

Independent School District of Boise City
 Technology – Introduction to Technology Course No. 1601

Open to: 7 One Semester Course or Wheel

Prerequisite: None

Lab Fee: \$8.00, Wheel - \$4.

Content: Students use computers to learn more about robots by programming LEGO Mindstorms robots to perform a number of challenging tasks. Other hands-on and robotics simulations are provided.

Table of Contents

DESCRIPTION	APPENDIX
UNIT 1: Computers	
1. History	A
2. Hardware	B
3. Internet Safety	C
4. District Policies	D
UNIT 2: Robotics	
Suggested Activities:	
1. LEGO Robotics: Building and Programming	E
2. LEGO Robotics: Pop Can Challenge	F
3. Robot Research	G
4. Star Wars Droidworks	H
5. RC Racing	I
6. Robot Arena	J
7. LEGO Robotics: Rat Maze	K
UNIT 3: Engineering	
Suggested Activities:	
1. Paper Bridges	L
2. Paper Flight (rockets, airplanes, kites)	M
3. C.A.D.: Design a House	N
4. Gravity Race Car	O

7th Grade Introduction To Technology		District Reference 1601
Unit 1	Computers	5 days

Instructional Objective		Standard Reference	
1601.01 Students will be able to understand and use computers as a tool.		02.03, 02.08	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Create a timeline of computer development.		TMA
02	Label the parts and hardware of a computer.		TMA
03	List and/or demonstrate safe Internet use.		TMA
04	Explain and/or demonstrate the proper way to follow Boise School District computer and Internet use policies.		TMA
05	Demonstrate the proper way to login and out of the school's network.		TO
06	Demonstrate knowledge of file management and Windows navigation.		TO

7th Grade Introduction To Technology		District Reference 1601
Unit 2	Robotics	7 days

Instructional Objective		Standard Reference	
1601.02 Students will be able to build a LEGO robot.		02.02, 02.07, 02.09, 02.10	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Build a LEGO robot capable of moving forward, backward, and in circles.	LEGO Mindstorms Subassembly Constructopedia.	TO
02	Be familiar with the "Pathfinder" chassis that has been a successful design in the past.	LEGO Mindstorms or Robolab CD ROM.	TO
03	Construct a robot that includes an RCX, wheels, and at least one light sensor.	LEGO Mindstorms or Subassembly Constructopedia.	TO
04	Keep LEGO kits and pieces organized and inventoried.	LEGO Mindstorms inventory sheets.	TO
05	Assemble gear trains, Compare battery types, Compare human vs. robotic costs, Demonstrate battery charging requirements, Evaluate robot performance, Identify various gears, Plan robotic objective		TO

Instructional Objective 1601.03 Students will be able to demonstrate how a light sensor works.			Standard Reference 02.03, 02.07, 02.10
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use the “view” option on the RCX to find the value of a color. The RCX should read a number between 1-100.	LEGO Mindstorms or Robolab CD ROM.	TO
02	Create and run a program that causes a robot to respond to a solid line. The robot should stop, make a sound, or change directions.	LEGO Mindstorms Subassembly Constructopedia.	TO
03	Create robotic program, Evaluate robot performance, Identify programming functions, Illustrate logical programming steps, Perform program download, Plan robotic objective, Test program performance		TO, TMA
Instructional Objective 1601.04 Students will be able to program a robot to push eight empty aluminum cans across a line and out of a circle.			Standard Reference 02.03, 02.07, 02.10
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use a light sensor to keep a robot inside a circle.	LEGO Mindstorms or Robolab CD ROM.	TO
02	Build a robot chassis that is capable of pushing empty aluminum cans outside a circle.	LEGO Mindstorms Subassembly Constructopedia.	TO
03	Analyze model robotic program, Create robotic program, Demonstrate battery charging requirements, Evaluate robot performance, Identify programming commands/symbols. Identify programming functions, Illustrate logical programming steps, Perform program download, Plan robotic objective, Test program performance		TO, TMA
Instructional Objective 1601.05 Students will be able to use LEGO pieces to construct different LEGO subassemblies (chassis).			Standard Reference 02.03, 02.07, 02.10
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Follow diagrams to build a given list of LEGO subassemblies.	LEGO Mindstorms Subassembly Constructopedia.	TO
02	Keep the LEGO kits organized.	LEGO Mindstorms inventory sheets.	TO
03	Motorize two of the subassemblies.		TO
04	Build and motorize one unique (self-designed) chassis.		TO

