THE EDUCATION FUND
CELEBRATING 30 YEARS
2015-2016

ideas with IMPACT

idea packet

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Mission to Planet X

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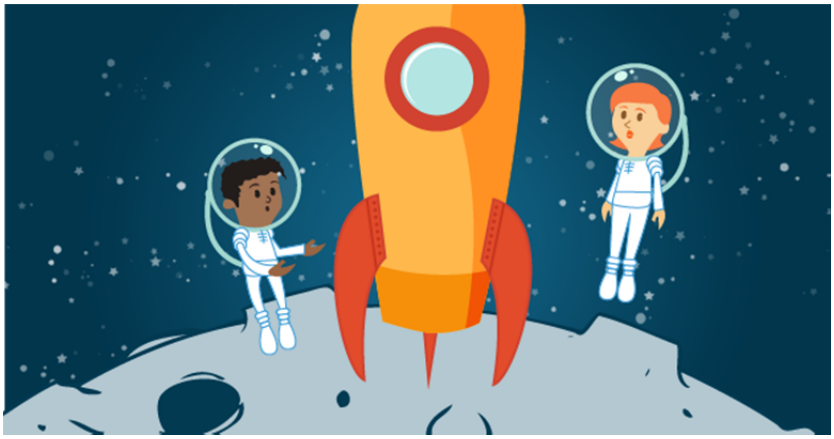
MAS 6-12 @ Zelda Glazer
School Mail : 6052

Mission to Planet "X"



For information concerning Impact II opportunities including Adapter and Disseminator grants, please contact:

The Education Fund
Telephone: (305)558-4544, EXT. 113
E-mail: IMPACT@educationfund.org
Website: www.educationfund.org

Table of Contents

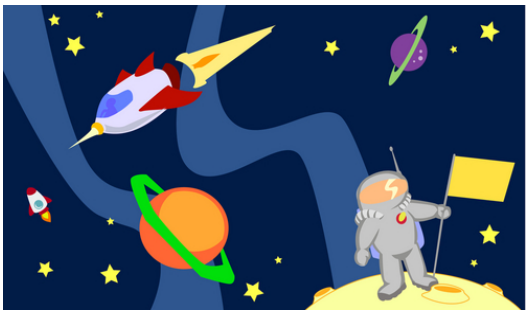
Goals / Objectives

SC.8.E.5.1 Recognize that there are enormous distances between objects in space and apply our knowledge of light and space travel to understand this distance.

SC.8.E.5.2 Recognize that the universe contains many billions of galaxies and that each galaxy contains many billions of stars.

SC.8.E.5.3 Distinguish the hierarchical relationships between planets and other astronomical bodies relative to solar system, galaxy, and universe, including distance, size, and composition.

SC.8.E.5.10 Assess how technology is essential to science for such purposes as access to outer space and other remote locations, sample collection, measurement, data collection and storage, computation, and communication of information.



Activities

- *Planet Research (students can be placed in teams of two and be assigned a planet to research information on)*

- *Discovery of Planet X (students will then provide information of their newly found planet. *Use template from the "Planet Research" activity for their newly found planet.*

- *Simulation of Planet Terrain (students will use a foam board to replicate the terrain of their newly found planet- Planet X.) This activity helps students simulate Space Missions like NASA astronauts in order to prepare for missions.*

- *Rover (students will assemble a "programmable robot" which will walk on Planet X – the simulated planet terrain). This activity helps students understand the engineering process NASA does when sending rovers into space for planet exploration.*

- *Rover Mission (students will provide directions to their programmable robot and describe the mission of their rover – collect samples, take pictures, etc.). This activity helps students understand how technology helps NASA learn about space and other planetary orbits.*

