



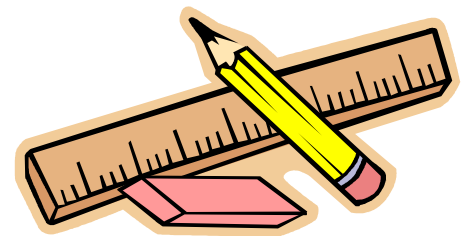
Engineering Technology Project Lead the Way: Gateway to Technology Student Learning Expectations



6th Grade “Design and Modeling” Units:

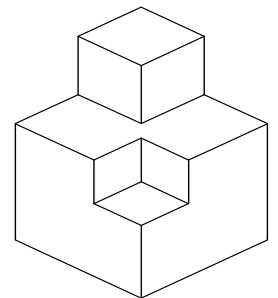
Unit 1: What is Technology?

1. Science is the study of the natural world, while technology is the study of how humans develop new products to meet needs and wants.
2. Changes in technology are seen through inventions, innovations, and the evolution of technological artifacts, processes, and systems.
3. Technology can have positive and negative social, cultural, economical, political, and environmental consequences.
4. Engineers, designers, and engineering technologists are needed in high demand for the development of future technology to meet the needs or wants of society.
5. An engineering notebook is used to record original ideas or designs.
6. STEM is an acronym for Science, Technology, Engineering, and Math.
7. Many careers exist in STEM related fields and the need for these types of careers will continue to increase.



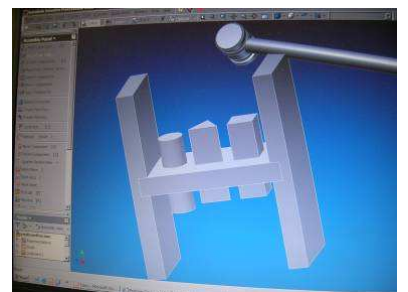
Unit 2: Measurement

1. In the United States, we currently use both English and Metric systems of measurement.
2. Being able to measure accurately is important at school and at home, at work and when pursuing hobbies.
3. Precision measuring tools are needed for accuracy, but tools must be used correctly to make sure accurate measurements are taken.
4. Quality workmanship and accurate measurements with precise instruments are necessary to successfully solve problems.



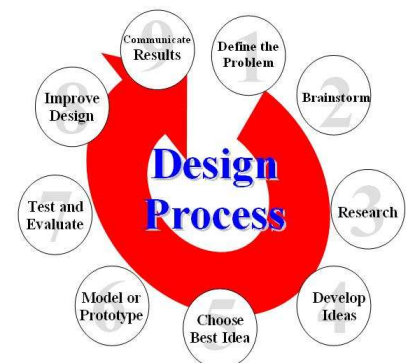
Unit 3: Sketching & Dimensioning

1. The ability to create an accurate sketch is an important skill to communicate ideas.
2. Orthographic drawings of an object are used to provide information that a perspective drawing may not be able to show.
3. Engineers apply dimensions to drawings to communicate size information.
4. There are general guidelines to follow when dimensioning.



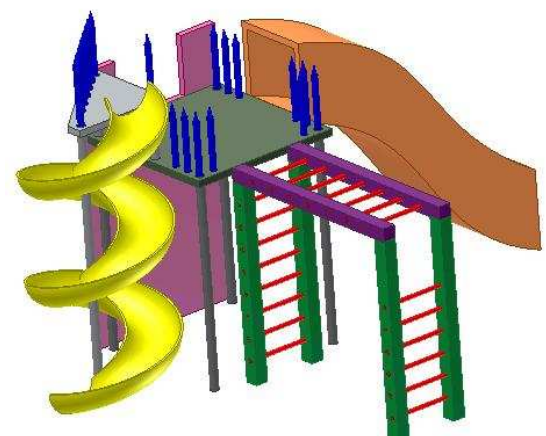
Unit 4: Designing for Production

1. Engineers use computer-aided design (CAD) modeling systems to create and annotate (label) working drawings.
2. As individual objects are assembled together, their degrees of freedom are systematically removed using various constraints (Inventor software).
3. Engineers use a design process to create solutions to existing problems.
4. Teamwork (PARRT) requires constant communication to achieve the goal at hand.
5. The fabrication of a prototype is the opportunity for the designer to see the product as a three-dimensional object.



Unit 5: Design Process

1. Many different design processes are used to guide people in developing solutions to problems.
2. Design teams use brainstorming techniques to generate large numbers of ideas in a short amount of time, striving for quantity, not quality.
3. The design brief is a tool for defining the problem; it is an agreement between the engineer and client.
4. Engineers use design briefs to explain the problem, identify solution expectations, and establish project constraints.
5. A decision matrix is a tool used to compare solution ideas to the criteria so that you can select the best solution.