05	Assemble gear trains, Evaluate robot performance, Identify various gears, Plan robotic objective		TO
Instructional Objective		Standard Reference	
1601.06 Students will be able to use the Internet to research robotics.		02.03, 02.04, 02.06, 02.10	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use a computer, the Internet to find valid information on robot history and the use of robots in society.	The Internet	TMA
02	Avoid plagiarism.		TO
03	Compare human vs. robotic costs, List commercial robotic uses, List home robotic uses	The Internet	TMA
Instructional Objective		Idaho Standards:	
1601.07 Students will create a multimedia presentation to share their research findings.		02.03, 02.08	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use Microsoft PowerPoint or a similar program to present research findings.		TMA
02	Provide references for each Web site used.		TMA
03	Provide a graphic example for each topic.		TMA
04	Include animations, slide transitions, and background designs on each slide.		TMA
Instructional Objective		Standard Reference	
1601.08 Students will use various software related to robotics and radio controlled vehicles.		02.03, 02.07, 02.10	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Learn to manipulate robots in simulation and game settings to accomplish set goals.		See Appendices J, L, M for grade sheets.
Instructional Objective		Standard Reference	
1601.09 Students will be able to build a LEGO robot capable of navigating a maze.		02.03, 02.07, 02.10, 02.11	
No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use light sensors and an RCX code that will guide a robot along a black line and through a maze.		TO
02	Analyze model robotic program, Create robotic program, Demonstrate battery charging requirements, Evaluate robot performance, Identify programming commands/symbols, Identify programming functions, Illustrate logical programming steps, Perform program download,		TO, TMA

	Plan robotic objective, Test program performance		
--	--	--	--

7th Grade Introduction to Technology		District Reference 1601	
Unit 3	Engineering		

Instructional Objective		Standard Reference	
1601.10 Students will use a single sheet of notebook paper to construct a bridge capable of holding a given load.		02.07, 02.12	

No.	Performance Objective	Resource Reference	Assessment Correlation
01	Use techniques to strengthen the properties of a single sheet of notebook paper.		TO
02	Follow directions for construction requirements.		TO
03	Build a paper bridge capable of holding the weight of as many pennies as possible.		TO

Instructional Objective		Idaho Standards:	
1601.11 Students will be able to use paper to construct flying models.		02.07, 02.09	

No.	Performance Objective	Resource Reference	Assessment Correlation
01	Construct a paper rocket.		TO
02	Launch a paper rocket for distance.		TO
03	Construct a paper airplane for distance.		TO
04	Construct a paper airplane for flight duration.		TO

Instructional Objective		Standard Reference	
1601.12 Students will learn to use a C.A.D. program to design a simple home.		02.03, 02.07	

No.	Performance Objective	Resource Reference	Assessment Correlation
01	Meet square footage and other requirements when designing a home.		TMA

Instructional Objective		Standard Reference	
1601.13 Students will learn about momentum and aerodynamics by constructing a gravity race car.		02.11, 02.09, 02.07	

No.	Performance Objective	Resource Reference	Assessment Correlation
01	Follow very specific criteria for weight, length, and width in the construction of a gravity race car.		TO
02	Use only the materials provided to construct a gravity race car.		TO
03	Make decisions about weight amount and placement for maximum performance.		TO

02.0 FUNDAMENTALS OF TECHNOLOGY

Prerequisite: None

Fundamentals of Technology is a prerequisite course for most of the Technology Education systems. Communication skills and tools are the major focus of this course. These same skills are central to all subsequent technology courses. The computer and other electronic devices are necessary for teaching an understanding of contemporary communications, manufacturing, power/energy/transportation and construction systems. An engineering focus of problem solving requires students to define a given problem, conduct appropriate research, develop solutions to the problem, construct prototypes, and evaluate their work.