Planet Research Activity

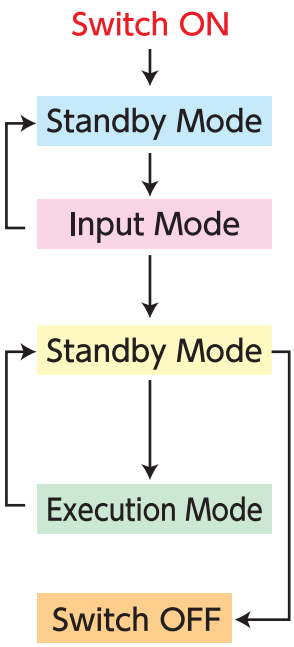
Planetary name:	
Discovered by:	
Orbit size (km):	
Orbit period: (length of year)	
Rotation period: (length of day)	
Equatorial: Circumference (km)	
Atmosphere:	
Temperature (Celsius) Day / Nights	
Gravity m/s	

Planet Photo (Illustration)

1 . How to use the Push-Button Programmable Robot

① Operating Modes

This robot has three different modes that it enters. They can be distinguished by the status of the LED.



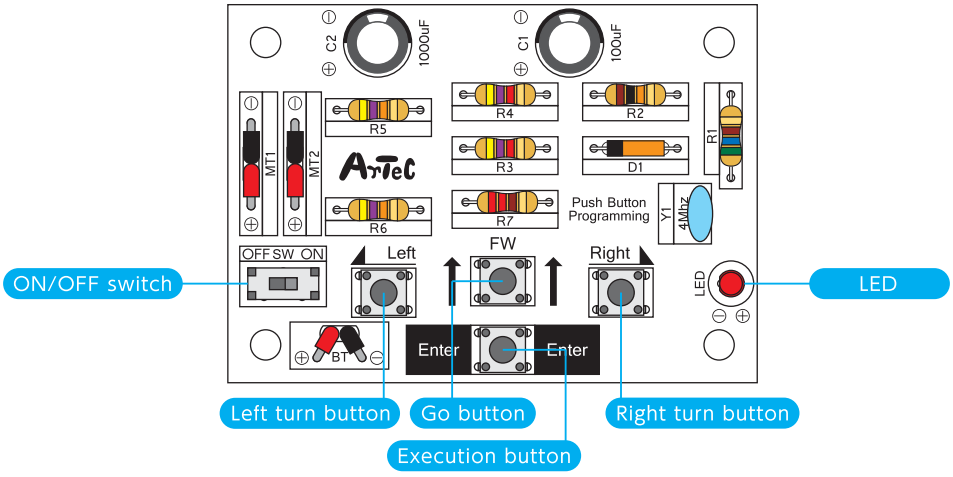
Operating Mode Chart

LED	Mode
Lit up	The LED is lit up and robot is ready for command input.
Flashes once after each input	When operating in Input Mode, the robot memorizes each command you enter.
Flashing	After you finish inputting all commands, hold down the Execution button for about two seconds. The robot enters Standby Mode and the LED starts blinking.
Lit up	When Execution button is pressed while the robot is in Standby Mode, it begins executing the commands and the LED stays on. After executing all commands, the robot returns to Standby Mode and the LED starts blinking.
LED off	Turn off the robot to delete all commands currently stored in memory.

Check!

I understand the robot's different operating modes. ☐

② How to control the robot.



Buttons	Written on the board	Button name	Command
Action	Right	Right turn button	Pressing this button once makes the robot turn to the right for 0.5 seconds.
	FW	Go button	Pressing this button once makes the robot move forward for 0.5 seconds.
	Left	Left turn button	Pressing this button once makes the robot turn to the left for 0.5 seconds.
Execution button	Enter	Execution button	Used for switching modes. Operates three ways: single press, double press, and long press (holding down the button).

③ How to control the robot

The robot is programmed by entering commands one at a time. This is done via the four buttons
"Go, Right turn" is two commands. Each command can have its own time span.
The number of times you press an action button determines how many seconds the robot will execute that action.
Each press of an action button means 0.5 seconds.
Two presses would be 1 second, etc.
To make the robot "Go forward for 5 seconds" in Step 1, you would press the Go button ten times in a row.
After pressing the Go button ten times in Step 1, press the Execution button once to input the command.
Next, input the right turn for Step 2.
After you finish inputting all the commands, hold down the Execution button for about two seconds to enter Standby mode.

