



HOUSTON MUSEUM  
*of* NATURAL SCIENCE

# Texas Essential Knowledge and Skills

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*MATTER AND MOTION:  
QUANTUM CHEMISTRY TO  
ASTROPHYSICS*

*UPDATED OCTOBER 2024*

Thank you for choosing the Houston Museum of Natural Science for your class field trip. We are delighted to have the opportunity to enrich your students' learning experience. To simplify planning your trip, we have provided the Texas Essential Knowledge and Skills (TEKS) for the **Matter and Motion Hall** by grade level. This resource is designed to help you align your trip with your curriculum, ensuring your visit is educational and enjoyable.

We look forward to welcoming you and your students for an unforgettable journey through the wonders of discovery.

For help with high school TEKS, please email [curriculum@hmns.org](mailto:curriculum@hmns.org).

## **Kindergarten**

### **Science 4.A**

The student is expected to explain how science or an innovation can help others.

Students can experiment with simple machines such as levers and pulleys to understand how they make work easier by allowing us to push or pull over increased distances. Simple machines help us solve real-world problems by allowing us to move heavy objects with less effort.

### **Science 4.B**

The student is expected to identify scientists and engineers such as Isaac Newton, Mae Jemison, and Ynes Mexia and explore what different scientists and engineers do.

By exploring the exhibit, students can learn the roles of different scientists and engineers. They can experiment with simple machines, observe the effects of forces, and understand basic concepts such as gravity and energy. They can also discover famous scientists and engineers and their work, including Richard Smalley from Rice University.

### **Science 5.B**

The student is expected to investigate and predict cause-and-effect relationships in science.

Students can observe firsthand how different forces and materials interact through guided exploration and playful experimentation using various exhibits, such as those demonstrating gravity and simple machines. These experiences help them understand cause-and-effect relationships, such as how pushing or pulling objects can change their speed or direction.

## **Science 6**

The student knows that objects have physical properties that determine how they are described and classified. The student is expected to identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects.

Students can observe the periodic table display, which has real-world examples of the various elements. Invite students to describe the items they see within the boxes using observable physical properties of objects, including shape, color, texture, and material. Explain to the students how these elements are organized into the periodic table based on specific properties.

## **1<sup>st</sup> Grade**

### **Science 1.A**

The student is expected to ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

Students can use the various displays and demonstrations to ask questions such as, "How do different forces affect motion?" Students can gather information and form hypotheses by interacting with models that showcase concepts like how simple machines make work easier.

### **Science 4.A**

The student is expected to explain how science or an innovation can help others.

Students can experiment with simple machines such as levers and pulleys to understand how they make work easier by allowing us to push or pull over increased distances. Simple machines help us solve real-world problems by allowing us to move heavy objects with less effort.

### **Science 4.B**

The student is expected to identify scientists and engineers such as Katherine Johnson, Sally Ride, and Ernest Just and explore what different scientists and engineers do.

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### **Science 5.B**

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### **Science 6.A**

The student is expected to classify objects by observable physical properties, including, shape, color, and texture, and attributes such as larger and smaller and heavier and lighter.

Students can observe the periodic table display, which has real-world examples of the various elements. Invite students to describe the items they see within the boxes using observable physical properties of objects, including shape, color, texture, and attributes such as larger and smaller and heavier and lighter. Explain to the students how these elements are organized into the periodic table based on specific properties.

### **Science 6.C**

The student is expected to demonstrate and explain that a whole object is a system made of organized parts such as a toy that can be taken apart and put back together.

Students can observe how various machines function and how their components work together to form a cohesive system. Invite students to experiment with the lever and the pulley. Then, encourage them to experiment with the nearby more complex machines and to identify the various parts of the machines that work together.

### **Science 7.A**

The student is expected to explain how pushes and pulls can start, stop, or change the speed or direction of an object's motion.

By engaging with various displays, students can experiment with different types of forces and observe the resulting changes in motion. For example, they can use levers and pulleys to lift weights, explore the effects of gravity and friction on moving objects, and even manipulate air currents to see how they affect the trajectory of lightweight materials.

## **2<sup>nd</sup> Grade**

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### **Science 4.A**

The student is expected to explain how science or an innovation can help others.

Students can experiment with simple machines such as levers and pulleys to understand how they make work easier by allowing us to push or pull over increased distances. Simple machines help us solve real-world problems by allowing us to move heavy objects with less effort.

### **Science 4.B**

The student is expected to identify scientists and engineers such as Alexander Graham Bell, Marie Daly, Mario Molina, and Jane Goodall and explore what different scientists and engineers do.

