

# 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 <input style="width: 150px;" type="text"/> used to make a judgment or decision
prototype	an early <input style="width: 100px;" type="text"/> 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.

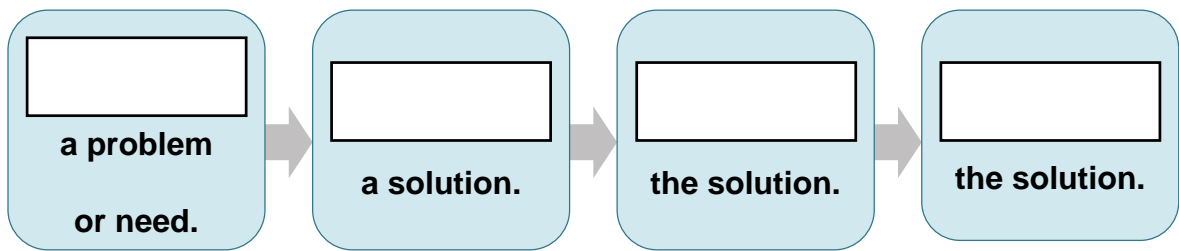
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## Stages of Technological Design

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



- 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
<ul style="list-style-type: none"> <li>• [ ] a problem or need.</li> <li>• Research related information.</li> <li>• Design an [ ] .</li> <li>• [ ] an investigation.</li> <li>• Analyze the [ ] .</li> <li>• Evaluate the [ ] .</li> <li>• [ ] the findings.</li> </ul>	<ul style="list-style-type: none"> <li>• Identify a [ ] or need.</li> <li>• [ ] related information.</li> <li>• Design a [ ] .</li> <li>• [ ] the solution.               <ul style="list-style-type: none"> <li>• Analyze the results.</li> </ul> </li> <li>• Evaluate the solution.               <ul style="list-style-type: none"> <li>• [ ] the solution.</li> </ul> </li> </ul>

- 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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## 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 <input type="text"/> days	Up to <input type="text"/> 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
<ul style="list-style-type: none"> <li>• Allow users to listen to <input type="text"/> without disrupting others</li> <li>• Can eliminate distractions</li> <li>• Are <input type="text"/></li> </ul>	<ul style="list-style-type: none"> <li>• Could damage hearing</li> <li>• May be a <input type="text"/></li> <li>• Can be lost or <input type="text"/></li> </ul>

- 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.



# Summary | Technological Design



## Lesson Question

What is technological design?



## Answer

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## Review: Key Concepts

Technological Design	Scientific Investigation
<p>1. <input type="text"/> a problem or need.</p> <ul style="list-style-type: none"> <li><input type="text"/> related information.</li> </ul>	<ul style="list-style-type: none"> <li>Identify a problem or need.</li> <li>Research related information.</li> </ul>
<p>2. Design a <input type="text"/>.</p>	<ul style="list-style-type: none"> <li>Design an <input type="text"/>.</li> </ul>
<p>3. <input type="text"/> the solution.</p> <ul style="list-style-type: none"> <li>Analyze the results.</li> </ul>	<ul style="list-style-type: none"> <li><input type="text"/> an investigation.</li> <li>Analyze the <input type="text"/>.</li> </ul>
<p>4. Evaluate the <input type="text"/>.</p> <ul style="list-style-type: none"> <li><input type="text"/> the solution.</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate the <input type="text"/>.</li> <li><input type="text"/> the findings.</li> </ul>

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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.*