Overview:

In this exercise, students will role-play a scenario in which their ability to collaborate and work together as a team will dictate their chances at survival on the moon.

Learning Outcomes:

- Thinking about principles for team management in stressful, high-stakes environments.
- Students will build collaboration, cooperation, problem-solving, and leadership skills.

Information for the Instructor:

- "Exercise on the Moon" packet, included below.

Instructions:

Split the class into two teams (A and B). Tell the class they will be doing an exercise in collaboration, teamwork, and leadership. Explain that they will be role-playing a scenario in which they are stranded on the moon and that their ability to work together as a team will dictate their survival.

Either individually or as a class, have students read through the packet. Check for questions or points of clarification. When students are ready, have them play out the scenario. The activity can be adapted based on the time available to the instructor.

Applications:

This activity can be used when students need to be engaged outside of the standard curriculum, for example, between units, near the end of the school year, after standardized testing, or at an after-school club. The activity can be used to exemplify that cooperation is possible (and sometimes necessary) between those who would not otherwise want to work together, which can also be tied into units in history, social studies, government, and leadership.

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Background to the Exercise on the Moon

Introduction

The exercise in which you are about to participate assumes that you have been shipwrecked on the moon and that your survival will depend upon reaching sound decisions on a fairly complex problem. We assume that none of you have been or are astronauts and therefore ask you to use your imagination and reasoning power without the benefit of prior experience.

The basis of this exercise is "collaborative problem solving." What we will try to demonstrate is that collaboration can produce a better solution to a complex problem than can be constructed by individuals working alone – and that is true when collaboration is with persons or parties whose interests are not identical with your own.

This exercise is also designed to examine the role of "facilitative" leadership. Each team will select a leader to facilitate discussion on a solution to the collective problem. Both the leader and the team during the exercise should think about the role of a facilitative (as opposed to a directive) leader, and the role of the team in such situations.

In short, this is an exercise on:

- Facilitating a complex dispute;
- Leading and participating in the management of a complex problem;
- Seeking areas for collaboration with a group that does not fully share the same interests and goals;
- The value of attempting collaboration early in a dispute rather than waiting until positions become hardened;
- Thinking about principles for team management in stressful, high stakes environments.

Managing Complexity

It is always useful, when confronted by complexity, to define the problem as precisely as possible.

The next step is to identify as precisely as possible, who the parties are, what their interests are, what their perceptions are, and then try to do the same with your own side with regard to perceptions, interests, prejudices, etc.

Another important step, often overlooked, or ignored, is the need to sort out differences in fact, data, and definitions of the problem. This step helps to reduce a complex problem to smaller "chunks," so that you can begin to identify parts of the problem, which are analyzed and discussed from the complex web of the larger problem. Another convenient step is to aggregate various chunks of the problem into larger and more complex pieces so that you and your competitors can play the game of "what if" to see if any solutions appear to be workable and acceptable to all sides. After playing this game of "what if," it will then probably be necessary to revise your analysis of the facts and the aggregation of the smaller chunks and continue to go between analysis and "what if" (i.e., negotiations) until a consensus can be reached for the entire problem.

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The fact that all of this may seem like simple common sense highlights the fact that something close to common sense is often quite far from what actually happens in real world disputes.

Collaboration

In this exercise, you will notice that the best solution is not a win/lose decision. Even though the two sides of this problem have slightly different needs and objectives, the best solution is one which is best for both sides, not only one side. One of the key theories that we are trying to illustrate through this exercise is that collaboration can in many cases lead toward one's own self-interest goals more quickly than an adversarial approach.

Like all theories, this one has limited application. It is not pertinent for all times or all conditions. But it can be useful at certain times and for certain disputes. We must therefore learn a technique – how to collaborate – and a judgment – when to collaborate. And, what leadership styles work in which situations.

Finally, when a conflict or an aspect of a dispute appears to be appropriate for collaboration, then it would be useful to start the process as early as possible. In this way, some agreement on the data and facts upon which the negotiations are to take place can be developed, and attitudes can be formed before decisions and prejudices become hardened into "non-negotiable" positions.

