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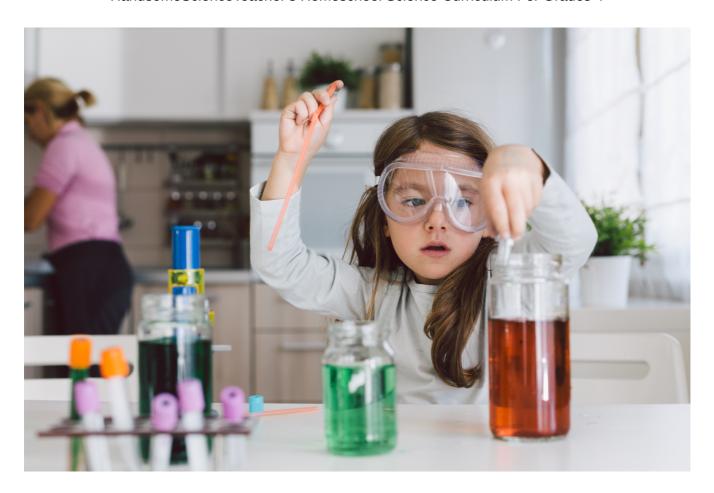
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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4

### HandsomeScienceTeacher's Homeschool Science Curriculum For Grades 4



### Unique & Very Liberal Copyright

It is the profound desire of the author of this work to provide a high-quality science education to as many children as possible. The author desires to be part of the solution when it comes to the breakdown in our education systems. For this reason, he has elected to give the following unusually liberal copyright authorization.

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Charleston, West Virginia, USA

# **Fourth Grade Edition**



### **Fourth Grade Science**

Welcome to your exciting science journey! When you complete this course you will be one of the smartest kids around. Okay, you probably already are, since homeschooled students tend to be super smart! This course is designed to help you push yourself even further by learning to think intelligently and work like a scientist.

There are sixteen units, which we call "Mastery Badges" in this book. Each of which is designed for you to complete while you are in fourth grade. There are 144 mastery badges altogether between kindergarten and eighth grade.

You have plenty of time, so don't rush! Plan to spend about two weeks per mastery badge.

### You Can Do Hard Things!

Remember that anything important is usually challenging. However, challenging doesn't mean impossible! You can do hard things! If you find yourself stressed out or confused, know something really important. Know that everyone feels that way sometimes. Feeling overwhelmed just means that your brain is making room for all the new things you are learning.

### **Trust In Yourself**

Learn to believe in yourself and to recognize your own learning patterns. When you feel overwhelmed remind yourself that you have felt that way before and that you got through those feelings. You didn't give up then, and because you didn't give up, you mastered the things that used to be hard for you, and you will master these new things as well.

### **Learning To Be A Scientist**

I have been teaching science for many years, and I am sometimes asked a question that sounds something like this:

"Mr. Bertoch, what is the point of science? Why do I have to learn this? How will it EVER help me in life?"

Can you hear the sarcasm? Fortunately, this question has a very easy answer. It is true that learning the job of the mitochondria (a microscopic mini-organ found inside of cells) will probably never come up on a job interview, a tax form, a driving test, or a future business meeting. It is true that unless you grow up to work in the field of medicine you will likely be just fine not knowing what this little bio-machine does. However, this misses a very important point.

When we learn about the mitochondria, we don't just memorize its function. We also learn to be curious. We learn how to do research, make observations, collect data, analyze data, look for patterns, make inferences, and how to support our views and opinions using evidence.

THAT IS WHAT MATTERS! That is why science is so important!

Years from now, you may forget some of the topics we study. I hope you don't. I hope you remember everything. But I harbor no unrealistic expectations. The fact is that you almost certainly will forget some of the topics we studied together during your time with me.

What you will not forget though, and what will absolutely change your life forever, are the practices that make you a more intelligent adult.

You will learn to think. To demand evidence. To use logic. To be curious. To make observations. To invent and create. To solve problems. To trust in your own intelligence and in your own abilities to be successful.

These are thing things that will lead to your success in any future job you choose to work in.

## **Topics Studied In The Fourth Grade**

During your time in fourth grade science you will study each of the following topics. By the end of your journey through this grade, you will be an expert on each of these things.

Your goal is to hold yourself accountable to a high standard. You are after all a homeschooled student, and everyone knows that homeschooled students are the most successful kind. You have a high bar, but you are up to the challenge!

### **Topics of Study This Year**

- Structures of Animals Help Them Survive
- Structures of Plants Help Them Survive
- The Five Senses
- How Animals Use Senses To Respond To Their Environments
- Fossils Show Us What Life Was Like In The Past
- Environments Change Over Time
- Energy & Speed
- Energy Is Transferred From Object To Object
- Energy Is Moved Using Heat, Electricity, Light, & Sound
- Energy Can Be Changed From One Form To Another
- Waves A Form of Energy
- Plants And Animals Communicate With One Another
- Plants And Animals Have Needs
- Day & Night
- The Seasons of The Year
- The Poles And Tropics

Each of these topics are broken down and explored in great depth using hands-on labs, videos, reading and writing assignments, quizzes, and many other fun and engaging activities.



Before we begin your science journey, I need to share some information with your parents or guardians about how this science curriculum works. Go ahead and hand this book over to them, and have them read the next few pages.

It would be a good idea to review the things discussed on the next few pages together so that both of you understand how this science class works.

### **Introduction For Parents**

**Welcome** to HandsomeScienceTeacher's Complete Science Curriculum! Welcome also to a fun, engaging, and hands-on science learning journey. Before we jump into the curriculum, let's first take a minute and talk about some routine housekeeping items. Important things like... why this curriculum was created, the pedagogy that it is built on, and how to utilize this resource to achieve the best possible results.

Even before we do that though, I should take a moment and introduce myself to you. Until you know who I am, and you know... why you should listen to me... there is really very little reason for you to continue using the rest of this article. When it comes to educating your child, it is important that you know who you're dealing with. Your children matter to you more than anything in this world. Which is exactly how it should be. Consider the next section my job interview with you. Where I answer your questions about why I am hopefully a worthy candidate to be entrusted with the science instruction of your precious children.

Questions like: Who is this incredibly handsome science teacher? What does he know about teaching science? What experience does he have with homeschooling? What is his personal agenda? What are his credentials? And most importantly... why does he think he is so handsome? Okay, so I won't answer the last question, since no one but me actually thinks that I truly am handsome... I'll do my best with the rest though, and then you can determine whether or not you think the curriculum I have created is worthy of use by your family.

### **About Mr. Bertoch**

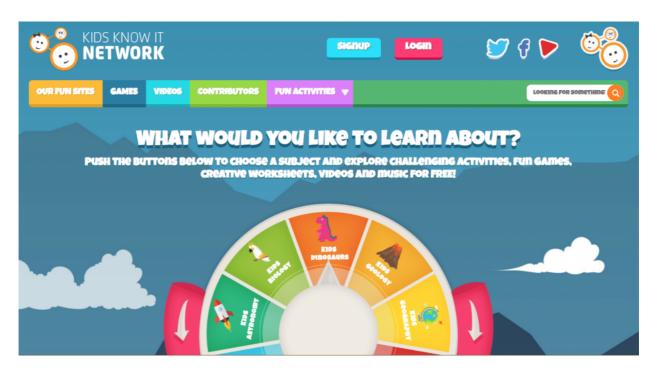
I began my career in education way back in 1998. Though my experience with science goes back to my childhood. As a young man, I used to stay up late at night, lay in the backyard, and stare up at the stars. During my idyllic childhood growing up on a farm in Hunter, Utah I was a science addict! Kind of geeky, I know, but I adored science, and absolutely couldn't get enough of it.

In 1998, at the age of 21, I founded a company called The KidsKnowlt Network, which would eventually grow to become the most popular (by traffic) educational portal on the Internet, serving tens of millions of students all over the world every single month. In 2012 when I sold it, no other online educational company was receiving more traffic than ours.

We had the largest (by traffic) Astronomy website, Biology website, Geology website, Geography website, Dinosaur website, History website, and spelling website in the entire world. We also had the second most popular math website. Our math website never got bigger than CoolMath.com. In that

area we had to settle for second place, but that's okay, because the people at CoolMath.com were pretty... well... cool! And hey... you can't win every battle!

I loved building and working at The KidsKnowlt Network. It gave me some amazing opportunities. I got to meet and work with some impressive individuals. Including governments all over the world, in order to develop their science standards and curriculums. As well as top executives for companies like Microsoft, Lenovo, Adobe, Home Depot, and others, as we worked to create educational opportunities in the private sector. I also was given the opportunity to speak at education and technology conferences around the world as a featured presenter. During this era of my life, I was a sought-after expert in the areas of education and technology, especially as it pertains to the sciences. Incidentally, we also published educational books and produced educational videos that went out to school systems around the globe.



In 2012 I had a life-changing epiphany though. As much as I loved my job, one day as I sat in my office, I realized something very important. I remembered that ever since I had been a young boy, I had always dreamed about being a science teacher. Not a speaker, not a presenter, not a CEO, not a science consultant to governments around the world... but a science teacher, in a classroom, working with students.

I was happy, but not entirely fulfilled. This realization ate at me, and in time I set out to find investors to take over The KidsKnowlt Network so that I could move myself toward my childhood ambition. To teach! My wife was kind in supporting me in this effort. Which is good, because leaving my influential position behind led to a 95% pay cut. Teachers make WAY less money than CEO's. That's okay though because my decision to enter the classroom also led to a 1000% increase in my overall state of happiness!

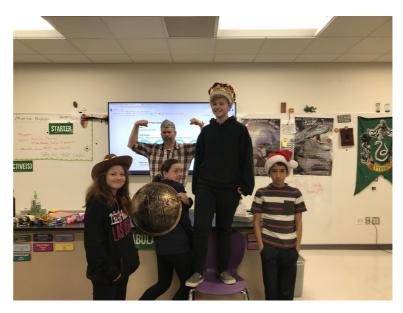
Within a year I had earned my teaching certificate, and then found myself hired to teach as a 7th-grade science teacher at West Jordan Middle School in a suburb just outside of Salt Lake City, Utah.

I continued teaching at West Jordan Middle School for the next seven years and absolutely loved it. During my time there I was awarded teacher of the year, as well as science department chair of the year (two different years). During this time, I was privileged to build a science fair program that dominated the State of Utah.

Eventually, my wife and I moved to Charleston, West Virginia where I then began teaching in a 6th-grade science class at West Side Middle School. A position that I continued working in for 3 years. Making my total time in public education 10 years. During my time at West Side Middle School, I was nominated for teacher of the year yet again. An honor that means more to me than I can express.

Following my departure from public education, I spent the next year developing the curriculum in this book

and teaching it to homeschool students around the world.



During this time, I taught more than 90 students from all over the world in small classes via Zoom. These students helped me to really refine and improve these learning resources so that they could become as effective as possible for families working outside of a school system. Taking into account the need to modify labs so that they utilize, as much as possible, supplies commonly found at home, adapting lessons so that they are effective without a teacher being in the same room via video instruction, and so forth.

And that pretty much takes me through the present day. But, what about my credentials?

## **My Credentials**

Before you begin using HandsomeScienceTeacher.com's materials, you deserve to have the peace of mind of knowing what my credentials are. What gives me the right to put these materials together? How do you know they will be effective? How do you know that they are built on sound pedagogy? Let's start with my degrees.

Please don't hold the fact that I have multiple degrees against me! I built my business empire without any degrees. During that time, I found that degrees matter far less than experience. Indeed, some of the best employees I ever hired did not have a degree. When it came time to teach though, I had to have them, and so I earned several over my decade as a teacher.

### My Degrees

I am lucky enough to have had the opportunity to have earned three degrees. Two in science and one in instructional design. I have a bachelors in Earth Science which covers astronomy, geology, atmospheric science, and oceanography. I have a masters in Biology, and I have a second masters in

instructional design. Instructional design is the methodical study of, and science behind, teaching and learning. With a particular focus on creating effective courses for students.

### My Understanding of The Various Science Standards

Don't hold this against me either. I know the standards well, and I know that can be a handicap, if not managed correctly. Please know that I am careful in my application of the standards, and I believe I know them well enough to know when to depart from them.

During my career I have had numerous opportunities to work on the International, National, and state, district, and even school levels in the areas of developing and unpacking science standards. During my time at The KidsKnowlt Network I sat on a number of councils that helped to design and influence the current national science standards in The Unitied States, as well as the science standards used by other countries. During that time my company was also hired by various states and organizations to consult on the creation of their standards. In these efforts, I always focused on using my influence to encourage school systems toward curricula that engendered an independent and logical mindset, where students learned to depend on their own skepticism and ability to think, rather than trusting experts.

During my time as a teacher I worked on the state and district levels to unpack science standards as well as to train other teachers in the district and state on how to teach those standards. When the State of Utah adopted the NGSS standards I sat on the State committee that went through and explored the implementation of the standards, and also spent weeks on the district level training other science teachers on how to utilize the standards.

Once again, my focus was on the important of teaching students to think for themselves, to demand evidence from the so-called experts, and to question everything. I wanted to create scientists, who don't believe me, rather than loyalists who follow what they are taught without question. Science is the process of questioning the experts, not worshipping them. My goal was always and foremost to get students to believe in their own intelligence.

Because of these experiences, I am intimately familiar with The Next Generation Science Standards, which are utilized by most states in the United States, having been part of the discussions and trainings from their creation down through their implementation, and having played at least a minor role in nudging these standards toward a student-centered approach.

### My Understanding of Science Pedagogy

What is Pedagogy? It is just a big word that essentially means the science of teaching. In this case, the science of teaching science... which sounds a little strange to say outloud. Science pedagogy is different than reading pedagogy, and different again from math pedagogy. Each content area touches different parts of the human mind, and so different strategies are required to reach learners.

So, what do I know about science pedagogy?

It turns out, quite a lot. Teaching science is something I am very good at. I know this sounds prideful, and I hope you will forgive me for saying as much. I don't mean to sound arrogant, but I am very good at teaching. Especially science.

At both middle schools where I taught, we worked with the most underprivileged kids in our communities. My first school, West Jordan Middle School, was the most highly impacted school in our district and one of the most highly impacted schools in the State of Utah. Our students experienced significant challenges relating to poverty.

My second school, West Side Middle School, was even more challenging. It was located in the highest crime community in the State of West Virginia, were our students lived in conditions that you cannot imagine. These students witnessed atrocities that most adults never see. They were sadly also frequently the victims of these crimes. Many of them lived in homes without utilities and were in constant survival mode.

Despite the many challenges and setbacks that our students faced, I was able to lead them on to scoring on average 20% higher on standardized tests than their peers. When I say this, I don't mean that they scored higher than their peers at the same school. Rather I mean that our poverty-stricken minority students were scoring 20% higher than students in other much more affluent schools and communities. This was an accomplishment that I am very proud of. It proved that our students were every bit as capable as those in more affluent communities.

I mentioned earlier a science fair program that I was lucky enough to get to build. During my time at West Jordan Middle School, I built this science fair dynasty which was unrivaled in the State of Utah.

At its height, we absolutely dominated the district, regional, and state science fairs. Averaging 30-40 kids every year going to the Central Utah State Science Fair, and 5-7 kids every year winning at the state science fair. I was even able to take 3 kids all the way to the national science fair where 2 of them won 3rd place in their division. **All of this from within these highly impacted schools!** 



**My students learn.** They don't just memorize facts. They actually understand the content and are able to use it to do real science on their own. I know how to teach science in a way that builds scientists, rather than just making them memorize facts.

The strategies used in this curriculum are proven to be successful. I do not believe in busy work! Busy work is a waste of time. Everything we do is intentional, has a purpose, and is tied directly back to helping students become intelligent thinkers. Likewise, the order of how I present the content is intentional.

### **Touching Students Brains As Many Times As Possible!**



This curriculum is designed to touch students' brains. Not literally! Thank goodness. That would be gross. But rather, my curriculum is designed to repeatedly touch a child's mind in a way that forces their brains to retain what they learn. Every time we poke the brain neuropathways in their mind for that content become stronger.

Here's the deal though. We don't want to just touch one part of their brain over and over again. To be truly effective, we need to touch as many different parts of their brain as possible. This is because each time we

engage another part of their brain, we once again strengthen the pathways that store the knowledge they are learning.

