

Challenger Learning Center Lessons and Objectives

The follow is a list of the supplemental lesson/activities offered by the Challenger Learning Center of the Rio Grande Valley. These fun learning experiences can be done here at our location or at your campus.

Theses experiences are intended to supplement and enhance understanding of TEA's TAKS objectives.

We can adapt these lessons to any grade level upon request (K-12)

Force, Motion, and Energy. Students experiment with the relationship between forces and motion through the study of Newton's three laws. Students learn how these forces relate to geologic processes and astronomical phenomena. In addition, students recognize that these laws are evident in everyday objects and activities. Mathematics is used to calculate speed using distance and time measurements.

Aeronautics

These lessons include, but are not limited to: Bernoulli Principal, Experimental Design, and Buoyancy

Energy

These lessons include, but are not limited to: the Electromagnetic Spectrum, Potential and Kinetic Energy

Force and Motion

These lessons include, but are not limited to: Gas Laws, Kinematics, and Newton's Laws of Motion

Earth and Space. Students identify the role of natural events in altering Earth systems. Cycles within Sun, Earth, and Moon systems are studied as students learn about seasons, tides, and lunar phases. Students learn that stars and galaxies are part of the universe and that distances in space are measured by using light waves.

Students will illustrate how Earth features change over time by plate tectonics. They will interpret land and erosional features on topographic maps. Students learn how interactions in solar, weather, and ocean systems create changes in weather patterns and climate.

Space Science

These lessons include, but are not limited to; Astronomy, Cycles, Experimental Design, Matter, Mythology, and Space Weather

Earth Science

These lessons include, but are not limited to; Density, Eclipse, Experimental Design, Light, Matter, Natural Resources, Weather and Climate, and Weathering & Erosion

Challenger Learning Center Lessons and Objectives

FORCE, MOTION, and ENERGY

Aeronautics

Any of the lessons can be used to address experimental design by changing or modifying any of the given variables

- Bernoulli Illustrated
Objectives:
 - Students will create experiences by air currents to change air pressure producing lift.
- Bag Balloons
Objective:
 - Demonstrate that heat can change air.
 - Determine that hot air rises.
 - Construct a working model of a hot air balloon.
- Sled Kite
Objective:
 - Construct and fly a simple sled kite.
 - Demonstrate how to make the kite fly at varying heights.
- Right Flight
Objective:
 - Construct a flying model glider.
 - Demonstrate weight and balance of a glider.
- Delta Wing Glider, Classic dart, Dragon fly, Canard, Candor
Objective:
 - Learn how to change the flight characteristics of a glider.
 - Conduct an experiment to answer a question.
- Rotor Motor
Objective:
 - Construct a rotary wing model.
 - Define a mathematical relationship using a model.
- Air Engines
Objective:
 - Observe how unequal pressure creates power.
 - Explain that air power can help airplanes fly.
 - Construct a working model of an air engine.
- Air
Objective:
 - Experiment to determine that air occupies space.

Challenger Learning Center Lessons and Objectives

- Bernoulli's Principle
Objective:
Construct a device that demonstrates Bernoulli's principle.
Understand the effect of air flowing over a curved surface.
- Wind Direction and Speed
Objective:
Construct and use simple wind sock. Measure wind direction and speed using a wind sock.
- Direction and Orientation
Objective:
Build a compass.
Determine the direction of north, south, east and west.
- Centripetal Forces
Objective:
The aim of this experiment is to demonstrate the principle of centripetal force.

- Air Pressure

Objective:

Use simple tools to visually create different air pressure experiments. As per the principles of air pressure, a moving stream exerts less pressure than the air surrounding the moving stream and a quick air stream has a lower pressure than a slow moving one.

