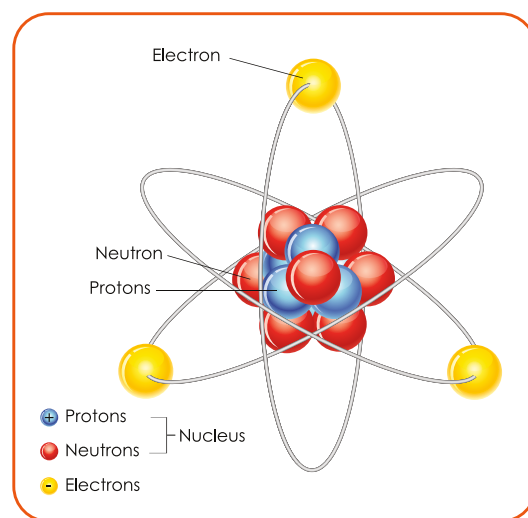


# Elements

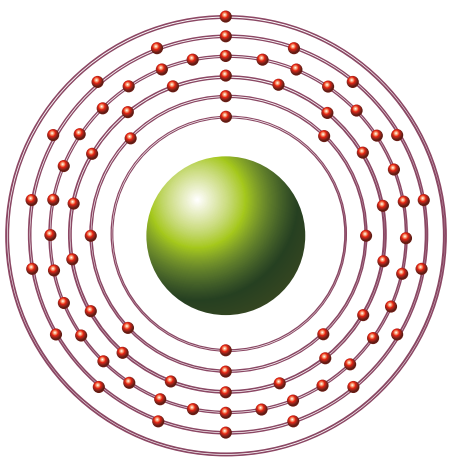
Day

Oh, hey there, friend! I'm glad you're back for another science adventure. Last time, we learned that atoms are the building blocks of matter. Hannah, do you remember the three parts an atom is made of?

I sure do! An atom is made of protons, neutrons, and electrons. Now that we've learned about atoms, it's time to explore the world of elements!



I'm excited to get started! But first, I have a question. Are all atoms the same? In other words, do they all have the same number of protons, neutrons, and electrons?



I'm glad you asked. God designed protons, neutrons, and electrons to combine in different ways to create different atoms. Let's talk about a couple different atoms today — we can start with gold.

Gold is a type of metal that is very valuable. Because it is valuable, it is also called a precious metal. Gold is often used to create valuable jewelry, like wedding rings, or it can be used as money. We know that gold is matter because it takes up space and has mass — gold is made of atoms. A gold atom has 118 neutrons and 79 protons in its nucleus (left).

Name: \_\_\_\_\_

Whoa, it would take a lot of M&M'S® to create a model of a gold atom!

It sure would! Now remember, last time we learned that electrons have a negative charge and protons have a positive charge. If an atom has more protons than electrons, the atom would have a positive charge. But if the atom had more electrons than protons, it would have a negative charge. However, an atom prefers to have an equal number of electrons and protons — this gives the atom a neutral charge.

A neutral charge means that the atom is balanced, so it won't have a positive or a negative charge to attract or repel.

Exactly. So, since a gold atom has 79 protons in its nucleus, it also has 79 electrons orbiting around the nucleus. We're out of time for today, but we're going to continue our discussion tomorrow. We'll see you then!



1. Have you ever seen gold jewelry or gold that is used as money?

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2. Silver is another type of precious metal. A silver atom has 60 neutrons and 47 protons in its nucleus. How many electrons does silver have orbiting the nucleus? Remember, an atom likes to keep protons and electrons balanced.

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3. Silver is used for silverware and also for jewelry. Can you find anything made of silver in your home? Write down what you find.

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# Day



We're continuing our exploration of atoms this week, and today we're ready to talk about the elements.

Let's get started! Atoms are the building blocks of matter. God designed the number of protons, electrons, and neutrons in an atom to combine in different ways to create different atoms. These different atoms are called substances.

A **substance** (said this way: süb-stühns) is a certain kind of matter. When a substance is pure and cannot be broken down into any other substances, we call it an **element** (said this way: ël-üh-mënt).

Hmm, that's a little tricky to understand — but I have an example to help us! Imagine we have a peanut butter cracker sandwich in front of us. What is it made from?

That's easy! The sandwich is made from peanut butter spread between two crackers.

