

Discover STEM Career Pathways with **Exploring STEM**

Project-based learning

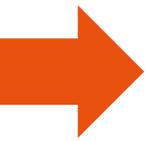
Easy to set up and run

Aligned to standards



LJ CREATE
Learning for life

➔ Exploring STEM



We're LJ Create, Education Specialists since 1979

Since 1979 we have been providing award-winning, world-class active learning solutions for technical education.

Today we create complete systems combining digital cloud content and tailor-made hardware kits that deliver innovative, inspiring learning in science, technology and engineering.

At LJ Create our mission is to enable learners throughout the world to achieve their full potential in a wide range of science and engineering areas by providing teaching solutions for schools and further education.

Our practical and innovative topic-specific solutions enable learners to achieve a firm foundation for their future, allowing them to grow and evolve in a way that meets their learning needs.

We help practitioners derive benefits in terms of learning outcomes and school management. We create more opportunities in science, engineering, and technology-based curricula to enable learning for life.

Today LJ Create employs a diverse range of staff who are dedicated to our company vision. With bases in the UK and USA we are able to impact considerable human and technological resources on our business.

“One of the benefits of the program for the students is that it encourages them to do more critical thinking and problem solving, they really have to think about their answers.”

- Leavernard Jones,
Technology Teacher

“I love this class it's so much fun using the presentations and making things work!”

- Sierra, Student

Our complete STEM curriculum works straight out of the box

STEM Design and **STEM Inquiry** are the two curriculum streams included in the Exploring STEM cloud content library. They work in conjunction to provide a complete STEM education program.

500+ hands-on learning activities

Over 300 hours of curriculum material

STEM DESIGN

Technology
Engineering Design
Application
Problem Solving

Modeling and Simulation
Communication and Collaboration
Critical Thinking
Research and Investigation

Aims of the Exploring STEM program

- To increase students' enthusiasm for STEM through active, project-based learning
- To improve students' understanding of basic concepts of engineering and technology
- To help students see the connections between the STEM subjects
- To expose students to a wide range of STEM career pathways
- To help students understand the diversity of applications of STEM in a wide range of different areas of industry and everyday life.
- Develop 21st Century Skills such as critical thinking, problem solving, creativity, team working, and the ability to process, question, and analyze information.

STEM INQUIRY

Science
Mathematics
Science Practices
Experiment

What is STEM Design?

STEM Design is a flexible program based on twelve themes including agriculture, biotechnology and transportation, with a focus firmly upon technology and engineering.

It introduces students to the concepts of engineering design and the basic principles of technological systems such as control systems and mechatronics. Students apply this knowledge as they explore a range of themes where the emphasis is very much on the application of technology and project-based problem solving.

Students investigate each theme through a range of meaningful activities that lead towards the development of a creative solution to an open-ended project.

The range of student activities is extensive and includes research, discussion, modeling, simulation, practical design and testing.

What is STEM Inquiry?

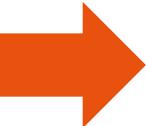
STEM Inquiry is a complete suite of middle school science lessons. The cloud-based curriculum is designed to meet the Next Generation Science Standards for middle school and aligns with a range of state standards.

The curriculum includes a wide range of activities including theory presentations, inquiry-based investigations, research activities, modeling and simulation, practical hands-on experiments and testing tasks.

As well as covering all elements of the physical, life and earth science content required at middle school, science practice is taught explicitly and integrated into all of the curriculum.

Students are continuously assessed and English language arts and math support is integrated into the program.

The curriculum is available in English and Spanish language and includes the facility to switch between them.



LJ Create are the blended learning experts, here's why...



What is Exploring STEM?

We have created our Exploring STEM program to exacting educational standards to provide middle school students with the skills and enthusiasm to continue their studies with a focus on STEM subjects. Our goal with Exploring STEM is to provide the best possible start to a fulfilling STEM career.

Will I need to purchase lots of consumable items?

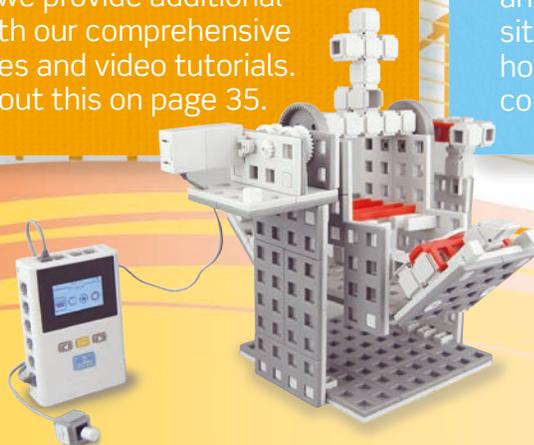
No, you won't. We understand that the cost of consumables can make project-based learning an expensive option. We have deliberately selected project activities that do not require a large investment in consumable items. Eight of the twelve STEM Design projects require no consumables at all.

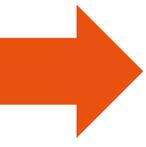
Is it easy to use?

Yes, it's very easy to use. The entire program is designed to be flexible and easy to implement. Our digital content team follow our two minute rule: "Teachers must be able to pick up and use our software within two minutes" What's more, we provide additional assistance with our comprehensive teaching guides and video tutorials. Read more about this on page 35.

Does your digital content include simulators?

Yes, our development team have created a suite of virtual simulators which students use to test designs and carry out experiments in real-world situations. You can read more about how they help prepare students for computerized testing on page 12.





Collaborative curriculum management made simple

Our comprehensive curriculum library contains over 3000 STEM lessons which are available any time, anywhere on the cloud. It makes getting started with Exploring STEM as easy as 1 2 3.

Our unique cloud-based resources provide digital content to help you plan and conduct lessons for students working in groups and alone, while our Learning Management System automatically tracks and records the progress of your students.

What's more, you can see where our resources link up to state and national curriculum standards, and access both academic and technical subject support. Finally, there are support materials and practical tasks for when you want to get hands-on in the classroom.

You can access the cloud from anywhere where you have an Internet connection and a web browser. What's more, the learning content updates automatically whenever we make changes to keep it up to date.



We promise that our out-of-the box cloud set-up is so easy, you'll be up and running in just 2 minutes.



1.