Step	Action	Sec.	Button push
1	Go	5 sec.	10 times

↓

Step	Action	Sec.	Button push
2	Right turn	3 sec.	6 times

Input example

(Go 5 seconds.→Right 3 seconds.→Left 4 seconds.→Left 3 seconds.→Go 3 seconds.)

- Press Go button ten times. Press Execution button once. The LED will flash once to confirm receipt of your command.
- Press the Right turn button six times. Press the Execution button once. The LED will flash once to confirm receipt of your command.
- Press the Go button eight times. Press the Execution button once. The LED will flash once to confirm receipt of your command.
- Press the Left turn button six times. Press the Execution button once. The LED will flash once to confirm receipt of your command.
- Press the Go button six times. Press the Execution button once. The LED will flash once to confirm receipt of your command.
- Hold the Execute button down for two seconds. The LED will begin flashing continuously and the robot will enter Standby Mode.
- Pressing the Execution button again causes the robot to enter Execution Mode. The LED will remain lit and the robot will perform the commands you entered.
- End. The LED will flash repeatedly and the robot enters Standby Mode.

Check!

I understand how to control the robot. ☐

④ How to cancel a command.

A command can only be canceled when the robot is in Input mode.
For example, when you want to cancel the command in Step 4 (Left turn), first press the Execution button once to finish entering the command.
Next, press the Execution button twice in a row. The LED will blink twice to confirm that the most recent command has been deleted. The program is now the same as it was after inputting Step 3.
Further, when you press Execution button twice in a row again, the command in Step 3 input will be deleted. Each double press of the Execution button deletes the last command in your program. If necessary, you can delete all your commands one by one.

Step	Action	Sec.	Button push
1	Go	5 sec.	10 times

↓ Input mode

Step	Action	Sec.	Button push
2	Right turn	3 sec.	6 times

↓ Input mode

Step	Action	Sec.	Button push
3	Go	4 sec.	8 times

↓ Input mode

Step	Action	Sec.	Button push
4	Left turn	3 sec.	6 times

↓ Input mode

Check!

I understand how to cancel a command. ☐

⑤ Specifications

The Push-Button Programmable Robot store up to 360 actions (equivalent of 180 seconds) or 30 steps.
Once 360 actions or 30 steps are entered, further input will not be accepted.