Right — the peanut butter and the two crackers combine to create a sandwich. Let's imagine now that we wanted to pull apart the sandwich and separate the ingredients. If we did that, we would have two separate items: the peanut butter and the crackers. We wouldn't be able to separate those items any further.

Ah, in your example, the crackers are like an element, and the peanut butter is like another element.

Right! An element cannot be broken down into any other substances. An element is made from one type of atom. Gold is an element, and pure gold is made from only gold atoms. Silver is another type of element — it is made from only silver atoms.

Scientists have been able to discover 98 elements that are found naturally on the earth. They've also been able to make 20 other elements in a laboratory. This gives us 118 different elements all together. God designed the elements to stay consistent — they are the same no matter where we find them, whether on the earth, deep within the earth, or far into outer space. Let's review what we learned today!



Name: \_\_\_\_\_



Copy each definition below.

1. A substance is a certain kind of matter.

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2. An element is a pure substance that cannot be broken down into other substances.

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I'm ready to learn more about elements today, how about you?

What are we waiting for? I've got a question to get us started. We learned last time that there are 118 different elements scientists have discovered. How do they keep track of all those different elements?

That's exactly what we are going to talk about today. As scientists began to discover different elements, they knew they also needed to find a way to organize the elements and show the relationships between them. But with so many elements, it was definitely not an easy thing to do!

Many different scientists worked to organize the elements, but one in particular became known as the father of the way we organize them. His name was Dmitri Mendeleev (said this way: Dŭh-mē-trē Měn-dŭh-lāy-ŭhv). Mendeleev was born in Russia in 1834, and God gave him a brilliant mind for science.

During Mendeleev's time, scientists only knew of about 63 of the elements. Mendeleev was determined to understand and organize those elements. He asked questions and played with each element like the pieces to a puzzle until the patterns became clearer to him.

But something still wasn't making sense. As he continued to work, Mendeleev realized that there must be more elements that would complete the patterns he was seeing — they just hadn't been discovered yet. He was right. And in fact, God had created the elements with such fine organization that Mendeleev was even able to predict what those missing elements would be like!

Mendeleev's chart organizing the elements became what we now call the periodic table of elements. Eventually, the missing elements were discovered, just as Mendeleev had predicted. Though other scientists also worked to organize the periodic table of elements a little better, Dmitri Mendeleev is known as the father of the periodic table.

The periodic table of elements helps scientists to organize and examine all of the different elements. It's able to give us a lot of information about each element in a clear way. We'll talk a little more about that soon! Mendeleev was able to see God's wisdom, consistency, and organization on display in the elements. Sadly, however, though Mendeleev believed there was a God, he rejected following Christ.

**PERIODIC TABLE OF ELEMENTS**

1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium							5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon				
11 Na Sodium	12 Mg Magnesium							13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon				
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson
		58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium		
		90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium		

Name: \_\_\_\_\_



1. There are 118 elements on the periodic table of elements. Find these elements in the word search below.

Gold      Oxygen      Nitrogen      Silver      Hydrogen  
Sodium      Zinc      Nickel

O	H	Y	D	R	O	G	E	N	X	Z
X	Z	N	V	B	S	O	D	I	U	M
Y	S	I	L	V	E	R	L	C	F	G
G	A	S	N	E	N	E	L	K	B	O
E	S	V	Q	C	W	P	O	E	K	L
N	I	T	R	O	G	E	N	L	P	D

2. How does the periodic table of elements help scientists?

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I really enjoyed learning more about atoms and the elements this week. I'm so excited to continue exploring the elements next week as well.



Me too. This week, I've been thinking about how God created each of the elements that scientists have been able to discover. The way the elements can be organized is amazing to me!

At the beginning of our science adventure this year, we talked about how science helps us organize and understand God's creation. It's important to remember that science can be organized because God created the world in an organized way. Science reveals the organized nature, infinite wisdom, and the power of our Creator.

The more we learn together, the more it reminds me of what we read in the Bible in Romans 1:20,

*For since the creation of the world God's invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made, so that people are without excuse.*

As we study God's creation through science, it reveals His eternal power and divine nature to us. The delicate design of a butterfly's wing, incredible night sky, and even the organization of the elements declare to us the glory, power, and majesty of God.

But like we saw this week, we have a choice to make as we continue to learn. We can choose to see God's glory, power, and majesty on display as we study His creation — or we can reject Him.