Fundamentals of Technology is designed to introduce students to those principles and skills used in subsequent technology courses. Students learn to sketch solutions to problems, create technical drawings and presentations, build models, and apply creative problem solving methods. Emphasis is placed on accessing and communicating information, using simple and complex tools in a safe manner, and increasing the students' awareness of the historical and contemporary implications of technology. Students are introduced to computer-aided graphics, design software, and computer-aided manufacturing. Students develop an understanding of the tools, techniques, and processes of technology using design principles, computers, problem solving and model making.

PROGRAM TASK LISTING EFFECTIVE DATE: June 30, 1995

PROGRAM AREA: Technology Education

PROGRAM TITLE: Fundamentals of Technology

IDAHO CODE NUMBER: TE 1905

- 02.01 Demonstrate proper and safe procedures while working with technological tools, apparatus, equipment, systems and materials.
- 02.02 Exhibit positive human relations and leadership skills (standard leadership skills task list).
- 02.03 Demonstrate computer application and literacy.
- 02.04 Integrate basic academic skills and concepts.
- 02.05 List requisites and employment opportunities for employment in today's and our future technological world.
- 02.06 Identify evolving technologies in our technological world.

- 02.07 Demonstrate and apply design/problem-solving processes.
- 02.08 Demonstrate basic knowledge of communications technology.
- 02.09 Demonstrate basic knowledge of transportation systems.
- 02.10 Demonstrate knowledge of robotics.
- 02.11 Demonstrate knowledge of power and energy.
- 02.12 Demonstrate basic knowledge of construction technology.
- 02.13 Demonstrate a basic knowledge of manufacturing technology.

PROGRAM TASK LISTING EFFECTIVE DATE: June 30, 1995

PROGRAM AREA: Technology Education

PROGRAM TITLE: Fundamentals of Technology

IDAHO CODE NUMBER: TE 1905

02.01 DEMONSTRATE PROPER AND SAFE PROCEDURES WHILE WORKING WITH TECHNOLOGICAL TOOLS, APPARATUS, EQUIPMENT, SYSTEMS AND MATERIALS--

The student will be able to:

1. Follow laboratory safety rules and procedures.
2. Demonstrate good housekeeping within total laboratory.
3. Conduct laboratory activities and equipment operations in a safe manner.
4. Exercise care and respect for all tools, equipment, and materials.
5. Identify color-coding safety standards.
6. Safely use hand tools and power equipment.
7. Explain fire prevention and safety precautions and practices for extinguishing fires.
8. Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

02.02 EXHIBIT POSITIVE HUMAN RELATIONS AND LEADERSHIP SKILLS (STANDARD LEADERSHIP SKILLS TASK LIST)--

The student will be able to:

1. Work cooperatively with others.
2. Demonstrate ability to do individual and cooperative planning of

an activity.

02.03 DEMONSTRATE COMPUTER APPLICATION AND LITERACY--

The student will be able to:

1. Define terms related to computer parts and usage.
2. List ways in which computers are used in technology.
3. Discuss advantages and disadvantages in the use of computers.
4. Demonstrate the application of a computer.

02.04 INTEGRATE BASIC ACADEMIC SKILLS AND CONCEPTS--

The student will be able to:

1. Find, understand, and apply information from a variety of sources, written and electronic, to produce a technical report.
2. Read and follow complex written instructions.
3. Answer and ask questions coherently and concisely, and follow spoken instructions.
4. Make and use measurements in both traditional and metric units.
5. Solve work-related problems involving basic arithmetic.