7th Grade “Science of Technology” Units:

Unit 1: Mechanics of Motion

1. There are six simple machines: the lever, pulley, wheel and axle, inclined plane, wedge, and screw.
2. Simple machines can make work easier by increasing mechanical advantage.
3. Compound machines are made from a combination of several simple machines.
4. Energy cannot be created or destroyed but may be transferred into different types of energy.
5. Humans use their energy, along with simple machines, to do work by changing the state of energy of an object from potential to kinetic.



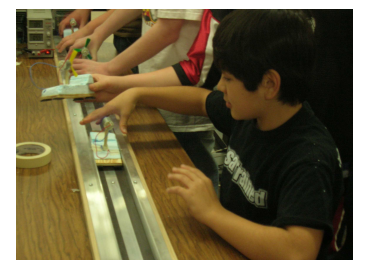
Unit 2: Investigating Energy

1. The six main forms of energy include solar or light radiation, thermal, electrical, mechanical, chemical, and nuclear.
2. Energy efficiency and conservation are necessary in order to reduce pollution, reduce our carbon footprint and create a sustainable world.
3. Energy can be transferred, or moved, from one object to another.
4. Energy can be transformed, or changed, from one form to another.
5. Energy sources can be renewable, exhaustible, or inexhaustible. There are advantages and disadvantages to each.
6. Power is measured in Watts and is calculated by multiplying Voltage and Amperage.
7. Engineers, designers, and engineering technologists are needed in high demand for the development of future technology to meet societal needs and wants.



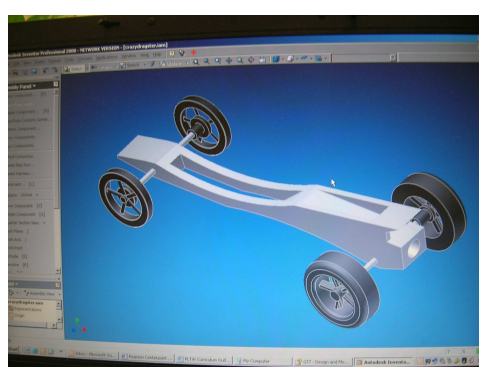
Unit 3: Applied Technology

1. Engineers use a design process to create solutions to existing problems.
2. Prototyping is an important step in the design process and provides the designer with a scaled working model that can be used for testing.



(Optional) Unit 4: Advanced CAD

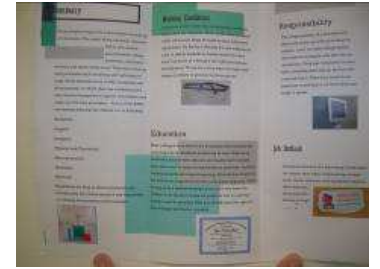
1. Complex geometric shapes are combined and joined to create a representation of an object.
2. Engineers use advanced computer-aided design (CAD) modeling systems to generate and annotate more detailed working drawings.
3. More advanced design features and constraints are used to create three-dimensional computer models.



8th Grade Automation and Robotics Units

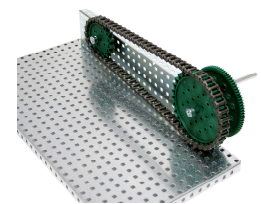
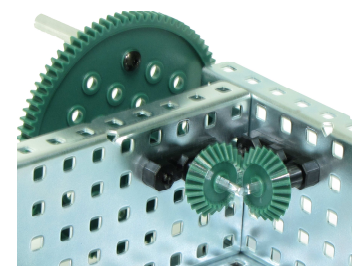
Unit 1: What is Automation and Robotics?

1. Automation is the use of technology to ease human labor or to extend the mental or physical capabilities of humans.
2. Robotics is the specialized field of engineering and computer science that deals with the design, construction, and application of robots.
3. The use of automation and robotics affects humans in various ways, both positively and negatively, including their safety, comfort, choices, and attitudes about a technology's development and use.
4. Automation and robotics have had an influence on society in the past and present and will influence society in the future.
5. Engineers, designers, and engineering technologists are needed in high demand for the development of future technology to meet societal needs and wants.