Digital Content

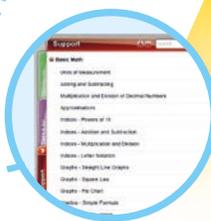
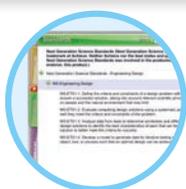
Our digital content is written by our team of experts and comprises presentations, investigations, practical tasks, assessments and support materials such as applications and simulators. Students can improve their knowledge then test out their skills with a practical task or design project.



2.

Learning Management System

Our Learning Management System automatically tracks and records the progress and attainment of your students, and the school's progress overall. You can see how much time students spend on each module, how often they log in, and instantly see records of their grades across the program.



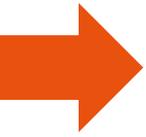
3.

Academic Standards and Support

It's easy to see exactly how our teaching resources link up to state and national standards. We also have plenty of resources offering support in core math, English and science requirements. You can read more about this on pages 12 and 13.



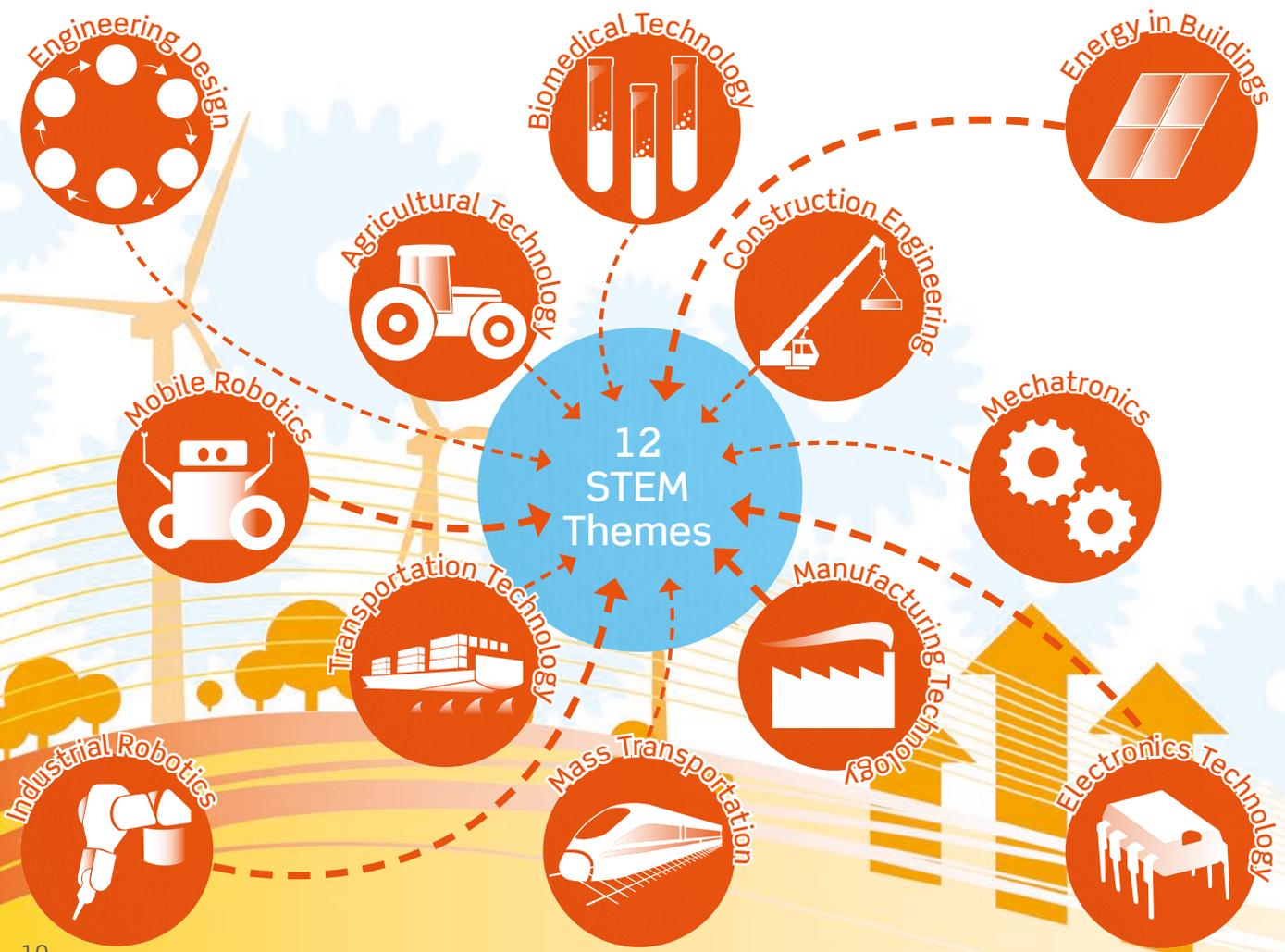
If something goes wrong or you can't find the answer in the cloud, you can call our dedicated support team.



Bringing STEM together with project-based learning

Our curriculum material uses **Active Learning** to foster a range of important skills across the core STEM subjects. Our **Presentations** and **Investigations** promote processing, questioning and analyzing information. Our **Simulations** and **Practical Tasks** involve problem solving,

creativity and critical thinking, while enhancing manipulative skills. Finally, each course concludes with a **Design Project**, to develop computer programming skills, and promote communication and interpersonal skills through team working.

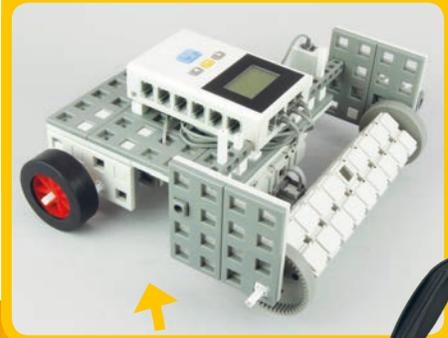




Investigation and Research



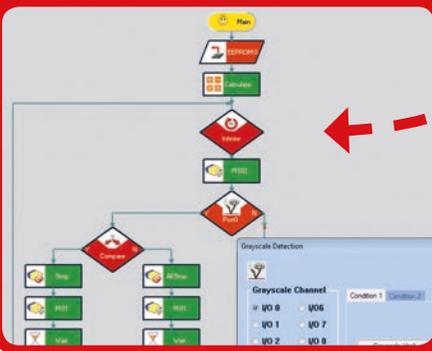
Design a Solution



Open-ended design projects

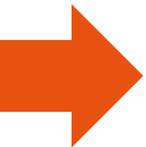
Each of our courses contains a varied mix of activities to prepare students to complete the open-ended project brief. Students then apply what they've learned to their own unique response to the project brief. There's no right or wrong answers here, just rewarding solutions and a few "eureka!" moments.