ENERGY

Any of the lessons can be used to address experimental design by changing or modifying any of the given variables

- Electromagnetic Spectrum
Objective:

Compare and contrast the regions of the electromagnetic spectrum;
Conduct research to gather information on uses of the electromagnetic spectrum;
Classify common uses of the electromagnetic spectrum into regions.
- Electromagnetic Spectrum continued.
Objective:

To explore the Electromagnetic Spectrum using a variety of interactive Internet resources and hands-on activities.
- Kinematics

Challenger Learning Center Lessons and Objectives

Objective:

In this lesson, we will investigate the words used to describe the motion of objects. That is, we will focus on the *language* of kinematics. This will help the student gain a comfortable foundation with the language which is used throughout the study of mechanics.

- Potential and Kinetic Energy

Objective:

Learn about the different types of potential energy. Discover how potential energy transforms into kinetic energy while conserving the total amount of energy.

FORCE AND MOTION

Any of the lessons can be used to address experimental design by changing or modifying any of the given variables

- Force, motion, and energy.

Objective:

The students examine the relationship between force, motion, and energy. Students will demonstrate and calculate how unbalanced forces change the speed or direction of an object's motion.

Demonstrate and calculate how unbalanced forces change an objects motion. Including, but not limited to:

Speed (velocity)

Speed=Distance/Time (v =Speed + direction)

Direction

Force

Force=mass x acceleration

Gravity

Weight=mass x gravity

Acceleration

Acceleration=force/mass

Inertia

Friction

Application of Newton's three laws

- Differentiate between speed, velocity and acceleration.

Objectives:

Students will participate in experiments that will enable them to distinguish between speed, velocity, and acceleration.

Challenger Learning Center Lessons and Objectives

Gas Laws

- Boyle's Law in a Bottle

Objectives:

Students will illustrate that as pressure is exerted on a gas, its volume decreases.

Students will illustrate that as the pressure exerted on a gas decreases, its volume increases.

- Cartesian Diver.

Objectives:

Students will discover the effect an object's volume has on its density

- Depth and Pressure

Objectives:

Students will discover how an increase in depth of a fluid affects the pressure that the fluid exerts.

- Pressure and foam.

Objectives:

Students will determine how pressure affects the volume of a foam substance.

Rise and Fall of water

Students will conduct simple experiments on the effects of heat and air volume.

- Air and Mass

Objectives:

To determine whether or not air has mass

Students will conduct simple experiments to determine if air has mass.

- Air and Temperature

Objectives:

To discover the effects of compressing air on its temperature

Students will conduct experiments to determine the relationship between air compression and temperature.

- Liquid Compression

Objectives:

Challenger Learning Center Lessons and Objectives

To discover whether or not a liquid can be compressed using air pressure
Students will conduct experiments to determine the possibility of liquid compression.

- Surface Area and Pressure
Objectives:

To discover the effects of surface area on the pressure that can be exerted by a liquid and other surfaces.

Students will conduct experiments to discover the effect of surface area on pressure that can be exerted upon a surface.

Students will discover if pressure is exerted equally in all directions at the same time.

- Cloud in a Bottle
Objectives:

Students will discover the process of water vapor and condensation.

Students will conduct experiments that illustrate the process of water changing states when pressure is exerted.

- Barometric Pressure
Objectives:

To discover the principle under which a barometer operates.

Students will conduct basic experiments that illustrate the principles of barometric pressure.

- Acids
Objectives:

To observe the formation of an acid due to the reaction between carbon dioxide and water.

- Forming a geyser
Objectives:

To demonstrate the application of gas laws.

Learn the predictability of geysers by understanding gas laws.

- Gas expansion
Objectives:

Challenger Learning Center Lessons and Objectives

To observe and analyze Ideal Gas Law and its application and the predictability of specific gas reactions.
Understand the result of changing temperature, pressure and volume on different gases.

EARTH AND SPACE

The following lessons include, but not limited to, NASA develop educational activities that have been modified to meet local educational needs.

SPACE SCIENCE

- Star Sort Pre K - 1st grades

Objective:

The child will count sort and identify patterns.

Teacher will explain what a star is. Sort the various stars and then create their own star using materials provided by teacher. Children will sort out about stars that have different colors and patterns.

