TGR EDU:
EXPLORE

GRADES
6–8

Natural Hazards

Robots to the Rescue

DIGITAL EXPLORATION

EDUCATOR GUIDE

TGR FOUNDATION
A TIGER WOODS CHARITY

Discovery EDUCATION

Using this Digital Exploration, students will act as scientists and engineers who have been tasked with evaluating technologies that can help humans during a natural disaster. They will first be introduced to conditions and patterns of geologic forces that lead to natural disasters. Students will then be challenged to use block coding to program a rescue robot to aid in a rescue and reconnaissance mission. Finally, students will examine how natural hazards affect humans and societies and explore the diverse range of careers in meteorology and disaster relief.

TIME REQUIRED

25–30 minutes

TOPICS

- Natural Hazards
- Geology
- Earths Materials and Systems
- Plate Tectonics and Large-Scale Systems
- Robotics
- Role of Society in the Development and Use of Technology
- Careers in Science, Technology, Engineering and Mathematics

HARDWARE RECOMMENDATION

Robots to the Rescue is accessible on any device. However, for optimal user experience, it is recommended that explorations are accessed via desktop or tablet. This exploration is functional for use on mobile devices (iOS and Android).

TECHNICAL SPECIFICATIONS

While the **Robots to the Rescue** exploration will function in all browsers, including Internet Explorer, Safari, Google Chrome and Firefox, browser load speeds will vary. For best performance, it is recommended that the most current version of your browser of choice is used when accessing the modules. Please note, connection speeds may be impacted by factors such as highly trafficked shared Wi- Fi access, public Wi-Fi and accessing modules behind a firewall.

OVERVIEW

This Digital Exploration has four main sections:

INTRODUCTION

How do natural hazards affect humans and societies? Students will be introduced to different kinds of natural hazards and sort them into three categories: interior processes, surface processes and severe weather events.

INVESTIGATE

Students will explore different geological and atmospheric patterns that cause natural hazards.

ACT

Students will apply ways different robotic technologies are used to aid in rescue and reconnaissance missions. Students will then be challenged to use block coding to program their robot to a natural disaster site.

ANALYZE

To summarize, students will discover how people in STEM-related careers study and reduce the impacts of natural hazards.

PROCEDURE

This exploration is designed to be flexible to meet the needs of many different learning environments

ONE-TO-ONE ENVIRONMENT

Students using the exploration for independent, self-paced learning can simply move through the exploration at their own pace.

WORKING IN PAIRS OR AT CENTERS

Students can take turns answering the questions throughout the exploration or work together to answer the questions. As students may have different reading levels, you will want to guide them to provide each group member with an opportunity to read and comprehend the information before moving on.

CLASS ENVIRONMENT

If you are leading a group in a one-to-many environment, you can use a projector and screen or whiteboard to make the exploration the focus of instruction and discussion. Use the questions in this guide and a show of hands, or other checking for understanding strategies, during each topic to gauge student comprehension.

CUSTOMIZED INSTRUCTION

You may also choose to use discrete elements from the exploration that fit your timeframe and curriculum.

PATH TO DISCOVERY

1. Explain that the purpose of this Digital Exploration is to examine the science, technology, engineering and math behind natural hazards and the robots used to assess damage and aid in rescue efforts caused by natural hazards.
2. Read the discussion questions before starting the Digital Exploration.
3. Guide students to respond to the questions, in writing, using evidence from the Digital Exploration.
4. Explain that you will be available to support students as they work.
5. Review student responses to the discussion questions after they have completed the exploration.

DISCUSSION QUESTIONS

- Is it better to try to prevent damage from natural disasters or to deal with disasters after they occur? Use evidence from the Digital Exploration in your response.
- Consider the robots and sensors you examined in the Digital Exploration or other types of robotic vehicles you are familiar with. Identify and explain which robot, and at least three sensors, you would include in a rescue mission involving a hurricane. Remember hurricanes are powerful storms with sustained winds of at least 74 mph. The effects of hurricanes can produce high winds, storm surges, intense rainfall and flooding.
- You programmed two different types of robots during the Digital Exploration. The first was to assess damage and the second helped provide aid to people in need. What are benefits and considerations when selecting an uncrewed robot versus sending humans to a rescue site?
- During the Digital Exploration, you investigated some of Earth's processes that led to natural hazards. What are some economic, social and environmental impacts that could occur as a result of a natural hazard? Which of these would be short-term impacts and which would be long-term? Have any natural hazards occurred in your community? What were the impacts?
- Describe why it is important for different careers to collaborate when preparing for, or responding to, a natural hazard. Use evidence from the Digital Exploration in your response.

NATIONAL STANDARDS

Next Generation Science Standards

MIDDLE SCHOOL

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Analyzing and Interpreting Data Analyze and interpret data to determine similarities and differences in findings.	**ESS3.B: Natural Hazards** Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.	**Patterns** Graphs, charts, and images can be used to identify patterns in data.

ISTE STANDARDS FOR STUDENTS

Knowledge Constructor: Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.

3d: Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

Computational Thinker: Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

5d: Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.