



## TEACHER RESOURCE

### AEROSPACE ENGINEER

#### Description

Perform engineering work in designing, constructing, and testing aircraft, missiles, and spacecraft. Conduct research on aircraft design. Recommend improvements in testing equipment and techniques.

#### Tasks

Design aeronautical or aerospace products to meet customer requirements.

Direct engineering of aircraft or aerospace products.

Plan and conduct experimental and stress tests on models and prototypes of aircraft and aerospace systems and equipment.

### AEROSPACE ENGINEERING AND OPERATIONS TECHNICIAN

#### Description

Operate, install, and maintain computer/communications systems, simulators, and other data instruments to launch, track, and evaluate air and space vehicles. May record and interpret test data.

#### Tasks

Exchange cooling system components in various vehicles.

Meet with engineering personnel regarding details of test procedures and results.

Test aircraft under simulated operational conditions. Perform readiness tests and pre- and postoperational checkouts to establish design features.

Operate computer systems and devices.

### AIRLINE PILOT, COPILOT, AND FLIGHT ENGINEER

#### Description

Pilot and navigate the flight of multiengine aircraft for the transport of passengers and cargo. Obtain a certification for the type of aircraft being flown.

#### Tasks

Instruct other pilots and student pilots in aircraft operations and the principles of flight.

Work as part of a flight team with other crew members, especially during takeoffs and landings.

Steer aircraft along planned routes with the assistance of autopilot and flight management computers.

### ASTRONOMER

#### Description

Observe, research, and interpret celestial and astronomical events. Increase basic knowledge about these events and apply it to practical problems.

#### Tasks

Study history, structure, and evolution of stars, stellar systems, and universe.

Analyze wavelengths of radiation from celestial bodies, as observed in all ranges of spectrum.

Develop mathematical tables giving positions of sun, moon, planets, and stars at given times for use by air and sea navigators.

Design optical, mechanical, and electronic instruments for astronomical research.

## M.A.R.S. Career Bingo—Career Descriptions

Study celestial phenomena from ground or above atmosphere, using various optical devices, such as telescopes situated on ground or attached to satellites.

Compute positions of sun, moon, planets, stars, nebulae, and galaxies.

Calculate orbits and determine sizes, shapes, brightness, and motions of different celestial bodies.

### AVIONICS TECHNICIAN

#### Description

Install, inspect, test, adjust, or repair avionics equipment, such as radar, radio, navigation, and missile control systems in aircraft or space vehicles.

#### Tasks

Connect components to assemblies such as radio systems, instruments, and in-flight refueling systems, using hand tools and soldering irons.

Assemble components such as switches, electrical controls, and junction boxes, using hand tools and soldering irons.

Adjust, repair, or replace malfunctioning components or assemblies, using hand tools and/or soldering irons.

Set up and operate ground support and test equipment to perform functional flight tests of electrical and electronic systems.

### CALIBRATION AND INSTRUMENTATION TECHNICIAN

#### Description

Develop, test, calibrate, operate, and repair many types of instruments. Instruments include mechanical, electromechanical, and electrohydraulic measuring and recording instruments.

#### Tasks

Use test equipment to change the performance and operation of instruments.

Sketch plans for developing instruments and related equipment.

Disassemble and reassemble instruments and equipment, using hand tools.

Inspect instruments and equipment for defects.

Select sensing, telemetering, and recording instrumentation and circuitry.

### CARTOGRAPHER AND PHOTOGRAMMETRIST

#### Description

Collect, analyze, and interpret geographic information provided by surveys, aerial photographs, and satellite data. Research, study, and prepare maps for legal, educational, and other purposes. May work with geographic information systems (GIS).

#### Tasks

Prepare and alter trace maps, charts, tables, detailed drawings, and three-dimensional optical models of terrain.

Analyze data from ground surveys, reports, aerial photographs, and satellite images in order to prepare topographic maps and related charts.

Revise existing maps and charts, making all necessary corrections and adjustments.

### CHEMIST

#### Description

Conduct chemical analyses or experiments in laboratories for quality control or to develop new products or knowledge.

## M.A.R.S. Career Bingo—Career Descriptions

### Tasks

Develop, improve, and customize products, equipment, formulas, processes, and analytical methods.

Analyze organic and inorganic compounds to determine chemical and physical properties.

Determine the composition, structure, and relationships of compounds, using chromatography techniques.

Prepare test solutions, compounds, and reagents for laboratory personnel to conduct test.