Programming and Testing



Simulations





We focus on fulfilling state and national academic standards

National and State Standards

The Exploring STEM program has been developed to align with national standards. These include the ITEEA Standards for Technological Literacy (ITEEA), the Common Core State Standards (CCSS), and the Next Generation Science Standards (NGSS). The curriculum has also been mapped to a range of state standards for science and career and technical education. Please contact us or your local representative if you would like further details relevant to your state.

Exploring STEM Simulators

Many of the Exploring STEM lessons include simulator-based activities. These unique virtual applications allow students to relate technology with its application, and can be used to help prepare students for the increased use of interactive content in computer-based standardized testing.

ITEEA ✓
 CCSS ✓
 NGSS ✓





Need some extra help? We've got it covered

Our Exploring STEM courses contain integrated academic support materials that can be accessed by students at any time. These support materials are designed to aid understanding of the key concepts within the Exploring STEM program. The blended mix of support for science, math, and English language arts will give your students the skills and confidence they need to complete the program.

Science

Presentations, investigations and assessments covering scientific principles such as:

- Forces
- Electricity and Magnetism
- Energy
- Genetics
- Heat Transfer

Math

Interactive investigations and assessments to enhance knowledge of math basics such as:

- Arithmetic
- Algebra
- Graphs
- Units of Measurement
- Trigonometry

English Language Arts

Engaging practical tasks that illustrate the following ELA fundamentals:

- Writing
- Speaking and Listening
- Reading
- Language



Our **STEM Design** program consists of 12 courses in technology and engineering. Each of our STEM Design courses is based on a design project and is intended to last for **fifteen class periods**. The content of each course is tailored to provide the skills and knowledge that students need to complete the final design project independently.

We recommend that all students complete the Engineering Design course [p 14] first. This will give them the theoretical background and practical skills to design, construct and program using our Engineering Construction Kit. Once this is completed, the additional eleven courses can be offered in any sequence.

The entire program is a 180 hour course of study, which can be spread across multiple grades, or focused on a single grade over a whole school year. For curriculum equipment details, please see pages 22 - 23.



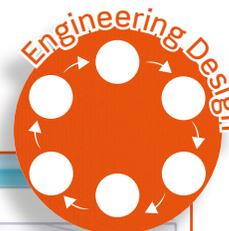
Engineering Design

Equipment Required: Engineering Construction Kit
Course Length: 15 Class periods

Engineering Design is based around a project to design a railroad crossing, including warning lights and sounds. Students will be introduced to the engineering design process. During the course, students are taught how to use the flowchart programming software and construct models using the Engineering Construction Kit in a sequence of hands-on tasks.

Hands-On Tasks Include:

- Design a system that turns on a light using a switch, modify the design so it automatically switches on the light when it gets dark.
- Use a motor and gear box to design a system that turns a table for one single rotation. Improve the design using magnetic switches.
- Design systems for raising and lowering a barrier.
- Design a traffic light set to follow a specified pattern.



Railroad Crossing System - Project

Lab Work: Design Project – A Railroad Crossing System

Railroad crossings are designed to allow cars and people to safely cross a railroad intersection.

A railroad crossing is usually fitted with an active warning system that automatically activates when a train is approaching.

Design and build a model of a railroad crossing with an active warning system that includes gates, lights, and barriers. Use the VJC control software to write a program for your design.

Use the help sheets for assistance.

[Controller Help Sheet](#)



Design an Automatic Railroad Crossing

Research Topics Include:

- Introduction to engineering design
- Engineering problems
- Alternative solutions
- Models and prototypes
- Communicating engineering design



Agricultural Technology

Equipment Required: Engineering Construction Kit
Course Length: 15 Class periods

Students are tasked with the project to design, build, and program a model of a vertical farming system. This will cause them to consider many variables. The range of hands-on tasks that provide the underpinning knowledge and skills for this challenge will introduce a variety of ways in which food manufacture is impacted by modern technologies. This course incorporates earth science topics.

Hands-On Tasks Include:

- Design a model of an irrigation machine.
- Design a machine for feeding livestock.
- Design an agricultural machine that can navigate around a field or follow a pre-programmed route.
- Design the control system for an artificial environment.
- Design a vertical farming system, including some elements of control and hydroponics.

Vertical Farm - Project

Lab Work - Vertical Farm

Vertical farming is a new way of farming; it is being developed as a way of growing plants in places where space is scarce. Layer upon layer of plants are grown in stacked frames. These frames can often move, which enables plants to be added, removed, and tended to by automated robots or humans.

Design and build a model of a vertical farming system that can place a tray of plants on one shelf, then a second tray on a shelf either above or below the first.

Use the help sheets for assistance.

[Controller Help Sheet](#)



Design a Vertical Farming System

Research Topics Include:

- Irrigation
- Agricultural machines
- Biomass and biofuels
- Artificial environments
- Earth science

Biomedical Technology

Equipment Required: Engineering Construction Kit, Biomedical Technology Kit
Course Length: 15 Class periods

Biomedical Technology introduces students to a diverse range of very different technologies related to health and well-being. They will model sanitation, spread of disease and vaccination using the Biomedical Technology Kit. Completing the final design project reinforces engineering design skills along with the life science topics that are explored in this course.

Hands-On Tasks Include:

- Use a cross-contamination kit to show how germs spread and use a hand washing tester kit to check how well hands have been washed by revealing “germs” under UV light.
- Use “vaccination gloves” to demonstrate herd immunity.
- Develop a mechanism for dosing pharmaceuticals.

Medical Scanning - Project

Lab Work - Medical Scanning

CT scanners consist of an X-ray tube that rotates around part of the body. MRI scanners use a strong magnetic field that is created in a tube. The patient's whole body goes into the tube when scanning begins.

