Parkinson's disease.

And remember Parkinson's disease I told you guys makes your muscles very rigid that means tight, hard like a rock so you can't move well, and that's why we talk about stem cells to help bring more dopamine to their brain.

Okay good.

So those are let's see one, two, three, four neurotransmitters.

Now last part neurological disorders.

With the brain healthy things are working quickly everything's functioning properly no problem.

Your mood is okay.

[33:00]

You can deal with everything fine but when there is some problem.

Too much of neurotransmitter or not enough of neurotransmitter or some of your nervous dying like Parkinson's disease or Alzheimer disease you can have serious problems.

Any time you are messing with something in your brain can lead to serious issues, right?

So these sayings are neurological diseases.

And I told you there are more than 600 neurological diseases that are supported by large research with and the UNITED STATES one in five people are diagnose with neurological disease so you can see 20%.

That's huge number, right?

In Korea too.

Those numbers are very similar I think they are little bit less in Korea but very close to the same amount.

So neurological disorder is very common so this field of science of biomedicine is very important.

Studying about the brain and these different chemicals how they can be treated.

Some of this neurological disease you can see.

Some of the major types of disorders include neurogenetic disorders.

Neuro, is said like we said, is brain.

Genetic is in your genes.

So these are disease that you will have at birth because it's genetic.

These types of diseases, Huntington disease we mention today, and muscular dystrophy.

Next, developmental disorders.

We talked about developmental with stem cells.

Stem cells teach us about the development of humans.

Developmental disorders would be like cerebral palsy.

Degenerative diseases and we've talked about this last week. Parkinson's disease is degenerative. Breaking down. Cells are dying.

And today we mentioned Alzheimer's disease

Those are both diseases for elderly older people about the age 65.

Metabolic disease, diseases such as Gaucher's disease.

Protect yourself from trauma a convulse of disorders we talked about today epilepsy.

And I told you guys convulse is moving like your body uncontrolled movement of your body.

And it's like a seizure or convulsion and so epilepsy is like that.

And then infectious diseases are also like neurological disorders, can cause neurological disorders and you all know AIDS.

[36:00]

It's a good example.

And the last one brain tumors.

Okay well that is it for the lecture notes, now we will do this review game.

In this game you also are given hints those you have problem, if you get one wrong you are done finished you are out.

Goodbye you can go home.

But you don't get to win.

If you win you don't have homework next class.

Today there is no homework.

Next class there will be the homework if you don't get to win.

Anyway there are hints that you can use you have three hints in this game. If you don't want to use one, don't, because you can save it for later.

You can have 50%, 50% hint. If you choose this hint, two of the answers will

Disappear so then you have 50% 50%.

There's a phone.

You can phone. You can call someone.

A computer calls someone for you.

You don't actually call someone.

The computers all do it.

And then in this game also there is the audience.

The people that are watching the game show which is the computer makes that up but you ask the audience and you can see what does the audience think is the right answer.

So you have three hints you can use those when you want to but as it total class you only get to use one of three hints.

Okay. So we are ready to start and first we'll be you start over here.

You will be first.

Are you ready?

You can stay wait there.

Where is your brain located?

Is your brain located in your skull? On the moon? In the ocean? Or at the movies?

No. We want you to... I know some of you may be on the moon.

But I want really you to think.

What do you think the answer?

A, In your skull?

Do you know what is skull?

Skull is the highest bone on your head.

So in your skull I hope so.

Is it right?

Yes. Your brain is located in your head, your skull.

That's 100 points.

You just got 100 points.

Okay next number 2.

How much does the average human's brain weigh?

[39:00]

How much does it weigh?

800 pounds? D?

800 pounds; 45kilogram your brain.

Wow. you must be 천재

Okay what is your answer?

C. Oh I think I remember from the lecture. Class the agree with him?

Yes, We are talking about the average human brain. Not your brain

Your brain was 잠일

Alright, your brain weighs about 3 pounds. Very good

Next, about how many neurons are in the average human brain?