Thus, we want to use the part of their brain that listens, the part of their brain that talks, the part of their brain that reads, the part of their brain that writes, the part of their brain that is creative, the part of their brain that is analytical, and above all, the part of their brain that is responsible for physical movement.

My curriculum engages their entire mind and body in the learning process. Forcing them to activate all of these parts of their brain. Which most other curriculums ignore. Most curriculums focus solely on memorization and reading. We will be engaging the entire mind, and in so doing, students will end each unit having created a very well-laid-down neuro network.

They will not just be able to recall a memorized fact. They will understand the fact, and how it relates to other facts. They will be able to utilize what they know to solve new problems. Their science education will form an integrated whole that will help them to understand the world for what it really is, and to think analytically about it.

Most importantly, they will learn to question the experts. They will learn to view themselves as every bit as smart as any expert, and as capable as anyone else of looking at data and drawing their own intelligent conclusions. Instead of being dependent on others to spoonfeed them knowledge, they will learn to seek out knowledge on their own and to determine for themselves what is true, and what isn't.

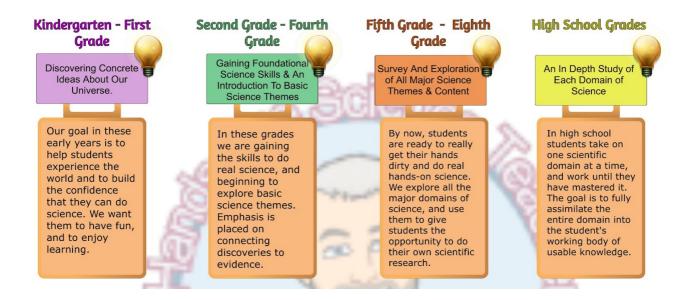
At no point in this curriculum do I tell them what they have to believe. Rather, I empower them to find truth on their own. It is not my job to impart my own agenda to them. Rather, it is my job to teach them to be skeptical of me as the teacher and to do their own research.

## **How This Curriculum Is Organized**

A lot of thought and experience has gone into organizing this curriculum so that it is as effective as possible. To get the most from these activities it is important that your student complete them in the order that they are presented.

### First Let's Look At The Curriculum As A Whole

The curriculum, which spans K-12 grade was created in order to achieve two very important purposes. Firstly, to develop intelligent, confident, and independent thinkers. Secondly, to impart a very deep understanding of all domains of science. To achieve this goal, the curriculum follows the framework expressed in this diagram.



As students progress through the curriculum mastery badges will become increasingly challenging. However, they all follow the pattern outlined below.

### **We Always Start With Discovering Labs**



Every unit, or "Mastery Badges" (more on mastery badges later) starts with what I call a Discovering Lab. Research shows that students learn and retain their knowledge best when they "discover" it for themselves, rather than when they have a teacher simply lecture to them. These discovering labs are designed to give students the opportunity to make their own discoveries.

When students begin a new Mastery Badge they won't yet know a lot of the vocabulary associated with it, and that is okay. When completing a Discovering Lab, we are not yet concerned with vocabulary. Instead, we are only working to give students experience and exposure to the concepts. These are hands-on projects that allow the students to get their feet wet with the material.



When scientists make new discoveries, they too lack the vocabulary. Because they haven't yet made up these new words. In other words, a real-world scientist makes up the vocabulary words only after they make the discoveries. Thus, in the same way, it is okay that your learner doesn't yet have the vocabulary words to describe what they are learning from a discovering lab. These words will come later on.

Students should complete the Discovering Labs carefully and do high-quality work. If they do not know what something means, they can and should research it using available resources such as books and online articles. It will be tempting for students to look ahead to the instructional video or the article that go with the Mastery Badge. Encourage them not to do this. They will gain more by doing their own research than by looking ahead.

How is doing research any different than looking ahead to the video or article that go with a Mastery Badge? It may seem like a subtle difference but it is important. By looking ahead to see what I teach in the video, they find answers that they will be tempted to accept as empirical. Because I am the teacher they will view what I say as the "correct" answer.

However, by doing their own research and watching outside videos, or reading outside articles, they will come across a wider array of opinions and views on a topic. They will have to read and evaluate these for themselves and decide what they believe. This is an important part of science. Scientists do research all the time. They read scientific journals and analyze articles as they try to learn what other scientists have already discovered.

It is okay for your learner to do research while completing a Discovering Lab (outside videos and articles) but resist the temptation to watch MY videos or read MY articles until after the lab is complete.

Scan the QR Code above to watch a video of me talking about Discovering Labs.

### The Second Part of Every Mastery Badge Is Instructional Videos

Every Mastery Badge includes one or more instructional videos, where I teach your student the material. Again, it is very important that students complete the Discovering Lab before watching these videos. It seems like a small thing, but it is actually huge. We want students to make their own discoveries prior to listening to me talk about the science behind what they have observed or researched. We want them to have formed their own opinions before I bias them with my teaching.



These science videos are easily accessed using any device via a QR code located within each Mastery Badge. They are free and included with this book. On average each video is about 10-20 minutes long, though younger grades tend to be shorter, and older grades tend to be longer.

Encourage students to really pay attention and to pause whenever they don't understand something. If they are confused they can rewind and rewatch, and even research online or in books to better understand a confusing topic. Your student's goal should be to not move beyond the video until they fully understand what is being taught.

In the older grades students are asked to write down 10 things that they learn from each video. Which helps them organize their thoughts. In younger grades they draw pictures, or do a combination of both. This engages the parts of their brain that both listen and write, and helps to create greater pathways in the brain.

### The Third Part of Every Mastery Badge Is Literacy Assignments



It goes without saying that reading and writing are very important. In fact, I don't think you could overstate just how important these skills are. Reading and writing cut across all content areas and for that matter, pretty much all aspects of life. In science, we read whenever we are doing research, and we write whenever we are communicating our discoveries to other people.

Each Mastery Badge includes a Literacy Assignment. In this assignment, students read an assigned article on HandsomeScienceTeacher.com (accessible by QR code) and where they will then write about what they read. They will also complete an online quiz that goes along with the article in order to check their understanding.

Take the time to really stress the importance of "Reading For Understanding" and "Writing To Communicate." Help students take ownership over their own reading and writing journeys. Younger students will need help reading and writing. Older students should be able to work on these literacy assignments more independently.



### What does it mean to read for understanding?

All of us can relate to reading something while not being present in our own minds. All of us have experienced having read something only to get to the end of it, and realized that we didn't retain any of what we read.

Reading For Understanding means that the student holds themselves accountable for their reading. This is an important learned skill. One strategy they can use is to stop every few sentences and intentionally ask themselves whether or not they are still paying attention. Other strategies include looking up vocabulary words they don't understand, and repeating back in their own minds what they are learning after each paragraph.

There are many strategies that can be used when working to read for understanding. Discuss these with your learner, and teach them to hold themselves accountable, so that they don't simply skim articles or race through them.

#### What does it mean to write to communicate?

Writing To Communicate means that students write clearly, concisely, and in a way that communicates complete thoughts. I tell students that it is helpful to imagine that they are writting to someone younger than themselves. We tend to write much better when we imagine that our audience is someone younger and less experienced than ourselves, than we do when we write to a teacher or an adult. Write in a way that instructs the reader, and helps them fully understand the topic.

This means planning your writing out, and being intentional in how you present your arguements.

Note that many of the writing prompts presented in these literacy assignments call for a student to write two or more paragraphs. However, they do not specify a definition for what a paragraph is. There is nothing in this curriculum that specifies a paragraph must be a certain number of sentences long, or that it must follow a particular standard format.

This is intentional, in order to allow this curriculum to play nice with other curriculums that you may be using in your homeschool journey. When a prompt says to write a paragraph, this should be interpreted according to whatever standard you are currently holding your students accountable against. If your definition of a paragraph is five sentences long, then students should write accordingly. If it eight sentences long, then likewise, you should have your students follow that standard.

Scan the QR code above to watch a video of me talking about how to Read For Understanding and Write To Communicate.

### **Online Quizzes**

Every article includes an online quiz that checks your learning. This is an opportunity for your student to see how much they really understood from the reading assignment. A standard goal would be that students score at least 75% or higher on these quizzes before moving on. However, you are free to adapt this to your own use and alter the requirements to fit your own needs. If students don't meet your expectation for them, have them re-read the article, and retake the quiz.

### All Mastery Badges End With A Capstone Applying Labs



The capstone of every Mastery Badge is an Applying Lab. These Applying Labs should be the last thing that your student does before passing off a Mastery Badge. They are culminating activities that require your student to use everything they have learned throughout the Mastery Badge.

In order to truly prove their competency with a Mastery Badge, and that they are indeed ready to pass it off, students should complete these Applying Labs from memory. If your student is able to complete the entire lab from memory, then that is a pretty good indication that they are ready to pass off the badge.

Note an important caveat though. When I say "complete the lab by memory" I am not referring to data or experiment results. I am referring to concepts and procedures. It is okay for students to look up data. Indeed many of the Applying Labs specifically call for them to do this in the directions and procedures.

Part of being a scientist is knowing how to look up data and how to complete experiments and simulations. What we care about isn't that they don't look up any data. Rather it is that they don't have to look up any of the procedures, or core content. In other words, do they understand the science, and can they use it to solve problems?



### **What Are Mastery Badges**

As a middle school teacher, one of the things I learned very early on was how meaningless grades are. They truly are completely and absolutely worthless. Or, at least mostly so. **The only thing a grade** really shows is how well a student is able to meet the arbitrary expectations of a particular teacher.

What they do not show though is how the grades of one teachers stack up against those of another. Johnny may earn an "A" in one class, but perhaps the same amount of work would have only earned him a "C" in another class down the hall.

More importantly neither grade tells us anything about how well Johnny actually understands the content. It is very possible to get an "A" in a class, without ever actually understanding anything that the teacher was teaching. All of us have undoubtedly BS'd (Bologna Sandwhiched) our way through a class. Often, it is enough to just turn in completed assignments and be likable to the teacher. Our work may not even have correct answers! Because teachers are busy, and if the assignment looks complete they will often give you a good grade on it, without actually checking your work (yes, teachers really do this).

An "A" can mean a lot of things. None of which are consistent from class to class, school to school, or teacher to teacher. But, what about an "F"?

### Failure In Education Doesn't Make Any Sense To Me!

The biggest reason of all for my absolute loathing of the letter grading system has to do with the letter F! The big FAIL! What a stupid

concept!

Children work really hard to try and learn something, and then when an arbitrary date on a calendar arrives the teacher decides that students are no longer allowed to continue trying.

These teachers pronounce any students who did not accomplish whatever task they were supposed to accomplish by that date to be FAILURES. Not because they can't learn. Not because they are unwilling to keep trying. But simply



because the calendar says they are out of time, and its too bad for them!

I can't imagine doing that in any other aspect of childhood. Can you? Imagine if a piano teacher worked that way. A child sits down to play the piano, and the teacher tells them that they have two weeks to learn a song, and if they don't do it by then, they will be a failure. Imagine if a basketball coach worked that way! An eager little budding athlete shows up to practice each night and faithfully works to improve their free throw, only to have the coach tell them after two weeks that they are a failure.

Yet, this is exactly and precisely what we do in education. It is almost child abuse in my opinion. It destroys that child's sense of well-being for no valid reason whatsoever. Declaring students to be failures accomplishes no good purpose. It neither motivates nor instructs. It is simply cruel and lazy on the part of the education system. What needs to happen is, like the piano teacher or the basketball coach, constructive feedback be given so that the student can continue to progress.

# Learning Doesn't Work The Way Public Education Insists On Teaching

Learning doesn't happen on the same timeline for every student. Some students learn some topics more quickly, while requiring addigtional time to learn others.

Returning to our example of a music teacher. A student who learns to play a song on the piano in three weeks is every bit as successful as the student who learned to play it in two. A child who needs a few extra seasons to master their free throw is every bit as valuable to a professional recruiter as the athlete who mastered it in a few months.



#### It is the final result that matters, not the time it took to get there.

Mastery Badges allow me to give each student their just reward when they complete a unit by mastering all the content associated with that unit. I created Mastery Badges during my first year as a public school teacher and I have never looked back.

Think of them as merit badges in scouting. In order to earn a Mastery Badge a student needs to complete all the assignments associated with each Mastery Badge. This includes passing off the quiz and completing the Capstone Applying Lab (from memory).

### **Student Self-Evaluation**

Throughout each Mastery Badge your student will repeatedly be asked to stop and self-evaluate or "check" their own progress. **Research shows that the single most influential factor in a student's learning success has to do with their ability to self-evaluate.** Students who stop and review their own progress do significantly better than students who don't take ownership of their learning.

As their adult guide, make sure that students are taking the time to honestly evaluate and own their progress. At the end of each Mastery Badge, before awarding the badge to them, have students honestly look back over their work and reflect on their efforts.

### Your Role As A Mastery Badge Counselor

Ultimately, it is up to you, the adult to determine whether or not a student has passed off a Mastery Badge. It is you who will act as their Mastery Badge Counselor, and who will be responsible for passing them off. Be honest, supportive, and kind in this role. Hold students accountable with constructive feedback. Discuss and decide together whether or not a student has achieved mastery of the content.



### What Does Mastery Mean?

Mastery refers to the student's ability to recall and use the knowledge and practices taught in the Mastery Badge. This includes the content as well as the Science And Engineering Practices. If students are able to easily recall the content and vocabulary, and if they are able to use this content to solve real world problems then they have "mastered" it and are ready to move on. If not, that's okay! We are not in a rush. Take the time to go back over the content and fill in the gaps.

### **Save The Mastery Badge Certificates**

The Mastery Badge Certificates in this book are meant to be saved in your homeschool files. They provide evidence to the state, should you ever be audited. Showing that your student has completed a valid and thorough science curriculum and that they mastered the concepts.

# The Eight Science & Engineering Practices And The Crosscutting Concepts

Over the past decade most school systems have been moving toward the Next Generation Science Standards (NGSS), which are built using what is often referred to as 3D science. These three dimensions include content, crosscutting concepts, and the eight science and engineering practices.

HandsomeScienceTeacher's Science Curriculum is built on these three dimensions of science. You will see both the crosscutting concepts and the eight science and engineering practices throughout each Mastery Badge.

Sometimes national and state standards get things very wrong. Other times they get them very right. This is a case of the latter. The eight science and engineering practices are tools that help us create intelligent thinkers. They go way beyond the scientific method that you and I were taught when we were young.

### The Eight Science & Engineering Practices Include:

- Ask Ouestions.
- Develop and Use Models.
- Plan and Carry out Investigations.
- Analyze and Interpret Data.
- Use Mathematics and Computational Thinking.
- Construct Explanations.
- Engage in Argument from Evidence.
- Obtain, Evaluate, and Communicate Information.

The purpose behind these practices is to help students become scientists. It isn't enough to simply memorize Newton's Laws of Motion. We want students to be able to use these laws to do actual science and to solve problems. We want to create scientifically minded students.

The more than 400 labs that your student will complete throughout their years working in this curriculum are built on these eight science and engineering practices, as well as on the crosscutting concepts.

### The Crosscutting Concepts Include:

- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter
- Structure and Function
- Stability and Change

### Your Child Is Every Bit As Smart As Any Expert

Let's be honest. Your child is smarter than most experts. Sadly, in today's world, there are a lot of so-called experts, who really are not that intelligent. They may have degrees and lots of letters after their names, but they aren't thinkers.

They aren't the people who developed the domains they now rule over. Those great thinkers of the past came, created new knowledge, and then retired, inevitably passing on. The ideas they created were passed on to people who studied their works but never really learned to create new knowledge themselves. These experts are all too often devoted disciples of the great minds of the past, rather than self-informed thinkers in their own right.

This curriculum teaches your child to trust their own intelligence and to demand that the experts prove the claims they are making.



# **How Much Time To Spend On Each Mastery Badge**

Each Mastery Badge is designed to take approximately two weeks to complete. You may finish some more quickly while others may take longer, but as a general rule plan your pacing around two weeks per badge.

Remember that you are not in a race. Mastery is far more important than finishing quickly. If a badge takes three or four weeks don't worry about it. There is space in your schedule for some badges to run a little longer.

### Goal: Complete 16 Badges Per School Year

The curriculum has been designed so that you only need to complete 16 badges per school year. If you complete these badges at the suggested pace of one every two weeks then you will only need 32 school weeks to finish all 16 badges. A typical school year includes 40 weeks, which means that you have time for Christmas break, Spring break, and also for some badges to take a little more time to finish.

