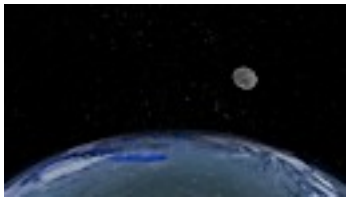
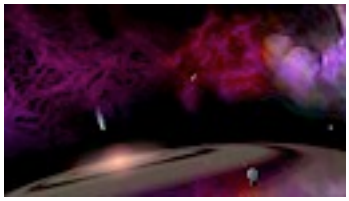
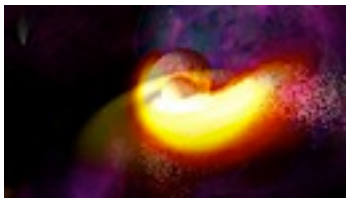
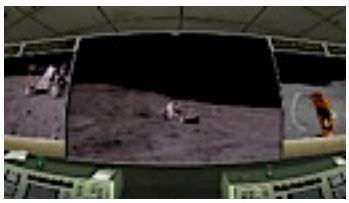
FUTURE MOON

VERSION (SUBTITLES) REVISED: JULY 26, 2013

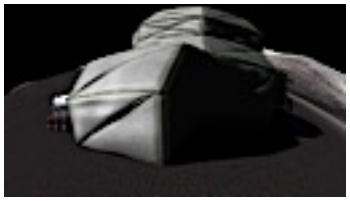
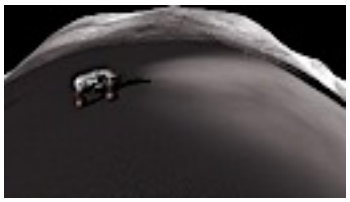
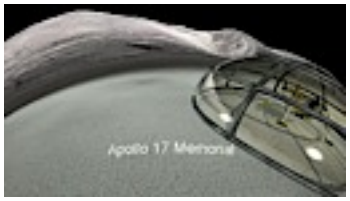
SCENE	TIME	SCRIPT
	00:21	*"I believe that this nation should commit itself to achieving the goal before this decade is out, of landing a man on the Moon and returning him safely to the Earth."*
	00:34	Less than eight years later, Apollo astronauts in lunar orbit photographed the living Earth hanging above the barren Moon one image that united two very different worlds.
	00:47	Separated for eons by the gulf between the heavens and the Earth, these worlds became one, linked forever in the human psyche.
	00:57	Two worlds, sharing the same orbit around the Sun, turning under the same stars, blown by the same solar wind, warmed by the same sunlight, separated by just over a light second but as different as day and night - as life and death.
	01:15	Two worlds joined by gravity - with more than four billion years of common history. Were they born together? or did they find each other in the crowded early solar system?
	01:27	Ancient rocks, preserved on the airless barren Moon, show that these companion worlds are related like a mother and daughter. But the Moon is much less dense than Earth an Earth without its iron core. Lunar rocks lack volatile compounds like water, but are rich in elements with high boiling points. Once they must have been Earth rocks, vaporized by a catastrophe powerful enough to rip worlds apart.
	01:56	More than four billion years ago, a young Sun's gravity brought little order to its unruly solar system. Too many tiny worlds shared the same flattened disk.

	02:09	A young Earth, without its companion Moon, grew by collecting debris strewn along its orbit. Meanwhile another world also was forming, in an orbit crossing Earth's. A collision was inevitable. It was just a matter of time... and the universe always has had plenty of time.
	03:06	With each orbit, the early Moon raised tides that flooded and then drained Earth's coastlines and stirred the depths of its oceans supplying energy and motion to mix the primordial stew from which the building blocks of life would emerge. Gradually life, carried on the tides, climbed from the sea onto the land... and in time learned to walk, to dream, and to reach for the Moon overhead.
	03:36	Nine million pounds of thrust overcame gravity's bonds as the mighty Saturn V propelled fifty tons of metal and human spirit toward the Moon.
	03:51	*"OK, Dave, its looking good here, roll is complete, we are pitching."* *"Houston, Tranquility Base here the Eagle has landed."* *"That's one small step for man, one giant leap for mankind."* *"Here men from the planet Earth first set foot upon the Moon, July 1969, AD. We came in peace for all mankind."*
	04:39	At six landing sites, humans, encased and enshrouded in space suits, stepped eagerly and awkwardly away from the lunar lander and planted a flag on the lifeless surface of the airless Moon claiming for all mankind Earth's last continent and largest space station.
	04:58	*"That's very good Gene, let me get this in stereo. Houston, that's beautiful, this has got to be one of the most proud moments of my life, I guarantee."*
	05:10	Imagine being the first geologists on a huge unexplored world full of rocks, dust and unsolved mysteries. The lunar soil is rocky debris crushed by meteorite impacts into a substance as fine as talcum powder that clings to everything it touches turning space suits a dingy gray. Back in the air of their lander, astronauts noticed that the Moon dust on their suits smelled like gunpowder.