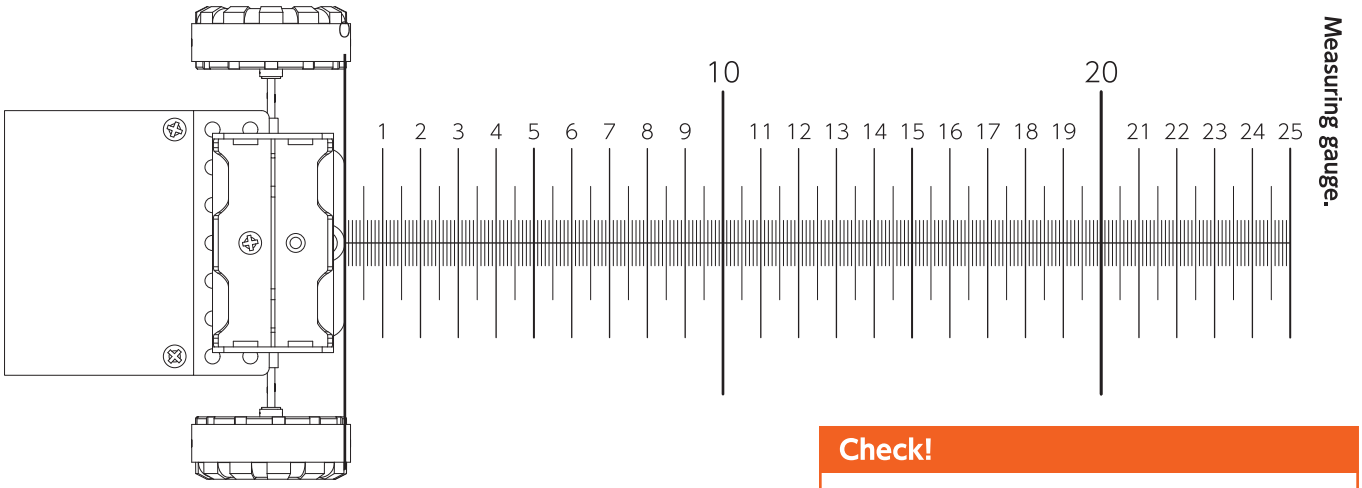
Date | Year | Class | NO. | NAME

2. Learn how the robot moves.

The two motorized gear boxes move the robot. Each motorized gear box has slightly different properties, making its movements unique. This causes the robot to sway right and left when moving forward. The amount of energy remaining in the batteries also affects how the robot moves. Periodically measure the robot's movements on the gauge paper and make adjustments through command input.

① Measuring forward movement

Measure the numerical values using the gauge on the back side of the course map.
Record numerical data on how long it takes the robot to move forward a certain distance and how far it can travel in a given time.



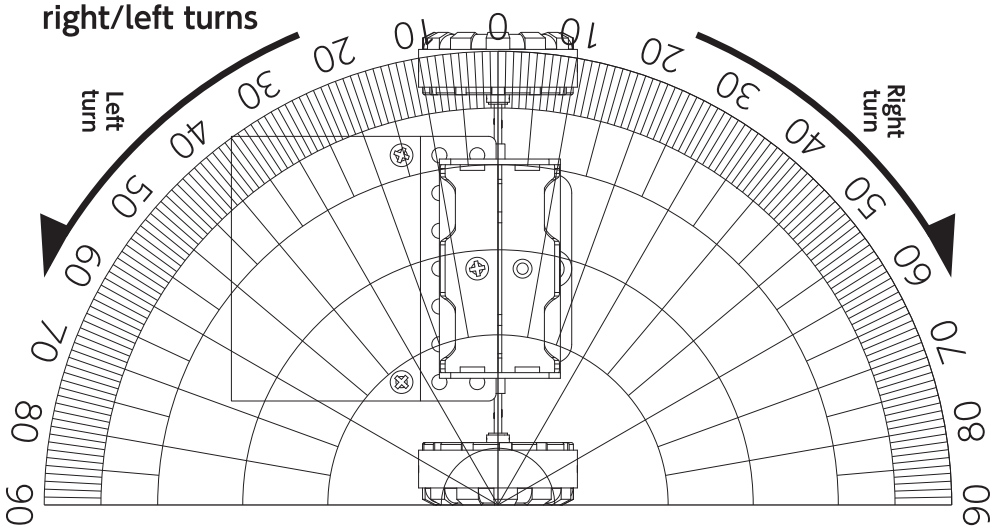
Check!

I gathered data on the forward movement. ☐

② Measuring right and left turn

Measure the numerical values using the gauge on the back side of the course map.
Record numerical data on how long it takes the robot to move forward a certain distance and how far it can travel in a given time.

