

## MITOCW | [watch?v=ECnAh0Vv7u0](https://www.youtube.com/watch?v=ECnAh0Vv7u0)

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**AUDIENCE:** All right, so you guys are going to get a story. And then you're going to get this. And you're going to have to first individually rank which one is more important, so one through-- four, five, six, seven eight--

**AUDIENCE:** You count really loud.

**AUDIENCE:** --15. Read the story. All right, story time, guys. All right, you--

**AUDIENCE:** OK, how old is Andrew?

**AUDIENCE:** Guys, I'm really 10. I'm 17 [INAUDIBLE] a three-year-old. All right, you remember our space crew originally scheduled to rendezvous with a mothership on the lighted surface of the moon. However, due to mechanical difficulties, your ship was forced to land at a spot some 200 miles from the rendezvous point.

During re-entry and landing, much of the equipment on board was damaged. And since survival depends on reaching the mothership, the most critical items available must be chosen for the 200-mile trip. Below are listed the 15 items left intact and undamaged after landing. The task is to rank order in terms of their importance for your crew and allow them to reach the rendezvous point. Place the number one by the most important item, number two by the second most important, and so on through number 15 for the least important.

[SIDE CONVERSATION]

**AUDIENCE:** Individual and then--

**AUDIENCE:** Guys, listen up.

**AMANDA MOK:** Before you--

**AUDIENCE:** Hey, guys, wait up.

**AMANDA MOK:** Sh. Before we do anything, on your piece of paper, there's only one column of lines. Please makes two more columns. Or, no, there's two?

**AUDIENCE:** Yes, two.

**AMANDA MOK:** There's two. Make one more on the left.

**AUDIENCE:** What are they for, Amanda?

**AMANDA MOK:** So we're first going to do this first individually. So you rank these on your own. And then after that, we're going to have a group discussion, and you're going to have to come to a group consensus about which items are more important, which items are least important. And then after you had decided in your group-- you guys have choose someone in your group. And then we're going to decide as a class which items are most important. And then we're going to compare those results with NASA. NASA's going to tell us how survival fit we are.

**AUDIENCE:** What are we surviving?

**AMANDA MOK:** Will we survive the move? Hopefully in your group, you've decided which is most important and which is least important. So as a class, we're going to decide now because we're running out of time. So what's most important? Yes?

**AUDIENCE:** Oxygen.

**AMANDA MOK:** Oxygen. Everyone agree?

**AUDIENCE:** Yeah.

**AMANDA MOK:** OK Where's oxygen? Ah ha, where's number two?

**AUDIENCE:** Water.

**AMANDA MOK:** Water?

[INTERPOSING VOICES]

**AMANDA MOK:** Why do you think that's the second to most important?

**AUDIENCE:** Because if you push that button, they will know right away where you are. You can live without water three to four days.

**AMANDA MOK:** Is 200 miles too far for FM? I think 200 miles is too far for FM because-- so FM is a radio, right? Can you get a radio station here that's broadcasting here 200 miles away?

**AUDIENCE:** Yes.

**AUDIENCE:** On the moon though, there's no atmosphere to disrupt the waves.

[INTERPOSING VOICES]

**AMANDA MOK:** I just know that waves don't travel through air. They don't need a medium. Electromagnetic waves don't need a medium--

**AUDIENCE:** Yeah, lights, people.

**AUDIENCE:** Scientists.

**AMANDA MOK:** Science.

**AUDIENCE:** The water cycle is important. [INAUDIBLE].

**AMANDA MOK:** Can you get to the base before you do, they do?

**AUDIENCE:** I think we have to figure out how fast you can walk in low gravity.

**AMANDA MOK:** Do you need to walk?

**AUDIENCE:** Jump, hop.

[INTERPOSING VOICES]

**AMANDA MOK:** Can you use the guns to propel yourself?

[INTERPOSING VOICES]

**AUDIENCE:** Here it is.

**AUDIENCE:** Oxygens and guns rely on combustion.

**AMANDA MOK:** You have oxygen.

**AUDIENCE:** And just kind of-- to say, like, just open the tank instead of like, leaning from it, saying that you can [INAUDIBLE]?

**AMANDA MOK:** It's regulated on the tank, I don't know.

[INTERPOSING VOICES]

**AMANDA MOK:** It's probably regulated on the tank, or regulated on the tank that let's out oxygen. You don't have to let our the whole tank, right?

**AUDIENCE:** Do you have to let out a cloud of it, and then [INAUDIBLE]?

**AUDIENCE:** Or, you could use it [INAUDIBLE].

**AMANDA MOK:** So what's number two? Water? I think general consensus is water. Water. Number three?

**AUDIENCE:** Portable feeding unit.

**AMANDA MOK:** Feeding unit.

**AUDIENCE:** So would the receiver/transmitter work out [INAUDIBLE]?

**AMANDA MOK:** Yeah.

**AUDIENCE:** Yeah.

**AUDIENCE:** We should put that number three.

**AMANDA MOK:** You want to contact first before you get there?

**AUDIENCE:** Yeah.

[INTERPOSING VOICES]

**AMANDA MOK:** OK.

[INTERPOSING VOICES]

**AUDIENCE:** You don't need anything else.

**AMANDA MOK:** My question is, 200 miles a very long distance for FM waves to travel. I'm not sure the signal would be strong enough for the base to understand.

