



# Engineering Design Journal

## PRIMARY – Grades K-3

Names of Group Members: \_\_\_\_\_

**PROJECT OBJECTIVE:** We challenge you to design a prosthetic limb that allows an animal to continue to live its best life in its natural habitat.

**There are 3 criteria that your design should meet:**

- The prosthetic limb must attach to your animal.
- The prosthetic limb must assist the animal in functioning in simple everyday tasks (such as moving).
- The prosthetic limb should be designed using a variety of shapes that will allow it to move (up and down, side to side).

## Lesson 1: Animal Locomotion

*What are some ways animals move?*

STEP 1 - PROBLEM	STEP 2 - MATERIALS
What science concepts are we learning about in today's activity?	List the materials you will use.
STEP 3 - DRAWING	STEP 4 - PREDICT
Draw a picture of an animal and how it moves.	What might happen to an animal that cannot move as they are meant to?
STEP 5 - TEST & OBSERVE	STEP 6 - ANALYZE & REFLECT
How does movement change for animals or humans that have limb differences?	How can bionic science help an animal or human with a limb difference?

## Lesson 2: Bionics

*What is bionics? What does it mean to be bionic?*

<b>STEP 1 - PROBLEM</b>	<b>STEP 2 - MATERIALS</b>
What science concept are we learning about in today's activity?	List the materials you will use to create and test bionics.
<b>STEP 3 - DRAWING</b>	<b>STEP 4 - PREDICT</b>
Draw a picture of how you will test the effect of having a bionic limb.	How will a bionic limb help or aid a human?
<b>STEP 5 - TEST &amp; OBSERVE</b>	<b>STEP 6 - ANALYZE &amp; REFLECT</b>
Using materials provided by your educator(s), create a bionic limb.	How would your bionic limb assist a human in day to day living?

### Lesson 3: Animal Prosthetics

*What would the purpose of a prosthetic be used for in an animal?*

<b>STEP 1 - PROBLEM</b>	<b>STEP 2 - MATERIALS</b>
What science concept are we learning about in today's activity?	List the materials you will use to design a prosthetic limb for an animal.
<b>STEP 3 - DRAWING</b>	<b>STEP 4 - PREDICT</b>
Draw a picture of how you will design a prosthetic limb for an animal.	How will the animal function with the prosthetic limb?
<b>STEP 5 - TEST &amp; OBSERVE</b>	<b>STEP 6 - ANALYZE &amp; REFLECT</b>
What do you notice?	What worked well? What might you change?

## Lesson 4: Meet Richard

Your challenge is to build Richard the moving dog as a whole group. You will then remove the back limbs to see how Richard the moving dog functions.

STEP 1 - PROBLEM	STEP 2 - BRAINSTORM IDEAS
What is the problem when you remove the back half? What do you need to be able to do to make Richard walk?	Brainstorm solutions to solve the problem. Write down your ideas and share them with your group.
STEP 3 - DESIGN A SOLUTION	STEP 4 - MAKE A MODEL
Draw and label a picture of what you plan to build.	List the materials you will use to build. Make a model of your idea. Follow your plan.
STEP 5 - TEST & EVALUATE	STEP 6 - REFLECT & SHARE
Did you get the result you wanted? What didn't work as expected? Modify your design.	What did you learn about from this project? Is there anything you would try differently next time? Be prepared to share your answers with your class.

**PROJECT:**

*Using your design from Lesson 3, as well as your new learning about bionic prosthetics, build a device for Winter, Leonardo or Thistle.*

*\*Refer to STEM Challenge slide deck for animal information.*

<b>STEP 1 - PROBLEM</b>	<b>STEP 2 - BRAINSTORM IDEAS</b>
What is the problem? What do you need to be able to do?	Brainstorm solutions to solve the problem. Write down your ideas and share them with your group.
<b>STEP 3 - DESIGN A SOLUTION</b>	<b>STEP 4 - MAKE A MODEL</b>
Draw and label a picture of what you plan to build.	List the materials you will use to build. Make a model of your idea. Follow your plan.
<b>STEP 5 - TEST &amp; EVALUATE</b>	<b>STEP 6 - REFLECT &amp; SHARE</b>
Did you get the result you wanted? What didn't work as expected? Modify your design.	What did you learn about from this project? Is there anything you would try differently next time? Be prepared to share your answers with your class.

## PROJECT: Reflection

<b>PART A - Build It</b>	<b>PART B - Test It</b>
What did you notice while building your prosthetic? What does the final product look like?	What happened when you attached the prosthetic limb? What worked well? What would you do differently next time?