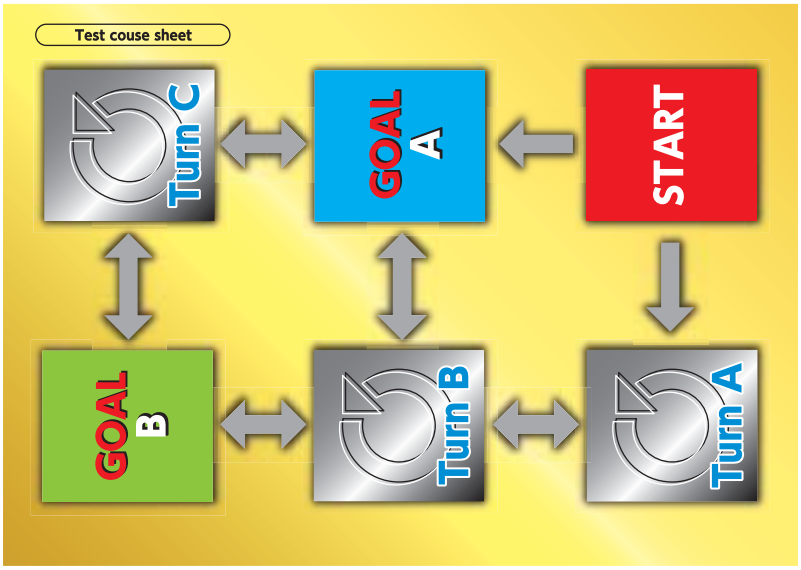
Measurement gauge for right/left turns



Check!

I gathered data on the right and left turns. ☐

3. Let the robot run the course.



Let the robot run from the start to the goal. If you can make the robot run to the goal and stop with in the goal square, you cleared the course. Use the data you recorded when you measured the performance of the robot in "2 Learn how the robot moves."

Course ①

Start Goal A

Step	Action	Length / Direction	Sec.	Button push
1				

Check!
I cleared Course ①. ☐

Course ②

Start → Turn A → Goal B

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				

Check!
I cleared Course ②. ☐

Date | Year | Class | NO. | NAME

Course ③

Start → Turn C → Goal B

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				

Check!
I cleared Course ③. ☐

Course ④

Start → Turn A → Turn B → Goal A

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				
6				
7				

Check!
I cleared Course ④. ☐

Course ⑤

Start → Turn C → Goal B → Turn A → Start

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Check!
I cleared Course ⑤. ☐

Course ⑥

Start → Goal A → Turn B → Goal B → Turn C → Start

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

Check!

I cleared Course ⑥. ☐

Course ⑦

Start → Turn A → Turn B → Goal A → Turn C → Goal B

Step	Action	Length / Direction	Sec.	Button push
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Check!

I cleared Course ⑦. ☐

Date | Year | Class | NO. | NAME

Interactive Resources

Classzone: Distances between planets in the solar system
This incredible simulation is a great way to help students visualize the vast distance between planets. Since the mobile we make in this unit has planets that are to scale but not distances to scale, this video is perfect for teaching that aspect. Students will be amazed at the vast distance between the outlying planets

Kids Astronomy: The Solar System
This interactive site gives users a chance to see the solar system in motion and to click on any part of it to learn more. It's a great way to help students visualize the different speeds at which the planets orbit the sun as well as the size of their orbits and the consequent varying lengths of their years. In 'visiting' all the various places in the solar system (even including comets and asteroid belts!), students get a full page of fascinating content on that topic that is both comprehensive and easy to understand.

Magic School Bus Space Chase
This quiz game coincides with the Magic School Bus book above. With each quiz question, the player follows Miss Frizzle around the solar system and answers questions along the way. The material is extremely relevant to the unit and it's a fun way for students to review what they've learned.

NASA: StarChild Learning Center
StarChild is a great source for the most up-to-date information since it was created by NASA. Students can explore various topics on the solar system on both a beginner and intermediate level. The site has the option to have content pages read to you as well. In addition to information, there are games and activities and it's easy to toggle back and forth between levels if users care to do so.

Wonderville: Phases of the Moon
This kid-friendly interactive activity gives students a quick lesson on the phases of the moon before it involves them in finding the phase of the moon that matches the moon's current position.

Mars Rovers - National Geographic
video.nationalgeographic.com/**video**/**mars-r**...
National Geographic Society
Watch as two NASA rovers embark on an incredible journey to uncover the secrets of Mars.

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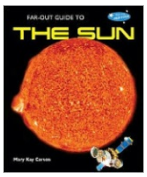
Literature Connections

13 Planets: The Latest View of the Solar System by David A. Aguilar. Illus. by the author. 2011. 64p. National Geographic Children's Books. (978-1426307706).