**AUDIENCE:** But there could still be a signal.

**AMANDA MOK:** There could be. That is true, or there may not be.

**AUDIENCE:** Or maybe on your third day.

**AMANDA MOK:** On the third day out here like, [GASPS]. But anyways, how do you know which way to travel on it they're [INAUDIBLE]? Are you just going to sit there for three days or are you going to [INAUDIBLE]?

**AUDIENCE:** Yeah, you sit there for three days holding the radio until hopefully, somebody picks you up.

**AUDIENCE:** Hopefully, right?

**AMANDA MOK:** So that's number three?

**AUDIENCE:** Transmitter.

**AMANDA MOK:** Transmitter? Everyone agree?

**AUDIENCE:** Come on, guys. There's a risk.

**AMANDA MOK:** We have-- Rebecca wants to say something.

**AUDIENCE:** The concentrate?

**AMANDA MOK:** The concentrates. I think it might take a while, but yes.

**AUDIENCE:** We didn't think you would need food until at least a weekend.

**AUDIENCE:** Yeah.

**AUDIENCE:** Wouldn't you die thought without heat?

**AUDIENCE:** [INAUDIBLE].

**AMANDA MOK:** Yes, you could freeze.

[INTERPOSING VOICES]

**AMANDA MOK:** Tell us when you get water. Tell us when you get water.

[INTERPOSING VOICES]

**AUDIENCE:** With the IV in the first aid kit.

**AMANDA MOK:** Anything else? So wait, what's number three? FM?

**AUDIENCE:** No.

[INTERPOSING VOICES]

**AUDIENCE:** You've got the IVs.

**AMANDA MOK:** You have another five minutes to decide.

[INTERPOSING VOICES]

**AMANDA MOK:** You've got heat. Why do we want heat instead of FM?

[INTERPOSING VOICES]

**AUDIENCE:** He had a space suit on. I think [INAUDIBLE] cold.

**AMANDA MOK:** Oh, when there's no atmosphere, it gets pretty cold, when there's no sun. I don't know.

**AUDIENCE:** If you land on the wrong side--

**AUDIENCE:** The heat is actually more important than the water. Heat will kill you instantly. Lack of heat would kill you instantly whereas lack of water would kill you in two days.

**AUDIENCE:** OK. So what's what--

[INTERPOSING VOICES]

**AUDIENCE:** Yeah, it says if you land on the lighted surface [INAUDIBLE].

**AMANDA MOK:** The lighted surface.

**AUDIENCE:** No, you're good then.

**AMANDA MOK:** OK, so what's number three? Have we decided? As a group?

[INTERPOSING VOICES]

**AMANDA MOK:** We have a group consensus?

[INTERPOSING VOICES]

**AMANDA MOK:** OK, wait. Hold on, kids. There seem to be several conversations going at once, and this needs to be a group discussion.

[INTERPOSING VOICES]

**AMANDA MOK:** Three? OK. Four?

[INTERPOSING VOICES]

**AUDIENCE:** We do shoot in space.

[INTERPOSING VOICES]

**AMANDA MOK:** Again, what's the-- I'm just writing it down. You guys tell me what to write down.

**AUDIENCE:** Can we do the [INAUDIBLE]?

**AUDIENCE:** [INAUDIBLE].

**AMANDA MOK:** Huh?

**AUDIENCE:** [INAUDIBLE].

**AMANDA MOK:** Stellar map?

**AUDIENCE:** [INAUDIBLE].

**AMANDA MOK:** So we have star map, portable heating unit, and guns as our choices.

**AUDIENCE:** Oh, what was the third one?

**AMANDA MOK:** Guns.

**AUDIENCE:** What would you do with a gun?

**AMANDA MOK:** Give you moment to propel you. Every action has an equal and opposite reaction, Newton's third law.

**AUDIENCE:** [INAUDIBLE].

**AMANDA MOK:** No, no, but when you shoot, the momentum of whatever propels propels you that way.

**AUDIENCE:** Yeah, but they're not [INAUDIBLE].

**AUDIENCE:** Do people on Earth fly backward whenever--

[INTERPOSING VOICES]

**AUDIENCE:** Yeah. This, essentially, is what she's talking about ultimately. [INAUDIBLE].

**AMANDA MOK:** Or, someone tell me what to write.

[INTERPOSING VOICES]

**AMANDA MOK:** Decide. Someone decide.

[INTERPOSING VOICES]

