

Name: _____

BRAND-NEW BODY PARTS

In “Wild Patients” (p. 8), you learned about some of the treatments veterinarians use to keep animals healthy. Sometimes scientists go to extreme lengths to help animals that have been injured. For example, they may give an animal a high-tech *prosthetic*—an artificial body part to repair or replace a damaged or missing one. Read the table below to learn how prosthetics are helping some injured animals lead normal lives. Then complete the rest of the skills sheet.

ANIMALS WITH PROSTHETICS

ANIMAL	PROSTHETIC DESIGN
Goose	In 2015, someone dropped off a goose that was missing most of its bill at a rescue center in Brazil. The bird was so injured that it couldn't eat on its own. To save the bird, a dentist used a <i>3-D printer</i> —a device that creates solid objects by building up layers of material—to make the goose a prosthetic bill out of a plastic. The prosthetic was attached to what was left of the bird's bill. The first beak turned out to be too heavy for the bird to easily open and close it. So the dentist created a new one that was one-third the weight, and the bird survived.
Tortoise	Freddy the tortoise was brought to a rescue center after roughly 85 percent of its shell was destroyed in a fire. Without a shell, the tortoise was at serious risk for infections and damage to its body. Scientists studied a similar turtle's shell to come up with a design. Then they used a 3-D printer to create a new shell out of plastic. Artists painted the white plastic with natural colors so Freddy would blend into the environment.
Dolphin	Winter the bottlenose dolphin lost her tail after it became entangled in a rope. The dolphin learned to swim using her flippers and a side-to-side motion. But scientists were concerned that she would eventually develop problems with her spine because dolphins' bodies don't normally move that way. A scientist who creates prosthetics for humans designed a flexible tail made from silicone, a type of <i>polymer</i> —a large molecule made up of repeating units—for Winter. To attach the new tail to her body, the scientists created a gel sleeve. The sleeve was designed to mimic <i>blubber</i> —the fat of sea animals—to protect Winter's sensitive skin while keeping the tail in place.

DIRECTIONS Use what you know to design a solution to the following problem: Alligators rely on their tails, which make up roughly half the length of their bodies, to propel themselves through the water. Suppose an alligator was injured and lost its tail.

Define the Problem: List at least three criteria or constraints that a prosthetic for an alligator needs to meet.

Design It: Draw a model of your design below. Be sure to label and explain the different parts of your design.

Brainstorm Ideas: Come up with several ideas for an alligator's prosthetic. Think about how you might design a prosthetic to replace it. What materials would you use? How would you attach it?