

The Game Developer's Toolkit

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. Developers use variables _____.
Ⓐ to establish directives
Ⓑ to execute a function
Ⓒ to hard-code every possibility
Ⓓ to hold values

2. A game developer can use geometry to _____.
Ⓐ plot a character's location on a coordinate plane
Ⓑ create a vector
Ⓒ create obstacles in the game
Ⓓ define a variable

3. What would happen if a video game did not use vectors?

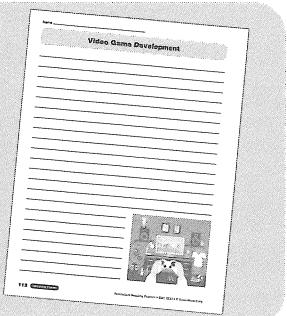
4. In your own words, explain pathfinding.

5. Explain why physics is important in a video game.

Write About the Topic

Use the Writing Form to write about what you read.

Explain how a game developer uses math to create a video game. Use details from the text.



The Field of Prosthetics

Level 1

Words to Know list, Reading Selection, and Reading Comprehension questions

What Is Prosthetics?

Fill in the circle by the correct answer.

What Is Prosthetics?

Prosthetics is the science of medicine and surgery that deals with artificial limbs. An artificial limb is a device that is designed to replace a lost or broken limb. The device is meant to fit into the body and help to put other body parts and perform the functions of the missing limb. Artificial limbs are divided into two types of "prostheses" or "prosthetic limbs": those that are made of metal and those that are made of plastic.

Limb Replacement: If a person loses a limb, it may be replaced with a prosthesis. This is done when there is no chance of regrowth of the limb. If one of your legs or arms is amputated, you can get a prosthesis that looks like the real limb.

There are many different kinds of prostheses. Doctors will pick the best individual needs of each patient.

Differences of Artificial Limbs

All of artificial limbs are alike in that they move and group objects, which means that they have a mechanical arm and hand. They also have a base, and have different kinds of materials. Some are made of wood, others are made of metal, and some are made of plastic. For others, it's not clear what material they are made of. There are different kinds of artificial limbs with a number of different capabilities. For example, some are designed for walking, while others are designed for running. Others are designed for climbing stairs, while others are designed for swimming. All of these different kinds of artificial limbs have their own unique features and benefits.

Myoelectric Prostheses: These have been around for a long time. They are designed to have a natural appearance and function to match as naturally as possible. The word "myoelectric" means that the device uses the signals from the body's muscles to move the limb. This means that the user can move the limb in a more natural way. A person who has lost a limb can use a myoelectric prosthesis to hold a pen or a pencil, or even a vertical board, which is used for writing.

Ultimate artificial limbs help a person to live a more normal life. They help a person to move more easily and quickly, and have greater independence.

Knee splices for knee-lock prostheses:

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Wrong to Known

- prosthetics
- surgery
- artificial
- device
- function
- process
- limbs
- capabilities
- mysteries
- reverses

The Field of Prosthetics ■

Level 2

Words to Know list, Reading Selection, and Reading Comprehension questions

Prosthetics Innovation

Fill in the circle by the correct answer. **13**

Prosthetics Innovation

Artificial limbs are devices that replace one or more parts of a person's body to take the place of one or more missing body parts. This technology has allowed the creation of new and improved prosthetic limbs.

The Earliest Units of Prosthetics

The earliest known prosthetic limb was produced in Egypt. A wooden prosthesis found in an ancient Egyptian tomb dates from around 2500 B.C. It was made of wood and leather. And as a hundred years later, there was another Egyptian amputee who had his arm replaced with a wooden arm. He then fought in a battle. It is then believed that he could continue fighting, for he needed to hold his spear with his wooden arm.

Legs were also made of wood during the Middle Ages. These legs were simple units with simple materials such as metal, wood, and leather. Amputees during the Middle Ages commonly appeared in public. And then, the purpose of prosthetics began to change. If they weren't missing limbs, then the limbs to be functioned.