**AMANDA MOK:** Raise your hand for heat then first.

[INTERPOSING VOICES]

**AUDIENCE:** Majority wins.

**AUDIENCE:** No, no, no, no. We didn't [INAUDIBLE]. How many think [INAUDIBLE]?

**AUDIENCE:** What?

**AUDIENCE:** Two.

**AUDIENCE:** Come on.

**AUDIENCE:** And how many people for guns?

[INTERPOSING VOICES]

**AMANDA MOK:** Wow, I don't think we've come to a decision yet, have we? No?

[INTERPOSING VOICES]



**AMANDA MOK:** OK, what are the options?

[INTERPOSING VOICES]

**AUDIENCE:** Heating.

**AMANDA MOK:** More for heating. So who's for map and who's for heating? Map? Heating? I guess heating wins.

[INTERPOSING VOICES]

**AUDIENCE:** And number five, do map.

**AMANDA MOK:** What should number five be?

[INTERPOSING VOICES]

**AMANDA MOK:** The guns?

[INTERPOSING VOICES]

**AMANDA MOK:** You can last a couple weeks without food.

**AUDIENCE:** Right now, we have our person not dying immediately, but still not finding hope anywhere.

[INTERPOSING VOICES]

**AUDIENCE:** Because you still could get 200 miles with your heating unit and your water and everything. But you don't know 200 miles in what direction.

**AMANDA MOK:** So maps?

**AUDIENCE:** Yeah, maps for number five.

**AMANDA MOK:** Other groups, ideas? Map? Five?

**AUDIENCE:** First aid kit.

**AMANDA MOK:** First aid kit for number five. Agree? Disagree?

[INTERPOSING VOICES]

**AMANDA MOK:** Reasons?

**AUDIENCE:** Map for number five so you can actually start moving.

**AMANDA MOK:** Are we going to need to vote again?

[INTERPOSING VOICES]

**AUDIENCE:** Is someone playing life raft number one? Is that NASA's? Are you supposed to propel yourself with that?

**AMANDA MOK:** I don't know. Someone tell me. I'm not the leader. You guys are the leaders. You have to decide as a group.

[INTERPOSING VOICES]

**AUDIENCE:** Whoever yells their option loud enough is right.

**AUDIENCE:** Map.

[INTERPOSING VOICES]

**AMANDA MOK:** Six?

[INTERPOSING VOICES]

**AUDIENCE:** What about the guns for number six?

**AUDIENCE:** No, no, no, no, no.

**AUDIENCE:** Matches.

[INTERPOSING VOICES]

**AMANDA MOK:** Are you guys going to discuss this or are you just going to yell out options?

**AUDIENCE:** How about the food?

[INTERPOSING VOICES]

**AMANDA MOK:** That has calories.

**AUDIENCE:** We can't put the map--

[INTERPOSING VOICES]

**AMANDA MOK:** So six?

**AUDIENCE:** We should get food.

**AMANDA MOK:** Food.

**AUDIENCE:** First aid kit.

**AMANDA MOK:** First aid kit.

[INTERPOSING VOICES]

**AMANDA MOK:** You guys hurry up and just finish this.

[INTERPOSING VOICES]

**AMANDA MOK:** Seven.

[INTERPOSING VOICES]

**AMANDA MOK:** Eight.

[INTERPOSING VOICES]

**AUDIENCE:** Compass.

**AUDIENCE:** Matches.

[INTERPOSING VOICES]

**AMANDA MOK:** Is it rope? Rope. Nine.

[INTERPOSING VOICES]

**AMANDA MOK:** Life raft?

**AUDIENCE:** Yeah, life raft.

[INTERPOSING VOICES]

**AMANDA MOK:** 10.

[INTERPOSING VOICES]

**AMANDA MOK:** 10. Come on.

[INTERPOSING VOICES]

**AUDIENCE:** The pistols would work, but the flares don't.

**AMANDA MOK:** What would the flares do?

[INTERPOSING VOICES]

**AMANDA MOK:** 200 miles, you can't see a single flare?

**AUDIENCE:** With no atmosphere? [INAUDIBLE].

[INTERPOSING VOICES]

**AUDIENCE:** Let's just hear what NASA had to say.

[INTERPOSING VOICES]

**AMANDA MOK:** OK, so NASA says 1 is oxygen, 2 is water, 3 is the map, 4 is food, 5 is solar-powered FM, 6 is rope, because you need to scale cliffs, and tying the end there together. 7 is first aid kit because the needles connect to the vials of vitamins.

And then the medicines will fit into a special aperture in the NASA suit. 8 is the parachute. Parachute serves to protect yourself from the sun's rays. 9 is the self-inflating raft because the carbon dioxide bottle may be used for propulsion. 10 is a signal flare. 11 is the pistols, possible

means of self-propulsion. 12 is dehydrated milk. 13 is a heating unit. 14 is magnetic compass.  
And 15 is the box of matches.