Though many scientists do follow Jesus Christ with their lives and trust what the Bible tells us, many others choose to close their eyes to God's glory, power, and majesty in His creation. They refuse to recognize God as our Creator and ultimately choose to reject God in their lives.

I've chosen to follow Jesus for my whole life, and I love to see His amazing design on display when we study science!





Has anyone in your family chosen to follow Jesus? Ask them to tell you about the day they decided to become a Christian. Then look up Romans 1:20 in your Bible. If you'd like, you can highlight this verse. Memorize Romans 1:20 with your teacher or with a sibling.





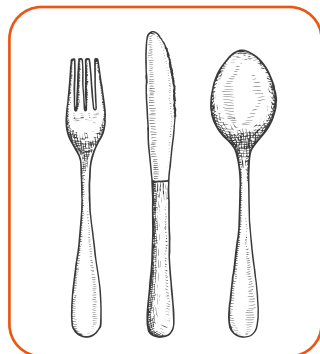
# Day

Hey, friend! We're here and ready to add a new page to our Science Notebook today.

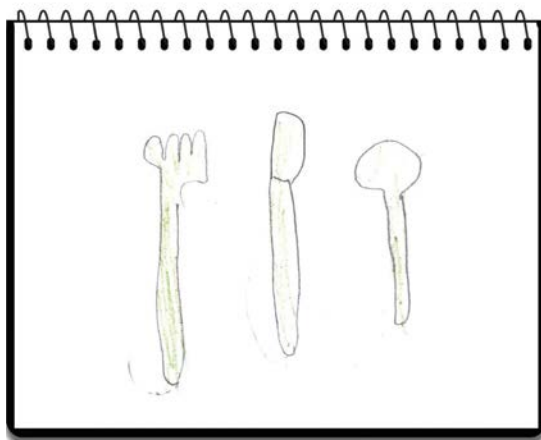
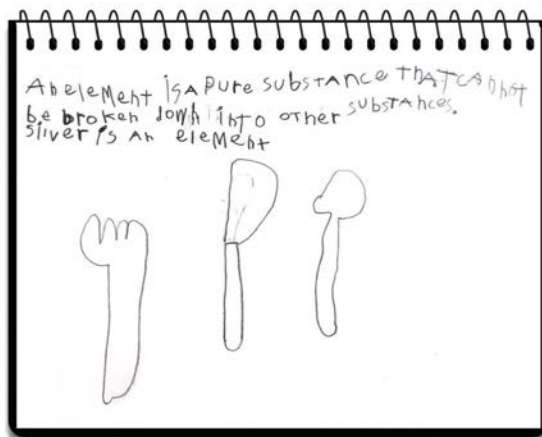
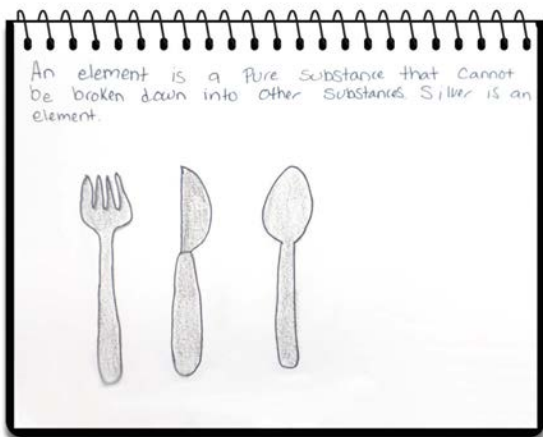


We learned more about atoms, elements, and the periodic table of elements this week. I'm excited to share what we've learned in our Notebooks! What should we draw this week, Hannah?

Well, we talked a little bit about the elements of silver and gold. Mom told us that the silverware in the kitchen is made from silver! I was thinking we could draw a picture of our silverware this week. I have an example picture we can use right here.



Great idea. Let's get started — we'll show you how our Notebooks turned out, and we can't wait to see yours!





In your Notebook, write: An element is a pure substance that cannot be broken down into other substances. Silver is an element.

Then draw a picture of silverware.



Learning about the organization of the elements this week reminded us that God's power is on display through His creation. Copy Romans 1:20 on the back of your Notebook page as a reminder.

*For since the creation of the world God's invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made, so that people are without excuse (Romans 1:20).*