Student Worksheet

Design a Robotic Insect

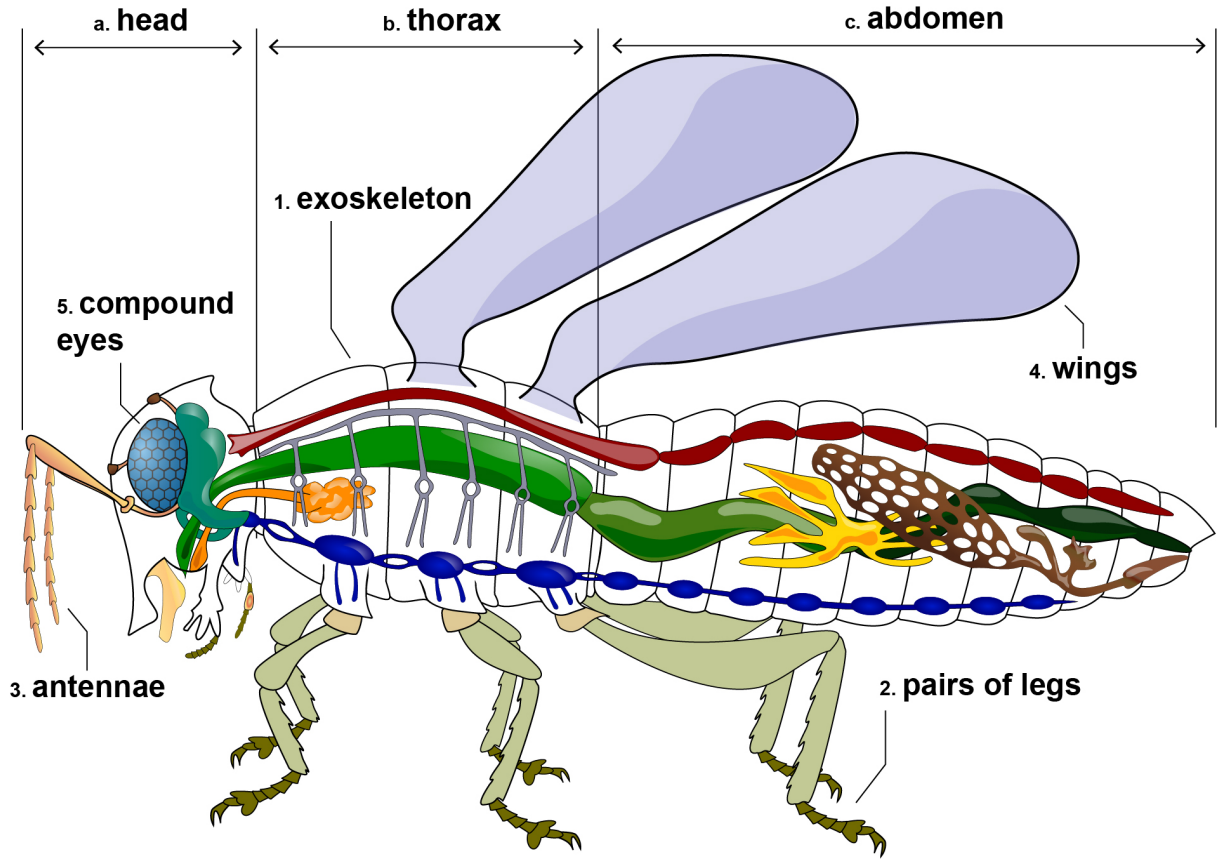
The Structure of Insects

Insects' bodies are made up of three main parts:

a. A **head** with eyes, mouth, and antennae
b. A **thorax** with legs and/or wings
c. An **abdomen** that contains their organs

Some structures found on insects and their purposes include:

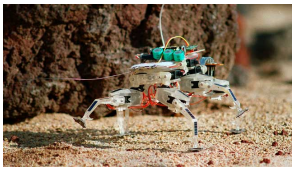
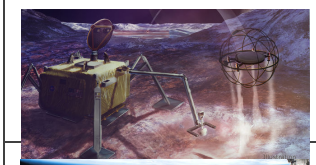
	STRUCTURE	FUNCTION
1.	A hard exoskeleton or external skeleton	Protects and contains body structures inside
2.	Three pairs of legs (6 legs)	Locomotion/movement
3.	Two antennae	Touch and sense of smell
4.	One or two sets of wings	Flight
5.	Compound eyes (honeycomb pattern)	Vision and movement detection



Design a Robotic Insect

Robots Inspired by Nature

NASA draws inspiration for its robots from insects and nature. Some of these robots stay on Earth, but some travel far off into our Solar System. Learn more about some of these nature-inspired robots in the table below.

	**LEMUR**	Can scale rock walls, gripping with hundreds of tiny fish hooks in each of its 16 fingers. Uses artificial intelligence (AI) to find its way around obstacles.
	**SpiderBot**	A micro robot that is designed to chart the terrain on other planets and explore smaller bodies, such as comets, asteroids, or the Moon.
	**A-PUFFER**	Foldable robots that could scout regions on the Moon and gain intel about locations that may be difficult for astronauts to investigate on foot.
	**SPARROW**	Would be propelled by steam and hop across the icy terrains, like those found on Jupiter's moon Europa and Saturn's moon Enceladus.
	**Geckobot**	A gripping system inspired by the tiny hairs on the bottom of geckos' feet allows this robot to cling to vertical walls and other surfaces.
	**BRUIE**	Designed for underwater exploration in extraterrestrial, icy waters, this robot uses its two wheels to roll on the underside of the ice covering bodies of water.
	**RoboSimian**	An ape-like robot that could respond to disaster scenarios too dangerous for humans.

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Design a Robotic Insect

My Robotic Insect's Environment

Your challenge is to draw a design for a robotic insect that has special structures to work in the following environment:

- Cold, but lots of sunlight.
- Many rocks that may act as obstacles to break apart or go around.
- Some hills and valleys.
- Dusty and windy. Can sometimes have dust storms.
- Long distances to travel. Lots of open space.

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Design a Robotic Insect

My Robotic Insect

1. **My robotic insect's name: _____**

2. **In the chart below, describe your robotic insect's environment, your robot's structures, and how the function of each structure will help the robot be successful in its environment:**

ENVIRONMENT	STRUCTURE	FUNCTION

3. **Why did you choose the structures you used on your Robotic Insect?**

4. **Will your Robotic Insect be successful in the Martian environment? Why or why not?**

5. **Are there any changes or adaptations you made, or would make to your Robotic Insect to make it even more successful on Mars? What did/would you change and why?**

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