Design and build a model of a scanner that includes a bed that moves to place the patient into a tube ready for scanning and scanning mechanisms. You will design a scanner where the mechanisms move up and down or side to side to simulate scanning the patient.

Use the help sheets for assistance if needed.

[Controller Help Sheet](#)



Design a Moving Medical Scanner

Research Topics Include:

- Sanitation
- Vaccination and immunization
- Genetic engineering
- Pharmaceuticals
- Physics of medical scanning



Construction Engineering

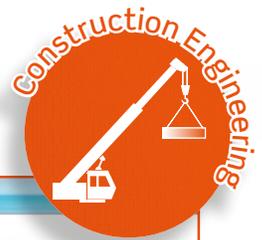
Equipment Required: Structures and Materials Teaching Set

Course Length: 15 Class periods

This course provides students with the background they need to design and construct a bridge that meets strict requirements. This math and physics rich course explores beam design and materials, then teaches students how to perform destructive testing on them to analyze the properties of their materials and the performance of their design.

Hands-On Tasks Include:

- Build and test a range of structures.
- Analyze forces on model skyscrapers.
- Build and test wooden beams.
- Build and test model concrete beams.
- Build and test beams made with recycled materials.
- Design, build and test a model bridge.



Bridge Design - Project

Lab Work – Bridge Design, Construction, and Test

• Bridges are used to span gaps, from only a few feet wide, to several miles across.

Through innovation, new bridge designs now incorporate less material, while at the same time they are stronger, and are capable of spanning longer distances.

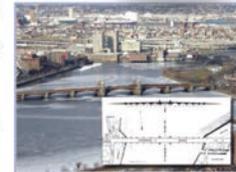
Design a bridge to solve the following construction problem:

Your bridge must be able to span 10" and must also be 12" long. The real bridge needs to carry two lanes of traffic in each direction. A lane of traffic on the scaled model is 0.5" wide.

The model beam must be capable of carrying a single load of 200 g.

When the load is applied it must not deflect more than 1/4".

The model should be as inexpensive as possible, so you need to keep a track on the budget of the project.



Design and Test a Road Bridge

Research Topics Include:

- Forces on structures
- Beams
- Concrete
- Green materials in construction
- Building bridges

Energy in Buildings

Equipment Required: Engineering Construction Kit, Green Energy in Buildings Trainer

Course Length: 15 Class periods

In this course students explore the use and wastage of energy in buildings. A model home, the Eco-Building, is fitted with heating, green energy generation, cooling and lighting systems, while a bank of sensors enables the on-screen analysis of energy use. The design project is to design an automated passive cooling device to supplement the energy-expensive air conditioning used in the model home.

Hands-On Tasks Include:

- Use the Eco-Building to investigate light levels, consumed energy and different types of lighting.
- Use the Eco-Building to investigate a grid-connected solar water heating system.
- Monitor and record temperature changes in air conditioned and heated rooms.



Automatic Sunshade - Project

Lab Work – Automatic Sunshade

• When designing a building, an architect will consider how energy efficient the building will be. With careful planning the building can make use of natural resources to aid the cooling process. Using renewable natural resources helps the environment and very often saves money.

Carry out an experiment using the ECO Building to show the effect of passive cooling.



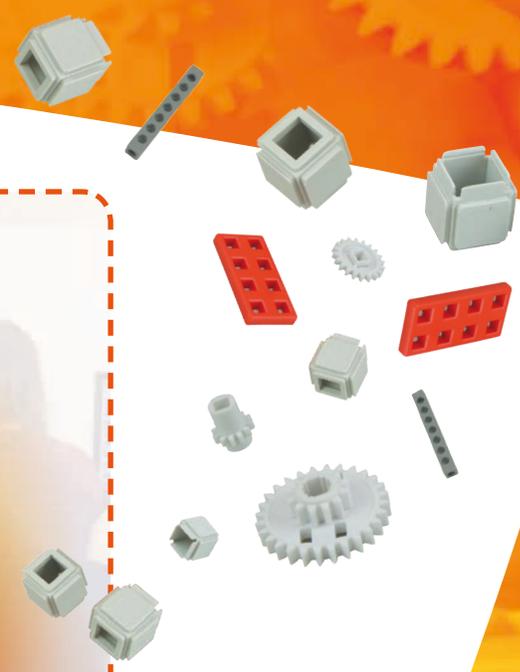
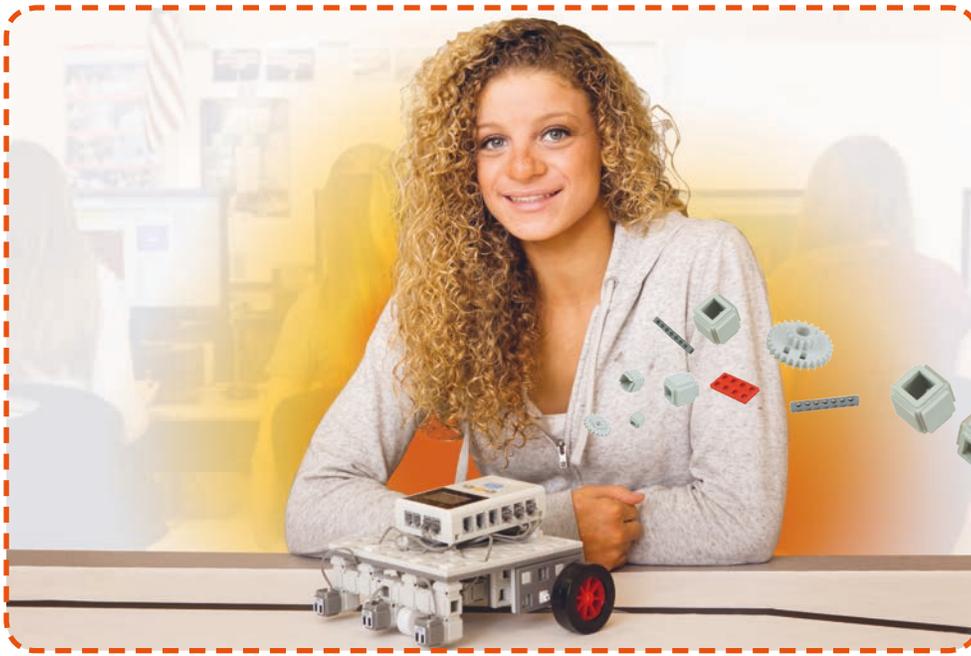
Recommended Equipment

- ECO Building using

Design an Automatic Sunshade

Research Topics Include:

- Energy in buildings
- Small scale wind turbines
- Solar electricity in the home, and solar heating
- Insulating and glazing
- Cooling systems



Mechatronics

Equipment Required: Engineering Construction Kit, Fluid Power Student Resource Pack
Course Length: 15 Class periods

This project, constructing a working fairground ride, has a wide range of potential solutions. The preparation for this challenge provides a background in the basics of mechanical machines, pneumatics, and hydraulics. Students are introduced to these concepts through a series of hands-on tasks to build machines that increase in complexity through the 15 class periods.