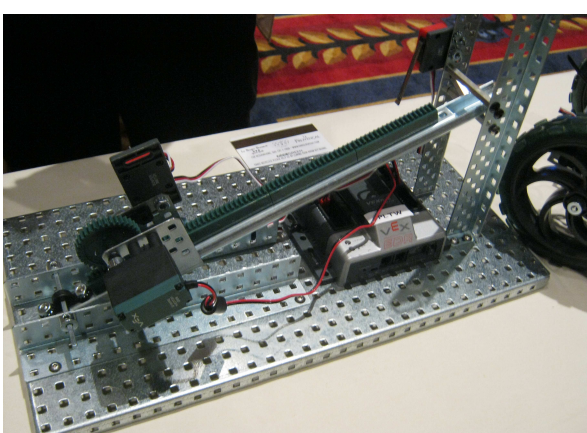
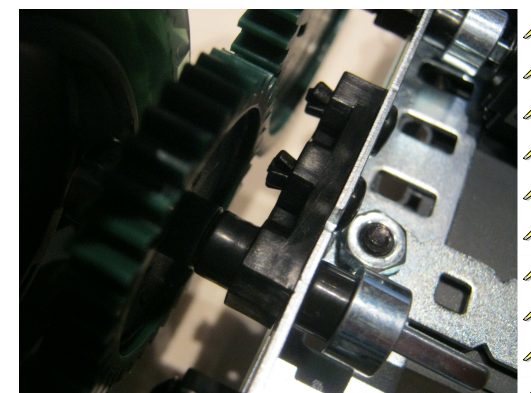
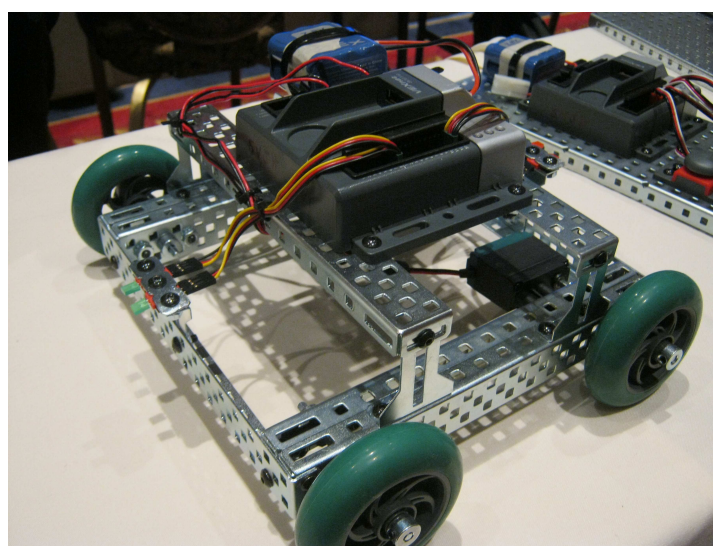
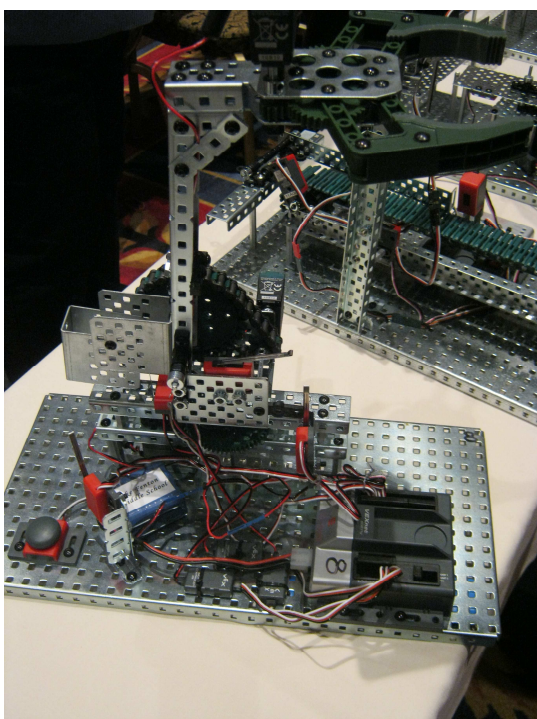
Unit 2: Mechanical Systems

1. Energy is the capacity to do work.
2. Engineers and technologists design mechanisms to change energy by transferring direction, speed, type of movement, and force or torque.
3. Mechanisms can be used individually, in pairs, or in systems.



Unit 3: Automated Systems

1. Automated systems require minimal human intervention (factory assembly line).
2. An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.
3. Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.
4. Invention is a process of turning ideas and imagination into devices and systems.
5. Some technological problems are best solved through experimentation.



```

33 task main()
34 {
35     //Program begins
36     while(1==1)
37     {
38         if (SensorValue(bumpSensor) ==1)
39         {
40             if (SensorValue(lowerSwitch) ==1) //chair on lower floor
41             {
42                 startMotor(chairMotor, -35);
43                 untilTouch(upperSwitch);
44                 stopMotor(chairMotor);
45             }
46             else if(SensorValue(upperSwitch) ==1) //chair is on upper floor
47             {
48                 startMotor(chairMotor, 35);
49                 untilTouch(lowerSwitch);
50                 stopMotor(chairMotor);
51             }
52             else //chair is stuck in middle
53             {
54                 startMotor(chairMotor, 35);
55                 untilTouch(lowerSwitch);
56                 stopMotor(chairMotor);
57             }
58         }
59     }
60 }

```