



# **MAGGIE GOES TO MARS**

UNT/NASA/ISTE Lesson Plan



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LESSON TITLE	DURATION/TIME FRAME
Maggie Goes to Mars	1 -2 hours (self-guided)

UNIT/THEME	GRADE LEVEL
Going to Mars (space science)	Middle school Grades 5-8

**TEACHER PRIOR KNOWLEDGE**  
 Identify what skills, understanding, or knowledge the teacher needs to prepare for this lesson. List resources the teacher could visit to gather additional knowledge or learning about specific technology for learning concepts identified in the instructional plan.

If assigned as a classroom activity, teachers will need to know how to download AR and VR apps. In addition, teachers may want to introduce some of the concepts about Mars and its atmosphere that makes it challenging to send humans to Mars.

**STUDENT PRIOR KNOWLEDGE**  
 Identify what skills, understanding, or knowledge the students need to prepare for this lesson.

Students will need to know how to download the augmented reality apps to a smartphone or tablet and how to download the virtual reality apps to a smartphone.

<b>LESSON OVERVIEW</b>
Brief overview of lesson objectives, lesson concept
This is a self-guided challenge for teaching users about the exploration of the moon and Mars. Users/students will need to employ various tools and skills to “get Maggie to Mars”. Included in the challenge are downloading and using innovative technology tools to explore NASA concepts.

<b>CONTENT AND SKILLS</b>	
<p><b>Concepts/Themes:</b></p> <ul style="list-style-type: none"> <li>• What do we want to learn about Mars and why?</li> </ul>	<p><b>Key Vocabulary:</b></p> <ul style="list-style-type: none"> <li>• Mission</li> <li>• Spacecraft</li> <li>• Planets</li> <li>• Moon</li> <li>• Mars</li> <li>• Surface</li> <li>• Rover</li> <li>• Robotic</li> </ul>
<p><b>Essential Questions:</b></p> <ul style="list-style-type: none"> <li>• What can we learn from other planetary objects to help us on Earth?</li> </ul>	
<b>Learning Objectives/Targets</b>	
<p><b>Content: Students will know...</b></p> <ul style="list-style-type: none"> <li>• The purpose of the Insight mission is to study the interior of Mars.</li> <li>• Spacecraft land in targeted locations on Mars to study different elements.</li> <li>• Where do NASA spacecraft launch?</li> <li>• How far away from Earth is the Sun?</li> <li>• What planet is targeted for the next human mission?</li> <li>• How do the temperatures vary on the different planets and why?</li> <li>• For what purpose are drones used by NASA?</li> </ul>	<p><b>Process: Students will be able to...</b></p> <ul style="list-style-type: none"> <li>• Use augmented reality to determine the purpose of different spacecraft.</li> <li>• Use virtual reality to explore the moon.</li> <li>• Use problem solving/programming skills to crack codes related to Mars.</li> </ul>

**ISTE STANDARDS FOR STUDENTS**

All indicators identified must be clearly represented in the instructional plan

- 1d. Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
- 3a. Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
- 3c. Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- 3d. Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
- 5c. Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
- 5d. Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

**Content Area Standards**

List the specific content area standards that are addressed in the lesson

**NGSS:** ESS1.B:Earth and the Solar System: The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.(MS-ESS1-2),(MS-ESS1-3); Scale, Proportion, and Quantity: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3),(MS-ESS1-4)

**Texas Essential Knowledge and Skills (TEKS) Middle School Science**

Earth and space. The focus of this strand is on introducing Earth's processes. Students should develop an understanding of Earth as part of our solar system. The topics include organization of our solar system, the role of gravity, and space exploration.

- (A) describe the physical properties, locations, and movements of the Sun, planets, moons, meteors, asteroids, and comets;
- (B) describe the history and future of space exploration, including the types of equipment and transportation needed for space travel
- (C) analyze the characteristics of objects in our solar system that allow life to exist such as the proximity of the Sun, presence of water, and composition of the atmosphere
- (D) identify the accommodations, considering the characteristics of our solar system, that enabled manned space exploration

**INSTRUCTIONAL PLAN**

List detailed steps of the lesson, including instructions for the students.  
Identify Task/Day/Week

This is a self-guided online challenge for students to become space cadets.

Background: Help! The Mars Insight Rover has hit a snag! Currently, NASA engineers and scientists are occupied with the Perseverance Mission to Mars. They are searching for promising space cadets to help with the Insight Rover currently on Mars. The Insight Rover has been using its robotic arm to help the heat probe known as the “mole” burrow into Mars. Unfortunately, a nearby rockslide has buried part of the arm and it can no longer assist the mole. To get the Insight Mission back on track, NASA needs YOU to help plan and execute the rescue mission to Mars. Because NASA won't be ready to send humans to Mars until around the year 2030, man's best friend and canine astronaut extraordinaire, Maggie, has been enlisted to help you complete this mission.

