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Warm-Up | Technological Design

Lesson Question

Lesson Goals

Characterize technological design.

Describe the four stages of _____ design.

Compare the processes of technological design and scientific investigation.

Evaluate a technological design to determine if it meets _____ 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.

_____ innovation

A. an early model from which later versions are developed

_____ prototype

B. the standards used to make a judgment or decision

_____ criteria

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

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Science and Technology

- Science is the process by which humans gain a greater understanding of how nature works through collecting _____ and _____ 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
  - _____ – the utilization of science and technology to design and construct machines, systems, or structures
  - _____ – the language that allows scientists to investigate the relationships that exist within the natural world utilizing numbers, quantities, and calculations

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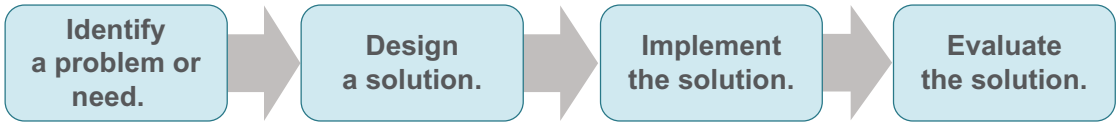
Stages of Technological Design

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



- Define a [ ].
- Research related information.
- Establish [ ].
- Prepare the initial design.
- Build and test a [ ].
- Analyze the results.
- Redesign and [ ].
- Report the solution.

The ATHLETE Robotic Rover

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

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Scientific Investigation

- Identify a [ ] or need.
- Research related [ ].
- Design an [ ].
- Conduct an investigation.
- Analyze the [ ].
- Evaluate the conclusions.
- Communicate the findings.

Scientific Investigation vs. Technological Design

Scientific investigation	Technological design
• Identify a problem or need.	• Identify a problem or need.
• [ ] related information.	• Research related information.
• Design an investigation.	• Design a solution.
• Conduct an investigation.	• [ ] the solution.
• Analyze the results.	• Analyze the results.
• Evaluate the [ ].	• Evaluate the solution.
• [ ] the findings.	• Report the solution.

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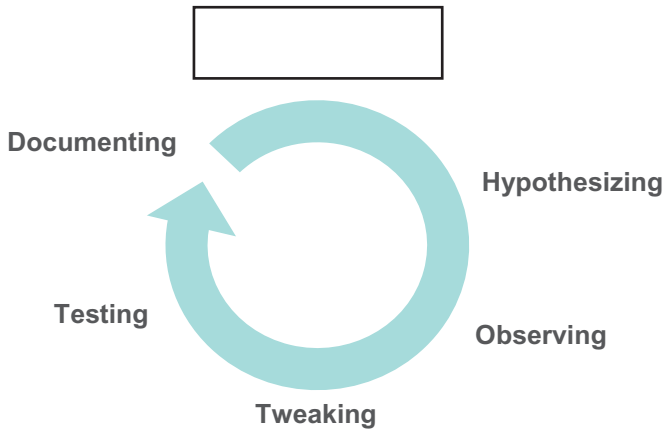
Technological Design

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



Technological Innovation

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

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Limitations to Technological Design

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

Cost-Effectiveness

- Cost-effectiveness means maintaining the [ ] cost for [ ].
  - **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 [ ] the amount of time it takes to make a [ ].
  - **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?

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Cost-Effectiveness vs. Time-Effectiveness

- _____ may be necessary.

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

Time to complete production: 14 days

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

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Technological Design Criteria

- The product of a technological design should:
  - _____ the problem.
  - be _____.
  - be affordable.
  - be _____.
  - not cause _____ to users.

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Benefits and Risks of Using Headphones

The benefits of _____ design should always outweigh the risks.

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

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Summary | Technological Design

Lesson Question

What is technological design?

Answer

Slide 2

Review: Key Concepts

[ ] 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.

[ ] investigation

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

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Summary | Technological Design

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Review: Key Concepts

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

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

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