Hands-On Tasks Include:

- Design a machine that changes a rotating force into an inline force and use it to move an object.
- Using simple gear trains, design a winch system.
- Use a combination of special gears such as worm and bevel gears to design a turntable.
- Construct a simple pneumatic and hydraulic circuit.
- Design a three floor elevator.



A Fairground Ride - Project

Lab Work - A Fairground Ride

- Fairground rides use a range of mechanical systems to move people in different ways for entertainment.

Carry out some research on fairground rides, such as carousels, Ferris wheels, and pirate ships, to find out how they work.

Design and build a model of a fairground ride. Use the VxC Programming software to write a program for your design.

Use the help sheets for assistance.

[Controller Help Sheet](#)



Design a Fairground Ride

Research Topics Include:

- Power transmission
- Mechanical systems
- Simple gears and compound gears
- Pneumatics and hydraulics
- Levers

Electronics Technology

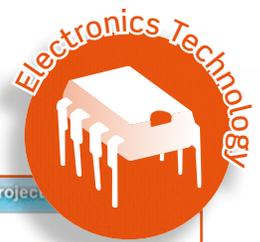
Equipment Required: Electronic Circuits Trainer Teaching Set

Course Length: 15 Class periods

To complete this project, students must design and test an electronic circuit. This clever course focuses on common applications of electrical technology and provides students with the practical experience necessary to incorporate electronics into their skills portfolio in a very short period.

Hands-On Tasks Include:

- Build a lamp circuit on a patch board consisting of a battery, lamp and switch.
- Build a polarity tester circuit on a patch board.
- Use the patch board to create an LED lamp circuit.
- Use an Electronic Circuit Simulator to model and test an automatic lighting circuit, then construct and test the automatic lighting circuit.
- Plan how to construct an automatic lighting circuit with a breadboard.



Plan, Construct and Test an Electronic Circuit - Project

Lab Work - Plan, Construct, and Test an Automatic Light Circuit

- A new device is to be added to a range of cars to help the driver.

The device will indicate with a flashing LED when the lighting level outside the car becomes low enough to need the headlights on.

Plan, construct, and test a circuit to fit the specified requirement.



Recommended Equipment

- Breadboard components found in *Electronic Circuits Student Resource Pack*

Design and Test an Electronic Circuit

Research Topics Include:

- Simple lamp circuit
- Polarity tester, and polarity tester circuit
- LED lamp circuit
- Automatic light circuit
- Breadboarding

Manufacturing Technology

Equipment Required: Injection Molding Trainer

Course Length: 15 Class periods

In this engaging project, students investigate the techniques used to create thermo-plastic products. Physical science related to the properties of materials is the academic focus of this course. Preparation for the design project includes substantial use of the design and evaluation process.

Hands-On Tasks Include:

- Use a plastic injection molding machine to mold a plastic model car.
- Use the Thermoject injection molder to make and then evaluate plastic doorknobs.
- Explore the impact of faults in the injection molding process.
- Test the doorknob designs and modify as appropriate.
- Modify, test and evaluate a final doorknob design.



Design and Manufacture a Door Knob - Project

Design and Manufacture a Door Knob

- A bathroom cabinet manufacturer has just purchased an injection molding machine. He's asked for help because he has no experience in injection molding.

Imagine you are a designer responsible for developing the design of an injection molded door knob. Test it using the Injection Molder Simulator.



[Thermoject Reference Sheet](#)

[Hints and Tips for Successful Molding](#)

Recommended Equipment

Design and Manufacture a Door Knob

Research Topics Include:

- Design loop
- Plastics and metals
- Physical and mechanical properties of materials
- Testing materials
- Injection machine controls



Mass Transportation

Equipment Required: Research and Design Teaching Set
Course Length: 15 Class periods

This course requires students to investigate science and engineering principles with a special emphasis on research and design concepts. Students model a computer-controlled mass transit system using a Maglev System Simulator and using our Maglev train model, complete a final design project that takes into account environmental, engineering and financial considerations.

Hands-On Tasks Include:

- Investigate a Maglev model powered by a ducted fan.
- Use the Maglev System Simulator to demonstrate three different modes of operation.
- Develop a control program to start, accelerate, decelerate and stop a model Maglev vehicle.
- Crash test a model Maglev vehicle to evaluate forces.
- Design, test and evaluate safety buffers.



Passenger Safety: Buffer Design - Project

Lab Work – Design a Buffer

Transportation systems must be safe for passengers to use. It is important that the system offers a safe means of travel.

For example, a train must travel smoothly and stop gently. Buffers are used to ensure a gentler stop if the train does not stop before hitting them. They do this by increasing the time of the collision so that the force is reduced.

Using the steps of the design loop to guide you, make a buffer for a model Maglev vehicle.



Recommended Equipment

- Research and Design Teaching Set

Design a Safety Buffer

Research Topics Include:

- Research and design approach
- Types of propulsion
- Modes of operation
- Controlling the service
- Passenger safety

Transportation Technology

Equipment Required: Engineering Construction Kit
Course Length: 15 Class periods

This course demonstrates the extent of the influence of transportation technology with a design project based on the movement of freight. Students are introduced to the principles of transportation technology, including wheeled vehicles, electric vehicles, intelligent vehicles and freight transportation.

Hands-On Tasks Include:

- Design and build a vehicle powered by an electric motor that can be driven forwards and backwards.
- Design a vehicle powered by electric motors that can be steered.
- Design a vehicle that requires the use of gears to climb a ramp or cross rough terrain using four-wheel drive.
- Design a vehicle with an intelligent collision avoidance system and autonomous braking.
- Design and build a container crane system.