If you finish in April, is that really so bad? You can move on if you want and work ahead, but it is also okay (and even encouraged) to just deschool a bit and enjoy an early summer break. Go outside, go for walks, and enjoy childhood!

### These little ones only get one childhood!

## **Everything Your Student Needs To Know For Science**

This curriculum covers everything your student needs to know for their entire science education. By the time they finish this curriculum if they work hard and keep themselves accountable to their own success, and if their results are like those of my other students, they will score higher on standardized science tests than the vast majority of their peers. Including those who have been taught in public and private schools.



Likewise, they will have a very strong footing preparing them for college and beyond. They won't

just have memorized a bunch of disconnected random scientific facts in order to pass a class. Instead, they will have become functioning scientists, who think analytically and who are able to use data and evidence to solve real-world problems.

## What Is My Agenda?

Unfortunately, in today's world parents have to be concerned about the various agendas hidden beneath the curriculum that is presented to their students. It is sad that this is the case, but it is a reality. Rest assured that great effort has gone into making sure that HandsomeScienceTeacher's Curriculum is completely agenda-free. Or at least in so far as it is possible for me to hide my own biases I have done so.

It is not my job to teach your student my values. It is my job to teach them science, and I stick to that very strictly. To that end, you have access to every lesson, every video, and every article before your child accesses them.

I have opinions, but I do my utmost to keep them out of the instruction.

# **Why I Created This Curriculum**

I am going to be very honest here. Perhaps too honest, considering I just got done discussing how I do not allow agendas to surface in my teaching. I will permit myself this one single exception, and I hope you will forgive me for indulging in it.

I recently left the public education system. I did this because I have grown increasingly alarmed and concerned by some of the things I have seen. In my opinion, it is wrong, incredibly wrong, for school systems to teach students things without parental consent that may run counter to the values held in the student's home. Likewise, it is wrong for teachers to ask students to confide in them, and to

promise these students that the teacher will not disclose what has been confided to their parents. I have watched over the past decade as wonderful teachers have retired and as their younger replacements have come in much more willing to hide things from parents or promote their own agendas.

I have sat in meetings where teachers have openly discussed the most basic psychological needs of students while advocating against bringing parents into the loop and even suggesting that parents don't have a right to be involved.

As a person who tries to live a life of integrity, I could frankly no longer be part of a system that increasingly advocates teaching ideas, values, and concepts that parents object to. Especially when these school systems have publicly denied doing the very thing they aggressively pursue behind closed doors.

In fairness, I have had some wonderful principals and have worked under fantastic leadership. However, as the years have progressed, those stepping up into new leadership positions have become increasingly willing to suppress parent access or mislead families in what is actually being covered in classes.

People of integrity teach in the light of day. They are not afraid to let parents see behind the curtain, and they certainly do not mislead parents. If you feel a conviction within your heart to teach something then its rightness should be so self-evident that it can withstand the scrutiny of parental oversight. If you believe that the parents are wrong, this can never justify lying or misrepresenting what is being taught.

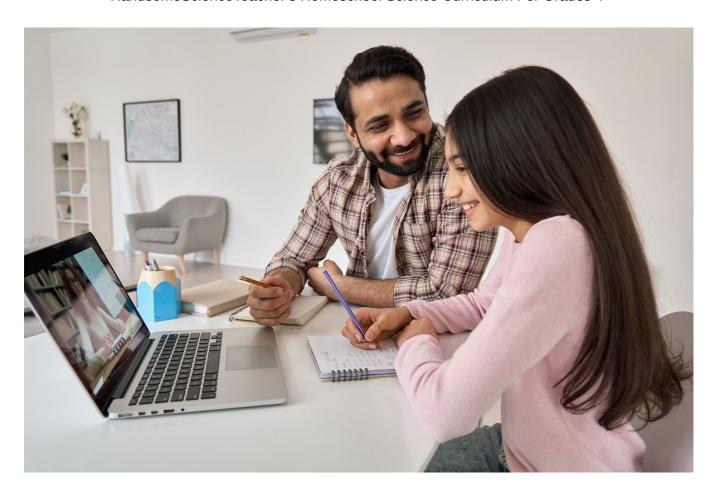
The final straw for me came when I found myself debating fellow teachers over the rights of parents. I found myself exasperated by my inability to convince a growing number of my colleagues that it was wrong to lie. Each year more and more teachers were resolutely convinced of the rightness of their efforts to promote ideas contrary to the will of parents. As these attitudes crept into leadership mandates were beginning to be written that required teachers to participate in this kind of disingenuous behavior.

People of integrity do not behave in such a manner, and again, being someone who strives, though admittedly often falls short, of such an ideal, I felt I could no longer participate in such a system, and still maintain my honor.

Fortunately, due to my earlier success in business, I didn't need the income, and though I loved working with my students, I made the decision to step into the world of homeschooling.

### **A Massive Wave of Homeschoolers**

Beginning in 2019 a massive wave of students left public education to begin homeschooling. This is nothing short of an absolute tidal wave! We are talking about millions of families who made the decision to leave the school system. My family was among them. We took our children out of public schools and into the wonderful and exciting world of homeschooling.



#### I Wanted To Be Part of The Solution

I have a lot to offer my fellow homeschooling families. My journey in the education system has been long and thorough. My credentials are deep and extensive. I was part of the initial group of "influencers" though the word didn't exist at that time, who built the first meaningful educational websites and portals. I have worked in the trenches designing national and state standards. I have taught in the classroom. I have all the degrees and credentials. I was teacher of the year and science chair of the year, and I understand homeschooling from the perspective of a parent.

I left public education at the end of 2021 so that I could begin to build this curriculum and **make it** available completely free of charge to you. There are other very excellent curriculums out there already. However, to my knowledge, there are very few if any others that are built on three-dimensional science or that take into account the best pedagogical strategies

## Why Is This Curriculum Free?

Firstly, let me explain what I mean by free. Since many who encounter this curriculum will have paid for it. If you purchased this curriculum in book form, then yes, it was certainly not free. There was a cost associated with the binding and production of the physical book. However, many of you will have come across this curriculum in digital form. Which is freely available for download and distribution without remuneration to the author.

If you have a digital copy of this curriculum please share it! Post it freely. So long as you do not alter the file, you are welcome to print it, photocopy it, and use it to your heart's content.

My purpose in creating this curriculum has never been to make money. It is and will always be about being part of the solution. It is about giving back and helping to fix a very broken education system.

There are millions of families who have pulled their students out of the public education system. These parents showed great courage in these actions. It is scary to take your student's education into your own hands. The trends we are seeing right now in public education put many families in a very difficult spot. Torn between a desire to protect their kids from the predations of decaying agendas, and the utter terror around the many unknowns of teaching at home.

These families deserve the very best without having to spend a lot of money. It is to these families, that I offer this curriculum at no cost.

A lot of effort has gone into making sure that this curriculum meets the highest standards. Free can sometimes equate to low quality, however at least in the case of these materials, free does not mean that you are getting something that is less effective.

In my very experienced opinion, you are simply not going to find a better curriculum on the market, than what I have produced in these books.

# Lab Supplies Available on HandsomeScienceTeacher.com

Having said that, I do sell lab supplies on my website www.HandsomeScienceTeacher.com. These supplies are provided at or below market cost, as a service to those families who may need them. Please do not feel pressured to buy these supplies from me. In fact, I go out of my way in the content to provide alternative supplies you can use if something is not available to you.

However, in those cases where families do desire to purchase (or rent) lab supplies they are available. If you are considering investing in lab supplies, may I recommend **The Lab Essentials Kit**, which contains the most common items used in the labs found throughout this program? These are the items that I find students usually do not have at home, including a small pocket microscope, a graduated cylinder, a precision scale, a compass, a metric ruler / magnifying glass, tweezers, specimen jars, safety glasses, and a few other odds and ends. This kit is sold significantly below retail value.

We also rent out a limited number of higher-end items including professional-grade microscopes, microscope slides, models, and various other things you might find in a school laboratory, but that you might not have access to at home.

To look through our inventory go to <a href="https://www.HandsomeScienceTeacher.com">www.HandsomeScienceTeacher.com</a>.

### What Can You Do To Help?

In exchange for utilizing these free resources, I ask for very little in return. All I really hope is that you will pay it forward. If you find this curriculum useful, please consider doing some of the following to help others find it.

- Consider posting a .pdf of this curriculum (available on HandsomeScienceTeacher.com) to your various homeschool groups online.
- Consider leaving a review of this book on Amazon and in other places. This helps so much
  more than you know, because it pushes the book up further in their searches, helping others to
  find it.
- Consider subscribing to my YouTube channel. Again, this helps by lending credibility to the channel, and as a result, helping the science videos climb higher in the results.
- Post our videos anywhere and everywhere. Feel free to incorporate our YouTube videos into your own projects. So long as they are not edited, and are imported via our YouTube channel. This helps us get the word out about these resources.
- Talk about this curriculum with family and friends who also homeschool.

I am deeply grateful for any and all such gestures, that help me let families know about these free resources.

### **Errors In This Book**

Creating these books was a monumental task that has already taken more than two years and thousands of hours to complete, and that will involve at minimum two more years of full-time work. While I am 100% confident in the scientific principles and the pedagogy, I am not 100% confident that there are not some typos or grammatical errors that I missed during editing.

A project like this usually is overseen by a vast team. Just look at the credits page of a typical textbook! I do not have a team to help me. For me, this has been a labor of love. That I have funded out of my own pocket, and that I am giving away freely once it is completed. When it is done it will include more than 15 textbooks with over 500,000 words of copy, hundreds of online articles with an additional 500,000 words of copy, and hundreds of videos and online quizzes.

A project this massively immense would take an education publishing firm 5-10 years to produce and would be overseen by a team of hundreds of people working full-time. The books would go through editors and proofreaders.

I am the writer, the editor, the proofreader, the video editor, the website programmer, and every other role associated with bringing this project to market. Each time I have gone over the text I have found errors. Again, not with the science or pedagogy, but with grammar, copy and paste errors, and so forth. It is absolutely inevitable that I missed some.

My options were to never release it or to put it out there and crowd-source the proofreading. In the end, I choose the latter.

If you find a mistake, please visit HandsomeScienceTeacher.com and report it. There is a link for reporting errors at the bottom of every page. I will correct the errors you report and update the project as we move forward together.





# **Animal Structures Help Them Survive**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how animals use their physical structures (body parts) to survive and even thrive in their respective environments.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands-on demonstration that you have mastered the skills and content of this badge.

# **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Animals are adapted to their environments
- Animal structures are unique to their environments
- These animal structures allow them to thrive in their environments

Name: Date:





# **Discovering Animal Structures**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

- 1. Draw a picture in the box below of your favorite animal. Make the picture as detailed as large and detailed as possible.
- 2. Label as many of the structures (body parts) of your animal as you can think of.

On the last page you drew a picture of your favorite animal, and you labeled its body parts (structures). Select five of the body parts you labeled, and explain how the animal uses them.

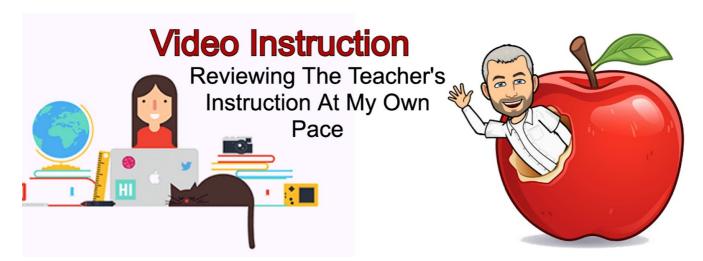
<b>Body Part (Structure)</b>	How The Animal Uses It
Example	Used For
Legs	Walking



# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

What body part do you think is most important to your animal? Explain why.
How would losing some of its parts (structures) affect your animal's ability to survive? Explain your answer.
What might happen to your favorite animal if it was removed from its environment and placed into another environment?  Example: If a fish were placed in a tree.
Why do you think that animals have the structures (body parts) that they do?



# **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the video than that you finish it

quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

# The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

### **Check Point**

I watched the video carefully, and understood what Mr. Bertoch taught me.

(If not, that is okay. Watch the video again, and discuss it with an adult)

# **What I Learned From This Video**

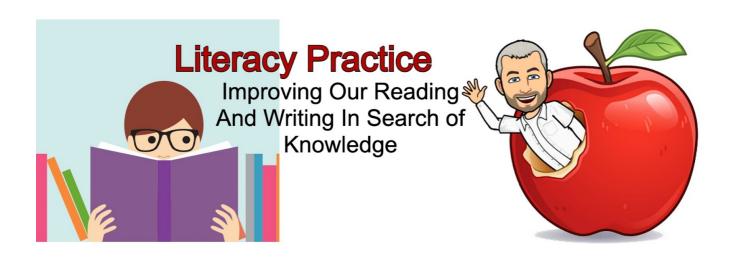


One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):

A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/animals-are-adapted-to-their-environments/

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

### **Check Point**

Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how animals use their structures (body parts) to survive.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





# **Applying Animal Structures**

Applying What We Have Learned.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment





# Welcome to The Mars Terraforming Expedition!

You have been selected as the lead scientist because we were told that you are the very best at creating new types of lifeforms! We know that you won't let us

down.

#### Note:

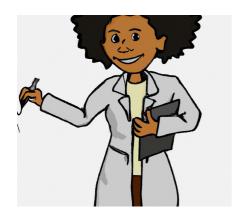
Rumors that our last lead scientist was eaten by a zombie bunny are highly exaggerated. They were not eaten! They were just... err... chewed on a little bit.. They were mostly fine, and anyway, you are here now, so that shouldn't happen again... Right!

**Problem 1:** Design an animal that can survive in underground caves

Scientists have discovered a cave in Sector G4-731 that has small amounts of underground water. The cave is very cold, but some liquid water can be found in pools by breaking through thin layers of ice. We have already placed algae in the pools that can be used as a food source for the animal that you create.



**Describe the structures** (body parts) that your animal will need in order to survive. Be detailed so that the Animal-Clone-Omatic 4000 will know how to build it.



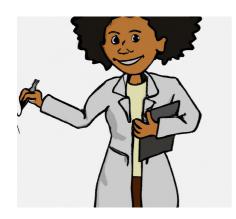
**Draw A Picture** of your animal. Be detailed so that the Animal-Clone-Omatic 4000 will know how to create it.

**Good job!** We will now feed both the description and the picture into the machine, so that the animals can be mass produced and then released into their new environment. Fingers crossed that none of them come out like those bunnies... err I mean, this will totally work out fine... Nothing to worry about. Let's move on to the next problem!

Problem 2: Design an animal that can turn algae and sand into soil
The surface of Mars will not be usable to grow plants until we can turn the
sand into soil. We have released algae into the sand, but we need an
animal that can eat the algae and poop out good soil. This animal will have
to be tough, because it will be exposed to harsh conditions on the surface
of the planet.



**Describe the structures** (body parts) that your animal will need in order to survive. Be detailed so that the Animal-Clone-Omatic 4000 will know how to build it.



**Draw A Picture** of your animal. Be detailed so that the Animal-Clone-Omatic 4000 will know how to create it.

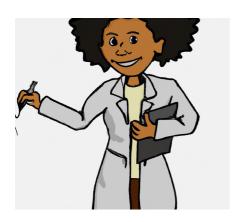
**Good job!** We will now feed both the description and the picture into the machine, so that the animals can be mass produced and then released into their new environment. I know that we promised you some down time between each animal in a spa-like environment, but... the thing about that is, we totally lied to get you here. There are no spas. On to the next animal!

### **Problem 3: Design an animal that can eat zombie bunnies!**

So... remember those zombie bunnies we mentioned earlier? Well, it turns out that they are multiplying really fast, and they now cover much of the surface of Mars. We kind of need you to create an animal for us that can eat the zombie bunnies, and convert their biomass into something useful. Like fertizlier, breathable air, or better yet, chocolate. (My vote is for chocolate, but you are the lead scientist, so you get the final say)

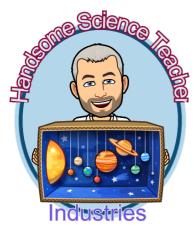


**Describe the structures** (body parts) that your animal will need in order to survive. Be detailed so that the Animal-Clone-Omatic 4000 will know how to build it.



