



#AskNASA

HOW WILL ASTRONAUTS DIG
ON THE MOON?



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Hi, I'm Jacob Bleacher. I'm a geologist.
That means I study rocks and dirt on the

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Earth and planets. This is ask NASA. I'm
here to answer your questions. What is

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unique about the surface of the Moon?
Well the Moon is quite unique from the

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Earth. It has no atmosphere, there's no
air to breathe. What that means is that

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the processes that have occurred on the
Moon are all preserved there in the

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rocks. For instance, if you look at the Moon from the Earth you may see circles.

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Those circles are impact craters. Let me
show you. Except, making craters is really

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dirty business - I need my crater making poncho. Now we're

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ready. Let's pretend this is the surface
of the Moon. It looks a lot like this.

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That's one crater. The surface of the
Moon has many more. On the Moon these

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craters have formed over time and as you saw, material from each crater buries the

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previous ones, making this very rough terrain. In that terrain at the pole

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there are some craters that we believe have water ice trapped there and they never

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see the sunlight. That's good for science and could also be a resource that helps

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our astronauts survive.

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Why study moon rocks? Well besides the fact that rocks are awesome, each rock is

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kind of like a person. It has its own fingerprint. We talked about impact

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craters - that's recorded in the rocks. Whether or not ice or water has been

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near there, that's recorded in the rocks. It tells us the history of the Moon.

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What tools will astronauts use to explore the moon? Hopefully we'll have plenty of

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tools for them, for instance something like this. This is a hammer like you

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would use here on Earth.

It's a geologist's best friend. It helps us

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to break up rocks and select samples. We

could also use things like rakes and

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shovels to help us find the right kind

of material to bring home.

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Eventually we could be using tools more

like this. This tool is an x-ray

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fluorescence spectrometer or XRF and XRF

basically shoots x-rays at a rock and

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then detects what comes back. And as I

talked about before, rocks have unique

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fingerprints. This helps us to determine

what that fingerprint is. Our astronauts

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will also use rovers like this model

that you can see right here. These

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vehicles are designed so that they can

help us move around on the surface.

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Well this tool is 3D printed but this is

just a model of an XRF. But right now

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we're actually testing 3D printers in space on the International Space Station.

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It'd be really helpful if we can use 3D printers to design the tools that we

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need. How are we preparing astronauts to investigate the Moon's surface? Well we

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have to practice here on Earth. The way we do that is we talk to them in the

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laboratory, in classrooms and we also take them out into the field, places like

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Hawaii or Iceland or Arizona. Places where there are similarities to what

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they might experience on the lunar surface. We're really excited to send

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humans to the moon with the Artemis program. The first woman and the next man

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will be going back there by 2024. Together they'll be able to explore the

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surface of the Moon. Right now our plan is to send crew to the surface of the

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Moon once per year and bring more supplies to the surface, so that we can

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explore more and more of the south polar region. That is a great question. The

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first thing that's going to be very different is that during Apollo the Sun

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was overhead but at the south pole the Sun is always going to be right on the

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00:03:48,889 --> 00:03:52,700

horizon. That means we'll have really long shadows and areas that are very

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dark. It's going to be very different. We really are exploring a brand new

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terrain where no one has ever been. The studies we'll be trying to do are looking

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at and understanding perhaps the water cycle on the Moon. And we really want to

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understand the processes that lead to that water being preserved there. Well

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that's an intriguing question. First of all, we can see fairly deep into the

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interior of the Moon by looking into craters. That's kind of our natural

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laboratory for getting at the inside of the crater.

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Every time I create our forms there's an explosion that moves rock up and out

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from inside of the Moon so our astronauts walking around the rim of the

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craters can pick up rocks that came from deep inside. The bigger the crater the deeper

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the rocks. Well in fact, we are aiming for farther out. Eventually we want to get to

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Mars, but first we're gonna go to the Moon and learn some really important

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answers to questions that will help us survive the trip out to Mars. Because I

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guarantee you I'm going have a lot of questions for them when they get back.