02.05 LIST REQUISITES AND EMPLOYMENT OPPORTUNITIES FOR EMPLOYMENT IN TODAY'S AND OUR FUTURE TECHNOLOGICAL WORLD--

The student will be able to:

1. List occupations, job requirements and employment opportunities in communications technology.
2. List occupations, job requirements and employment opportunities in construction technology.
3. List occupations, job requirements and employment opportunities in manufacturing technology.
4. List occupations, job requirements and employment opportunities in energy, power, and transportation technology.

02.06 IDENTIFY EVOLVING TECHNOLOGIES IN OUR TECHNOLOGICAL WORLD--

The student will be able to:

1. List evolving technologies.
2. Report on a recent or evolving technology.

02.07 DEMONSTRATE AND APPLY DESIGN/PROBLEM-SOLVING PROCESSES--

The student will be able to:

1. Describe and explain steps in the design/problem-solving process.
2. Propose solutions to given problems.
3. Design and implement the optimal solution to a given problem.

02.08 DEMONSTRATE BASIC KNOWLEDGE OF COMMUNICATIONS TECHNOLOGY--

The student will be able to:

1. Discuss the history of communications systems.
2. Identify and apply common terms and definitions associated with communications.
3. Discuss the use of computers in communications.
4. Demonstrate computer literacy through use and application of computers in communication systems.
5. Understand the use and function of telecommunication components.
6. Illustrate knowledge of graphic arts concepts.
7. Demonstrate knowledge of drafting/design concepts, manual and electronic.
8. Understand how information is exchanged between humans and machines.
9. Discuss the influences and effects of communications technology on society, culture and the environment.

02.09 DEMONSTRATE BASIC KNOWLEDGE OF TRANSPORTATION SYSTEMS--

The student will be able to:

1. Discuss the history of transportation (Systems/Future/Impacts).
2. Discuss and demonstrate Land Transportation (Systems/Future/Impacts).
3. Discuss and demonstrate Water Transportation (Systems/Future/Impacts).
4. Discuss and demonstrate Atmospheric Transportation (Systems/Future/Impacts).
5. Discuss and demonstrate Space Transportation (Systems/Future/Impacts).
6. Discuss the future of Transportation.

02.10 DEMONSTRATE KNOWLEDGE OF ROBOTICS--

The student will be able to:

1. Define the term "Robots".
2. Discuss uses of Robots.
3. Define common parts of a Robot.
4. Demonstrate/construct a Robot.

02.11 DEMONSTRATE KNOWLEDGE OF POWER AND ENERGY--

The student will be able to:

1. Identify Fossil Fuels and uses.
2. Define wind and water resources.
3. Demonstrate a wind or water resource.
4. Define/discuss Solar Energy.
5. Define/discuss Nuclear Energy resources.
6. Discuss Energy Conservation.
7. Demonstrate application of power/energy to technology systems.
8. Define/demonstrate basic electronic/electrical theory.

02.12 DEMONSTRATE BASIC KNOWLEDGE OF CONSTRUCTION TECHNOLOGY--

The student will be able to:

1. Apply blueprint reading skills.
2. Discuss/demonstrate basic construction concepts/techniques.
3. Identify construction materials and processes.
4. Discuss uses of new technology in construction.
5. Define basic construction vocabulary.
6. Discuss the future of construction.
7. Discuss the types of construction (land, space, and underwater).

02.13 DEMONSTRATE A BASIC KNOWLEDGE OF MANUFACTURING TECHNOLOGY--

The student will be able to:

1. Demonstrate the essential elements and organization of the free enterprise system.
2. Discuss the history of Manufacturing.
3. Identify types of Production Systems.
4. Demonstrate/define Research and Development.
5. Discuss financial aspects of Manufacturing.
6. Define Industrial Relations.
7. Define materials, material processing, material testing, and material recycling.
8. Discuss/explore traditional and innovative equipment.
9. Discuss/demonstrate the use of robotics/computers (CAM) in manufacturing.
10. Demonstrate the mass production process.