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Warm-Up | Technological Design

Lesson Question

Lesson Goals

Characterize _____ design.

Describe the four _____ of technological design.

Compare the _____ of technological design and scientific investigation.

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

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

criteria	the _____ used to make a judgment or decision
prototype	an early _____ from which later versions are developed

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Science and Technology

- _____ is a process that involves the collection of information and ideas supported by _____. Science also:
  - seeks ways to meet the _____ of society.
  - has influenced _____ in technology.
- _____ is the application of new methods or devices to _____ problems. Technology also has influenced the _____ of science.

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Slide 2

Stages of Technological Design

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

[ ] a problem or need.	[ ] a solution.	[ ] the solution.	[ ] the solution.
• Define a need. • [ ] related information.	• Establish [ ]. • Prepare the initial design.	• Build and test a [ ]. • Analyze the results.	• [ ] and retest. • [ ] the solution.

- Designing a solution involves establishing criteria or standards used to make a judgment or decision, and preparing an initial design.
- What is a prototype? It's an early model from which later versions are developed.

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The ATHLETE Robotic Rover: Example

ATHLETE stands for All-Terrain Hex-Limbed Extra-Terrestrial Explorer.

Identify a problem or [ ] .	A [ ] vehicle is needed to unload and transport cargo.
Design a solution.	Create initial designs for [ ] .
Implement the solution.	[ ] the various prototypes' capabilities.
[ ] the solution.	[ ] and retest improved prototypes. Develop a [ ] robot.

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Scientific Investigation

- [ ] a problem or need.
- [ ] related information.
- [ ] an investigation.
- [ ] an investigation.
  - Collection and recording of data is important in order to make observations.
  - Any problems should also be noted during this time.
- [ ] the results.
  - After data has been collected, calculations and comparisons should be completed.
- [ ] the conclusions.
- [ ] the findings.

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Scientific Investigation vs. Technological Design

Let's take a look at the similarities and differences in this side-by-side comparison.

Scientific Investigation	Technological Design

• _____ a problem or need.
• Research related information.
• Design an _____ .
• _____ an investigation.
• Analyze the _____ .
• Evaluate the _____ .
• _____ the findings.
	• Identify a _____ or need.
	  • _____ related information.
	• Design a _____ .
	• _____ the solution.
	  • Analyze the results.
	• Evaluate the solution.
	  • _____ the solution.

- With scientific investigation, you conduct an investigation, but with technological design, you implement a solution or a product.

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Cost-Effectiveness

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

	Import	Domestic
Cost per case		$40
Shipping per case	$10	
Total per case	$45	$48

- It is more cost-effective to have the product continue to be imported.

Time-Effectiveness

- Time-effectiveness means _____ the amount of time it takes to make a product.
  - **Example:** It takes one engineer _____ to assemble a product by hand. With a machine, the work can be completed in just _____. Which is more _____ -effective?
- The machines take half as much time to do the work as the engineer if it was done by hand.

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Slide 7

Cost-Effectiveness vs. Time-Effectiveness

- The process of technological design should be both cost-effective and time-effective, but this isn't always the case.
- _____ may be necessary.

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

- Time to _____ production: 14 days
- So, in this case, the company may have to make a trade-off, paying a little more for the part in order to complete production faster.

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Technological Design Criteria

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

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Benefits and Risks of Using Headphones

The _____ of technological design should always outweigh the _____.

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

- Many of the risks involved with using headphones are associated with their improper use, such as listening to the music at too high a volume.
- If used properly, the benefits of using headphones far outweigh the risks.

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Summary | Technological Design

Lesson Question

What is technological design?

Answer

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Review: Key Concepts

Technological Design	Scientific Investigation
1. _____ a problem or need. • _____ related information. 2. Design a _____. 3. _____ the solution. • Analyze the results. 4. Evaluate the _____. • _____ the solution.	• Identify a problem or need. • Research related information. • Design an _____. • _____ an investigation. • Analyze the _____. • Evaluate the _____. • _____ the findings.

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Summary | Technological Design

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TECHNOLOGICAL DESIGN CHECKLIST

- The process and _____ that result from technological _____ should:
  - _____ the problem.
  - be _____ -effective and _____ -effective.
  - be available.
  - be affordable.
  - be _____ .
  - not cause harm to users.
- The _____ should outweigh the risks.

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

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