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| **Merit Badge:** | Space Exploration |
| **Counselor Name:** | **Ed Rafacz** |
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| **Preferred Method of Contact:** | **Phone or email** |
|  | **Prerequisites:***list all requirements which needto be completed in advance* | 1. What is the purpose of space travel (Read for Discussion)
	1. Historical – (Page 7)
	2. Immediate goals in terms of specific knowledge
		1. Current Benefits (P.11)
	3. Benefits relate to Earth Resources, technology and new products Humanity’s Future (P.11)
2. Make a trading card of a Space Pioneer. Be prepared to talk about it (Prerequisites)
	1. Information on card (Page 14 – 21)
		1. When were they Born and where
		2. Education
		3. Career before Space exploration
		4. Space Career
		5. Most famous in space exploration for…
	2. (Extra Information) Former Astronauts - <https://www.nasa.gov/astronauts/biographies/former>
	3. (Extra Information) Present Astronauts - <https://www.nasa.gov/astronauts/biographies/active>Rockets -
3. Rockets
	1. Build, Launch, Recover, then Launch the same rocket again – You may fix it to launch again. (Prerequisites)
	2. Parts of a rocket (Read for Discussion) (Page 30 – 31)
4. Discuss Newton’s laws and how they apply to space travel (Read for Discussion)
	1. Law of Action-Reaction (Rubber Band)
		1. **First Law** – an Object in motion stays in motion or at rest stays at rest unless acted on by another force. (Page 34)
		2. **Second Law** – Force = Mass x Acceleration (Rubber band on different spot of ruler) Page 34
		3. **Third Law** – For every action there is an equal and opposite reaction (Rubber band on ruler and drop) Page 35
	2. How Rocket Engine Works (Page 35)
		1. Engine push rocket up and earth down, relative to mass
	3. How Satellites stay in Orbit (Page 37-38)
		1. Throw ball further and further ( Newton story) Ball eventually miss hitting the ground.
	4. How Satellites take picture
		1. Graph paper and dots (Page 39-41)
5. Do b or c of the following (Do before and send in early)
	1. Discuss with your counselor a past unmanned space exploration mission and an early manned space mission (Page 9). (Prepare for Discussion)
		1. Extra information Interactive Virtual Spacecraft Museum - <https://www.patreon.com/user?u=29726054>
	2. Design an unmanned mission to another planet or moon. Show the conditions of the planet or moon, then show the design and how you overcame the extreme conditions. (Prerequisites) (Page 43-55)
		1. Include these three as a minimum
			1. Environmental Issues (Pressure, Temperature, Radiation)
			2. Power issues
			3. Why are you going there? What do you want to measure? Water, Minerals, further exploration?
	3. Make an electronic scrap book using electronic news articles and photos on a current planetary exploration mission. Use Google Slides or PowerPoint or comparable format. (Prerequisites)
6. Describe purpose, operation and components of shuttle or space station (Read For Discussion) (Page 57-73)
	1. Shuttle ( <http://spacecraftguide.com/Panorama/SpaceShuttle.html> )
	2. Space Station ( <http://esamultimedia.esa.int/multimedia/virtual-tour-iss/> )
7. Design a moon base and show source of energy, life support, Purpose and function (Page75-79) (Prerequisite)
8. Go over 2 careers in space. (Page 80-85) (Prerequisite)

**Prerequisites are Highlighted in Red. Do as many prerequisites as you can, and hand them in day before class. It’s ok to not finish the prerequisites. You can finish them later but you will get a partial.** |
| **Class Work:***list all requirements which will be completed in class* | **We will do requirements 1, 3-parts of a rocket, 5a, and 6 in class. They are labeled as Read for Discussion. MAKE SURE you read these sections and be prepared to add to the discussion.** |
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| **Use of “Online” Workbook:** | Found at = <https://troop577wichita.weebly.com/uploads/1/1/2/2/11225514/space_exploration_2004.pdf>  |
| **Purchase of Merit Badge Booklet:** | NOT REQUIRED but very helpful! Please try to bring one. |
| **Number of Sessions needed:***each session is 2 hours* | 1 |
| **Maximum Class Size:** | 10 |
| **Notes and/or Comments:** |  |