	05:39	Simple experiments show the effects of lower gravity and no atmosphere. Watch as Dave Scott drops a falcon feather and a hammer. Compare their speeds on the airless Moon.
	05:53	*"Well with my left hand I have a feather, in my right hand a hammer. I guess one of the reasons we got here today was because of a gentleman named Galileo, a long time ago who made a rather significant discovery about falling objects in gravity fields. And we thought where would be a better place to confirm his findings than on the Moon, and so we thought we'd try it here for you. The feather happens to be appropriately a falcon feather for our Falcon. and I'll drop the two of them here and hopefully they'll hit the ground at the same time. How about that? This proves that Mr. Galileo was correct."*
	06:40	*"This is really a rock and roll ride, isn't it? I've never been on a ride like this before. Boy oh boy. I'm glad they've got this great suspension system on this thing. Yahoo! golly, this is so great you can't believe it."*
	07:01	To go farther and see more, NASA invented a battery powered rover with wire mesh wheels capable of exploring the Moon and perhaps becoming a prototype for tomorrow's lunar dune buggies.
	07:14	The rover rode piggyback to the Moon, outside the lunar module, attached to it like a mattress tied on the top of a car. Once lowered, it unfolded like a backpacker's tent. It could zip along at a top speed near ten miles per hour with small fenders deflecting rooster tails of dust. In the Moon's low gravity, a bump sent astronauts and rover off the ground on a very bouncy wild ride.
	07:47	Imagine being the first humans on this barren world...the first to see a place, kick a rock, stir up dust or leave footprints and rover tracks in its timeless soil. All expressions are inadequate, the experience of a lifetime wrapped in a few precious hours, in a place to which you can never return.
	08:10	*"like uh, powdered charcoal to the sole and insides of my boot. Outstanding! OK, getting the other deck out. I was strolling on the Moon one day, in the merry, merry month of December," "no May," "May."*

	08:36	*"When then much to my surprise, a pair of funny eyes, te dum, te dum, te dum"* *"Boy is this a neat way to travel. Isn't it great?"* *"tum te dum dum dum tum te dum dum dum tum te dum dum dum."* *"I like to skip along."* *"Not me boy."* *"Gene, I'm going to take that SEB number two and my camera and I'm heading home."* *"OK, Boy is this fun."*
	09:07	*"This valley of history has seen mankind complete its first evolutionary steps into the universe, leaving the planet Earth and going forward into the universe I think no more significant contribution has Apollo made to history. It's not often that you can foretell history, but I think we can in this case."*
	09:39	Gene Cernan, the last man to walk on the Moon, remembers... *"I slowly pivoted, trying to see everything, and was overwhelmed by the silent, majestic solitude. Not so much as a squirrel track to indicate any sort of life, not a green blade of grass to color the bland, stark beauty, not a cloud overhead, nor the slightest hint of a brook or stream. But I felt comfortable, as if I belonged here. From where I stood on the floor of that beautiful mountain-ringed valley the Moon seemed frozen in time."*
	10:15	It's been more than 30 years since Gene Cernan left the Moon. Perhaps the space stations of today will ultimately lead to a return to Earth's largest space station, the Moon.
	10:27	And a future mission control center will document human and robotic exploration of the Moon and its many resources.
	10:35	The Moon's most precious resource may be water. Since its birth, rocky asteroids and icy comets have crashed into the Moon and pockmarked its face. Each comet impact also delivered water ice to this dry world. At the poles, colonies in perpetual twilight can mine the Moon for this trapped ice.

	10:58	The Moon has raw materials. Oxygen makes up 44% of the Moon's weight. Astronauts will mine surface rocks for oxygen to breathe and to use as rocket fuel. They can turn the Moon's silicon into solar cells and computer chips and cast its soil into beams, rods, plates, tubes and glass fibers.
	11:22	The Moon has solar energy with no atmosphere to block sunlight during the long lunar day. Robots can manufacture solar cells from lunar soil. Then solar power stations, made of lunar materials, will collect sunlight and beam the energy to Earth as microwaves.
	11:43	The Moon is rich in an energy fuel called Helium 3, produced in the Sun's core. For billions of years, this stardust has fallen on the Moon while Earth's atmosphere blocks it from settling on Earth. The Moon's Helium 3 can fuel tomorrow's nuclear fusion reactors on Earth.
	12:04	The Moon's far side is quiet and undisturbed by radio noise blaring from Earth. In these silent, wide-open spaces, rows of radio dishes made from lunar materials, capture images of distant galaxies, and listen for signals from distant alien worlds.
	12:25	The Moon protects the genome of life. The greatest threat to life on Earth is probably the impact of an asteroid or comet. Such a direct hit destroyed more than half of the species on Earth 65 million years ago. An Earth impact will not damage ecosystems on the Moon.
	12:46	The Moon can support an enclosed terrestrial biospheres complete with plants and animals - for oxygen, food, and companionship. Here a 120 pound human weighs only 20 pounds and can jump six times higher than on Earth. In a pressurized dome, humans wearing wings can actually fly.
	13:10	The lunar Olympic games will break all terrestrial records featuring pole vaults more than 120 feet, long jumps more than 180 feet, weightlifting of over an Earth-ton, and graceful gymnasts leaping six times higher than they can on Earth.
	13:29	Life on the Moon may become so pleasant that visitors dread returning to the oppressive gravity pull of Earth - a force that increases their Moon weight six-fold.

	13:41	A return to the Moon is possible after a journey of only 24 hours from low Earth orbit. Pretend the future is now and the Moon is waiting.
	19:45	Welcome to the Future Moon: sustainable, self-sufficient, and profitable:
	19:53	- a producer of solar power and fusion fuel
	19:58	- a platform for the most powerful deep space telescopes
	20:03	- a source of raw materials to build, launch, and fuel tomorrow's space ships
	20:09	- a home for the first humans to call another world home and the living companion of mother Earth.
CREDITS		**ENDING CREDITS**
Copyright	20:20	2006, Rice University
Narration		Walter Cronkite Captain Gene Cernan
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Apollo Program Photography and Satellite Imagery:		Johnson Space Center National Aeronautics and Space Administration
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Recorded at		Fish – Eye Studios Tel Aviv
Sponsored by		Lockheed Martin Museums Teaching Planet Earth Grant
Funding		From NASA Through Rice University
“Future Moon”		By the Houston Museum of Natural Science
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