By exploring the exhibit, students can learn the roles of different scientists and engineers. They can experiment with simple machines, observe the effects of forces, and understand basic concepts such as gravity and energy. They can also discover famous scientists and engineers and their work, including Richard Smalley from Rice University.

### **Science 5.B**

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Students can observe firsthand how different forces and materials interact through experimentation using various exhibits, such as those demonstrating gravity and simple machines. These experiences help them understand cause-and-effect relationships, such as how pushing or pulling objects can change their speed or direction.

### **Science 6.A**

The student is expected to classify matter by observable physical properties, including texture, flexibility, and relative temperature, and identify whether a material is a solid or liquid.

Students can observe the periodic table display, which has real-world examples of the various elements. Invite students to describe the items they see within the boxes using observable physical properties of objects, including texture, flexibility, and relative temperature, and identify whether a material is solid or liquid. Explain to the students how these elements are organized into the periodic table based on specific properties.

### **Science 7.A**

The student is expected to explain how objects push on each other and may change shape when they touch or collide.

Students can engage in hands-on exhibits illustrating concepts such as force and momentum. For example, they might manipulate models to observe how different materials collide or use interactive stations to see how varying forces can move various objects using pushes and pulls.

### **Science 7.B**

The student is expected to plan and conduct a descriptive investigation to demonstrate how the strength of a push and pull changes an object's motion.

Invites students to hypothesize how the simple and complex machines in the exhibit will work to change an object's motion. For example, how does the lever help a single person lift the piano, a job that would be impossible for most people to do alone?

## **3<sup>rd</sup> Grade**

### **Science 2.A**

The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.

Invite students to find and observe various examples of models throughout the exhibit. Ask the students to identify the advantages and limitations of models, such as their size, scale, properties, and materials.

### **Science 4.A**

The student is expected to explain how scientific discoveries and innovative solutions to problems impact science and society.

Encourage students to observe and interact with the various displays that feature groundbreaking scientific discoveries and innovative solutions. Encourage students to explain how they have impacted or will impact science and society.

## **Science 4.B**

The student is expected to research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

The Matter and Motion Hall offers an interactive platform for students to explore STEM careers through hands-on experiments and dynamic displays. It delves into physics, chemistry, and engineering principles, showcasing practical applications of scientific concepts and featuring profiles of professionals in various STEM fields for student inspiration and guidance.

## **Science 7.A**

The student is expected to demonstrate and describe forces acting on an object in contact or at a distance, including magnetism, gravity, and pushes and pulls.

Students can explore the complex and simple machines to demonstrate and then describe to an adult the various forces acting on objects, including a large metal ball bearing, fans, springs, and even a full-sized piano and motorcycle!

## **Science 8.A**

The student is expected to identify everyday examples of energy, including light, sound, thermal, and mechanical.

Encourage students to find examples of different types of energy, such as light, sound, thermal, and mechanical, throughout the exhibit. There are interactive displays featuring each type of energy for students to explore.

## **4<sup>th</sup> Grade**

### **Science 2.A**

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### **Science 5.B**

The student is expected to identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

Students can directly engage with and manipulate variables as they identify and investigate cause-and-effect relationships that underpin scientific phenomena. They can interact with displays that demonstrate principles such as Newton's laws of motion, the properties of matter, and energy transformations.

### **Science 5.D**

The student is expected to examine and model the parts of a system and their interdependence in the function of the system.

Students can explore systems and their interdependent parts with simple and complex machines. Students can directly observe how individual components like levers, pulleys, gears, and inclined planes work together to perform a task. They can first use a pulley to lift a piano, providing an understanding of mechanical advantage and the interdependence of force and movement. They can experiment with more complex machines to see how each component contributes to the system's overall performance.

## **5<sup>th</sup> Grade**

### **Science 2.A**

The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.



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complex machines to see how each component contributes to the system's overall performance.

### **Science 7.A**

The student is expected to investigate and explain how equal and unequal forces acting on an object cause patterns of motion and transfer of energy.

Students can experiment with the "Air Track" and observe how forces affect the motion of an object on a nearly frictionless surface. By applying equal and unequal forces to a glider, they can see firsthand how these forces impact acceleration and velocity, providing a clear visual of Newton's Laws of Motion.

## **6<sup>th</sup> Grade**

### **Science 2.A**

The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.

Invite students to find and observe various examples of models throughout the exhibit. Ask the students to identify the advantages and limitations of models, such as their size, scale, properties, and materials.

### **Science 4.A**

The student is expected to relate the impact of past and current research on scientific thought and society, including the process of science, cost-benefit analysis, and contributions of diverse scientists as related to the content.