Improving in Prosthetics

In the 1500s, French doctor created a wooden arm in artificial limbs. Before this, onsets of war would leave many soldiers with a big loss of limbs. He also created first prosthetic arms with a hinge at the shoulder. He also invented a hinged prosthesis with a hinge at the knee. It was not until the 1600s that a doctor created a wooden leg with a hinge at the knee. In 1605, a Dutch doctor created a wooden leg with a hinge at the knee. Impressive improvements were made to the body. These early prosthetic designs included prosthetics in the 20th century and today.

Prosthetic Limbs

As prosthetic limbs improve and function so naturally that it's hard to tell the difference between a real limb and a prosthetic limb. And we can see some examples used to make prosthetic limbs. These include bone and muscle tissue pieces used to design, build, and adjust an artificial limb. It allows the limb to move like a natural limb. It even creates natural-looking, natural-moving artificial limbs.

Word to Know

Prosthetics Innovation

prosthetics
surgery
artificial
limbs
device
orthopaedical
uncomplicated
functional
hinge
mechanical
hamstrings
cuff

Schroeder Smith & Prosthetic Co. LLC

The Field of Prosthetics #13

Level 3

Words to Know list, Reading Selection, and Reading Comprehension questions

Prosthetics: Past and Present

Prosthetics: Past and Present

Prosthetics is an area of medicine that deals with artificial limbs, which are sometimes also referred to as orthopedic devices. An artificial limb is a device that replaces a missing limb or part of a limb. Artificial limbs have been around since ancient times, but they were not very effective until the late 1800s. Since then, prosthetic technology has advanced rapidly, and today's prosthetic limbs are much more functional than ever before.

Earlier Prosthetics

The earliest prosthetic device was found in an archaeological dig near Thebes, Egypt. It is a mummified wooden leg that is about 3,000 years old. A wooden peg was inserted into the lower human femur bone, and it had to be soled so that it could be used as a walking aid. The leg was made from wood and leather. It was not very comfortable to wear, and people who wore it had to constantly adjust it. Prosthetic devices had to be replaced often because they were made from simple materials such as wood and leather. They were not very flexible, and they did not move well. They were also very heavy and uncomfortable to wear. That is why people wanted to remove them on a regular basis.

Then, in the early 1800s, a man named James Gammie invented a prosthetic arm with a leather cuff that allowed him to grip things better. He had to invent a new way to make the leather cuff so that it would not bind when he moved his arm. This invention was a great improvement over earlier prosthetic arms, but it still had some problems. The leather cuff was very stiff, and it did not allow the arm to move naturally. It was also very heavy and uncomfortable to wear.

Prosthetics Today

Technological advances over time have greatly improved prosthetic devices. Artificial limbs now have more options and features than ever before. We no longer have artificial limbs that don't move naturally or that don't fit well with other systems that don't exist naturally in the body. Some prosthetic devices now have sensors that tell them when a person is sitting, standing, or walking. These sensors can then adjust the limb to fit the person's needs better. For example, if a person is sitting down, the artificial limb will automatically fold up to prevent the person from getting stuck in their chair. If a person is walking, we can have a sensor that tells the limb when to move forward and when to move back. This allows for a much more natural movement of the limb. Sophisticated mechanical parts, such as hydraulic and electrical components, are being used to create more functional and comfortable prosthetic limbs.

Words to Know

Prosthetics: Past and Present

- prosthetics
- artificial
- limbs
- device
- ever-changing
- orthopedic
- uncomplicated
- function
- hinge
- mechanical
- upright
- durable
- sophisticated

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National Endowment for the Arts

An athlete who lost a leg in a tragic accident uses a prosthetic leg to compete in track and field.

The Field of Prosthetics 105

Assemble the Unit

Reproduce and distribute one copy for each student:

- Visual Literacy page: The Field of Prosthetics, page 121
 - Level 1, 2, or 3 Reading Selection and Reading Comprehension page and the corresponding Words to Know list
 - Graphic Organizer of your choosing, provided on pages 180–186
 - Writing Form: The Field of Prosthetics, page 122

Introduce the Topic

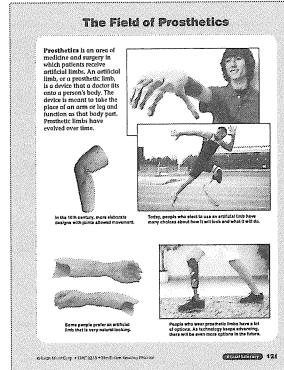
Read aloud and discuss The Field of Prosthetics paragraphs and photos. Explain that some people choose to have a prosthetic limb to replace a lost or injured limb on their body. Point out that today, there are many options for artificial limbs because of advancements in technology.