**Draw A Picture** of your animal. Be detailed so that the Animal-Clone-Omatic 4000 will know how to create it.

**Whew! Great work!!** Best lead scientist EVER! And look, you didn't even get eaten!



Student's Signature

#### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

#### **Time To Evaluate Your Work**

**Date** 

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?
- 3. Did you watch the assigned video?

	<ul><li>4. Did you water the assigned video?</li><li>5. Are your answers accurate?</li></ul>
Industries	My Self-Evaluation: Based on the criteria listed above, I believe I have passed off this Mastery Badge because (Be detailed ans specific)
the Mastery Badge because.	Evaluation: 's work. Based on the criteria listed above I hereby certify that they have passed off (Be detailed and specific) Note: Any adult may serve as a Mastery Badge are committed to ensuring the highest standards of excellence.

**Signature of Mastery** 

**Badge Counselor** 

Date

#### **Certificate For Your Homeschool Records**

The following certificate which has been awarded through self-evaluation by the student, and also certified by a mastery badge counselor proves that the student listed thereon has completed all the work and has mastered all the concepts for the specified topic.

#### Keep this on file as evidence of your successful completion of this topic.

If audited by the State, these certificates stand as evidence that you have worked on and successfully completed a rigorous science curriculum.





# **Plant Structures Help Them Survive**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how plants use their physical structures (plant parts) to survive and thrive in their environments.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### I. Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### **III.** Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Plants are adapted to their environments
- Plant structures are unique to their environments
- These plant structures allow them to thrive in their environments

Name: Date:



Discovering Lab 🛚

Learning Through Hands
On Activities





# **Discovering Plant Structures**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

- 1. With an adult's supervision, go outside and collect six plant specimens. Then diagram (draw) a detailed picture of each specimen in the space provided.
- 2. Label the structures (plant parts) of each of your specimens by writing the names of each part on your diagram. (Examples: Roots, leaves, stems, thorns, seeds, flower, etc).



My 1st Specimen (Diagram)	My 2nd Specimen (Diagram)
My 3rd Specimen (Diagram)	My 4th Specimen (Diagram)
My 5th Specimen (Diagram)	My 6th Specimen (Diagram)

Notice that all six specimens have many things in common, but some of them are also unique. Complete the following chart based on your observations and research.

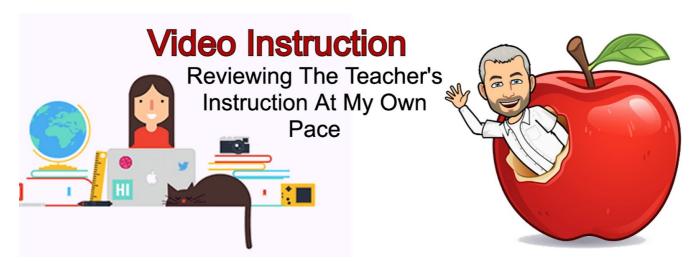
Plant Part (Structure)	What the plant uses it for
Cuticle (Plant Skin)	Protects the plant
Roots	
Stem	
Leaves	
Flower	
Seeds	



# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	What parts did all six of your plants have?
2.	Did any of your plant specimens have parts that the others didn't? (examples might be thorns, flowers, etc). Explain what these parts do, and why you think the plant has them.
2	What might happen to a plant if one or more of its parts were
ა.	What might happen to a plant if one or more of its parts were removed, such as the roots, the leaves, etc? Explain your answer.
1	Why do you think each type of plant is different from the others?
4.	Explain your answer.



## **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the video than that you finish it

quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

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Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

#### **Check Point**

I watched the video carefully, and understood what Mr. Bertoch taught me.

(If not, that is okay. Watch the video again, and discuss it with an adult)

## **What I Learned From This Video**

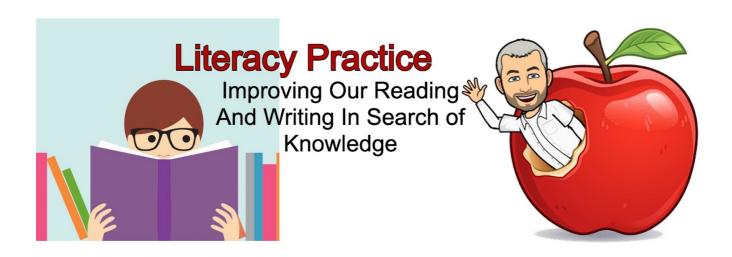


One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):

A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/plants-are-adapted-to-their-environments/

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

#### **Check Point**

Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

#### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

#### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how plants use their structures (plant parts) to survive.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





# **Applying Plant Structures**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



## **Experimenting On Plants**

Earlier you collected plant samples and made diagrams showing your observations of the various plant parts. Now you are going to do hands-on experiments with plants to see what happens when you remove some of their

parts.

## **Supplies:**

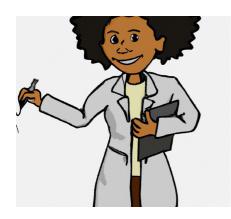
For this lab you are going to need three healthy plants. You can obtain these very cheaply from a local greenhouse, or collect samples from outside. Make sure that all three plants are the same type (variety/species), that they are the same size, and that all three start out healthy.

#### **Plant 1: Remove The Roots**

Remove the roots of your first plant, being careful not to damage the rest of it. Then place the plant (without roots) back into a pot of healthy soil, place it in a location where it will get plenty of sunlight, and make sure to water it. Observe your plant for one week.



What happened to your plant? Describe how your well your plant survived without roots.



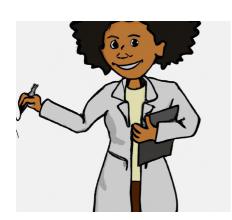
**Draw A Picture** of how your plant looked after going one week without roots.

#### **Plant 2: Remove All Leaves**

Remove the leaves of your second plant, being careful not to damage the rest of it. Then place the plant (without leaves) back into a pot of healthy soil, place it in a location where it will get plenty of sunlight, and make sure to water it. Observe your plant for one week.



What happened to your plant? Describe how your well your plant survived without leaves.



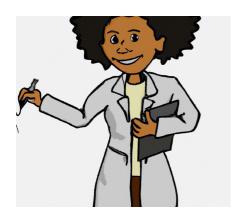
**Draw A Picture** of how your plant looked after going one week without leaves.

### **Plant 3: Healthy Plant**

This is our healthy plant, to compare our other samples to. Do not remove any of its parts. Place this plant into a pot of healthy soil, and then put it in a location where it will get plenty of sunlight, and make sure to water it. Observe your plant for one week.



What happened to your plant? Describe how your well your plant survived with all of its parts.



**Draw A Picture** of how your plant looked after going one week with all of its parts.



Student's Signature

#### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

#### **Time To Evaluate Your Work**

Date

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?

	4.	Did you watch the assigned video? Did you answer all the questions using complete sentences? Are your answers accurate?
Industries	Based	If-Evaluation: on the criteria listed above, I believe I have passed off this Mastery Badge se (Be detailed ans specific)
Mastery Badge Counselor		
the Mastery Badge because	(Be c	Based on the criteria listed above I hereby certify that they have passed off letailed and specific) Note: Any adult may serve as a Mastery Badge mitted to ensuring the highest standards of excellence.

**Signature of Mastery** 

**Badge Counselor** 

Date

#### **Certificate For Your Homeschool Records**

The following certificate which has been awarded through self-evaluation by the student, and also certified by a mastery badge counselor proves that the student listed thereon has completed all the work and has mastered all the concepts for the specified topic.

#### Keep this on file as evidence of your successful completion of this topic.

If audited by the State, these certificates stand as evidence that you have worked on and successfully completed a rigorous science curriculum.



HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



## The Five Senses

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover your five senses, and learn how they are used by your body to help you understand and interact with the world around you.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Humans have five main senses.
- These senses help us to understand and interact with the world.
- How each sense works by gathering information and transmitting it to our brain.

Name: Date:



Discovering Lab 🛚

Learning Through Hands
On Activities





# **Discovering The Five Senses**

Making your own discoveries.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



## **Communicating With Our Senses**

We use our senses to understand and interact with the world around us. Each sense is a little different and helps us understand the world in a different way. In this lab you will complete a difficult task while having some of your senses unavailable to you.



### **Supplies:**

For this lab you will need a recipe for cookies, and all of the ingredients in the recipe. You will also need two blindfolds, two sets of earplugs, tape, string or rope, and two assistants to help you, such as parents or siblings.

#### **Instructions:**

You are going to bake a batch of cookies following a recipe. However, some of your senses will be blocked to make it more challenging. Select one of you to fill each role listed below.

#### • Person 1

This person can see and talk, but can't hear or feel (use their hands). Have them wear earplugs, and tie their hands behind their back.

#### • Person 2

This person can hear, but they can't see or talk. Have them wear a blindfold, and tape their mouth.

#### Person 3

This person can talk, but they can't see or hear. Have them wear a blindfold and earplugs.

Do not look at the recipe until everyone is ready. Under an adult's supervision work together to follow the recipe and bake a batch of cookies. Make sure that everyone participates.

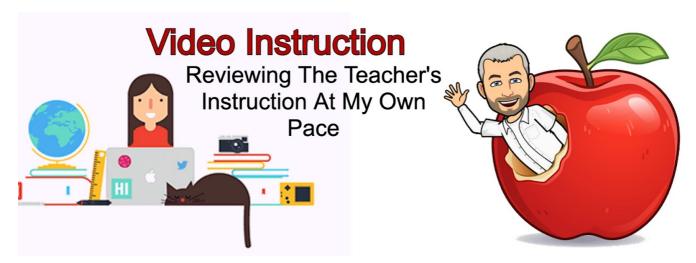




# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	Describe your experience baking cookies without all your senses.  Was it difficult? How did your cookies turn out? Be detailed.
2.	Why are our senses important? Be detailed.
3.	Sometimes people are born without one of their senses, or they lose it due to an accident or illness. What do you think life might be like without one of your senses?
4.	Explain what each of your five senses does and why it is important.



## **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the video than that you finish it

quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

# The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

#### **Check Point**

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## **What I Learned From This Video**

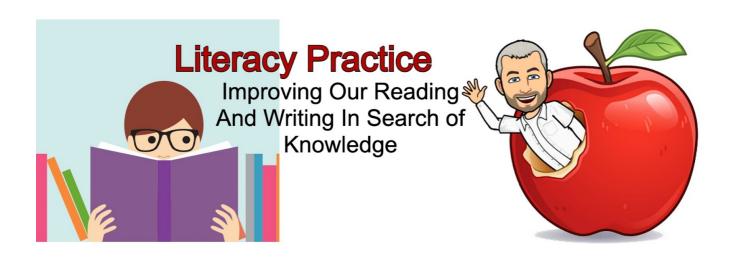


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Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):

A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



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#### **Check Point**

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Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

#### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

#### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how we use our five senses to better understand the world around us.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





# **Applying The Five Senses**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



## **Living Without One of Your Senses**

For this lab you are going to select one of your senses to go without for an entire day. Though you have five, we will be selecting from only three of them. Either hearing, seeing, or touch.

#### Note:

For this lab you will intentionally select one of these three senses to go without for a period of time. It is recommended that this time period be long enough to really give you an idea of what life would be like without this sense. While the amount of time is up to you, it is recommended that you spend a minimum of 6-8 hours without the sense that you select.

1.	Which sense will you go without?
If you	oving Your Sense I are going without sight place a blindfold over your eyes. If you are I without hearing put earplugs in your ears. If you are going without In tie your hands behind your back.
	several hours remove the blindfold, earplugs, or rope and answer the ving questions:
2.	Describe what it was like to go without this sense for an extended period of time.
3.	If you had to live without this sense for many years, do you think you could adapt to it?
4.	Why are our senses important? Be detailed and specific.



Student's Signature

#### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

#### **Time To Evaluate Your Work**

Check each of the following to evaluate your work:

- Did you do every assignment?
   Did you read the assigned article?

Counselor, so long as they a	are committed to ensui	ring the highest standards of excellence.	
the Mastery Badge because	(Be detailed and sp	pecific) Note: Any adult may serve as a Ma	
Mastery Badge Counselor  I have reviewed this student		e criteria listed above I hereby certify that t	hey have nassed off
	because (Be detail	led ans specific)	
		a listed above, I believe I have passed off t	his Mastery Badge
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**Badge Counselor** 

#### **Certificate For Your Homeschool Records**

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# **Animal Senses**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover that animals do not have all the same senses that we do.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### I. Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### **III.** Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Most mammals share the same five senses that humans have.
- Some animals like dolphins, bats, turtles, sharks, and others have additional senses.
- Other aninmal have more refined or less refined senses.
- Some animals have fewer or even no senses.

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



Discovering Lab &

Learning Through Hands
On Activities





# **Discovering Animal Senses**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

#### **Animals Don't All Have The Same Senses**

Scientists do a lot of research. In this lab, you will use the Internet, books, or other resources to learn about the senses of different types of animals. You will discover that not all animals have the same five senses. Some have more while others have less.



### **New Senses Beyond Human Ability**

Each animal listed below has special senses beyond what a human can detect. With adult supervision use the Internet, books, or other resources to learn about these senses. Then write a one-sentence summary discussing each one.

Animal	One Sentence Descriptions
Sea Turtle	Sense: Sea turtles are able to sense something that we can't. They use this sense to help them navigate around the world's vast oceans.  Describe This Sense:
Bat	Sense: Bats are able to sense something that we can't. They use this sense to help them navigate in very dark places and find prey.  Describe This Sense:
Shark	Sense: Sharks are able to sense something that we can't. They use this sense to help them detect the muscle movements of prey.  Describe This Sense:

### Same Senses But Not The Same

Each animal listed below has senses that are similar to those of humans. However, they work a little bit differently. With adult supervision use the Internet, books, or other resources to learn about these senses. Then write a one-sentence summary discussing each one.

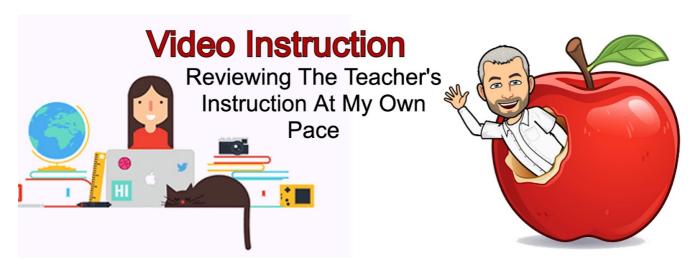
	Animal	One Sentence Descriptions
Sei Sei	Elephant	Sense: Elephants are able to call out to one another at a distance of up to six miles using a sense of hearing that is different from ours.  Describe This Sense:
	Dog	Sense: Dogs can see, but they can't tell the difference between many colors. Their ability to see is different from ours.  Describe This Sense:
	Arctic Reindeer	Sense: Arctic reindeer can see details in the lichens they eat, and also in the fur of wolves that we can't. Making it easier for them to spot food, and avoid predators.  Describe This Sense:



# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	Why do you think different animals have different senses? Explain your answer.
2.	Do you think it would be better to have more senses or fewer senses? Explain your reasoning.
3.	Some animals, like worms, have very few senses. Others, like sponges, don't have any. How do you think this affects their ability to survive?
4.	Some snakes can sense the heat of their prey from a distance. Allowing them to "see" the animals in the dark. How might this help the snakes? Be detailed.



### **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

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Watch The Assigned Science Video

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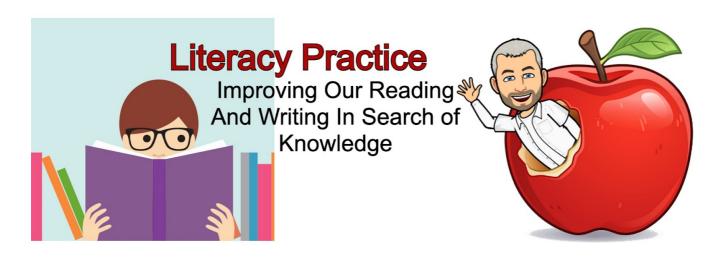
### **What I Learned From This Video**



One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):
A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



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### 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



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Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how animals use their senses to survive.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





### **Applying Animal Senses**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



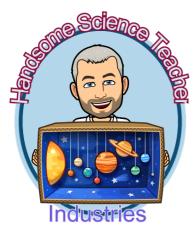
### **The Sensimatic Hat**

Everyone here at Acme Corp. is super impressed by your invention, and we can't wait to mass produce it. Err... what exactly does the Sensimatic Hat do though? None of us can quite figure it out. But, we totally love it!