[** This simulation is modified from an original exercise developed by the American Arbitration Association during the Cold War. Team A was made up of astronauts from the Soviet Union; Team B from the United States. **]

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Exercise on the Moon

Scenario and Instructions

Each of you is a member of a multi-national team of astronauts who are part of a multi-national mission to explore the surface of the moon. You all come from different countries and have not worked together before, other than taking a one-week training session. The mission is divided into two teams: Team A (the "flight" crew, whose job is to fly the lunar craft to the moon and back to the mother ship upon completion of the exploration) and Team B (the exploration crew, whose job it is to go out from the lunar craft and collect data about the moon).

The Crisis: When the lunar craft attempted to land on the moon's surface a meteor shower damaged the space ship and forced it to crash land on the dark side of the moon, hundreds of kilometers from its landing point. Those of you who have survived the crash are now stranded on the moon without any communication with the mother ship. The captain of the lunar craft did not survive the crash, so there is no single leader with authority over both crews. Each team must select its own leader.

Survival: The goal of the exercise, and the overriding goal for the stranded astronauts, is to make use of the equipment in the damaged spacecraft and divide it up in the best way possible to ensure the rescue and survival of both crews.

The engineers among the crew have determined that in order to be rescued, Team B needs to reach an area on the dark side of the moon that is suitable for a lunar landing. The rescue site is 100 kilometers away, but in order to get there the exploration crew will have to go into and through a deep 10-kilometer wide crater that could be dangerous. Going around the crater would add another 25 kilometers to the trip. While Team B attempts to reach the site for a lunar landing, Team A needs to stay with the damaged craft because in 72 hours the moon's orbit will be positioned so that Team A can communicate with the mother ship on the only possible radio frequency when the moon's orbit shifts the crash site into the sunny side of the moon. After the initial 72 hours of darkness, the crash site and Team A will remain in the sun. Team A will then alert the mother ship to get to the landing zone and rendezvous with Team B. A rescue party will then be dispatched to the crash site in order to get more supplies to Team A so that they can safely get to the landing zone.

It is important to reiterate that based on NASA's previous scenario planning, rescue can only occur at the landing zone while communication with the mother ship can only occur from the crash site. Therefore, both crews must survive in order to ensure the survival of all the stranded astronauts.

The Negotiation Scenario

At the beginning of the simulation, each crew member will prioritize the list of equipment and supplies. Then each crew will meet separately in order to develop consensus about how the undamaged material should be divided. Each crew must prioritize the list of equipment based on its respective mission. Therefore, Team A must think about what it needs to survive at the crash site long enough to contact the mother ship and hold out until the rescue party arrives. Team B must think about what it needs to travel 100 kilometers and reach the landing zone. Once consensus has been reached by each team, the two crews will come together in order to divide the equipment.

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Each team will have to choose a leader. The leader will run the meeting on how to prioritize the team's equipment needs and record these on the accompanying forms or designate a team member to do so.

Note: This is an exercise in group decision-making. This means that each team's priorities and each crew's priority ranking for each of the survival items must be agreed upon by each group member before it becomes a part of the group decision. Consensus is difficult to reach. Therefore, not every ranking will meet with everyone's complete approval. Try, as a group, to make each ranking one with which all crew members can at least partially agree. Here are some guidelines to use in reaching consensus:

- Avoid arguing for your own individual judgments. Approach the task on the basis of logic;
- Avoid changing your mind only in order to reach agreement and avoid conflict. Support only solutions with which you are able to agree somewhat, at least;
- Avoid "conflict-reducing" techniques such as majority vote, averaging or trading in reaching decisions;
- View differences of opinion as helpful rather than as hindrances in decision-making

On Form #1 each individual should rank the equipment items.

On Form #2 place the individual rankings made earlier by each team member in one of the columns. The final column will be the ranking for each item as decided by the consensus of the team.

On form #3, the two teams will agree on how to divide up the equipment in order to ensure their rescue and survival of the entire crew.