### COMPUTER PROGRAMMER

#### Description

Convert statements and procedures to flow charts for coding into computer language. Develop and write computer programs. May program web sites.

#### Tasks

Correct errors by making appropriate computer changes.

Conduct trial runs of programs and software applications

Compile and write documentation of program development.

Write, update, and maintain computer programs or software packages to handle specific jobs, such as tracking inventory, storing or retrieving data, or controlling other equipment.

Perform revision and repair of existing programs to increase operating efficiency.

Write, analyze, and review programs, using workflow chart and diagram.

### GEOLOGICAL SAMPLE TECHNICIAN

#### Description

Look for petroleum, gas, or mineral gas by testing geological samples. Analyze the physical and chemical properties of petroleum products to determine the quality of the material.

#### Tasks

Supervise well exploration and drilling activities.

Participate in geological, oceanographic, and other surveys.

Compile and record test data for review and further analysis.

### GEOLOGIST

#### Description

Study composition, structure, and history of the Earth's crust. Examine rocks, minerals, and fossil remains to study the development of the Earth. Apply knowledge of chemistry, physics, biology, and mathematics to explain geological processes. Locate mineral and petroleum deposits and underground water resources.

#### Tasks

Locate natural gas, oil, and mineral ore deposits and underground water resources, using aerial photographs, charts, and research and survey results.

Conduct geological studies to provide information for community development issues.

Study ground and surface water movement in order to provide advice on issues like waste management.

# M.A.R.S. Career Bingo—Career Descriptions

## **MATHEMATICIAN**

### **Description**

Conduct research in fundamental mathematics or in application of mathematical techniques to science, management, and other fields. Solve problems in various fields by mathematical methods.

### **Tasks**

Apply mathematical theories and techniques to the solution of practical problems in business, engineering, or the sciences.

Address the relationships of quantities, magnitudes, and forms through the use of numbers and symbols.

Perform computations and apply methods of numerical analysis to data.

Conduct research to extend mathematical knowledge in traditional areas, such as algebra, geometry, probability, and logic.

## **MINING AND GEOLOGICAL ENGINEER, INCLUDING MINING SAFETY ENGINEER**

### **Description**

Determine the location and plan the extraction of coal, metallic ores, nonmetallic minerals, and building materials, such as stone and gravel. Conduct surveys of deposits or undeveloped mines and plan their development. Examine deposits or mines to determine whether they can be worked at a profit. Make geological and topographical surveys.

### **Tasks**

Test air in ventilation shafts to detect toxic gases and recommend measures to remove them.

Select methods and equipment to transport waste materials and mineral products efficiently and economically.

Select or develop mineral location, extraction, and production methods, based on factors such as safety, cost, and deposit characteristics.

Prepare schedules, reports, and estimates of the costs involved in developing and operating mines.

## **STATISTICIAN**

### **Description**

Develop mathematical theory or apply statistical theory to collect, organize, and interpret data to provide usable information.

### **Tasks**

Evaluate sources of information in order to determine any limitations in terms of reliability or usability.

Develop and test experimental designs, sampling techniques, and analytical methods.

Design research projects that apply valid scientific techniques and utilize information obtained from baselines or historical data in order to structure uncompromised and efficient analyses.

Analyze and interpret statistical data in order to identify significant differences in relationships among sources of information.

Adapt statistical methods in order to solve specific problems in many fields, such as economics, biology, and engineering.

Prepare data for processing by organizing information, checking for any inaccuracies, and adjusting and weighting the raw data.

# M.A.R.S. Career Bingo—Career Descriptions

## **SURVEYING TECHNICIAN**

### **Description**

Adjust and operate surveying instruments. Compile notes, make sketches and enter data into computers.

### **Tasks**

Record survey measurements and descriptive data, using notes, drawings, sketches, and inked tracings.

Position and hold the vertical rods, or targets, that survey technicians use for sighting in order to measure angles, distances, and elevations.

Place and hold measuring tapes when electronic distance-measuring equipment is not used.

Perform calculations to determine earth curvature corrections, atmospheric impacts on measurements, and other measurements.

## **SURVEYOR**

### **Description**

Make exact measurements and determine property boundaries. Determine the shape, elevation, or dimension of land. Use land information for engineering, mapmaking, mining, and other purposes.

### **Tasks**

Prepare or supervise preparation of all data, charts, plots, maps, records, and documents related to surveys.

Prepare and maintain sketches and legal descriptions of surveys in order to certify and assume liability for work performed.

Plan and conduct ground surveys designed to establish baselines, elevations, and other measurements.