### The Sensimatic Hat Allows Humans To Sense...

Describe a new sense that your invention gives to humans. Be creative! **Example:** It allows you to sense 30 seconds before someone else is going to fart so that you can leave the room and not be choked to death by the toxic fumes.

we going to sell it to the public?
Write a script for a commercial that can be played on the radio to sell your hat to the public. In this commercial talk about the benefits of having this new extra sense.
Great Job! Now for a billboard!  Design (draw) a billboard that can be put on the side of the road to advertise The Sensimatic Hat.



### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?
- 3. Did you watch the assigned video?
- 4. Did you answer all the questions using complete sentences?
- 5. Are your answers accurate?

	5. Are your answers accurate?
Industries	My Self-Evaluation: Based on the criteria listed above, I believe I have passed off this Mastery Badge because (Be detailed ans specific)
the Mastery Badge because	Evaluation: s work. Based on the criteria listed above I hereby certify that they have passed off (Be detailed and specific) Note: Any adult may serve as a Mastery Badge re committed to ensuring the highest standards of excellence.

# the Mastery Badge because... (Be detailed and specific) Note: Any adult may serve as a Mastery Badge Counselor, so long as they are committed to ensuring the highest standards of excellence. Student's Signature Date Signature of Mastery Badge Counselor

### **Certificate For Your Homeschool Records**

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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# Fossils Provide Us With A Record of The Past

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how fossils create a record that shows us the Earth's past.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

### **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Fossils form in different ways.
- Fossils show us what kinds of things lived on the Earth in the past.
- Fossils can be found all around us.

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



Discovering Lab 🕸

Learning Through Hands
On Activities





### **Discovering Fossils**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Creating Your Own Fossils**

Sometimes scientists recreate phenomena that they observe in nature in a lab in order to better understand them. In this activity, you will be creating your own fossils.



### **Supplies:**

For this lab you will need clay, play dough, or homemade salt dough. You will also need living things to make fossils with, such as leaves, seashells, and your own hands (handprints).



- 1. Roll the clay out so that it's flat.
- 2. Take each living thing that you collected (leaves, seashells, your hands, etc) and gently press them into the clay.
- 3. Allow the clay to dry.

You Have Made Fossils! Good Job

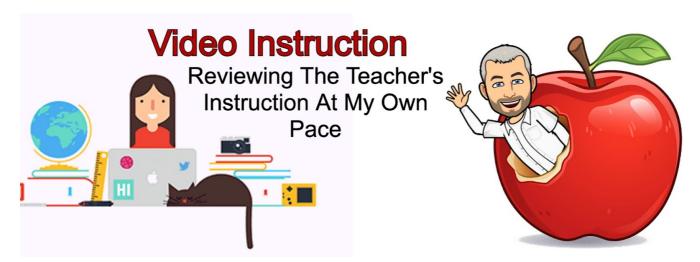


### **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1. In your experiment you used some type of clay. In nature clay is very common, but it isn't the only medium where fossils form. What are some other substances that you think fossils might form in?

2. How do you think fossils can be used to understand what life was like on the Earth millions of years ago?



### **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

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(If not, that is okay. Watch the video again, and discuss it with an adult)

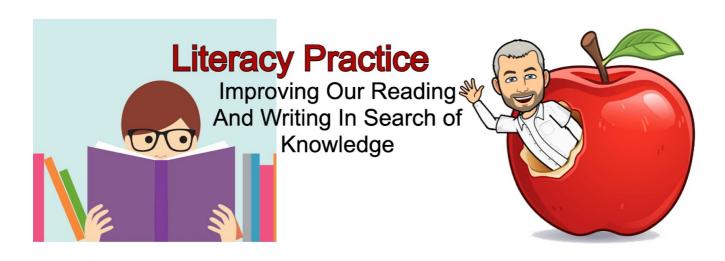
### **What I Learned From This Video**



One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):
A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

### 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/fossils-provide-clues-about-the-past/

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

### **Check Point**

Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how fossils form and how scientists use these fossils to understand the past.

Name: Date:



# **Applying Lab**

Proving That We Can Do It Ourselves





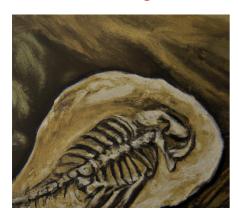
### **Applying Fossils**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Understanding The Past Using Fossils**



This lab is going to require you to work like a detective in order to understand the past. The only clues you will have are fossils from long ago.

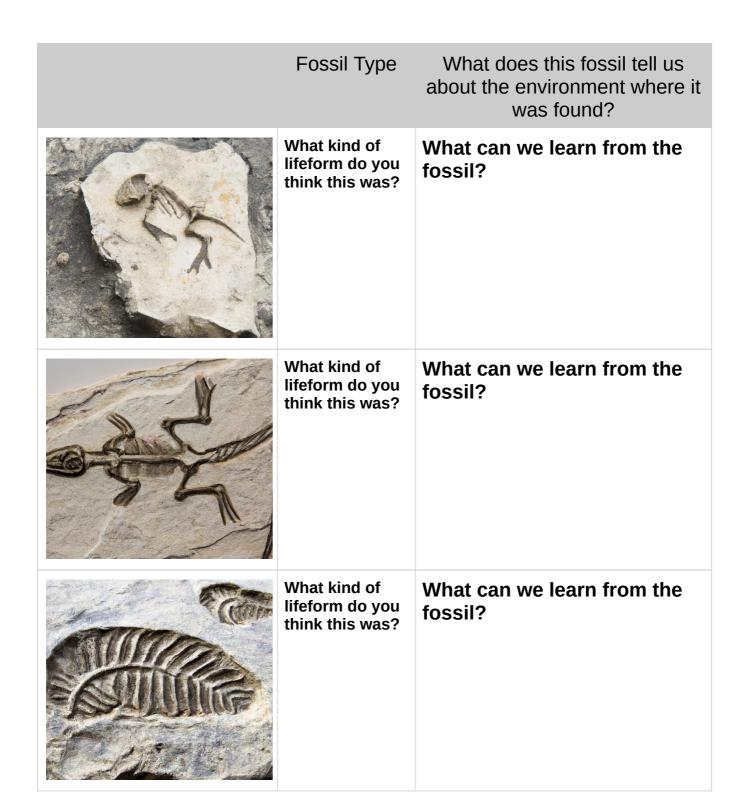
Your job is to examine each fossil, and then describe what life must have been like when these fossils formed. All of the fossils shown are from the same place and time period. Which means that they all lived together in the same

environment.

### **Welcome Young Paleontologist To The Project!**

Our team is working hard to identify thousands of fossils from long ago. Select a crate of fossils from off the shelf and get to work identifying them! These fossils will help us understand what the environment was like long ago.

Fossil Type	What does this fossil tell us about the environment where it was found?
What kind of lifeform do you think this was?	What can we learn from the fossil?
Leaf from a plant	The leaf is broad. It looks like a leaf from a rainforest. The environment probably had a lot of water.
What kind of lifeform do you think this was?	What can we learn from the fossil?
What kind of lifeform do you think this was?	What can we learn from the fossil?



# Good Work My Young Paleontologist! Now, Let's Put The Clues Together

Wow, I know it is your first day as a paleontologist, but that was amazing! You have identified some very important information about this ancient environment and made many new discoveries.

Now, put all these clues together to tell us what life was like in this ancient habitat.

1.	Write two sentences describing what life was probably like in the ancient environment that you examined. Be detailed, and use the fossils as your evidence.
2.	Draw a picture, showing what life was probably like in this ancient environment. Be detailed and include both plants and animals in your drawing.



Student's Signature

### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

Date

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?

	<ul><li>3. Did you watch the assigned video?</li><li>4. Did you answer all the questions using complete sentences?</li><li>5. Are your answers accurate?</li></ul>	
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**Signature of Mastery** 

**Badge Counselor** 

Date

### **Certificate For Your Homeschool Records**

The following certificate which has been awarded through self-evaluation by the student, and also certified by a mastery badge counselor proves that the student listed thereon has completed all the work and has mastered all the concepts for the specified topic.

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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# **Environments Change Over Time**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how environments change.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

### Key Things We Will Learn In This Mastery Badge

Some of the most important things we will learn in this mastery badge:

- An environment is made up of the living and non-living things in a particular area.
- Environments are often in a state of equilibrium or balance.
- Sometimes they are thrown out of balance and can change, becoming very different.

Name: Date:



Discovering Lab 🕸

Learning Through Hands
On Activities





### **Discovering Environments**

Making your own discoveries.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Changing The Environment**

In order to better understand what they are seeing in nature, scientists often create experiments in the lab. In this activity, you will recreate a forest, and then watch how it changes over time, as a result of changing conditions.



### **Supplies:**

For this lab you will need a plastic bin, sand, water, and small trees which you can make out of branches, or which can be purchased from a hobby shop.



### **Step 1: Create A forest**

- 1. Fill the plastic bin with sand.
- 2. Place your trees in the top of the bin to make a forest.

### Your Forest Is In Homeostasis

Observe your forest for a few minutes and notice that it is in balance. Notice that nothing changes.

Why do you think nothing is changing in your forest? Be detailed.

If all the conditions in your forest remain the same (temperature, water, sunlight, etc) how long will the forest remain the way it is? Explain your answer. Why do you think nothing is changing in your forest? Be detailed.

### Step 2: Let's Shake Things Up

In order to change the environment we have to disrupt the equilibrium of your forest so that it is no longer in homeostasis. This means that we are going to have to shake things up.

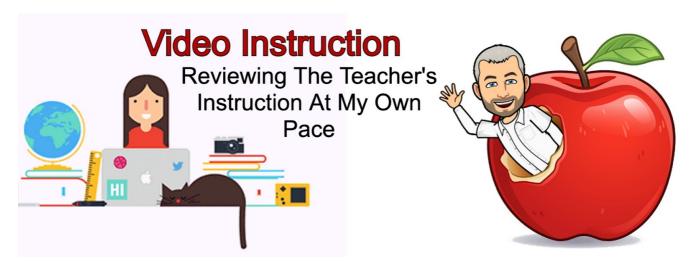
- 1. Cut a 2-3 inch hole in the side (near the bottom) of your bin.
- 2. Place your bin outside such as in a backyard.

3. Put a hose on the top of the bin, and turn it on, but just enough to allow only a trickle of water to run.

### **Your Forest Is No Longer In Homeostasis**

We have altered the conditions in your forest by adding a river. Observe your forest for several minutes and record what happens.

How did your forest change? Be detailed.
Why do you think changing the conditions eventually changed the forest?
What can we learn about the real world from your experiment? What happens to actual environments when the conditions in those environments change?



### **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the video than that you finish it

quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

# The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

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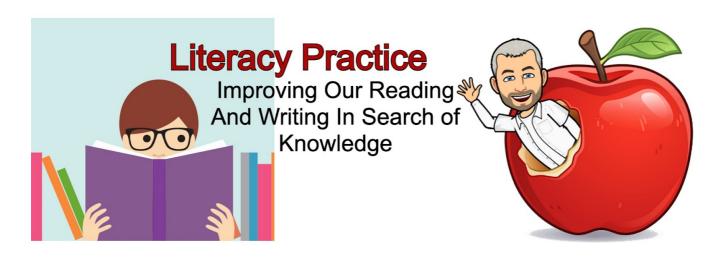
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A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



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### 1. Practice Reading For Understanding

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I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how environments sometimes change when the conditions in the environment change.

Name: Date:



# **Applying Lab**

Proving That We Can Do It Ourselves





## **Applying Environments**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### Can You Save The Fluffunians?



The Fluffunians have lived in the forests of the planet Fluffnia for many generations. They have always been a peaceful species, preferring to frolic and skip through life. Lately they have been so busy frolicing and brushing their hair, that they haven't noticed the conditions in their forest changing. Their sun has gotten a little bit hotter, and as a result, each year their forests are getting less and less rain.

### The Trees Are Dying

Without water, the trees of the forest will eventually die, and the land will become more arid. If the Fluffunians are to survive they will need to move away and find a new home in a more healthy forest.

You must convince the Fluffunians to move!

### Make A Sign To Hang In The Forest

Fluffunians are WAY too busy frolicking (and brushing their hair) to listen to some crazy alien from another planet (you) telling them about how their forest is dying. Talking is no use. You will have to make a sign, and place it along the path where they will see it as they frolic and skip past it.

### Your Sign Should Be Convincing

Make your sign stand out so they will notice it. To do this, it is recommended that you use a lot of bright colors! Also, make it informational by explaining how their forest is about to change into a desert. Fluffunians are usually so busy playing that they don't read long paragraphs. Some words are okay, but be sure to use a lot of pictures and diagrams to help them understand how environments change over time, when the conditions in those environments change.

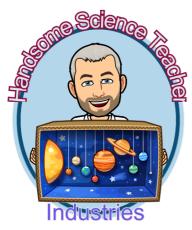
### **Extra Credit**

Okay, not really since this is homeschool, and homeschool doesn't work like that, let's call it a dare instead...

Hang your sign on your street, in your apartment hall, or somewhere else where others will see it, and confuse your neighbors!

Okay, you don't have to do this part, but confusing neighbors is always fun! (Make sure you have parental permission if you do actually do this)





Student's Signature

### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

**Date** 

Check each of the following to evaluate your work:

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## **Energy And Speed**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how adding energy to an object affects its speed.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### I. Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### **III.** Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Energy is the ability to do work.
- Adding energy to an object increases its speed.
- Decreasing energy decreases speed.

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



Discovering Lab 🛚

Learning Through Hands
On Activities





## **Discovering Energy & Speed**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## **Adding Energy To An Object**

Energy allows objects to do work and to move. Any object in motion has energy. In this lab you will discover what happens to an object when you change the amount of energy that it has.



## **Supplies:**

For this lab you will need a ball.



**Step 1: Observe A Ball** 

Place a ball on the ground and observe it. Boring, I know... but that's okay because we are learning!

Notice That The Ball Remains Still

No matter what you say to the ball, it will
not move on its own.

Why do you think the ball remained still? Be detailed.

## **Step 2: Throw The Ball Softly**

Pick up the ball and softly throw it in a safe direction.

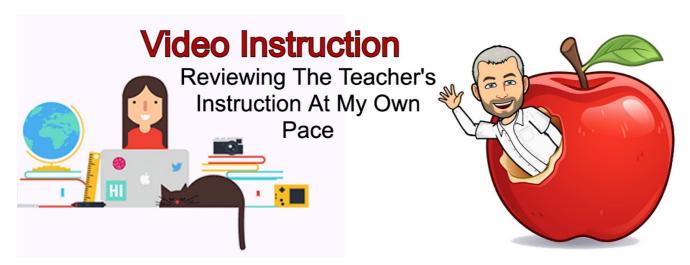
Why did your ball move when you threw it? What did you add to the ball to make it move? Be detailed.

## Step 3: Throw The Ball Hard

Pick up the ball and throw it in a safe direction as hard as possible.

What did the ball do this time that is different from when you threw it softly? Be detailed.

How does adding more energy to the ball affect how fast it travels?



## **Handsome Science Teacher One Take Videos**



## Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

## Take Your Time, Pause And Rewind As needed

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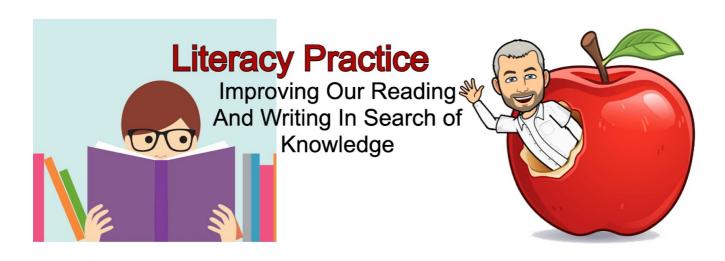
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One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):
A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



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### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

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### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how changing the amount of energy an object has affects that object's speed.

Name: Date:



## **Applying Lab**

Proving That We Can Do
It Ourselves





## **Applying Energy & Speed**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## **Defend The Kingdom From An Army of Angry Marshmallows**



As the general of our nation's armies it is up to you to defend the kingdom against our enemies. Whose most deadly weapon (marshmallows) vexes us greatly!

The fate of our empire is in your hands. Now excuse us while we all go hide in a cave and allow you to fight this battle for us!

## **Supplies**

For this lab you will need marshmallows, two rubber bands (or slingshots), stackable paper cups, and a helper, such as a sibling or parent.