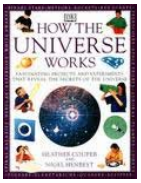
The newest edition of this book includes the 8 planets and 5 dwarf planets that form our solar system. It's a great introduction to the planets as it gives a brief overview of each planet and the sun, explains how the solar system formed, and briefly touches on the discovery of new solar systems orbiting distant stars. It's enough information to get students acquainted with the planets before studying them more in depth as we'll be doing later in the unit.

Far-Out Guide to the Sun by Mary Kay Carson. 2010. 48p. Bailey Books. (978-1598451801).



This book explores fascinating facts about the sun as well as mysteries still being researched today. It's a comprehensive resource for learning about the sun because of the wide variety of topic it touches on, including the sun's relationship with the earth, the age of the sun and its future, and the long journey research probe Solar Probe will begin in a few years when it departs Earth to research the sun.

How The Universe Works by Heather Couper and Nigel Henbest. 1994. 160p. Reader's Digest. (978-0895775764).

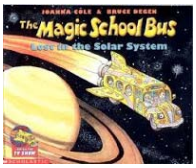


This book is the source of 90% of the activities within this unit. It's an amazingly creative resource for hands-on experiments kids can do to learn about the universe. The materials and prep work involved are never too complicated and experiments that require parents to help out are clearly noted. I was so excited to discover so many interesting experiments within this book and it's a wonderful addition to any upper elementary science classroom.

If You Decide To Go To The Moon by Faith Mcnulty. Illus. by Steven Kellogg. 2005. 48p. Scholastic Press. (978-0590483599).

In this imaginative book, readers go on a journey to the Moon and gain a perspective on how things differ up there. It's a great way to help students understand the atmosphere and lack of gravity of the Moon as well as its unique landscape. The end of the fascinating journey gives students an idea of the importance of air and water, "Earth's special blessings". The book is a great way of helping students understand why we can't live on the moon.

The Magic School Bus Lost In The Solar System by Joanna Cole. Illus. by Bruce Degen. 1992. 40p. Scholastic Press. (978-0590414296).



Another adventure with Miss Frizzle, this is the story of the Magic School Bus's journey through the solar system. This series of books is always a great way to get students imaginations going and help them see science class as more of an adventure than a task. This book even ends with the class making a mobile of their solar system discoveries which is also an activity in the unit. Students will love doing the same thing as the students in the story. The only caveat is it still includes Pluto as a planet but that would also be a great way to show students that for a long time everyone believed it was.

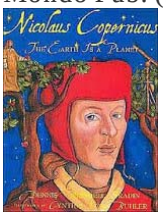
Mighty Megaplanets: Saturn & Jupiter by David Jefferis. Illus. by the author. 2008. 32p. Crabtree Publishing. (978-0778737537).

This book is a great introduction to the gas giant planets. Though it focuses on Saturn and Jupiter, it goes into detail about the gas giants in general. Students will love learning about the rings of these gas giants, from the bold rings of Jupiter to the less visible rings of Saturn. Because it can be hard to grasp the idea of planets made up of mostly gas, the imagery and fun facts in this book make it a great resource for helping students understand the wonders of these two gas giants.

My Science Notebook: The Moon by Martine Podesto. Illus. by the author. 2009. 104p. Gareth Stevens Publishing. (978-0836892154).

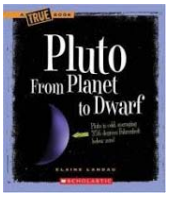
This book is a series of letters to 'Dr. Brainy', a scientist who knows all about the moon. The questions range from simple to more complex but Dr. Brainy never fails to give a thorough answer that's easy to understand. This book would be a great addition to a KWL chart about the moon if students looked through it to see if Dr. Brainy answered any of the questions they came up with.

Nicolaus Copernicus: The Earth Is a Planet by Dennis B. Fradin. Illus. by Cynthia Von Buhler. 2004. 32p. Mondo Pub. (978-1593360061).