This exhibit allows students to explore the profound effects of scientific research on society and the evolving landscape of scientific thought. Through interactive exhibits and displays, students can trace the development of key scientific concepts and technologies. They can also see firsthand how past and current physics, chemistry, and engineering research have revolutionized our understanding of the natural world and fostered technological advancements that shape modern life. The hall also highlights the contributions of diverse scientists from various backgrounds, showcasing their groundbreaking work.

### **Science 4.C**

The student is expected to research and explore resources such as museums, libraries, professional organizations, private companies, online platforms, and mentors employed in a science, technology, engineering, and mathematics (STEM) field to investigate STEM careers.

The Matter and Motion Hall offers an interactive platform for students to explore STEM careers through hands-on experiments and dynamic displays. It delves into physics, chemistry, and engineering principles, showcasing practical applications of scientific concepts and featuring profiles of professionals in various STEM fields for student inspiration and guidance.

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### **Science 6.C**

The student is expected to identify elements on the periodic table as metals, nonmetals, metalloids, and rare Earth elements based on their physical properties and importance to modern life.

Students can explore the two periodic table exhibits to deepen their understanding of element classification and significance. The first exhibit features a large, interactive periodic table where students can touch screens using their feet to learn about each element's physical properties, such as atomic number, atomic mass, and state of matter. The second display contains real-world specimens related to each element on the periodic table, providing a tangible example of each.

### **Science 7.A**

The student is expected to identify and explain how forces act on objects, including gravity, friction, magnetism, applied forces, and normal forces, using real-world applications.

Students can explore applied forces by using a pulley to lift a piano and a lever to lift a motorcycle. They can experiment with these simple machines, learning to reduce the force needed to move an object. This real-world application helps illustrate the principles of mechanical advantage.

## **7<sup>th</sup> Grade**

### **Science 2.A**

The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.

Invite students to find and observe various examples of models throughout the exhibit. Ask the students to identify the advantages and limitations of models, such as their size, scale, properties, and materials.

### **Science 4.A**

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### **Science 6.A**

The student is expected to compare and contrast elements and compounds in terms of atoms and molecules, chemical symbols, and chemical formulas.

Students can utilize the interactive periodic table to compare and contrast elements and compounds. By choosing different elements on the display, students can access detailed information about each element's atomic structure, chemical symbol, and common compounds it forms. In doing so, they will uncover the differences and relationships between atoms, molecules, and chemical symbols.

### **Science 6.B**

The student is expected to use the periodic table to identify the atoms and the number of each kind within a chemical formula.

Students can explore the interactive periodic table exhibit to identify the elements and the number of each type within a given chemical formula. The interactive table highlights the corresponding elements, shows their positions, and provides detailed information about each.

### **Science 13.A**

The student is expected to identify and model the main functions of the systems of the human organism, including the circulatory, respiratory, skeletal, muscular, digestive, urinary, reproductive, integumentary, nervous, immune, and endocrine systems.

Students can explore a larger-than-life model of the brain, allowing them to understand its complex structure and functions. They can engage with various interactive elements, such as illuminated pathways and touchscreens, to trace neural connections, observe how different brain regions communicate, and learn about the processes involved in sensation, thought, and movement.

## **8<sup>th</sup> Grade**

### **Science 2.A**

The student is expected to identify advantages and limitations of models such as their size, scale, properties, and materials.

Invite students to find and observe various examples of models throughout the exhibit. Ask the students to identify the advantages and limitations of models such as their size, scale, properties, and materials.

#### **Science 4.A**

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This exhibit allows students to explore the profound effects of scientific research on society and the evolving landscape of scientific thought. Through interactive exhibits and displays, students can trace the development of key scientific concepts and technologies. They can also see firsthand how past and current physics, chemistry, and engineering research have revolutionized our understanding of the natural world and fostered technological advancements that shape modern life. The hall also highlights the contributions of diverse scientists from various backgrounds, showcasing their groundbreaking work.

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#### **Science 5.B**

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#### **Science 6.A**

The student is expected to explain by modeling how matter is classified as elements, compounds, homogeneous mixtures, or heterogeneous mixtures.

The interactive periodic table allows students to visualize and understand how matter is classified into elements and compounds. Students can select different elements from the periodic table and learn about their unique properties, atomic structures, and real-world applications. Additionally, students can experiment with modeling how elements combine to form compounds.

### **Science 13.B**

The student is expected to describe the function of genes within chromosomes in determining inherited traits of offspring.

Using the interactive DNA exhibit, students can explore how DNA is structured and how it functions within cells. They can manipulate models of DNA strands to see how genes are organized on chromosomes, how they function, and their role in heredity.