This lesson – the child will distinguish the differences between objects, organize, and make predictions based on shape and size.

- Pinhole Camera

Objective:

Build a specialized, Sun-measuring *pinhole camera*. Safely observe the Sun with the pinhole camera and record image size measurements. Calculate the diameter of the Sun from your measurements and a known distance to the Sun.

- Moving Right Along Curriculum - Kindergarten through 2nd grades,

Objectives:

Students will learn:

Challenger Learning Center Lessons and Objectives

That Earth rotates on its axis, with one rotation measured as one day;
That Earth revolves around the sun, with one revolution equaling one year;
That Earth's rotation and revolution affect our view of the stars;
The definition of the word "constellation;"
The shapes and stories of some currently visible constellations; and
Why people created constellations.

- Sky Stories Curriculum - Kindergarten through 2nd grades,
Objectives:

Students will learn:
What a constellation is;
Shapes and stories of some Greco-Roman constellations;
Why recognizing constellations was and still is important to many cultures; and
Why we can't see all the stars all the time.

- What's Up? Curriculum - Kindergarten through 2nd grades,
Objectives:

Students will learn:
That we can see stars in the night sky, as well as the moon and some planets;
Some ways in which stars, planets, and the moon differ from each other;
The difference between reflecting and emitting light;
The definition of a constellation; and
The shapes and stories of some currently visible constellations.

- Planets Curriculum 3rd through 5th grades,
Objectives:

Students will learn:
A basic definition of the word "planet;"
How to recognize planets in the night sky;
How planets and stars differ from each other; and
What prograde and retrograde planetary motions are.

- Star Quest 3rd-5th grades, 45 to 60 minutes
Objectives:

Students will learn:
To use a star map to find constellations;
Stories or interesting facts for at least three constellations;

Challenger Learning Center Lessons and Objectives

Some reasons for the creation of constellations; and
Some cultures which created constellations.

- Stellar Lunar Curriculum - 3rd-5th grades

Objectives:

Students will learn:

What the term 'phases of the moon' means;
What causes the phases of the moon;
The names and cycle of the phases of the moon;
What a constellation is; and
Information about two or three constellations.

- Moons of the Solar System Curriculum - 3rd through 5th grades,

Objectives:

Students will learn:

Basic definitions of the terms “star,” “planet,” “moon,” and “orbit;”
Approximate distances between the sun and Earth and Earth and the moon;
Approximate sizes of the sun, moon, and Earth;
That our moon cycles through phases, and that this cycle is caused by the changing positions of the sun, moon, and Earth relative to each other;
That all the other planets in our solar system except for Mercury and Venus have at least one moon;
Some characteristics of other planets and their moons.

- Mars Curriculum - 6th through 8th grades

Objectives:

Students will learn:

Basic definitions of the words “planet” and “orbit;”
How to recognize Mars and other planets in the night sky;
Some of Mars' physical characteristics; and
About past and future missions to Mars.

- Stellar Navigation Curriculum - 6th-8th grades

Objectives:

Students will learn:

Why stellar navigation was developed;
How to use Polaris to determine compass points;
How to use Polaris to estimate latitude; and
How the stars would appear from at least three different latitudes.

Challenger Learning Center Lessons and Objectives

- Solstice and Equinox Curriculum - 6th-8th grades

Objectives:

Students will learn:

The dates of the solstices and equinoxes;
The origin and definitions of the words 'solstice' and 'equinox';
What occurs on the solstices and equinoxes; and
How solstices and equinoxes relate to the seasons on Earth.

- World in Motion Curriculum - For 6th-8th grades

Objectives:

Students will learn:

Names and appearances of at least four constellations;
That most objects in the solar system are in regular and predictable motion;
That the regular and predictable motion explains such phenomena as the day, the year, phases of the moon, and eclipses;
That gravity keeps Earth, the other planets, and Earth's moon in their orbits;
How to recognize a planet in the night sky; and
The difference between normal and retrograde planetary motion.