Read and Respond

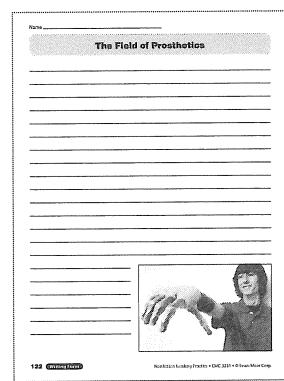
Form leveled groups and review the Words to Know lists with each group of students. Instruct each group to read their selection individually, in pairs, or as a group. Have students complete the Reading Comprehension page for their selection.

Write About the Topic

Read aloud the leveled writing prompt for each group. Tell students to use the Graphic Organizer to plan their writing. Direct students to use their Writing Form to respond to their prompt.



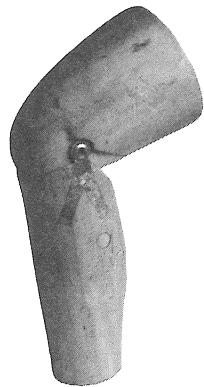
Visual Literacy



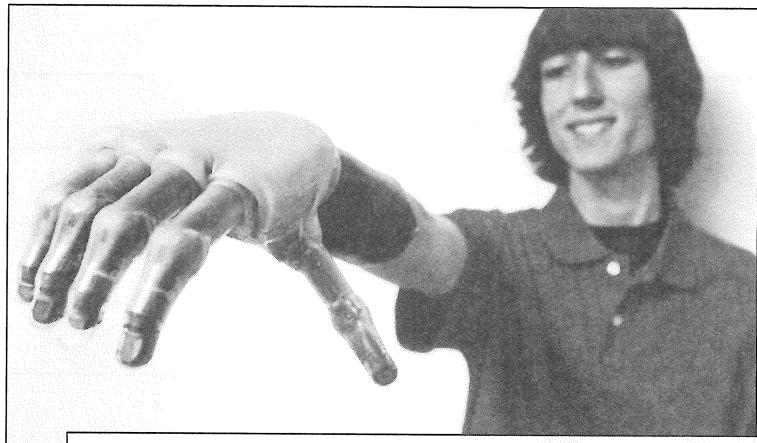
Writing Form

The Field of Prosthetics

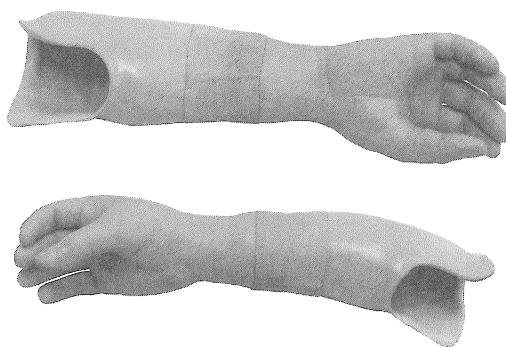
Prosthetics is an area of medicine and surgery in which patients receive artificial limbs. An artificial limb, or a prosthetic limb, is a device that a doctor fits onto a person's body. The device is meant to take the place of an arm or leg and function as that body part. Prosthetic limbs have evolved over time.



In the 16th century, more elaborate designs with joints allowed movement.



Today, people who elect to use an artificial limb have many choices about how it will look and what it will do.



Some people prefer an artificial limb that is very natural looking.



People who wear prosthetic limbs have a lot of options. As technology keeps advancing, there will be even more options in the future.