Freight Transport - Project

Lab Work – Industrial Machines
A crane should have horizontal movement to take a container backward and forward between the dock side and the waiting boat. It should also have vertical movement to pick up and put down the container. All movement should be controlled by the crane driver using switches.
Design and build a model container crane system that can move a container from a "dock" onto a "ship". Use the VJC control software to write a program for your design.
Use the help sheets for assistance.



[Controller Help Sheet](#)

Design an Industrial Crane

Research Topics Include:

- Introduction to transportation
- Power and control
- Intelligent vehicles
- Freight transport

Industrial Robotics

Equipment Required: Engineering Construction Kit
Course Length: 15 Class periods

Industrial automation involves robotics and beyond, and this project, to design a model industrial work-cell, demonstrates this perfectly. The application of mechanical systems and control devices in this course will be of great assistance to students as they continue through their engineering training and career pathway.

Hands-On Tasks Include:

- Design and build a simple conveyor belt system.
- Design and build a simple arm that moves in response to commands on the controller.
- Design and build a conveyor with sensors that only moves when an object is placed on it.
- Design and build a simple Cartesian robot.
- Design and build a complex robot/machine incorporating a conveyor.



An Industrial Robotic System - Project

Lab Work – Industrial Machines
Machines used in industry come in all shapes and sizes, and are used in all sectors to carry out different tasks. Conveyor systems transport products and components around factories.
Design and build a conveyor system that can move a component along a conveyor belt. It should be possible to control the direction of movement of the conveyor. Use the VJC Programming software to write a program for your design.
Use the help sheets for assistance if needed.



[Controller Help Sheet](#)

Design a Conveyor Belt System

Research Topics Include:

- Industrial machines
- Controlling machines, the control loop
- Sensors and actuators
- Industrial robots
- Computers and manufacturing



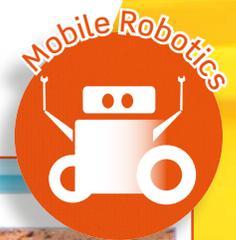
Mobile Robotics

Equipment Required: Engineering Construction Kit
Course Length: 15 Class periods

Of all the engineering topics in our program, this one is likely to be the most attractive to students, and generate the most competition amongst them! We introduce some related study in space science, but the emphasis is on critical thinking skills and creativity.

Hands-On Tasks Include:

- Design a simple mobile robot that can follow a pre-programmed route, then take a sensor reading and return to base.
- Design a mobile robot that switches itself off when it gets dark to conserve power.
- Design a robot that can avoid obstacles using simple switches or IR proximity sensors.
- Design a robot that uses sensors to navigate.
- Design a robotic rover which is able to navigate around a specific area.



Space Robots - Project

Lab Work – Powering Mobile Robots

Mobile robots that roam around on the surface of other planets are often solar powered. When night falls, the temperature drops. To conserve power, the robot stops carrying out any activities until the Sun rises again.

Design and build a model robot that stops moving when it gets dark and starts up again when it gets light. Use the VJC control software to write a program for your design.

Use the help sheets for assistance.

[Controller Help Sheet](#)

[VJC Programming Software Help Sheet](#)



Design an Automatic Mobile Robot

Research Topics Include:

- Introduction to mobile robots
- Powering mobile robots
- Controlling mobile robots
- Sensors for mobile robots
- Space robots



What will you need to get started?

Engineering Construction Kit

This classroom-based resource consists of a construction kit with over 450 parts including motors, sensors and a programmable control unit for students to develop and test their programs. There's a limitless number of design possibilities!



Biomedical Technology Kit

This kit includes a cross-contamination kit to show how germs spread and a hand-washing tester kit to check how well hands have been washed.



Structures and Materials Teaching Set

Consists of a variety of tools to make beams and test them with beam testing equipment, all neatly contained in a plastic storage box.



Research and Design Teaching Set

Based around a magnetic levitation track and control software, vehicles are propelled along the track by ducted fans.





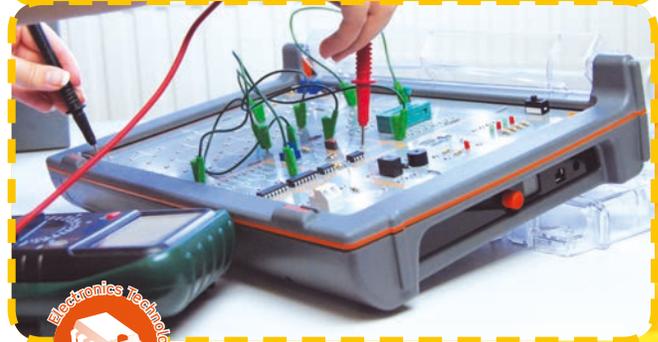
Fluid Power Student Resource Pack

Consists of a variety of syringes and connectors allowing students to safely investigate fundamental hydraulic concepts.



Electronic Circuits Trainer Teaching Set

Includes hardware and software components and resources for building circuits on both a breadboard and printed circuit board.



Injection Molding Trainer

Consists of an injection molding machine and a flexible smart molding system that allows students to produce a variety of injection molded components.



Green Energy in Buildings Trainer

This exciting trainer is fitted with solar heating and cooling systems and is fitted with onboard sensors that, via USB, allows the analysis of energy use on a computer.



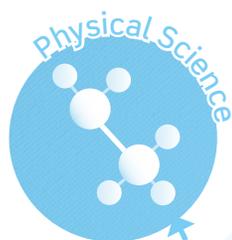
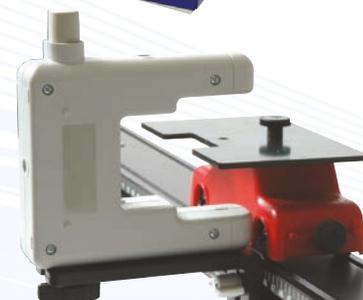


Our **STEM Inquiry** program forms a complete suite of middle school science lessons. The focus is on science investigation, with integrated math, English language arts and engineering.

Over the following pages you'll find details of our four comprehensive science courses. Together they will equip you with all you need to carry out each of the practical experiments included in your cloud-based STEM Inquiry program. Each of the kits includes a range of items needed to perform the practical tasks. You can also purchase kits individually.