- Astrology: Fact or Fiction? 9th-12th grades

Objectives:

Students will learn:

What the ecliptic is;
The zodiac constellations lie along the ecliptic;
The location of the sun determined the original dates of the 12 zodiac constellations;
The original dates of the zodiac constellations are no longer accurate because of precession;
Basic requirements for something to be a science; and
That astrology is a pseudoscience, not a science.

- How do we know...? - 9th-12th grades,

Objectives:

Students will learn:

To recognize at least two constellations visible from their location;
Major developments in three time periods: Greco-Roman times, the 17th century, and the late 19th century to today;

Challenger Learning Center Lessons and Objectives

How certain inventions improved our knowledge of the universe;
About the contributions of several individuals to our understanding of the universe;
That most of what we know about our universe we learned from electromagnetic radiation;
How astronomers use the electromagnetic spectrum to learn about the universe;
That Earth's atmosphere blocks or absorbs some types of radiation; and
That we can't see all kinds of electromagnetic radiation, but we do have tools that allow us to study all kinds.

- Hubble Space Telescope (HST)- 9th-12th grades,
Objectives:

Students will learn:
Why the HST was put into orbit;
Some facts about the HST;
Some developments and new information gained by the HST; and
What scientists plan for the next orbiting telescope (the James Webb, a.k.a. The Next Generation Space Telescope or NGST).

- Classifying Galaxies
Objectives:

The learner will: recognize that galaxies are collections of billions of stars. Understand that galaxies take a variety of forms. Develop and apply a galactic classification scheme. Comprehend that galaxies are classified in four major categories.

- Classifying Stars
Objectives:

Develop abilities to do scientific inquiry.
Develop an understanding of science and technology in our society.

- Distances in Space
Objectives:

Develop an understanding for science and technology by learning to navigate through the night sky.
Develop an appreciation for distances between objects in space and tremendous voids that separate these objects.

- Craters on the moon and planets

Challenger Learning Center Lessons and Objectives

Objectives:

Learn to compare and distinguish physical and chemical characteristics.
Develop an appreciation for space exploration techniques and scientific tools.

- Distances in Space; AU, Light Years, etc.. and Theories

Objectives:

Draw inferences on distances that exist between objects in space.
Analyze, review and critique scientific explanations on the evolution of the Universe.

- Characteristics of the Universe

Objectives:

Compare and analyze how characteristics of the Universe have changed overtime.
Extrapolate and make predictions of how the objects in the Universe will change over time.

- Size and Scale of the Moons, Planets, Stars, Solar System, Galaxy, and Universe

Objectives:

Using models compare, analyze and draw inferences on the impact different characteristics of objects have on each other.
Using collected data predict and draw inferences of objects' cycles and processes.

- The stars/ Constellations (Pre-K through 1st)

Objective:

They will learn that there are groups of stars called constellations.
Teacher will illustrate several constellations.
The children will be evaluated through the creation of their constellations and ability to work in small groups.

- Components of our Solar System

Objective:

Challenger Learning Center Lessons and Objectives

Students will differentiate between planets, meteorites, comets, asteroids, and moons. They will describe equipment and transportation for space travel; identify and illustrate how the tilt and revolution causes changes in seasons and the length of a day. Students will relate the Earth's movement and moon's orbit to the observed cyclical phases of the moon

- Characteristics of the Universe

Objective:

Students will describe characteristics of the universe such as stars and galaxies. Students will be able to explain the use of light years to describe distances in the universe of the universe research and describe historical scientific theories of origin.

- Earth, Moon and Sun (Pre-K through 1st)

Objective:

The child will identify basic shapes as it relates to objects in our immediate solar system. The child will observe and describe how rotation of the earth causes day and night.