We've talked about this today two times

C! one hundred million.

Everybody agrees with her? You better say something

Oh wait she was the one who was sleeping today

We can't trust her

D~ one hundred billion
If you look on the first paragraph you can see

That is correct

One hundred billion neurons are in the human brain and your nervous system

Okay good you have a 300 points

Next, what are the two parts of the central nervous system?

Brain in the left toe? Okay

C, spinal cord in brain yes we talked about that today

Spinal cord in the brain what are we call that?

That is the… CNS Central Nervous System. Yes

That is correct you have a 500 points

What is the name of the junction between two neurons

D the connector ah…B? D? ah D synapse

Everybody agree? That is correct! 1000 point you are doing very well

Next, what lobe of the brain is the most important for vision?

B? question? B can you read this? What does it say?

[42:00]

Occipital lobe. Everybody agree? Sure that was in our notes today

That is correct 2000 points. Good job

Alright now we jump over to you sir

Which of the following is not a neuron transmitter?

Serotonin, tetramine, dopamine, acetylcholine

Which is not a neuron transmitter?

B! Tetramine

Let's see… serotonin we talked about today. Didn't we? yes I remember that one

Dopamine we talked about many times and acetylcholine I think someone mispronounced that today so must be this one

That is correct we are on 1000 points going very well

Next, you! What disease what neurological disease is characterized by electrical storm in the brain? We've talked about this today in the lecture… electrical storms many signals are firing in the brain.

Is it B? You will not find in your notes. It is something I've talked about today

I heard a B. Are you sure? You want to take a hint? Remember you have three hints.

50/50 phone or audience? Oh…. Correct that is correct

Epilepsy. Epilepsy is a neurological disorder we talked about that today

There is a lot of electrical activity happening in the brain

I told you a lot of electro-chemical signals so person starts to shake. They are convulsing

That is epilepsy. Next, which drug comes from a plant called Cannabis Sativa?

This is from our drug lecture. You need to remember. We've talked about this drug

You don't remember the drug lecture? A? Marijuana

What do you think class? Do you agree with her? She is correct

[45:00]

We've talked about the plant Cannabis Sativa is also a marijuana

Okay very good why are we talking about Cannabis Sativa with neuroscience? Because Cannabis marijuana remember I told you the facts your senses. Your senses are very heightened. So marijuana increases different chemicals in the brain

Next, what do the arrows point to in this diagram of the neuron?

D… what are they? Reading? dendrites… very good

Even telling us information wow

You get an A+. dendrites is correct. Very good. Arrows point to dendrites and dendrites accept the information. Bring it to cell body. Okay 3200

Who do we go to next? Bambam Oh it can't what am I thinking? Of course

What connects the right and left hemispheres of the brain?

We did not talk about this today my fault I forgot

We talked about different parts of the brain but our brain isn't in two hemispheres right?

There is right and there is left. We say right brain and left brain and they are connected.

Those two parts of the brain are connected by something. What is it connected by?

The corpus callosum, thalamus, superior colliculus, choroid plexus.

And I am sorry but it's not in our notes and I didn't talk about it so you have to know this.

In Korea, people usually take 50/50 but I don't know. 50/50 is still 50/50. These might give you more information I don't know.

No computers! That is cheating. A dictionary is also cheating.

You want the 50/50? Okay…. 50/50. It's either the corpus callosum or choroid plexus.

[48:00]

What are you think? You think it is the choroid plexus? You sure? Would you like to take another hint? No? you sure.. final answer? No…..

The corpus callosum is what connects left hemisphere. That was difficult I did not even talk about it today, but my other class I didn't either and they got it right.

But it's okay you guys had 64000.

64000 dollars woo alright! Sorry I'll pay you later.

Give it to you later.

Alright anyway we are finished.

Good job that's it.

Have a good week and no homework today yay!