In total the program provides **240 hours of instruction with over 50 hands-on and virtual experiments** in the following subjects:

- Structure and Properties of Matter
- Chemical Reactions
- Forces and Interactions
- Energy
- Waves and Electromagnetic Radiation
- Structure Function and Information Processing
- Matter and Energy in Organisms and Ecosystems
- Growth, Development and Reproduction of Organisms
- Natural Selection and Adaptation
- Space Systems
- Earth Systems
- History of Earth
- Weather and Climate
- Human Impacts





Science Practice

00:00

Science Practice

Science practice is integrated into all of the STEM Inquiry lessons, but there are also some specific lessons that can be used to teach science practice concepts (such as data logging) explicitly.

Science Practice Topics Include:

- Designing experiments and investigations
- Data collection and analysis
- Evaluating and critiquing science explanations
- Use of scientific tools such as data logging.

A complete data logging set for use in Science Practice lessons can be ordered as 520-00. The set includes:

- A hand-held data logger and software (p 25)
- A range of sensors for specific applications, including:
 - Light sensor (multi range)
 - Force sensor
 - Heart rate sensor
 - Light gate x 2



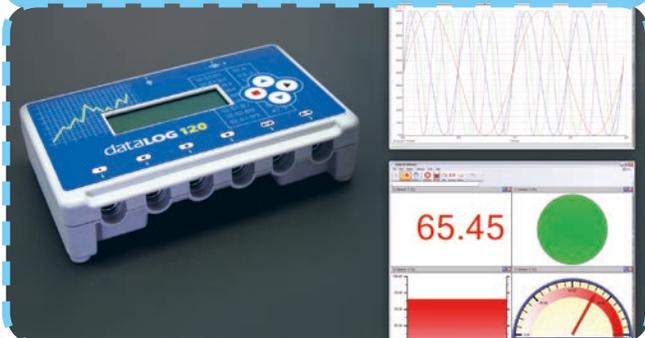
- Magnetic field sensor
- Motion Sensor
- Sound sensor
- Temperature sensor x 2

Data Logger and Software

Order data logger and software only as: 520-01
[This set does not include sensors]

This resource has been designed for ease of use in a wide range of science and technology applications.

The hand-held data logger may be operated in both standalone mode, and linked to a PC via USB connection.



Data Logger Sensors

The data logger sensors can also be ordered separately:

Force sensor: 520-02
Heart rate sensor: 520-03
Magnetic field sensor: 520-06
Motion sensor: 520-07
Sound sensor: 520-08

Temperature sensor: 520-09
Data logging storage container: 520-11
Light gate: 520-04
Light sensor: 520-05





Life Science

The middle school life science curriculum has been developed to cover a wide range of life science topics including:

- Structure and function of organisms
- Cell theory
- Matter and energy in organisms and ecosystems
- Growth, development and reproduction of organisms
- Natural selection and adaptation

Each of the life science hardware kits includes items to perform a number of experiments from the curriculum material. The kits are supplied in a labeled storage box along with an inventory to provide simple resource management and replenishment of consumable items.

Please inquire with your class requirements to purchase the full set of life science equipment:

- Biology Apparatus Kit (p 26)
- Human Torso Kit (p 26)



- Human Biology Kit (p 27)
- Plant Biology Kit (p 27)
- Microbiology Kit (p 27)
- Lab Microscope (p 27)



Biology Apparatus Kit

Order as: 510-01

This kit explores practical topics including:

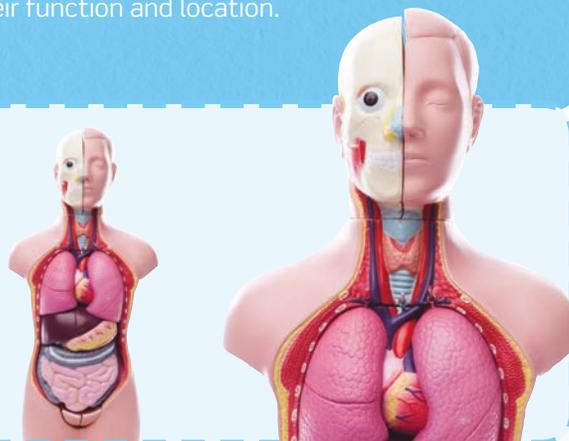
- Sugar in food
- Starch in food
- Protein in food
- Fat in food
- Photosynthesis (also requires Plant Biology Kit)



Human Torso Kit

Order as: 500-07

The Human Torso Kit enables the investigation of fundamental human biology. The model allows for each of the main organs to be removed and replaced, to help develop an understanding of their function and location.





Human Biology Kit

Order as: 510-03

This kit provides materials for exploring practical topics relating to human biology such as:

- Bones
- Human response to stimuli
- The effects of exercise

Please note: some activities require data logging equipment



Plant Biology Kit

Order as: 510-04

This kit provides materials for exploring practical topics relating to plant biology such as:

- Photosynthesis
- Rate of photosynthesis

Please note: this resource requires access to the Biology Apparatus Kit and some activities require data logging equipment



Microbiology Kit

Order as: 510-05

This kit provides materials for exploring practical topics relating to microbiology such as:

- Osmosis
- Creating and viewing microscope slides

Please note: this resource requires access to the Biology Apparatus Kit and a Lab Microscope.



Lab Microscope

Order as: 500-24

This bench optical microscope is used in microbiology experiments.

A Microscope camera system is also available, please order as: 551-03



Physical Science

The middle school physical science curriculum has been developed to cover a wide range of physical science topics including:

- Structure and properties of matter
- Chemical reactions
- Force and interactions
- Energy and motion
- Waves and electromagnetic radiation

Each of the physical science hardware kits includes items to perform a number of experiments from the curriculum material. The kits are supplied in a labeled storage box along with an inventory to provide simple resource management and easy replenishment of consumable items.