Name _____

The Field of Prosthetics



Words to Know

What Is Prosthetics?

prosthetics

surgery

artificial

device

functions

prostheses

limbs

capabilities

myoelectric

sensors

Words to Know

Prosthetics Innovation

prosthetics

surgery

artificial

limbs

device

archaeological

uncomplicated

functional

hinge

mechanical

harness

cuff

Words to Know

Prosthetics: Past and Present

prosthetics

artificial

limbs

device

ever-changing

archaeological

uncomplicated

function

hinge

mechanical

upright

durable

sophisticated

The Field of Prosthetics ■

The Field of Prosthetics ■ ■

The Field of Prosthetics ■ ■ ■



What Is Prosthetics?

Prosthetics is an area of medicine and surgery that deals with artificial limbs. An artificial limb is a device that a doctor fits onto a person's body. The device is meant to take the place of an arm or leg or other body part and perform the functions of that body part. Artificial limbs are also sometimes known as "prostheses" or "prosthetic limbs." There are many kinds of artificial limbs.

Limb Replacement

Some people choose to use an artificial limb when they have lost the use of one of their legs or arms. Prosthetic limbs can replace arms below the elbow or above the elbow. And legs can be replaced below the knee or above the knee.

There are many different kinds of artificial limbs. Doctors look at patients' individual needs to decide which one is best for each patient.

Different Kinds of Artificial Limbs

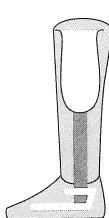
Not all artificial limbs are alike. For example, some artificial limbs appear more natural than others. Some can move and grasp objects, while others can't. Artificial limbs are made of different materials, come in different sizes, and have different capabilities. For some people, having an artificial limb with a natural appearance is the most important thing. For others, it's more important that it fits well so they can live an active lifestyle. Some people are more interested in comfort. Still others want the newest technology, such as artificial limbs that move as naturally as possible.

Myoelectric Prosthetics

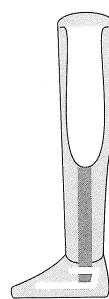
Myoelectric prosthetic limbs have joints that move. They are designed to have a natural appearance and function as naturally as possible. The word "myoelectric" means *electricity from the body's muscles*. This type of artificial limb uses sensors and the user's muscle contractions to move joints in the limb. A person using an upper limb myoelectric prosthesis might be able to bend the joints in the artificial hand, wrist, elbow, and thumb, for example.

Ultimately, artificial limbs help people who have lost limbs regain the functions of the missing body part and have greater independence.

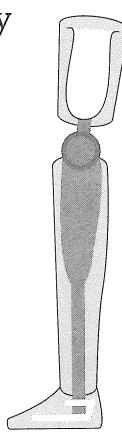
Some options for lower limb prostheses



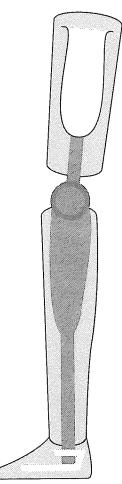
Syme's prosthesis
below the knee



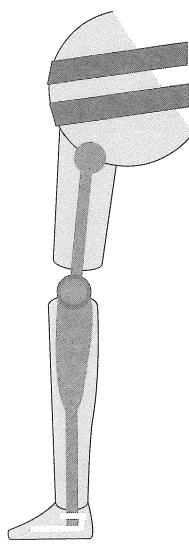
Below-the-knee
prosthesis



Through-the-knee
prosthesis



Above-the-knee
prosthesis



Above-the-knee and
hip joint prosthesis

What Is Prosthetics?

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. An individual may consider _____ when choosing an artificial limb.
 - A material, size, and function
 - B appearance
 - C fit
 - D all of the above

 2. The terms “prostheses,” “artificial limbs,” and “prosthetic limbs” _____.
 - A are used in different areas of medicine
 - B relate to leg replacements only
 - C have completely different meanings
 - D refer to the same thing

 3. Explain the differences between the artificial limbs shown in the text.
-
-

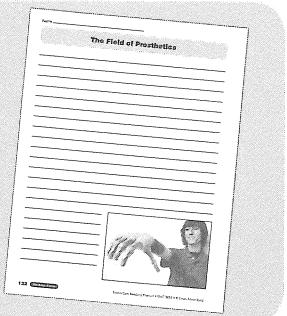
4. How does the author support the idea that there are different kinds of artificial limbs?
-
-

5. In your own words, what is the main purpose of artificial limbs?
-
-

Write About the Topic

Use the Writing Form to write about what you read.

