**?**

**W**

**2K**

investigation.

.

and scientific

design.

meets specific

technological design

technological

to determine if it

of

of

technological design

**Compare** the

**Describe** the four

**Evaluate** a

design.

**Characterize**

**Lesson Goals**

**Lesson Question**

**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 |


# 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.

**Slide**

# 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.

•

* Establish
	+ Build and test a

. .

•

and retest.

related information.

* Prepare the initial design.
* Analyze the results.

•

the solution.

**2**

* + 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.

**2**

**4**

**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.

|  |
| --- |
|  |
|  |
|  |
|  |

**Slide**

**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. |

**Slide**

**4**

# 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.

**7**

* The machines take half as much time to do the work as the engineer if it was

done by hand.

-effective?

. Which is more

product by hand. With a machine, the work can be completed in just

to assemble a

make a product.

* **Example:** It takes one engineer

the amount of time it takes to

* Time-effectiveness means

**Time-Effectiveness**

**Slide**

**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?

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

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

**7**

**9**

to users.

* not cause
* be durable.

.

* be
* be available.

the problem.

•

of a technological design should:

* The

**Technological Design Criteria**

**Slide**

**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.

•

•

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.

|  |  |  |
| --- | --- | --- |
|  | **Import** | **Domestic** |
| **Total cost** | $45 | $48 |
| **Shipping time** | Up to days | Up to days |

**Slide**

# Benefits and Risks of Using Headphones

**9**

The of technological design should always outweigh the

.

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

* + 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.

What is technological design?

**Lesson Question**

**Slide**

**?**

**Review: Key Concepts**

**Answer**

**2**

|  |  |
| --- | --- |
| **Technological Design** | **Scientific Investigation** |
| 1. a problem or need.
	* related

information.1. Design a .
2. the solution.
	* Analyze the results.
3. Evaluate the .
	* the solution.
 | * Identify a problem or need.
* Research related information.
* Design an .
* an investigation.
* Analyze the .
* Evaluate the .
* the findings.
 |

**Slide**

should outweigh the risks.

not cause harm to users.

* The

.

be

•

•

-effective.

-effective and

be

be available. be affordable.

•

•

•

the problem.

should:

•

that result from technological

* The process and

**TECHNOLOGICAL DESIGN CHECKLIST**

**2**

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