The tasks include:

**Task #1:** Download *Spacecraft 3D* on your tablet or smartphone and *Solar System Space Museum (AR/VR)* on a smartphone.

**Task #2:** Play embedded video to learn about how NASA is getting to Mars.

**Task #3:** It's time to start planning your mission. First, you must determine which spacecraft Maggie will go to Mars in. Use the *Spacecraft 3D* app and the pebble target shown to activate the AR. Follow the instructions provided in the app to view the different spacecrafts for Mars. To help Maggie explore Mars, you will need to find out the following information.

1. Find the spacecraft in which the main purpose is to study the interior of Mars.
2. Find the spacecraft that landed in Gale Crater on Mars.

**Task #4:** Now that Maggie has a spacecraft, let's get this mission underway. To successfully take off from Kennedy Space Center, explore the Atlas V 551 spacecraft from the *Spacecraft 3D* app to determine which NASA logo is shown on the spacecraft.

**Task #5:** Maggie needs to test her space paws out with a quick moon walk before she heads to Mars. Download the free *Solar System Space Museum AR/VR* app. Once you've explored Earth and the moon answer the following questions about what Maggie learned on her moon walk.

1. How many miles is Earth from the sun?
2. What percentage of Earth's atmosphere is Oxygen?

**Task #6:** Now that she has her space paws in order, it's finally time to send Maggie to Mars! Prepare for take off! Using the *Solar System Space Museum AR/VR* app, answer the following questions about the solar system to help Maggie navigate her way to Mars.

1. What planet is the hottest?
2. What planet is humanity's next destination?

**Task #7:** Maggie has made it to Mars! To find the Insight rover, you will need to get an aerial view of the red planet using the first ever Mars helicopter. Watch the video below to learn how NASA is using a drone to collect different pictures on Mars. Then click the secret code word from the choices below to fly the drone through the maze connecting Maggie to the Insight rover.

1. Pick the correct name of the Mars helicopter to see it fly.
2. Did you know flying drones for NASA is an actual career?

**Task #8:** Great work! Your drone has found the Insight Rover! The next step of your mission is to break the code below so Maggie's rover can travel to the Insight, and Maggie can free the robotic arm covered by rocks and dust. To break the code, follow the instructions in each column to uncover the answer to the question below.

1. Where is NASA hoping to send astronauts in 2030?

**Task #9:** Great work Space Cadet! Solve the puzzle below by using the secret code to finish Maggie's Mission and send her back to Earth. Click on the word that matches each group of symbols.

Final screen: You did it! Way to go Space Cadet! Students may earn a certificate that can be printed out once they complete the survey related to the experience.

The challenge includes links to other AR and VR apps related to space science.

Apollo 15 Moon Landing VR, Spacecraft AR, Astronaut VR Google cardboard, NASA Be a Martian, and NASA Selfies.

### ASSESSMENT(S) / OUTCOME MEASURES

Formative/Summative performance based assessments, formal and informal monitoring of student progress, how learning data is collected and used for re teaching and personalized learning

\*Please provide links to any resource that can be copied and reused

- Which spacecraft was designed to study the interior of Mars (A. Curiosity, **B. Insight**, C. Perseverance, D. Ingenuity)
- Which of the spacecraft landed in Gale Crater on Mars? (**A. Curiosity**, B. Insight, C. Perseverance, D. Ingenuity)
- How many miles is Earth from the Sun? (**A. 93 million**, B. 124 million, C. 55 million, D. 4 million)
- What percentage of the Earth's atmosphere is oxygen? (A. 36%, B. 85%, **C. 21%**, D. 1%)
- Which of these planets is the hottest? (A. Mercury, B. Jupiter, **C. Venus**, D. Mars)
- Which of these planets is humanity's next destination? (A. Mercury, B. Jupiter, C. Venus, **D. Mars**)
- Which is the correct name of the Mars helicopter? (A. Curiosity, B. Perseverance, C. Insight, **D. Ingenuity**)
- Where is NASA hoping to send astronauts in 2030? (A. Mercury, B. Venus, C. Earth, **D. Mars**)

### MATERIALS / RESOURCES/TECHNOLOGY

- <https://www.maggiestoestomars.org/>
- Target for Spacecraft 3D <https://www.jpl.nasa.gov/apps/images/3dtarget.pdf>

**LESSON REFLECTION****How does this lesson empower students to take an active role in their learning?**

This is a self-paced challenge to help Maggie get to Mars. The participants will use augmented and virtual reality as well as coding skills.

**How does this lesson give students the opportunity to evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources?**

Key scientific concepts about outer space living conditions, distance, time, and practicalities of space exploration are embedded in this lesson.

**How are students acting as computational thinkers by breaking problems into component parts, extracting key information and developing descriptive models to understand complex systems or facilitate problem-solving?**

There are two "coding" puzzles in the challenge that require some simple problem solving.