the moon has captivated humanity's collective imagination since ancient times humans have studied it for hundreds of years first with telescopes than with robotic probes even sending American astronauts to the lunar surface but in many ways our nearest neighbor remains a mystery and so knowing what happened with the moon will help us understand what happened with the earth Venus mercury and Mars and so that's the reason we want to try to understand it we're trying to understand the past formation of the planets and so that
will help us learn the future clues about our own planets history and the influence of the moon's gravity on earth that dusty lunar surface the Gravity Recovery and interior laboratory mission or Grail features twin spacecraft embarking on a challenging mission to map the moon's gravity its sole purpose is to measure gravity the moon to try to help us understand how the planets were formed and how they evolved over time grails two spacecraft will fly in formation above the lunar surface to
measure the variations in gravity the
mission seeks to reveal clues about our
Moon's thermal history and how the inner
solar system's rocky planets developed
Grail is departing from pad be at Cape
Canaveral Air Force Station Space Launch
Complex 17 pre-launch processing and the
final countdown are managed by NASA's
launch services program at adjacent
Kennedy Space Center our team especially
gets excited whenever we leave Earth
orbit and going to the moon excites us
and it cites the public
the two spacecraft called Grail a and
Grail be are riding into space

00:01:55,118 --> 00:02:00,219
side-by-side aboard a powerful delta 2

00:01:58,030 --> 00:02:02,618
heavy rocket built by united launch

00:02:00,219 --> 00:02:05,890
alliance it's a rocket with an

00:02:02,618 --> 00:02:07,810
impressive reliability record if we just

00:02:05,890 --> 00:02:10,289
look at the delta 2 rocket which is the

00:02:07,810 --> 00:02:14,800
version of the vehicle that we fly today

00:02:10,289 --> 00:02:17,769
nASA has a perfect launch record 48 for

00:02:14,800 --> 00:02:19,719
48 the payload for NASA's most recent

00:02:17,769 --> 00:02:22,569
lunar mission called el rol cross

00:02:19,719 --> 00:02:25,209
weighed in at 66 hundred pounds and was

00:02:22,568 --> 00:02:29,500
the size of a minivan it launched in

00:02:25,209 --> 00:02:31,719
2009 aboard a massive Atlas 5 rocket but

00:02:29,500 --> 00:02:34,209
that extra performance isn't needed for

00:02:31,719 --> 00:02:38,019
the Grail spacecraft which together away
only about 1,600 pounds each unit is about the size of a washing machine designed to be compact and rugged a perfect fit for the Delta 2 preparing two spacecraft adds an extra challenge to the team's workload from environmental testing before launch all the way through the countdown and then for instance on launch day we have two dedicated teams one to go LA and 12 grail be and they'll have to individually powerup each spacecraft and go through their health checks and put the spacecraft in the proper
configuration for launch after the climb

to orbit the Grail spacecraft will be

released from launch vehicle one at a
time as launch controllers and managers

on the ground wait for news of
definitely wait to celebrate until both

those spacecraft are safe and under

taxilunar crews two men grills journey

to the moon will take three and a half

months a mission plan offering plenty of
time for controllers to make sure the

spacecraft are ready to get to work and

regardless of when we launch we're going
to have a constant arrival day so relay

will arrive on the year's eve of 2011

and will arrive on New Year's

Day of 2012 each spacecraft will have to

each spacecraft will have to execute a critical 38th minute lunar

orbit insertion burn to slide into lunar

orbit then they'll spend the next five

weeks reducing their orbit period and

getting into formation

during the missions three months science

phase the moon will rotate three times

beneath the two Grail spacecraft as they

calculate the gravity they encounter one

spacecraft will trail the other in orbit
and each will slow down or speed up in

00:04:16,569 --> 00:04:21,610
response to the changing gravitational

00:04:18,730 --> 00:04:23,319
pull from below and you need the two

00:04:21,610 --> 00:04:24,520
spacecraft to do that in order to

00:04:23,319 --> 00:04:27,339
measure the distance between the two

00:04:24,519 --> 00:04:29,709
very precisely this data will allow

00:04:27,339 --> 00:04:31,599
scientist an unprecedented chance to

00:04:29,709 --> 00:04:34,060
study the gravity of the whole moon

00:04:31,600 --> 00:04:36,430
including the far side facing away from

00:04:34,060 --> 00:04:40,060
Earth and envision the moon's interior

00:04:36,430 --> 00:04:42,250
from crust to core the Grail mission

00:04:40,060 --> 00:04:44,589
also marks the first time students have

00:04:42,250 --> 00:04:47,709
a dedicated camera onboard a planetary

00:04:44,589 --> 00:04:50,500
spacecraft in order to request photos of

00:04:47,709 --> 00:04:53,349
specific lunar targets the moon camp
project is headed by Dr. Sally Ride, the first American woman to fly in space.

What students need to do is to go on to moon cam.ucsd.edu and that's how they register to submit images four of four of the note and then the images will be put on the internet for the students to see at the missions in the Grail. Spacecraft will be decommissioned eventually impacting the lunar surface.

The path from the earth to the moon has been well traveled in recent decades by pioneers like Surveyor, the Apollo astronauts, lunar prospector, and many astronauts lunar prospector and many.
more today Grail is ready to take its

place in his long line of lunar

explorers the moment I’m looking forward
to is when we finally get in formation

flying and we're really ready to start
taking science data for the mission I'm
going to be passing complex 17 about

three-thirty am on my way console and

that hour of the morning looking off to

the east seeing the rocket bathed in

spotlights it's an emotional time for

all of us on the launch team

you