Explain the factors that can influence a person’s choice of an artificial limb. Use details from the text.

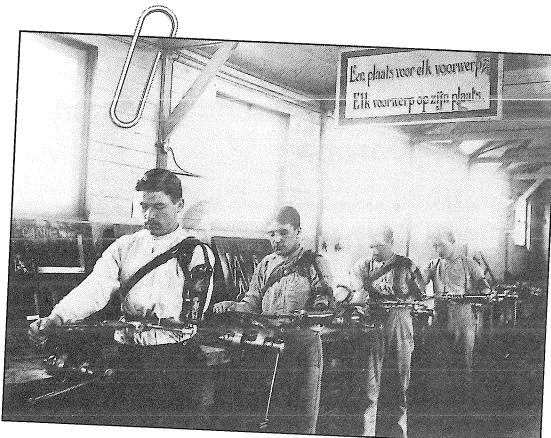


Prosthetics Innovation

Prosthetics is an area of medicine and surgery that deals with artificial limbs. An artificial limb is a device that a doctor fits onto a person's body to take the place of an arm or leg. Over time, technology has allowed the creation of new and improved artificial limbs.

The Earliest Uses of Prosthetics

There is evidence that ancient Egyptians used prosthetics. In Egypt, a prosthetic toe was found in an archaeological dig. It's estimated to be 3,000 years old and was made of wood and leather. And a historical account states that a warrior from ancient Rome lost his arm in a battle. He then had an iron hand made, which could hold his shield so that he could continue fighting. For hundreds of years, prosthetic devices had uncomplicated designs with simple materials such as metal, wood, and leather. Knights during the Middle Ages commonly used iron prosthetic limbs. Back then, the purpose of prosthetics was for people to appear as if they weren't missing limbs rather than for the limbs to be functional.



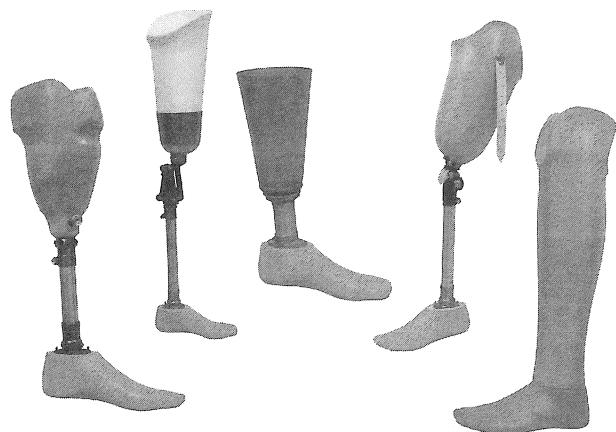
World War I veterans with prosthetic arms working in a shop in 1917

Improvements in Prosthetics

In the 1500s, a French doctor wanted to add joints to artificial limbs. Before then, an artificial limb's ability to perform a function wasn't a big concern. He created the first prosthetic arm with a hinge, which allowed it to bend. He also invented a hinged mechanical hand and a prosthetic leg with a hinge at the knee that could be locked. It also had a harness, which helped it better attach to the body. In 1690, a Dutch doctor created a new kind of prosthetic leg with a cuff that improved how easily the limb attached to the body. These early prosthetic designs influenced prosthetics in the 20th century and today.

Prosthetics Today

Some artificial limbs appear and function so naturally that it's difficult to tell them apart from real body parts. Leather, plastic, and wood are common materials used to make artificial limbs. Computer technology and mechanical pieces are used to design, build, fit, and adjust artificial limbs. These days, prosthetics technology aims to create natural-looking, natural-moving artificial limbs.



Five different kinds of leg prosthetics

Prosthetics Innovation

Fill in the circle by the correct answer. Then write the answers to numbers 3, 4, and 5.

1. What is the main idea of this text?

- (A) Artistic creativity has improved the quality of artificial limbs.
- (B) Technology has improved the quality of artificial limbs over time.
- (C) The earliest uses of prosthetics were better than today's.
- (D) The oldest prosthetic device is 3,000 years old.