Students will be able to describe how moon orbits around the earth and how the earth rotates and orbits around the sun. Students will introduce geometrical shapes, circle, square and triangle. Vocabulary words rotate and orbit will be introduced and described. Children will make their own model of the earth, moon and sun and describe orbit and rotation

- Seeing the Distance (Pre-K through 1st)

Objective:

Children will be able to sort objects that can be seen using telescopes, binoculars and magnifying lens.

Children will use instruments to see distance of various objects provided by the teacher.

Children will be able to sort which objects could be viewed with a telescope, binoculars and magnifying lens.

- Moon Changes

Objective:

Challenger Learning Center Lessons and Objectives

Child will discuss and describe the four phases of the moon.
The child will create a model of the moon and use different lighting to understand why there are changes in the lunar phases.
The child will be able to discuss and describe four phases of the moon.

EARTH SCIENCE

- Cycles in Earth Systems

Objective:

Students will analyze and predict the sequence of events in the lunar and rock cycles.

- Rain, Lightning and Wind (Pre-K through 1st)

Objective:

The child observes and discusses characteristics of changes in the sky. The child will explain what happens first, next and last, after a weather event using their five senses. Have the opportunity to make patterns, observations and comments on changes in the weather and in seasons by drawing upon observations and experiences.

- THE LIVING AND THE NON-LIVING! (Pre-K through 1st)

Objective:

Children will learn to distinguish between living and non-living. Children will sort objects that are living and non-living based on a list of individual characteristics. Children will draw a picture of something that is living and something that is not living. Or cut from a magazine 3 things that are living and three that are non-living objects

- Wind and water Erosion (Pre-K through 1st)

Objective:

The child conducts experiments to gain knowledge Wind and water erosion, creating land features on Earth.

The child will conduct experiments to gain understanding about the causes and effects of wind and water erosion.

- Shadows (Pre-K through 1st)

Challenger Learning Center Lessons and Objectives

Objective

Children will learn how shadows are created; light does not bend; and the sun is the source of light.

Moving a light source closer to an object can make its shadow grow larger while moving the light source away can have the opposite effect. Children will create their own shadows to experiment and see what happens to different objects when you tilt the light source from left then right or change its brightness, what happens to the shadow if make the light source very dim? Children will learn how the sun's position in the sky effects the size of shadows

- Rock, Soil and Sand (Pre-K through 1st)

Objective:

The child will observe and compare earth materials and identify the importance of soil, rocks and sand.

The child will observe, collect, and investigate soil, rocks and sand.

Teacher explains how they will use the magnifying lens. Children will have opportunity to explore and investigate different types of soil samples in front of them

- Cycles

Objectives:

Identify events and describe changes that occur on a regular basis such as daily, weekly, lunar and seasonal cycles (living organisms, sleep cycle, seasonal migration)

Lunar Cycles

Seasonal Cycles

Rock Cycle

Water Cycle

Frog Cycle

Day and Night

Tides

Animal Life Cycles

Plant Cycles

DENSITY

- What is Density

Objective;

Challenger Learning Center Lessons and Objectives

Students will make predictions about which items will sink or float and relate their observations to the formula for density.

Students will learn that an object's density can be changed by altering its mass or by altering its volume.

- Understanding Density

Objective:

Students will work lab experiments that will help them define mass and volume.

Students will apply the mathematical formula for density.

Notice

Major components of these lessons were created by NASA, Digitalis Education Solutions, Inc. (DigitalisEducation.com), and Starry Night, Brian Rohig and Creative Chemistry Concepts.

These lesson plans have been adapted for classroom use by Challenger Learning Center of the Rio Grande Valley (CLC RGV) and have modified for use with NASA sponsored planetarium systems.

Challenger Learning Center Lessons and Objectives

License

Permission is granted to copy, distribute, and modify this document provided that existing copyright notices, the text of this license, and the text of the "Notice" section are not removed or modified, other than to add your own copyright notice for your modifications.

Copyright

Copyright 2006, Digitalis Education Solutions, Inc.

Note: These lesson plans are written to be used in the northern hemisphere.