

Space Technology (40-assignment)



This is an integrated instructional module designed specifically to operate within the LJ ScanTEK Modular Technology Program environment. It includes a 10-assignment exploratory curriculum and a further 30-assignment in-depth curriculum. The exploratory curriculum and the in-depth curriculum are each split into two parts. Each part includes a pre-test and post test. The module includes hardware, software and curriculum materials sufficient to provide a complete learning experience.

The curriculum incorporates continuous assessment through questions. When used in conjunction with a ClassAct networked management system, this provides instant feedback of student performance. The assessments begin with a comprehensive pre-test. This quiz includes questions for each subsequent assignment, together with questions that will specifically test math and reading ability.

Every assignment starts with a series of questions designed to track inventory. These ensure that any missing items are located before they are needed.

Each assignment is divided into a series of tasks. Hands-on tasks form the core of the student work. Where appropriate, these are accompanied by research tasks based upon illustrated textbooks and on-screen applications. Assessment questions are incorporated into each task.

Typical 10-assignment topic areas include:

- Function of the component parts of a model rocket
- Flight stages
- Mass, force and distance relationships
- Height and average speed calculation
- Forces and stability
- Rocket propulsion techniques
- Mission planning
- Safety and performance
- Model rocket assembly for flight
- Pre-flight checks and launch of a model rocket
- Flight and recovery

Typical 10-assignment activities include:

- Watch a video introducing the basics of space technology.
- Find out how computer programs can be used to simulate the flight of model rockets.
- Launch a model rocket.
- Calculate the heights that model rockets reach.
- Calculate the average speeds of model rockets as they fly through the air.
- Use a computer program to apply what you have previously learned to a simulated mission.
- Launch a water-filled rocket.
- Calculate the height and average speed of the water-filled rocket.
- Explore the forces acting on rockets.
- Discover why launch pads may be used.
- Examine the benefits of adding fins to stabilize rockets.
- Perform an experiment to investigate the relationship between mass and the distance traveled by a rocket.
- Use a computer program to explore the relationship between force and the distance traveled by a rocket.
- Construct a simple toy to see how it acts on Earth.

Typical 10-assignment activities include (continued):

- Perform a series of experiments to investigate gravity.
- Explore the hazardous conditions in space.
- Discover how space suits can allow astronauts to work and live in space.

Typical 30-assignment topic areas include:

- Rocket payloads
- Trigonometry calculations to determine height
- Center of gravity and center of pressure
- Rocket stability
- Rocket propulsion techniques
- Analysis of computer simulated flight and actual flight
- Atmospheric forces on a rocket
- Images from space
- Model rocket kit assembly
- Rocket recovery systems

Typical 30-assignment activities include:

- Use a computer program to find out how to put the main components of a model rocket together.
- Use a computer program to find out how model rockets can carry payloads.
- Find out how computer programs can be used to simulate the flight of model rockets.
- Retrieve information from a computer database and use it in rocket flight simulations.
- Calculate the heights of fixed and moving objects using angles and distances.
- Examine the stability of model rockets and see how it can be changed.
- Launch a model rocket that carries a payload.
- Use a computer database to store results of a rocket launch and calculate the height reached by the rocket.
- Calculate the velocity of a model rocket and compare this and the height with predictions about the flight. Find out how accurate the predictions were.
- Discover the effect that the size of a payload has on the flight of a model rocket, using the flight simulation program.
- Perform tests to experiment with two of the forces that affect a rocket's flight.
- Perform a test to see how the size of a rocket affects its wind resistance.
- Launch a rocket that uses compressed air and water. Perform tests to see the effect of the water on the rocket's flight.
- Examine the energy changes that occur in a rocket from lift off to its destination.
- Find out how energy can be used to determine the speed of space vehicles.
- Find out how measurement errors can cause problems with space missions and use a rocket flight simulator to examine consequences such errors may have.
- Investigate the different systems that are used to return model rockets and real space vehicles to Earth safely.

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Typical 30-assignment activities include (continued):

- Carry out an experiment to measure the pull of the Earth's gravity.
- Use a rocket flight simulator to examine the effect that air has on a rocket in flight.
- Examine a system for demonstrating the effect that the direction of forces can have on a rocket flight.
- Apply a formula to calculate the height of a model rocket that takes aerial photographs.
- Launch a model rocket that takes a photograph while it is in the air.
- Determine the height of a model rocket from the photograph it takes.
- Discover how the view of the Earth differs from different positions in space.
- Explore the different types of satellites that orbit the Earth.
- Design a time line that shows how artificial satellites have developed over the last 40 years.
- Calculate the speed of satellites at different locations and find out how long they take to orbit the Earth.
- Evaluate the benefits and costs that the development of Space Technology has had.
- Find out how instructions can be made easier to read using flow diagrams.
- Design a flow diagram that provides instructions for launching a model rocket.
- Determine the pull of gravity at different distances from the Earth and find how to generate gravity in a space station.

Each assignment is designed around a list of performance objectives. These lists include academic, technical and occupational objectives. The assignments are written in such a way as to enable a student to attain the performance objectives, with the assessment questions linked to these in order to provide a measure of true competency.

The performance objectives are used by the ClassAct management system to generate a comprehensive portfolio of student competency reports. Default reports supplied with this module include:

- Entry report
- Technical/Occupational Exit report
- Basic Skills report based upon the federal SCAN's report.

The items supplied with this instructional module include:

- 10-assignment On-Screen Student Assignment Guide CD
- 10-assignment Student Assignment Guide
- 10-assignment Student Workbook
- 10-assignment Instructor's Guide
- 30-assignment Student Assignment Guide
- 30-assignment Student Workbook
- 30-assignment Instructor's Guide
- Computer Aided Instruction Software
- Video: 'Liftoff to Learning'
- Rocket launch instruction sheets
- Model rocket kits
- Model rocket launch control unit
- Model rocket launch pad
- Spring-loaded dowel launcher
- Safety glasses
- Altitude finder (clinometer)
- Water powered rocket kit
- Bicycle pump

Additional items required:

- Computer
- Access to DVD player

Module Facts

For Technology Program, order as: ST190/40 Space Technology

	No.	Average time
Assignments	40	45 minutes
Extension Activities	4	45 minutes
Total		33 hours



LJ Technical Systems
Web site: www.ljgroup.com