Edgenuity

Warm-Up | Technological Design

Lesson Question

What is technological design?

Lesson Goals

Characterize technological design.

Describe
the four stages of
technological
design.

Compare the processes of technological design and scientific investigation.

Evaluate
a technological design to determine if it meets
specific
criteria.

Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

C innovation

A prototype

B criteria

A. an early model from which later versions are developed

B. the standards used to make a judgment or decision

C. the introduction of a new idea, method, or device

© Edgenuity, Inc.

Warm-Up | Technological Design

Science and Technology

- Science is the process by which humans gain a greater understanding of how nature works through collecting information and ideas supported by evidence. Science also:
  - seeks ways to meet the needs of society.
  - has influenced advances in technology.
- Technology is the process by which the human-made world is created through applying new methods or devices to solve problems. Technology also has influenced the progress of science.

What Is STEM?

- STEM is the relationship between science, technology, engineering, and math.
  - Science – the study of the natural world around us through observation and experimentation
  - Technology – the application of scientific knowledge to address real-world problems
  - Engineering – the utilization of science and technology to design and construct machines, systems, or structures
  - Math – the language that allows scientists to investigate the relationships that exist within the natural world utilizing numbers, quantities, and calculations

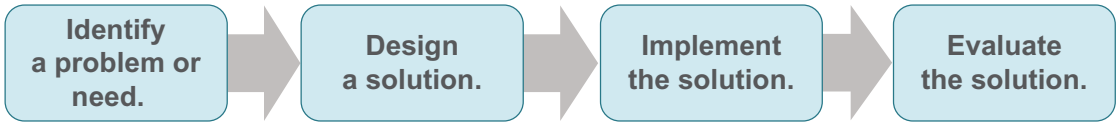
© Edgenuity, Inc.

Instruction | Technological Design

Slide 2

Stages of Technological Design

Technological design involves applying scientific knowledge to create products that meet specific needs.



- Define a need.
- Research related information.
- Establish criteria.
- Prepare the initial design.
- Build and test a prototype.
- Analyze the results.
- Redesign and retest.
- Report the solution.

The ATHLETE Robotic Rover

Identify a problem **or need.**	A utility vehicle is needed to unload and transport cargo.
Design a solution **.**	Create initial designs for prototypes.
Implement **the solution.**	Test the various prototypes' capabilities.
Evaluate **the solution.**	Redesign and retest improved prototypes. Develop a full-sized robot.

© Edgenuity, Inc.

Instruction | Technological Design

Slide 2

Scientific Investigation

- Identify a problem or need.
- Research related information.
- Design an investigation.
- Conduct an investigation.
- Analyze the results.
- Evaluate the conclusions.
- Communicate the findings.

Scientific Investigation vs. Technological Design

Scientific investigation

- Identify a problem or need.
- Research related information.
- Design an investigation.
- Conduct an investigation.
- Analyze the results.
- Evaluate the conclusions.
- Communicate the findings.

Technological design

- Identify a problem or need.
  - Research related information.
- Design a solution.
- Implement the solution.
  - Analyze the results.
- Evaluate the solution.
  - Report the solution.

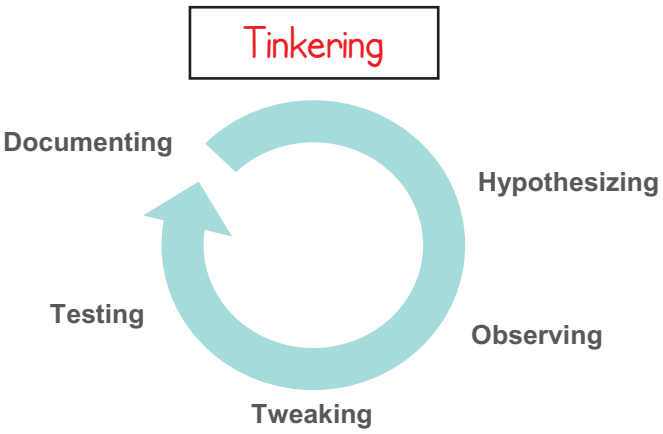
© Edgenuity, Inc.

Instruction | Technological Design

Slide 5

Technological Design

Technological design utilizes a system of tests and refinements, including: deliberate and methodical



Technological Innovation

- Technological design leads to the development and innovation of new technologies.
  - The ALVIN submersible is a manned deep-ocean research vehicle owned by the US Navy.
    - As a result of the technological design process, ALVIN has undergone numerous improvements over time.

© Edgenuity, Inc.

Instruction | Technological Design

Slide 5

Limitations to Technological Design

- General limitations to technological design may include:
  - natural [laws].
  - material properties.
  - [safety].
  - user friendliness.
  - product appeal.

Cost-Effectiveness

- Cost-effectiveness means maintaining the [lowest] cost for [production].
  - **Example:** A computer-engineering company imports parts from another country. Each part costs $0.35 and shipping costs $10 per case. One case contains 100 parts. A new, domestic company makes the parts for $0.40 each and ships them for $8 per case. Which is more cost-effective if the company needs just one case of parts?

Time-Effectiveness

- Time-effectiveness means [minimizing] the amount of time it takes to make a [product].
  - **Example:** It takes one engineer 10 hours to assemble a product by hand. With a machine, the work can be completed in just five hours. Which method is more time-effective?

© Edgenuity, Inc.

Instruction | Technological Design

Slide 5

Cost-Effectiveness vs. Time-Effectiveness

- Trade-offs may be necessary.

	Import	Domestic
Total cost	$45	$48
Shipping time	Up to 14 days	Up to 7 days

Time to complete production: 14 days

Ideally, the process of technological design should be both cost-effective and time-effective.

Slide 7

Technological Design Criteria

- The product of a technological design should:
  - solve the problem.
  - be available.
  - be affordable.
  - be durable.
  - not cause harm to users.

© Edgenuity, Inc.

Slide 7

Benefits and Risks of Using Headphones

The benefits of [technological] design should always outweigh the risks.

Benefits	Risks
• Allow users to [listen] to music without disrupting others • Can eliminate distractions • Are portable	• Could damage hearing • May be a distraction • Can be lost or broken

© Edgenuity, Inc.

Summary | Technological Design

Lesson Question

What is technological design?

Answer

(Sample answer) Technological design involves applying scientific knowledge to create products that meet specific needs. The process of technological design utilizes a system of deliberate and methodical tests and refinements.

Slide 2

Review: Key Concepts

Technological design

1. Identify a problem or need.
   - Research related information.
2. Design a solution.
3. Implement a solution.
   - Analyze the results.
4. Evaluate the solution.
   - Report the solution.

Scientific investigation

- Identify a problem.
- Research related information.
- Design an investigation.
- Conduct an investigation.
- Analyze the results.
- Evaluate the conclusions.
- Communicate the findings.

© Edgenuity, Inc.

Summary | Technological Design

Slide 2

Review: Key Concepts

- The process and products that result from technological designs should:
  - solve the problem.
  - be cost-effective and time-effective.
  - be available.
  - be affordable.
  - be durable.
  - not cause harm to users.
- The benefits should outweigh the risks.

Use this space to write any questions or thoughts about this lesson.

© Edgenuity, Inc.