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FORM #1 (Individual)

INVENTORY OF UNDAMAGED MATERIAL

_____ One box of matches

_____ 100 cartons of food concentrate (5-day ration for each crew member)

_____ 150 feet of nylon rope

_____ Parachute silk (from 3 parachutes)

_____ One portable heating unit

_____ Two .45 calibre loaded pistols

_____ One case dehydrated milk

_____ One 100 lb. Tank of oxygen (this tank holds a 5-day supply for one five-person team) and two 60 lb. tanks of oxygen (each tank holds 3-day supply for one five-person team)

_____ One stellar map (of the moon's constellation)

_____ One life raft

_____ One magnetic compass

_____ 15 2-gallon containers of water (normally a 5-day ration for 10 crew members)

_____ Five light flares

_____ One First aid kit containing injection needles

_____ One Solar-powered FM receiver-transmitter

_____ 3 Flashlights

_____ 1 map of moon's terrain

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FORM #2 (Crew)

INVENTORY OF UNDAMAGED MATERIAL

Team Individual
Priority Priority

_____ _____ One box of matches

_____ _____ 100 cartons of food concentrate (5-day ration for each crew member)

_____ _____ 150 feet of nylon rope

_____ _____ Parachute silk (from 3 parachutes)

_____ _____ One portable heating unit

_____ _____ Two .45 calibre loaded pistols

_____ _____ One case dehydrated milk

_____ _____ One 100 lb. Tank of oxygen (this tank holds a 5-day supply for one five-person team) and two 60 lb. tanks of oxygen (each tank holds 3-day supply for one five-person team)

_____ _____ One stellar map (of the moon's constellation)

_____ _____ One life raft

_____ _____ One magnetic compass

_____ _____ 15 2-gallon containers of water (normally a 5-day ration for 10 crew members)

_____ _____ Five light flares

_____ _____ One First aid kit containing injection needles

_____ _____ One Solar-powered FM receiver-transmitter

_____ _____ 3 Flashlights

_____ _____ 1 map of moon's terrain

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FORM #3

Disposition of Undamaged Material

	TEAM A	TEAM B
One box of matches		
100 cartons of food concentrate (5-day ration for each crew member)		
150 feet of nylon rope		
Parachute silk (from 3 parachutes)		
One portable heating unit		
Two .45 calibre loaded pistols		
One case dehydrated milk		
One 100 lb. Tank of oxygen and two 60 lb. tanks of oxygen		
One stellar map (of the moon's constellation)		
One life raft		
One magnetic compass		
45 gallons of water (normally a 5-day ration for each member of the crew)		
Five light flares		
One First aid kit containing injection needles		
One Solar-powered FM receiver-transmitter		
3 Flashlights		
1 map of moon's terrain		

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You question the wisdom of relying on a mission to a remote site with little equipment and margin for error. You wonder whether staying put and relying on the mother ship to search for survivors and find you would not be a better option. NASA ingenuity could well develop a way to get you the needed supplies.

You are the only member of the mission who has explored the moon for a day (on a previous moon exploration). You think that trying to get so many people with equipment over 100-130 kilometers of unknown territory may be too risky. You wonder whether a better option would be for everyone to fan out and explore outward up to 35 kilometers for a possible new and closer landing spot.

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FORM #2

CONSENSUS FORM

Item	Name: _____	Consensus
One box of matches		
100 cartons of food concentrate (5-day ration for each crew member)		
150 feet of nylon rope		
Parachute silk (from 3 parachutes)		
One portable heating unit		
Two .45 calibre loaded pistols		
One case dehydrated milk		
One 100 lb. tank of oxygen (this tank holds a 5-day supply for one team) and two 60 lb. tanks of oxygen (each tank holds 3-day supply for one team)		
One stellar map (of the moon's constellation)		
One life raft		
One magnetic compass		
45 1-gallon containers of water (normally a 5-day ration for each member of the crew)		
Five light flares		
One first aid kit containing injection needles		
One Solar-powered FM receiver-transmitter		

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