Please inquire with your class requirements to purchase the full set of physical science kits:

- Physics Apparatus Kit (p 29)
- Force and Energy Kit (p 29)
- Motion Kit (p 29)
- Electricity and Magnetism Kit (p 30)
- Light Rays Kit (p 30)
- Measurement Kit (p 31)
- Scientific Inquiry and Problem Solving Kit (p 31)
- Chemistry Apparatus Kit (p31)
- Chemistry Fundamentals Kit (p31)



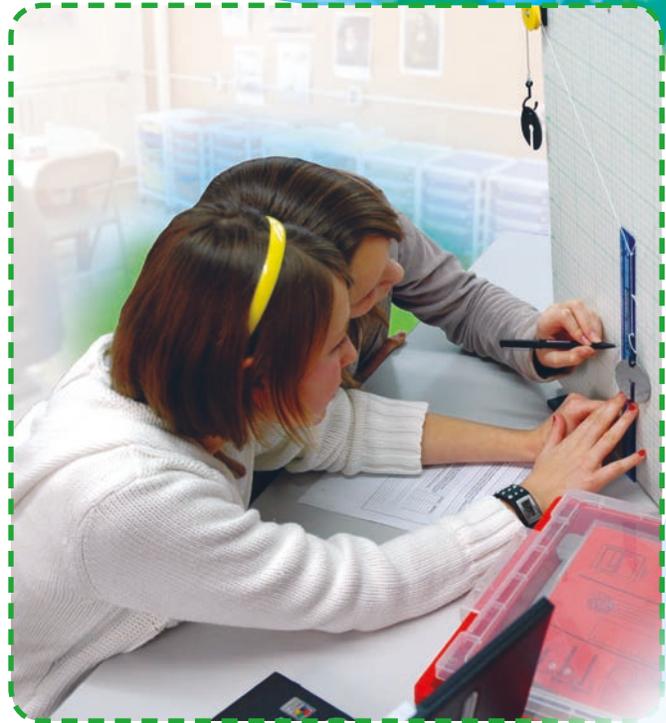


Physics Apparatus Kit

Order as: 511-01

This kit provides materials for exploring practical topics relating to physics such as:

- Force, energy and waves
- Magnetism
- Moments and levers



Force and Energy Kit

Order as: 511-02

This kit provides materials for exploring practical topics relating to force and energy such as:

- Energy transformation
- Newton's laws of motion
- Work and energy

Please note: some activities require the Physics Apparatus Kit



Motion Kit

Order as: 511-03

This kit provides materials for exploring practical topics relating to motion such as:

- Speed, velocity and acceleration
- Force and momentum
- Newton's laws of motion

Please note: some activities require data logging equipment



Electricity and Magnetism Kit

Order as: 511-05

This kit provides materials for exploring practical topics relating to electricity and magnetism such as:

- Conductors and insulators
- Electromagnetism

Please note: this resource requires the Physics Apparatus Kit and some activities require data logging equipment



Light Rays Kit

Order as: 511-07

This kit provides materials for exploring practical topics relating to light such as:

- Light waves
- Reflection
- Lenses
- Refraction





Measurement Kit

Order as: 511-08

This kit provides materials for carrying out scientific measurements, including:

- Measurement
- Density of liquids
- Density of solids
- Errors and tolerance



Scientific Inquiry and Problem Solving Kit

Order as: 511-10

This kit enables students to engage with practical scientific inquiry topics such as:

- Designing a solution
- Designing an experiment
- Conducting an experiment



Chemistry Apparatus Kit

Order as: 512-01

This compact and portable chemistry kit includes the items required to perform a number of simple chemistry experiments to provide a grounding in the basic principles of chemical science.



Chemistry Fundamentals Kit

Order as: 512-02

This hands-on kit helps students explore key concepts of chemistry such as acids and bases and chromatography.



Earth and Space Science

The middle school Earth and space science curriculum has been developed to cover a wide range of Earth and space science topics including:

- Space and the solar system
- Earth systems and materials
- History of Earth
- Weather and climates
- Human impacts on Earth systems

Each of the Earth and space science hardware kits includes items to perform a number of experiments from the curriculum material. The kits are supplied in a labeled storage box along with an inventory to provide simple resource management and easy replenishment of consumable items.

Please inquire with your class requirements to purchase the full set of Earth and space science kits:

- Earth Science Apparatus Kit (p 32)
- Stream Table Kit (p33)
- Fossils Kit (p 33)
- Rocks Kit (p 33)
- Planetarium Kit (p 33)



Earth Science Apparatus Kit

Order as: 513-01

This kit includes materials for practical experiments in Earth science topics such as:

- Climate change
- Oil pollution
- Soil texture
- The water cycle and clouds





Stream Table Kit

Order as: 500-11

This kit allows students to model the course of a stream through a landscape, enabling the practical study of topics such as erosion, deposition and natural forces.



Fossils kit

Order as: 513-02

This kit provides a good selection of fossils for investigation into fossil formation for both plant and animal life.



Rocks Kit

Order as: 500-10

The Rocks Kit contains a range of rock samples for investigations into the types, formation, and origin of rocks. The kit allows for group investigation, when students take turns to select a rock to analyze.



Planetarium Kit

Order as: 500-12

The Planetarium Kit is used to explore the interaction and relationships between the Sun and Earth. The equipment enables hands-on investigations into night and day, as well as the seasons.





You can try out Exploring STEM in your classroom for free!

Our team would be delighted to hear from you if you have any questions about how we can support you to implement the right equipment for your needs.

If you're unsure about whether you require our hardware sets please don't hesitate to call our experienced team who can help you make a cost-effective choice for your classroom.

If you'd like to try out the Exploring STEM digital content to see how it could help you in the classroom then visit our website ljcreate.com to try our free demonstration course material.




Try out a **FREE** online demo of our Digital Content in your classroom!
All you have to do is visit ljcreate.com/exploringSTEM or give us a call to get started

We provide a full range of support materials to help teachers in the classroom. Our courses all come with a thorough Program Guide so you can plan curriculum across the school year effectively. We also provide Lesson Notes and Lesson Plans so you can get the most out of our content and hardware.

Program Guide

This guide details the sequence of lessons in the Exploring STEM program, lists any resources that may be required and provides recommended program delivery timings.

Lesson Notes

These notes are to aid teaching staff in lesson preparation. They provide details for each lesson and activity and a complete list of resources and consumables required.

Lesson Plans

These plans provide detailed guidance on the organization of the lesson, equipment, objectives and activities, key words, expected results and support materials.



We'd love to come and meet you so you can try our kits out for yourself!
Call us at 1-800-237-3482 to schedule a **FREE** consultation with one of our team



For more information on our range of STEM resources, please contact:

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Orlando, FL 32837

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E: info@ljcreate.com

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