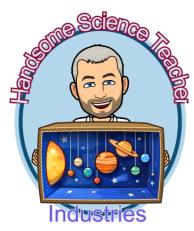
### **Build Your Castle Forts**

Using the same number of cups, have you and your helper build a fort or castle on opposite sides of the room.

### Let The Battle Begin!

Without crossing over to the other side of the room, use rubber bands or slingshots to launch marshmallows toward each other's castles. The first person to reduce the other's castle to a single layer of cups wins.

What caused the most damage fast marshmallows or slow marshmallows? Explain your answer.
What did you have to do to make your marshmallows travel faster? Explain why this made them move more quickly.



### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

Date

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# Transferring Energy From One Object To Another

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how energy is transferred from one object to another.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands-on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Energy is the ability to do work.
- Energy cannot be created or destroyed.
- Energy can be transferred from one object to another.

Name: Date:



Discovering Lab &

Learning Through Hands
On Activities





## **Discovering How Energy Works**

Making your own discoveries.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## **Transferring Energy From One Object To Another**

Energy can't be created. Nor can it be destroyed. It can only be converted from one form to another or transferred from one object or substance to another. In this lab we will discover how energy is transferred from object to object.



## **Supplies:**

For this lab you will need two hard balls. Baseballs, golfballs, marbles, or poolballs all would work great.



## **Hypothesis:**

Predict what you think will happen when you roll one ball into a second ball.

## **Experiment To See What Happens**

Place one ball in the middle of a table. Then carefully roll a second ball into it. Observe what happens.

Describe what happened when you rolled one ball into another ball. Be detailed.

In order to move an object needs to have energy. Where did each ball get energy from in order to move?

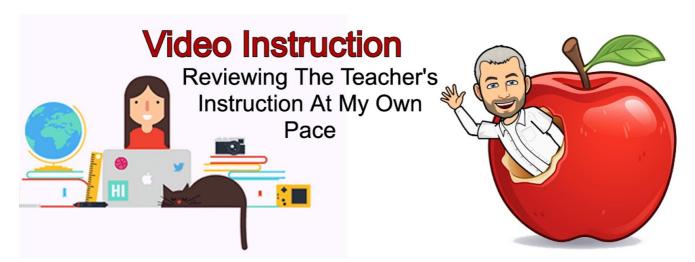
Describe how energy can be transferred from one object to another.



## **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	If energy can't be created, where do you think it comes from? How does an object that isn't moving get the energy it needs to start moving?		
2.	If energy can't be destroyed then where does it go when an object stops moving?		
3.	3. Describe what energy is in your own words.		
4.	Describe what would happen to the energy in an asteroid if it crashed into another asteroid.		



## **Handsome Science Teacher One Take Videos**



## Good Job On Completing The Discovering Lab!

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### **Check Point**

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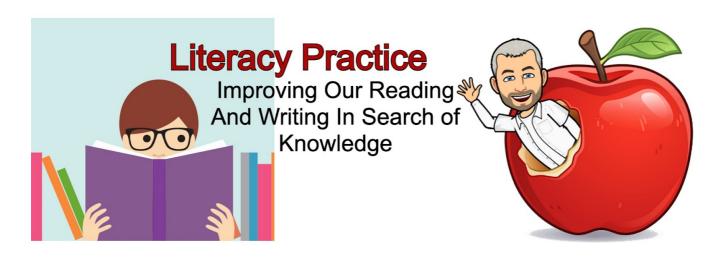


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A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



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## 1. Practice Reading For Understanding

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## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/energy-can-be-transferred-from-one-object-to-another/

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I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

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### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how energy can be transferred from one object to another.

Name: Date:



## **Applying Lab**

Proving That We Can Do
It Ourselves





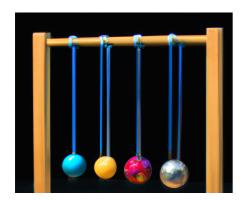
## **Applying Energy & Objects**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Build Your Own Newton's Cradle**



A great tool for showing how energy can be passed back and forth between different objects is a Newton's cradle. In this lab you will build your own Newton's cradle using marbles, string, hot glue, and sticks.

## **Supplies**

For this lab you will need 2-4 marbles, string, hot glue, styrofoam, and sticks. Popsicle sticks, pencils, and skewers all work great.

- 1. Build a frame for your Newton's cradle using the styrofoam as a base. Press two sticks down into the styrofoam, and then tape or hot glue a third stick across the top so that it is suspended between them.
- 2. Cut one piece of string for each marble.
- 3. Using hot glue attach a marble to the end of each piece of string.
- 4. Tie the strings to the crossbar (top stick) of your frame, making sure that each marble hangs at the same height.



**Note**: This is a simple design. If you really want to get the full effect of a Newton's cradle you can modify the design slightly, so that there is room for the marbles to pass between two sticks leaning against each other as shown in the picture. Which will allow you to swing the

marbles further.

### **Test Your Cradle, Observe What Happens**

Pull one of the marbles out to the side and release it, allowing it to swing back down and hit the other marbles. Observe what happens, and record the results.

Where is the first marble getting its energy from? What happens to it when you lift it into the air? Be detailed.

When you let go, and the first marble hits into a second marble, what happens to the energy that it had? Where does the energy in the first marble go?

Explain why energy cannot be created or destroyed. Explain moves from object to object.



Student's Signature

### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

Date

Check each of the following to evaluate your work:

- Did you do every assignment?
- Did you read the assigned article?
- Did you watch the assigned video?

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**Signature of Mastery** 

**Badge Counselor** 

Date

#### **Certificate For Your Homeschool Records**

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## **Energy Travels Through Space & Substances**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how energy moves through the Universe.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands-on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Though energy cannot be created nor destroyed, it does move around.
- Some of the ways that energy moves is as heat, electricity, light, and sound.
- This energy can be detected and measured.

Name: Date:



Discovering Lab 🛚

Learning Through Hands
On Activities





## **Discovering How Energy Moves**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## **Energy Moves Through The Universe**

Energy does sometimes remain still, but often it moves from one place to another. It does this in a number of different ways. In this lab you will explore different forms that energy can take, and how it travels from one place to another.



## **Supplies:**

For this lab you will need a candle, a lighter or match, a small thermometer, a flashlight, a speaker, and a balloon.



## **How Does Energy Move Through The Universe**

Energy is sometimes stored in an object or substance. Such as when electricity is stored in a battery.

Other times energy moves from place to place. In this lab you will observe energy moving and measure its movements.

## **Energy Can Travel As Heat**

One way that energy travels is in the form of heat. Heat is a type of energy that allows energy to radiate out from a central source.

- **1.** Light a candle and set it on a table.
- **2.** Carefully place your hand near (not too close) the candle and feel the heat.
- **3.** Now slowly move your hand further away.
- **4.** Use a small thermometer to take a temperature reading a few feet from the candle. Then take a second temperature reading a few inches from the candle. Record your results below.

**Note:** You will need to wait a minute for each reading, while the thermometer samples the temperature.

If energy cannot be created, where do you think the energy in the candle is coming from?

When you place your hand near the candle what do you feel? How is that energy getting from the candle to your hand?				
Energy Can Be Measured				
Record the temperature a few feet away from the candle.	Record the temperature a few inches away from the candle.			
Temp:	Temp:			
<ul> <li>Energy Can Travel As Light</li> <li>Another way that energy travels is in the form of light. Light allows energy to move out from a central source in the form of waves.</li> <li>1. With an adult's supervision, take a partner outside on a dark night and move so that you are several meters apart.</li> <li>2. Turn a flashlight on and off, and record your results below.</li> <li>If energy cannot be created, where do you think the light made by the flashlight is coming from?</li> </ul>				
How did the light get from the flashlight to your eyes?				

### **Energy Can Travel As Sound**

Another way that energy travels is as sound. Sound allows energy to move through substances like air and water.

- 1. Connect a speaker to a device and play a loud song.
- 2. Place your hand near the speaker.

What do you feel when your hand is near the speaker?

### **Energy Can Travel As Electricity**

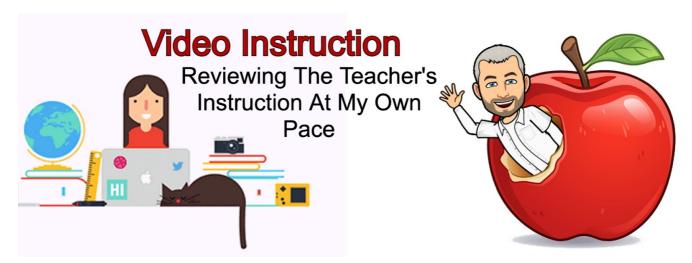
Energy also travels as electricity. We think of electricity as traveling in wires, and it does. But it also travels through the air. An example of this is lightning.

- 1. Blow up a balloon.
- 2. Rub it in your hair for 60 seconds.
- 3. Hold the balloon above your head, or above either someone else's. **Note:** This experiment will not work on all types of hair. It is okay to use a doll.
- 4. Place the balloon against the wall or ceiling.

What happened when you held the balloon above someone's head? Why do you think their hair was attracted to the balloon?

What happened when you held the balloon against the wall? Why do you think the balloon was attracted to the wall?

Have you ever been shocked? Being shocked is caused by tiny electrical charges that move from one object to another. Like tiny lightning bolts. Where do you think that energy comes from?



## **Handsome Science Teacher One Take Videos**



## Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

## Take Your Time, Pause And Rewind As needed

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quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

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## The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

### **Check Point**

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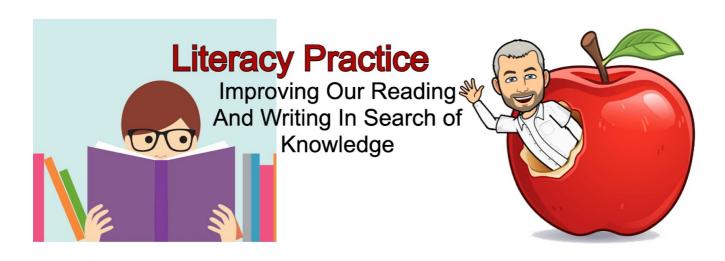
## **What I Learned From This Video**



One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):
A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

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### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

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**Writing Prompt:** Write two sentences describing how energy moves from one place to another.

Name: Date:



## **Applying Lab**

Proving That We Can Do
It Ourselves





## **Applying Energy & Movement**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## The Imperial Mines of The Moon Jakita



Welcome to Jakita Imperial slave! You have been assigned to work in the ice mines. Where you will help in the very important work of mining ice for the royal family's lemonade.

It is very cold on Jakita, and we don't provide warming equipment for slaves. However, you are welcome to invent your own solutions to keep

warm.

Heat is a form of energy. Where will you find energy on Jakita to produce heat? Be creative and use your imagination.

How will you move that energy from wherever you find it, to the depths of the Jakita mines? Examples might be to move it as electricity through wires, as heat through the air, etc.
Draw a detailed diagram showing how you will collect and transport energy, and then how it will be turned into heat.



### **Congratulations! You Have Completed The Entire Mastery Badge**

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### **Time To Evaluate Your Work**

Date

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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# **Energy Can Be Changed From One Form To**Another

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how energy changes from one type of energy to another.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

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#### II. Video Instruction

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# **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Though energy cannot be created nor destroyed, it does change from one type of energy to another.
- Sometimes it might seem like energy has been lost, but really it has just changed forms.
- Sometimes it might seem like energy is created, but really it has just changed forms.

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



Discovering Lab &

Learning Through Hands
On Activities





# Discovering How Energy Changes

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

# **Energy Can Change From One Form To Another**

Energy takes many different forms and it can change from one form to another. For example, the energy stored as calories in a log can be converted into heat and light by burning the log.



### **Converting Calories Into Heat**

As living things, we need a constant supply of energy. We obtain this energy through the food we eat, and we use the energy in a lot of different ways. For example, our bodies produce heat to keep us warm. Our nervous system produces electricity. Some living things can even produce their own light.

In this lab, we will be converting some of the calories stored in your body into electricity, mechanical energy, and then finally into heat.

# **Supplies:**

For this lab you will need a small thermometer.



# Your Nervous System Uses Electricity The movements of your body are

controlled by your brain and your brain runs on electricity. Crazy I know, but also true. Every thought you think, and every movement you make are possible because your brain produces a small amount of electricity.

### **Let's Make Some Internal Electricity!**

This part of the lab is easy! All you have to do is think. Think of anything you want. Imagine a sunset, or recall a memory, or think about what you are going to do this afternoon. Good job! These thoughts are literally converting the food you ate from your last meal into actual electricity.

### **Sharks Can Sense This Electricity**

Did you know that sharks can sense this electricity, and some animals, like the electric eel, can use the electricity from their bodies to shock and even kill other animals?

### **Now Let's Create Mechanical Energy**

So far, we have converted your calories into electricity. We can also make mechanical or kinetic energy. Mechanical energy is the energy of motion or movement.

Wave your hands around, dance, run, skip! All of these actions are converting the calories from the food you ate during your last meal into mechanical energy.

### Let's Create Some Heat Energy

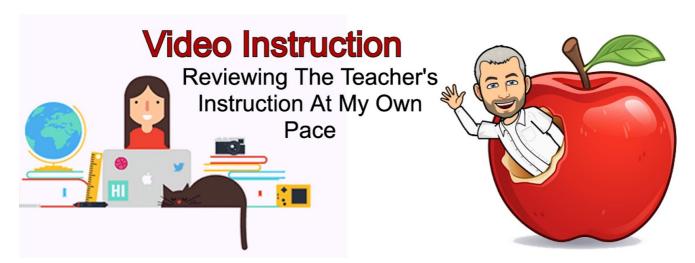
Remember that we can measure energy. Before we do the next part of this lab, let's take a measurement.

Hold the palms of your hands together and place a thermometer between them. Record the temperature in the box provided.			
low rub your hands together as fast as you can for 60 seconds. Then			

place the thermometer between your hands again and record the temperature.

How did the temperature change? Be detailed.

We know that energy cannot be created. Where did the energy come from to create the heat in your hands? Be as detailed as possible.



# **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

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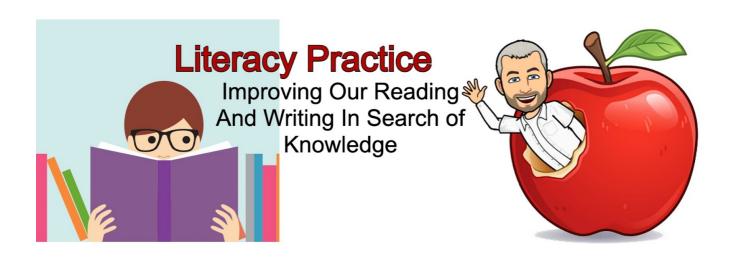


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What I learned from this video (One Sentence):

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**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



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**Writing Prompt:** Write two sentences describing how energy can be changed from one form to another.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





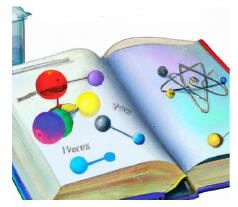
# **Applying Energy Conversion**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Writing A Textbook Article**



You have been hired by Acme Textbook Incorporated to write articles for an upcoming fourth-grade science textbook.

# Topic:

The topic you have been assigned is energy conversion.

Write a 2-3 paragraph textbook article explaining how energy can be converted from one type of energy to another. Share a few examples, such as how light can be converted to heat, or how sound can be converted to vibrations.

Use a separate piece of paper to complete this assignment.



### **Congratulations! You Have Completed The Entire Mastery Badge**

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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# **Energy Can Create Waves**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how waves sometimes form when energy moves through a substance or space.

### What This Packet Includes:

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

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# **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- When energy moves through space or through substances, it sometimes forms waves.
- Waves are usually circle-shaped and radiate outward from a central point.
- When we see a wave moving outward, it is the energy and not the substance that moves.
- Waves are measured by their wavelength and amplitude.

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



Discovering Lab 🕸

Learning Through Hands
On Activities





# **Discovering How Energy Can Create Waves**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

# **Adding Energy Into A Substance Can Create Waves**

If you suddenly add energy to a substance you might disrupt it, creating waves. These waves typically start in a central location, and roll outward, away from the epicenter.



### **Let's Create Some Waves**

In order to see this phenomenon in action, you are going to create some waves of your own.