2. Why were the earliest artificial limbs more simple?

- (A) Technology wasn't as advanced back then.
- (B) Technology was more advanced back then.
- (C) They didn't have any of the same materials we have now.
- (D) People didn't need artificial limbs back then.

3. What is one possible challenge knights using an iron artificial limb had? Why?

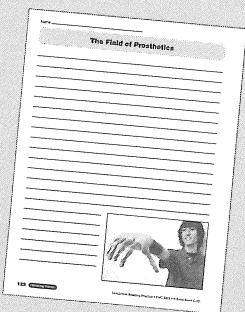
4. Which areas of prosthetics technology have seen improvement over the years?

5. Are today's prosthetic limbs necessarily better than those of the past? Why or why not?

Write About the Topic

Use the Writing Form to write about what you read.

Compare and contrast how prosthetics was in its early days with how it is now. Use details from the text.



Prosthetics: Past and Present

Prosthetics is an area of medicine that deals with artificial limbs, which are sometimes also known as prosthetic limbs. An artificial limb is a device that replaces a person's arm or leg. Artificial limbs have been used for centuries and have changed with technology and with people's ever-changing needs.

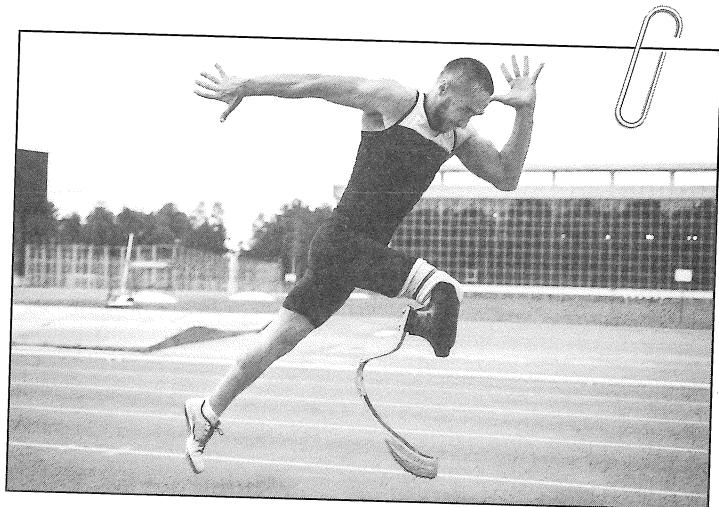
Earlier Prosthetics

In 2000, a prosthetic toe was found in an archaeological dig near Thebes, Egypt. It is in a museum in Cairo. It is thought to be about 3,000 years old. And a famous story tells of an ancient Roman general who lost his arm in battle. He then had an iron hand made, which could hold his shield so that he could continue battling. For hundreds of years, prosthetic devices had uncomplicated designs with simple materials such as metal, wood, and leather. Knights during the Middle Ages used iron prosthetic limbs, which were tough but not very flexible. Their purpose wasn't to function as an arm or leg but rather to give the appearance that a limb wasn't missing.

In the 1500s, a doctor invented a prosthetic arm with a hinge, which allowed the arm to bend. He also invented a hinged mechanical hand and a prosthetic leg with a hinge at the knee that could be locked when the user wanted to stand upright. Adding these joint-like features to prosthetic limbs allowed more movement in the limbs. Before then, people didn't expect artificial limbs to perform a function. These early prosthetic designs influenced prosthetics today.

Prosthetics Today

Technology has improved over time, and individuals' needs have changed, so options for artificial limbs have changed, too. We still have artificial limbs that don't allow movement. But there are many other options that didn't exist centuries ago. Some artificial limbs appear and function so naturally that it's difficult to tell them apart from real limbs. Nowadays, people are living longer, healthier lives. People who use artificial limbs do not have to be limited in their physical activity. This means that artificial limbs need to be more durable and flexible. Luckily, we have computer technology and more sophisticated mechanical pieces to design, build, fit, and adjust artificial limbs. Prosthetics technology aims to create the most naturally functioning prosthetic limbs possible.



An athlete who uses a prosthetic lower limb