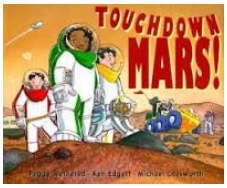
This book is a beautifully illustrated biography on Copernicus and how he contributed to astronomy with his idea that the planets rotate around the sun. Students will love the pictures and the elementary-level text will make it easy for them to understand Copernicus's theories and notions.

Pluto: From Planet to Dwarf by Elaine Landau. 2008. 48p. Children's Press. (978-0531147948).



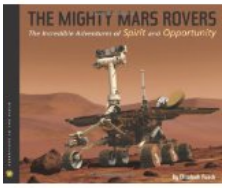
This helpful little book opens with two true or false statements, one of which is true and one of which is false. The false statement of course is that Pluto is a planet and the book goes on to explain the discovery of Pluto and its reclassification in 2006. The book is a great resource for helping students understand the difference between planets and dwarf planets.

Touchdown Mars! by Peggy Wethered and Ken Edgett. Illus. by Michael Chesworth. 2000. 40p. Putnam Juvenile. (978-0399232145).

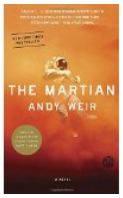


This adventure book brings the readers on the long journey from Earth to Mars as an astronaut. Readers get to explore Mars from its canyons and volcanoes to its moons, learning facts about the red planet along the way. It's an imaginative piece of literature to add to the classroom and even contains a Mars A-B-Cyclopedia at the end for student reference.

The Mighty Mars Rovers: The Incredible Adventures of Spirit and Opportunity (Scientists in the Field Series)
Jun 19, 2012 by Elizabeth Rusch



The Martian
by Andy Weir



RESEARCH IDEAS

Please find below a few ideas for topics of papers, presentations, or other projects for students to learn more and help deepen students' understanding of the Planets, our Solar System/Galaxy and Future Space Exploration.

• Formation of the Sun and solar system

• Satellites and Telescopes for observing objects in the solar system, past, present, future. Some past/present missions include SOHO (Sun), Pathfinder (Mars), Galileo (Jupiter), Mariner flyby missions (Mercury, Venus).

• Aurora borealis (Northern lights)

• Space weather & the effect of solar activity on Earth

• Eclipses

• Possibility of life in the solar system

• Moons of the planets

• Debate: whether or not Pluto is a planet

• Comets

• Craters on the Moon

• Craters on Earth, history of meteor impacts on Earth

• What meteorites tell us about the Solar System

• Volcanic activity and plate tectonics on planets and moons

• Search for and discovery of planets around other stars (called exoplanets)

• Humans in space / History of Space Exploration

• History of knowledge of the Solar System

THE EDUCATION FUND
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APPLY FOR AN IMPACT II ADAPTER GRANT!

M-DCPS teachers, media specialists, counselors or assistant principals may request funds to implement an IMPACT II idea, teaching strategy or project from the Idea EXPO workshops and/or curriculum ideas profiled annually in the ***Ideas with IMPACT*** catalogs from 1990 to the current year, 2015-16. Most catalogs can be viewed at The Education Fund website at www.educationfund.org under the heading, "Publications."

- Open to all K-12 M-DCPS teachers, counselors, media specialists
- Quick and easy reporting requirements
- Grants range from $150 - $400
- Grant recipients recognized at an Awards Reception

To apply, you must contact the teacher who developed the idea before submitting your application. Contact can be made by attending a workshop given by the disseminator, communicating via email or telephone, by visiting the disseminator in their classroom, or by having the disseminator visit your classroom.

Project funds are to be spent within the current school year or an extension may be requested. An expense report with receipts is required by May 2, 2016.

APPLICATION DEADLINE:
December 11, 2015

Apply online at www.educationfund.org

For more information, contact:
Edwina Lau, Program Director
305.558.4544, ext. 113
elau@educationfund.org

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