## **Supplies:**

For this lab you will need a large body of water, such as a pond, stream, or lake. If this is not possible, a bathtub filled with water can be used. You will also need some objects to throw into the water, such as rocks. Finally, you will need a metal pan, sand, and a spoon.



# Waves Travel Through Many Substances

If you shake a pan of jello you will see waves. You see them in water. They even travel through the ground when earthquakes occur. Waves form when energy travels through a substance.

# **Making Waves In Water**

With the supervision of an adult go

somewhere, where there is a lot of water. Find a calm place where there are as few waves on the surface as possible. Throw a single rock into the water and observe what happens.

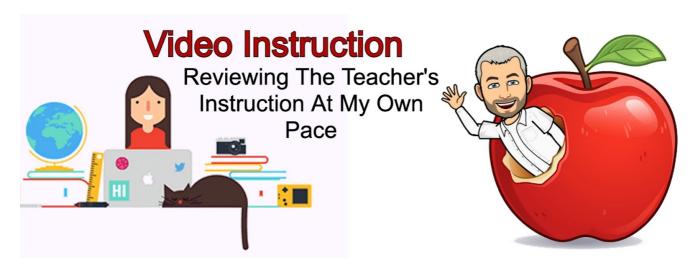
The rock adds energy to the water.
Where does this energy go? What does the energy do to the water?

Draw a diagram (picture) showing what the surface of the water looks like right after you throw a rock into it.

# **Making Waves In Sand**

Turn a pan upside down,	and cover it in a thin	layer of sand. Us	sing a spoon,
carefully tap the center of	f the pan.		

What happens to the sand? How is this similar to what the water did when you threw rocks into it?
Explain how an earthquake might be similar to what you observed when you threw rocks into the water.
Draw a picture of what you think it might look like when waves travel through land creating an earthquake.



# **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

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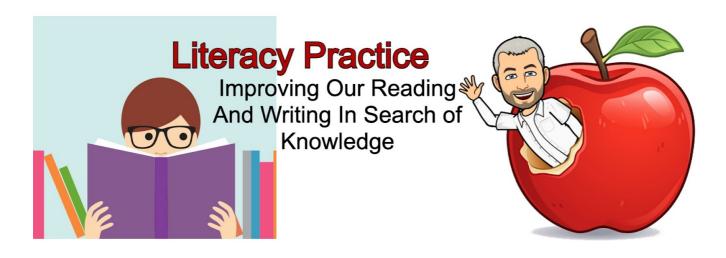


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What I	learned	from	this	video	(One	Sentence	١.
vviiai i	icailicu	11 0111	นแอ	viucu	(One	Sentence	).

A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

# 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

# 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/energy-moving-through-a-substance-creates-waves/

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

#### **Check Point**

Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

**Writing Prompt:** Write two sentences describing how energy sometimes forms waves when it travels through substances.

Name: Date:



**Applying Lab** 

Proving That We Can Do
It Ourselves





# **Applying Waves**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### **Measuring The Wavelength And Amplitude of Rope Waves**



It is difficult to measure the size of waves when they are moving. It just isn't possible to get a measuring tape or ruler next to a moving wave of water. However, we can create 'frozen' waves using rope.

# **Supplies:**

For this lab you will need a rope, and a ruler or

measuring tape.

### Frozen Rope Wave 1

Create a 'frozen' wave using a rope by laying the rope out on a table in a wave pattern. After creating the wave, use a measuring tape or ruler to measure the wavelength and amplitude. Record your results below.

Wavelength	
Amplitude	

### **Frozen Rope Wave 2**

Create another 'frozen' wave using a rope by laying the rope out on a table in a wave pattern. Make this wave a different size than the last. After creating the wave, use a measuring tape or ruler to measure the wavelength and amplitude. Record your results below.

Wavelength	
Amplitude	

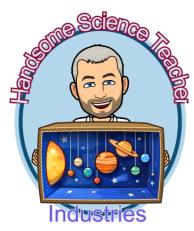
### Frozen Rope Wave 3

Create another 'frozen' wave using a rope by laying the rope out on a table in a wave pattern. Make this wave a different size than the last. After creating the wave, use a measuring tape or ruler to measure the wavelength and amplitude. Record your results below.

Wavelength	
Amplitude	

Describe what wavelength is and how it is measured.

Describe what amplitude is and how it is measured.



Student's Signature

### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

### **Time To Evaluate Your Work**

**Date** 

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?
- 3. Did you watch the assigned video?

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**Signature of Mastery** 

**Badge Counselor** 

Date

#### **Certificate For Your Homeschool Records**

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### Keep this on file as evidence of your successful completion of this topic.

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# **Plants And Animals Communicate**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how plants and animals use a variety of solutions to communicate.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### **III.** Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

# **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Plants and animals communicate using a variety of strategies.
- This includes sound, sight, coloration, smell, and even chemical signals.
- Communication helps individuals within an environment understand their place and cope.

Name: Date:



Discovering Lab 🛚

Learning Through Hands
On Activities





# **Discovering Communication**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### The Environment Is Telling You About Its Needs

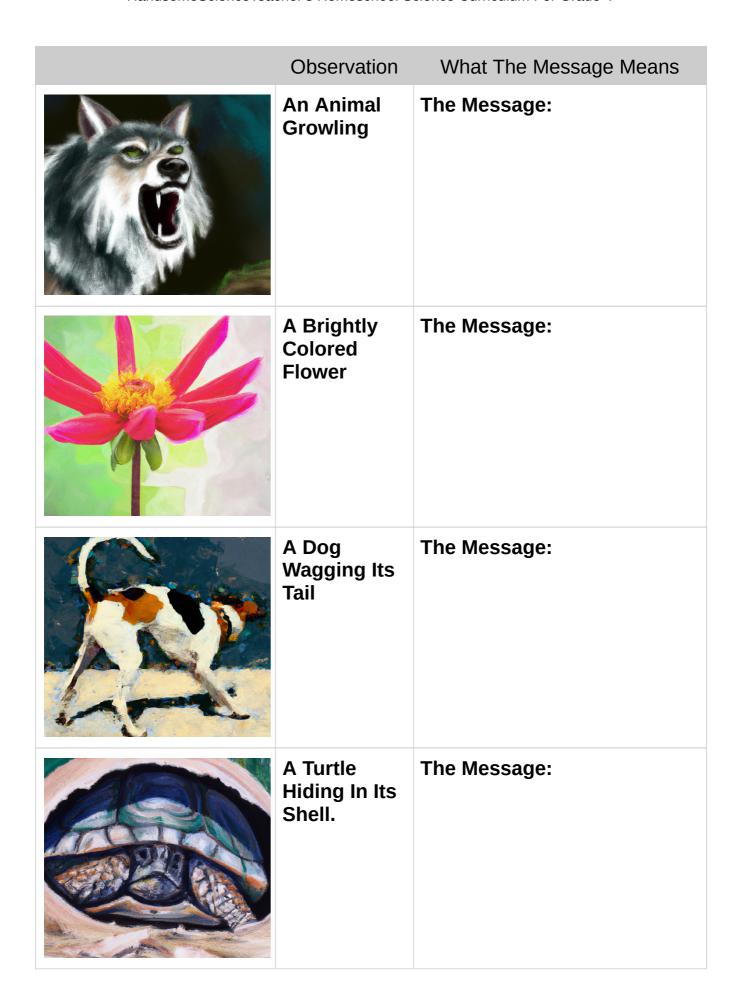
Have you ever been on a hike in the forest? What are some things that you noticed as you walked along the trail? Did you see any insects with yellow and black bodies? What about fruiting plants or flowers? These are just some of the ways that plants and animals communicate with us and with each other.



# What Is The Environment Saying To You?

Each of the examples listed below shows an example of a plant or animal communicating. Complete the chart, explaining what the plant or animal is trying to say.

Observation	What The Message Means
Yellow And Black Insect	The Message: This insect can probably sting.
Plant With Thorns	The Message:
Frog Calling Out At Night	The Message:

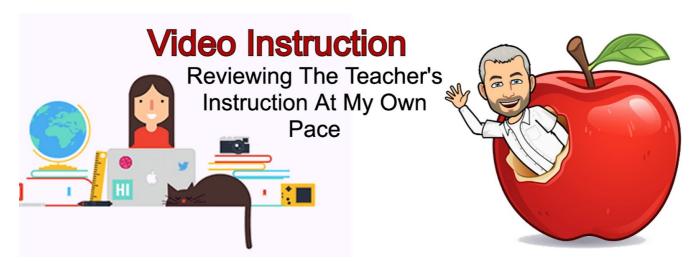




# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	Why do you think plants and animals communicate?
2.	What are some ways that you can think of that plants and animals communicate?
3.	Give an example of one way that either a plant or an animal communicates danger.
4.	How can paying attention to the signals of plants and animals help us as humans?



# **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

# Take Your Time, Pause And Rewind As needed

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Watch The Assigned Science Video

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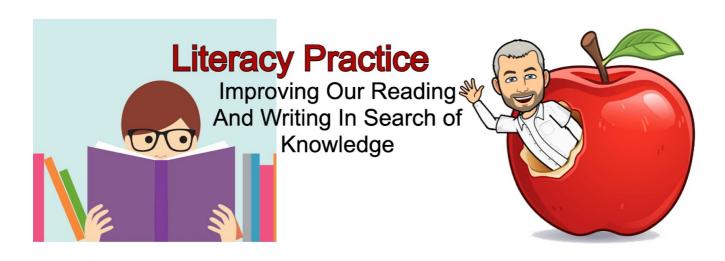
# **What I Learned From This Video**



One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video (One Sentence):
A picture of something I learned from the video:



**Activity: Reading And Writing** 



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**Writing Prompt:** Write two sentences describing how plants and animals communicate.

Name: Date:



**Applying Lab** 

Proving That We Can Do It Ourselves





# **Applying Animal Senses**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



# **Speaking For Nature**

You have learned a lot about listening to the messages from plants and animals. Now it is time to put this experience into practice by translating these messages into words.

# **Translating The Communications of Nature Into Words**

With an adult's supervision find a message from nature and translate it into words. This can be anything from the changing leaves communicating the approach of autumn to a barking dog communicating that it thinks the mailman is going to eat its family.



### **Create A Bubble Cartoon**

What would this plant or animal say if it could use words to talk? Draw a picture of the plant or animal, and then write a sentence or two inside a speech bubble, showing what it is trying to say.

How do you know this is what the message means? Explain your answer.



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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# **Living Things Have Needs**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover how plants and animals thrive when their needs are met.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

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Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

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## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Plants and animals have several needs that must be fulfilled in order for an organism to thrive.
- Many of these needs are common and are shared across most or even all organisms.
- Some needs are specific to only a few or to a single organism.

Name: Date:



Discovering Lab

Learning Through Hands
On Activities





# Discovering The Needs of Living Things

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## **Living Things Have Needs**

Each living thing is unique and this means that its needs are unique. However, the needs of many of these living things are shared in common. For example, all living things need energy, and most living things require oxygen. On the other hand, some of the needs of living things are unique only to them. While most living things will do just fine without eucalyptus leaves, a koala will die without them.



## **Using Our Imagination**

Denying an animal one of its needs would be cruel. For this lab we are going to use our imagination and imagine what would happen if we to stop plants and animals from getting one of the things it needs.

Need	What if this need isn't met?
Whales need water.	What would happen if this need wasn't met?
Pandas need bamboo.	What would happen if this need wasn't met?
Palm trees need warm tropical weather.	What would happen if this need wasn't met?

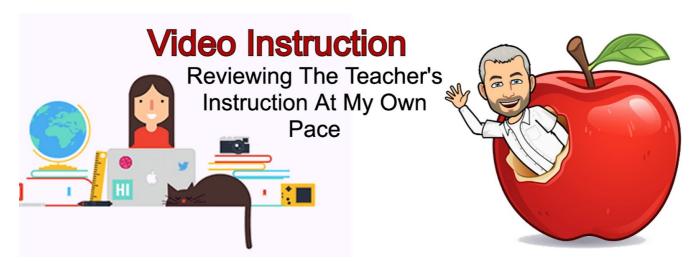
Observation	What The Message Means
Babies need milk (or formula).	What would happen if this need wasn't met?
Flowers need insects to spread their pollen.	What would happen if this need wasn't met?
Dogs need water.	What would happen if this need wasn't met?
Elephants need dry land.	What would happen if this need wasn't met?



# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	You are a living thing. What are some of the needs that you have?
	Which of your needs do you think are most important? Explain your answer.
	What would happen to you if your needs were not met? Explain your answer.
4.	Can you think of any needs that another living thing has, that are different from your own, such as a plant? How and why are the needs of this living thing different from yours?



# **Handsome Science Teacher One Take Videos**



# Good Job On Completing The Discovering Lab!

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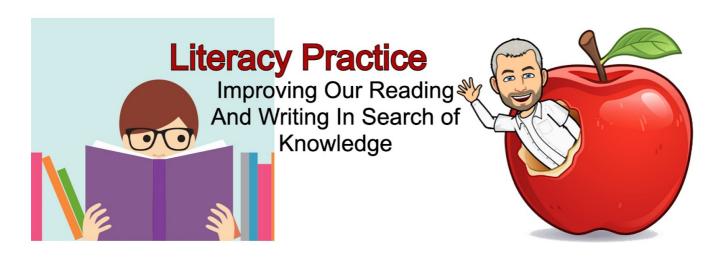
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**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



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## 1. Practice Reading For Understanding

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Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

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**Writing Prompt:** Write two sentences describing how the needs of living things must be met in order for the organism to thirve.

Name: Date:



# **Applying Lab**

Proving That We Can Do
It Ourselves





# **Applying Animal Senses**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



# **Welcome To Trout & Trout Law**

We are so glad you have joined the law firm of Trout and Trout! Welcome aboard! As a new attorney, we have hand-picked your first case. You will represent a family of fish who have been banned from the water and forced to wear pants.

## **Congress Passed The "Fish Must Wear Pants Act"**

As you have undoubtedly read in the newspaper, Congress recently passed a law forcing all fish to wear pants, to get jobs, and to act like "regular people." The fish don't like wearing pants. They complain that the pants make them itchy. Which is the main thing that bothers them... itchy pants. A less important issue that we should also probably mention is that fish die when they are out of water... but mostly we think it is itchy pants that will win this case... But as lead attorney, if you think we should focus on the fact that they are all dying... well that is okay too I suppose.



### **Prepare Your Opening Arguments**

When you go to trial you will be given five minutes to argue your case before Judge Grizzwald B. Bearinson. Your goal is to convince the judge that fish should be allowed to remove their itchy pants and once again swim freely in the water.

**Note:** Keep your clients away from the judge! He has been known to eat fish!

Prepare a five-minute speech that convincingly explains why fish need to be in the water, and why they should not be forced to wear pants.		



#### **Congratulations! You Have Completed The Entire Mastery Badge**

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#### **Time To Evaluate Your Work**

Date

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- 1. Did you do every assignment?
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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# **Day And Night**

# What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover what causes day and night.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

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#### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

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## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- We live on a planet that orbits the Sun.
- The Sun is a star that produces immense heat and light.
- The Earth rotates (spins) once each 24 hours creating day and night.

Name: Date:



Discovering Lab &

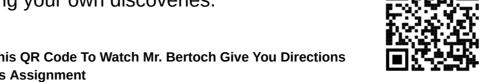
Learning Through Hands On Activities





# **Discovering Day And Night**

Making your own discoveries.



Scan This OR Code To Watch Mr. Bertoch Give You Directions **For This Assignment** 

### The Earth Is Round And Orbits The Sun

Everything you have ever touched in your entire life is part of the same planet. We all live on Earth. Earth is round, and orbits a very bright star called the Sun. The Sun produces a tremendous amount of light and heat. Because the Earth spins sometimes we face the Sun and sometimes we face away from the Sun. This causes day and night to occur.



### **Creating A Model To Better Understand What Is Happening**



In order to better understand things they observe in nature, scientists often build models. In this lab you will be creating a model of the earth so that you can show how day and night occur.

### Step 1: Build A Model of The Earth

In order to show how day and night work, we first need to build a model of the Earth. You can do this a number of ways. Just make sure your model is 3-dimensional and that it is round. You might use clay, paper mache, a styrofoam ball, or even a softball. Then paint the oceans and land on your globe.

## Step 2: Create A Sun

For this lab, you are going to need something to represent the Sun. This can really be anything, as long as it produces light. You might use a lamp with the cover removed, a flashlight, or even a cellphone.

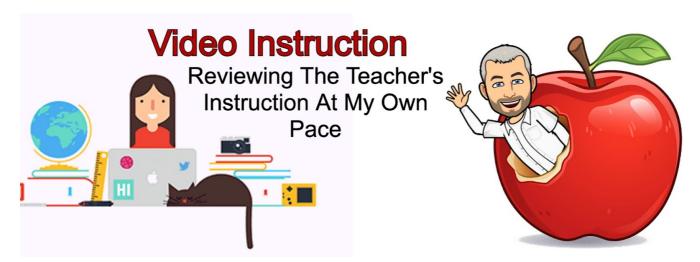
# **Step 3: Recreate The Darkness of Space**

Take your earth and sun into a dark room, such as a bathroom. You want the only source of light to be your sun. Hold your earth a few feet away from the light source and slowly spin it around in your hand. Observe what happens and record your results below.

Describe what happens to the light as you spin the Earth around.	

What part of the planet is the darkest? Why is it darkest?

What part of the planet is lightest? Why is it so bright?			
Based on what you have observed, what do you think causes day and night on the Earth?			
Questions That Make You Think: Always answer thinking questions using complete sentences.			
1. Where is the Sun at night? Why can't we see it?			
2. Why do you think it looks like the Sun moves across the sky each day? What is really happening?			
3. Explain why you think it is colder at night than it is during the day.			



# **Handsome Science Teacher One Take Videos**



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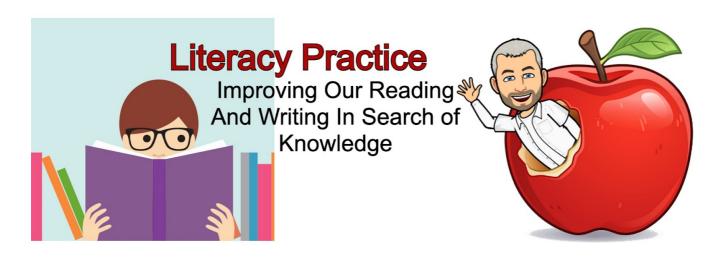


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Name: Date:



**Applying Lab** 

Proving That We Can Do It Ourselves





# **Applying Day & Night**

Applying What We Have Learned.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



# **Proving The Earth Is Round**

Your friend Flick insists that you are full of beans because you think the Earth is round. Flick says that he asked his father, and his father told him that the Earth was flat. Your other friend, whose name is Schwartz triple dog dares you to prove to Flick that the Earth really is

round.

# **Use Day & Night As Evidence To Prove To Flick That The Earth Is Round**

How can you use day and night to prove to your friends that the Earth is round? What do day and night tell us about the shape of the Earth?

Write a theme (a short essay) explaining how day and night prove that the Earth is round.



#### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

#### **Time To Evaluate Your Work**

Check each of the following to evaluate your work:

- 1. Did you do every assignment?

Student's Signature	Date	Signature of Mastery Badge Counselor	Date
the Mastery Badge because	(Be detailed and specific)	Note: Any adult may serve as a Mas highest standards of excellence.	
Mastery Badge Counselor		a listed above I hereby certify that the	ey have nassed off
	because (Be detailed ans	specific)	
Industries	<b>My Self-Evaluation:</b> Based on the criteria listed a	above, I believe I have passed off thi	s Mastery Badge
	<ol> <li>Did you answer all t</li> <li>Are your answers a</li> </ol>	he questions using complete senten ccurate?	ces?
	<ol> <li>Did you read the as</li> <li>Did you watch the a</li> </ol>	ssigned video?	

#### **Certificate For Your Homeschool Records**

The following certificate which has been awarded through self-evaluation by the student, and also certified by a mastery badge counselor proves that the student listed thereon has completed all the work and has mastered all the concepts for the specified topic.

#### Keep this on file as evidence of your successful completion of this topic.

If audited by the State, these certificates stand as evidence that you have worked on and successfully completed a rigorous science curriculum.



HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



# The Seasons of The Year

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover some of the characteristics of each season.

#### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

#### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### **III.** Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

#### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Many parts of the world experience changing seasons.
- These seasons are often categorized as summer, autumn, winter, and spring.
- The seasons have predictable patterns.
- The seasons are caused by the Earth orbiting the Sun.

Name: Date:



Discovering Lab &

Learning Through Hands
On Activities





# **Discovering The Seasons**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

## The Earth Orbits The Sun Causing Seasons

We live on a planet in outer space called Earth. Our home planet orbits a medium-sized star called the Sun. It takes the Earth one year to complete each trip around the Sun. One effect of these trips around the Sun is that many parts of the world experience predictable seasons.



## **The Characteristics of Each Season**

Complete the following chart with some of the characteristics of each season.

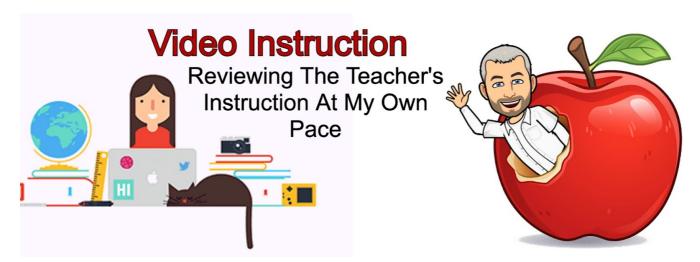
Season	Characteristics of This Season
Summer	Some things I observe in the summer are  The summer is very warm and sometimes even hot. There are lots of plants and animals moving around.
Autumn	Some things I observe in the summer are
Winter	Some things I observe in the summer are
Spring	Some things I observe in the summer are



# **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	Why do you think the seasons change?		
	What do you think is the biggest difference between each of the seasons?		
3.	Explain how the seasons affect plants and animals.		
	Draw and label a picture of your favorite season. Include at least three plants and three animals.		



## **Handsome Science Teacher One Take Videos**



## Good Job On Completing The Discovering Lab!

Now let's connect your discoveries to the vocabulary. Mr. Bertoch has created a video for you to watch.

## Take Your Time, Pause And Rewind As needed

You are not in a hurry! It is more important that you understand the video than that you finish it

quickly. Take your time. If you don't understand something, pause the video and discuss with an adult.

When you finish this video, you should have a good understanding of the concepts that have been taught. If you find yourself confused, rewind, and rewatch.

# The Video For This Mastery Badge Can Be Opened Using This QR Code

This Mastery Badge includes one video:



Watch The Assigned Science Video

Scan This QR Code To Open And Watch The Assigned Video For This Mastery Badge

### **Check Point**

I watched the video carefully and understood what Mr. Bertoch taught me.

(If not, that is okay. Watch the video again, and discuss it with an adult)

## **What I Learned From This Video**

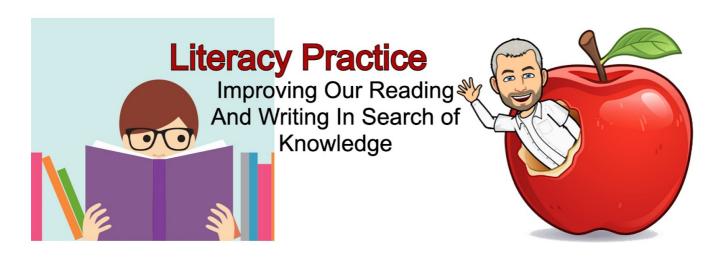


One very powerful way to help yourself remember what you learned from the video is to summarize it in your own words and in the form of pictures.

Write one sentence in your own words explaining what you learned from the video. Then draw a picture of something you learned from the video.

What I learned from this video	(One Sentence):
--------------------------------	-----------------

A picture of something I learned from the video:



**Activity: Reading And Writing** 



**Directions:** Reading and writing are very important life skills. Good scientists must be able to learn through reading and communicate their own discoveries through writing.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

### 1. Practice Reading For Understanding

Read the article below **for understanding**. Reading for understanding means that you take your time and monitor your own learning. If you get to the end of a sentence and you do not remember or understand what you read, **re-read it.** 

## 2. Practice Writing To Communicate

Complete the writing prompt below. Do your very best to write clearly so that others will understand what you are saying. This means using correct spelling, grammar, and writing, taking your time to think about the best ways to clearly communicate to others the main ideas that you are trying to get across to them.



Read The Assigned Article Carefully For Understanding. https://handsomescienceteacher.com/Online-science-classes-kids/what-causes-the-seasons/

Scan This QR Code To Open And Read The Article That Goes With This Mastery Badge

#### **Check Point**

Let's make sure that you really did read for understanding!

Remember that it is important to hold yourself accountable to a high standard and to take pride in your own success as a learner.

I Read For Understanding. I did not skim the article. I understood the material that the article discussed.

### **Quiz Time**

seasons.

Complete the quiz at the end of the article and post your score in the box below. Your goal is to get at least 75% on the quiz. Did you accomplish this goal?

%

### **Now Let's Write To Communicate**

Remember that when you write to communicate you are taking your time, and explaining the topic in a detailed and concise way. Don't rush! You are not in a hurry. Think about what you are going to say, and plan how you will say it. So that someone else who reads your sentences will understand them easily.

Writing Prompt: Write two sentences describing what causes the

Name: Date:



## **Applying Lab**

Proving That We Can Do
It Ourselves





## **Applying The Seasons**

Applying What We Have Learned.

Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



## **An Annual Community Picnic**

Mayor McSnuddler of your local town wants to schedule an annual picnic to bring the community together. Mr. McSnuddler insists that the picnic should be held on January 15th each year, which is the anniversary of the day his dear mother first baked him his favorite type of pie. The Mayor insists that everyone in the town must come to the park in shorts and t-shirts, which is what he was wearing back then, and enjoy sitting on the lawn

eating pie and playing lawn games.

# **Convince The Mayor That January 15th Is Not The Best Date For His Picnic**

The mayor is used to getting his way and refuses to listen to reason! You must convince him that a picnic in January is not a good idea. Create and label a detailed diagram for the Mayor showing him how the seasons work. Then recommend a better date for his picnic.



### **Congratulations! You Have Completed The Entire Mastery Badge**

You have worked really hard to earn this mastery badge. More importantly, you have worked hard to earn your knowledge!

#### **Time To Evaluate Your Work**

**Date** 

Check each of the following to evaluate your work:

- 1. Did you do every assignment?
- 2. Did you read the assigned article?

	<ul><li>3. Did you watch the assigned video?</li><li>4. Did you answer all the questions using complete sentences?</li><li>5. Are your answers accurate?</li></ul>		
Industries	My Self-Evaluation: Based on the criteria listed above, I believe I have passed off this Mastery Badge because (Be detailed ans specific)		
Mastery Badge Counselor Evaluation: I have reviewed this student's work. Based on the criteria listed above I hereby certify that they have passed off the Mastery Badge because (Be detailed and specific) Note: Any adult may serve as a Mastery Badge Counselor, so long as they are committed to ensuring the highest standards of excellence.			

Signature of Mastery

**Badge Counselor** 

**Date** 

Student's Signature

#### **Certificate For Your Homeschool Records**

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HandsomeScienceTeacher's Homeschool Science Curriculum For Grade 4



## **The Tropics And Poles**

### What I Will Be Learning In This Mastery Badge:

In this mastery badge we will discover that not all parts of the Earth experience seasons. Some areas are always warm while other places are always cold.

### **What This Packet Includes:**

It is important that you complete all aspects of this packet so that you gain the knowledge and skills that we are working on.

### Discovering Lab

A discovering lab is a fun, introductory lab, where we discover the knowledge on our own.

#### II. Video Instruction

You will watch a video presented by Mr. Bertoch, and answer questions about it.

#### III. Literacy Practice

Reading and writing are critical life skills, and also very important to science. You will read the assigned article and complete a writing prompt.

### IV. Applying Lab

An applying lab is how you pass off the Mastery Badge. It serves as the quiz. It is a hands on demonstration that you have mastered the skills and content of this badge.

## **Key Things We Will Learn In This Mastery Badge**

Some of the most important things we will learn in this mastery badge:

- Not everywhere experiences seasons.
- The topics are always warm. They experience a neverending summer.
- The poles are always cold. They experience a neverending winter.

Name: Date:







## **Discovering The Tropics & Poles**

Making your own discoveries.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment

# The Earth's Poles Are Always Cold While The Tropics Are Always Warm

Some parts of the Earth do not experience seasons. They are either always cold or are always warm. The cold parts of the Earth are located at the poles (top and bottom) while the warm place is in the tropics (middle or equator).



## The Tropics And Poles Are Very Different From Each Other

With an adult's permission and supervision use the Internet, books, or other resources to learn about the characteristics of the tropics and poles. Then complete the chart below based on what you learn.

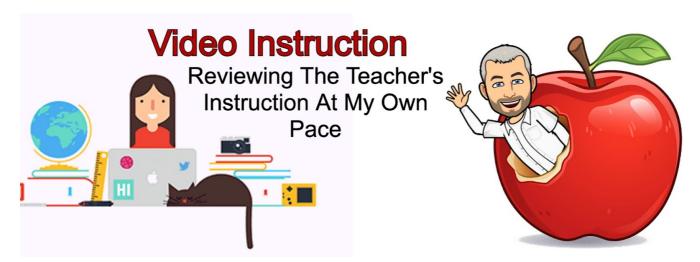
Location	Characteristics
Tropics	Five Animals Found In The Tropics Are  • • • • • • Five Plants Found In The Tropics Are  • • • • • • • • Describe what the temperature in the tropics is like.
Poles	Five Animals Found In The Poles Are  • • • • • • • • • • • • • • • • Describe what the temperature in the poles is like.



## **Questions That Make You Think:**

Always answer thinking questions using complete sentences.

1.	Why do you think the tropics are always so warm?
2.	Why do you think the poles are always so cold?
	What would happen to an animal adapted to the poles, such as a polar bear, if you suddenly moved it to the tropics?
	polar bear, if you sudderly moved it to the tropics:
	Why do you think there are fewer types of plants and animals in the poles than in the tropics?



## **Handsome Science Teacher One Take Videos**



## Good Job On Completing The Discovering Lab!

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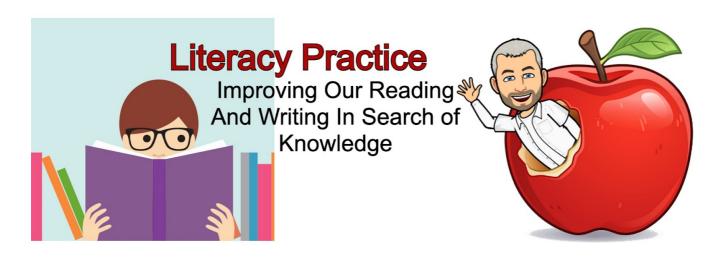


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**Writing Prompt:** Write two sentences explaining why the poles are cold and the tropics are warm.

Name: Date:



**Applying Lab** 

Proving That We Can Do
It Ourselves





## **Applying Poles & Tropics**

Applying What We Have Learned.



Scan This QR Code To Watch Mr. Bertoch Give You Directions For This Assignment



## Can You Sell Santa's Workshop?

Santa is retiring to the tropics so that he can spend his days surfing in the sun. He and Mrs. Clause have hired you as a real estate agent to sell their home and workshop.

Create a brochure that you can hand out to potential buyers listing the features of the home and why people should consider buying it. In your brochure discuss the climate and what causes it, as well as some of the plants and animals that buyers might encounter if they move to one of the poles.



# Now Find Santa A New Home In The Tropics

Really great job on selling Santa's home! Though now the Clauses have nowhere to live. They have once again hired you. This time to find them a new home in the tropics.

### Draw A House For Santa & Mrs. Clause

Create a detailed drawing of a home in the tropics where Mr. and Mrs. Clause can live. Include at least three plants and three animals in your drawing that they might encounter while living there.



Student's Signature

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Date

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**Signature of Mastery** 

**Badge Counselor** 

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# Fifth Grade Is Up Next



#### **Congratulations On Finishing Fourth Grade!**

Next Stop! Fifth Grade!! In fifth grade, we will learn moreabout geology, geography, weather, environments, and astronomy. Fifth grade begins a new journey, where we explore all of the domains of science in an integrated approach spanning the next four grades (5th-8th). During this time you will actively explore all major themes of science in preparation for high school, and will conclude in 8th grade with a capstone project.

Visit HandsomeScienceTeacher.com to download a digital copy of the fifth-grade textbook for free. If you would like a physical copy, they can also be purchased on HandsomeScienceTeacher.com.

