

Ariel

A Moon of Uranus

(Card 1 of 2)



Subsurface Reservoir

133 

Ariel is made of about one half rock and one half water ice.

Gravity

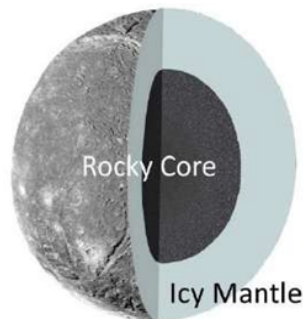
Ariel's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Ariel

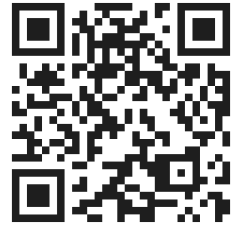


*Model of Ariel's
Interior*

Ariel

A Moon of Uranus

(Card 2 of 2)



Surface Reservoir

15 

Ariel's surface is made of water ice and carbon dioxide ice.

Gravity

Ariel's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Ariel



Ariel's canyons and craters
Photo credit: Voyager 2

Callisto

A Moon of Jupiter

(Card 1 of 2)



Subsurface Reservoir

244 

Callisto may have an underground ocean of salty liquid water.

Gravity

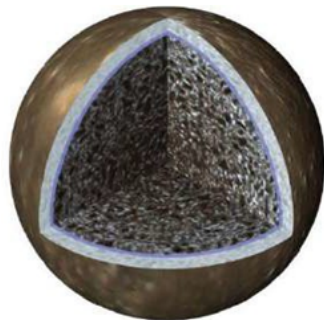
Callisto's gravity is 0.13 times the gravity of Earth.

Composition

Rock & Ice



Callisto



Callisto interior model

Callisto

A Moon of Jupiter

(Card 2 of 2)



Surface Reservoir

27



The surface of Callisto is made up of a mixture of water ice and rock.

Gravity

Callisto's gravity is 0.13 times the gravity of Earth.

Composition

Rock & Ice



Callisto



*Galileo image of Callisto
Credit: Galileo Spacecraft*

Ceres

A Dwarf Planet & Main
Asteroid Belt (Card 1 of 1)



Subsurface Reservoir

124 

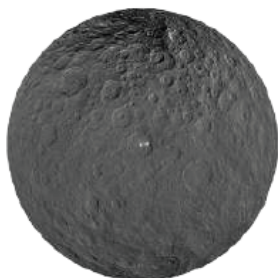
Ceres may contain a thin outer layer of dust and rock over a deeper layer of salty water ice.

Gravity

Cere's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Ceres



Ceres interior model

Charon

A Moon of Pluto

(Card 1 of 2)



Subsurface Reservoir

137 

Charon has water ice in its subsurface that may once have been liquid.

Gravity

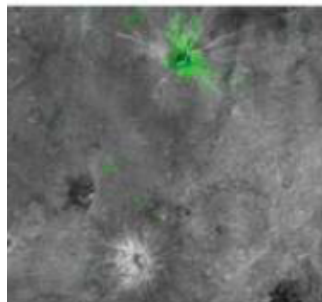
Charon's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Charon



*Imaged water ice in craters
Credit: New Horizon Spacecraft*

Charon



A Moon of Pluto

(Card 2 of 2)

Surface Reservoir

15



The surface of Charon is a mixture of ices, including water ice.

Gravity

Charon's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Charon



Long, deep canyon encircles Charon, Credit: New Horizons

Dione



A Moon of Saturn

(Card 1 of 2)

Subsurface Reservoir

129 

Dione may contain a deep subsurface ocean of liquid water.

Gravity

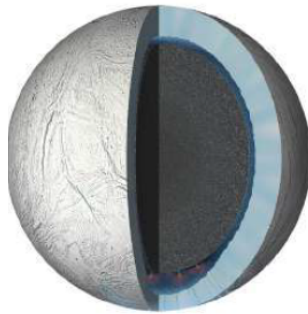
Dione's gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Dione

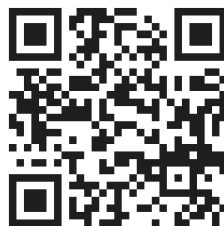


Dione interior

Dione

A Moon of Saturn

(Card 2 of 2)



Surface Reservoir

14 

Dione has a mostly water ice surface.

Gravity

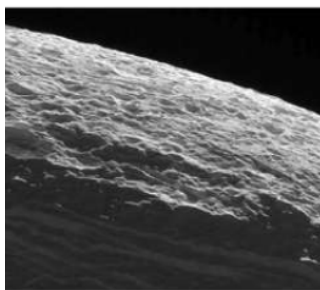
Dione's gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Dione



*Surface of Dione
Credit: Cassini*

Earth



**The 3rd Planet from
the Sun (Card 1 of 3)**

Surface Reservoir

155 

Surface water is present on Earth in the form of oceans, rivers, and glaciers.

Gravity

In this deck, we compare other objects' gravity to Earth's gravity.

Composition

Rock



Earth



Earth True-Color Mosaic

Earth



**The 3rd Planet from
the Sun (Card 2 of 3)**

Subsurface Reservoir

14 

On Earth, water is held underground as liquid water and ice.

Gravity

In this deck, we compare other objects' gravity to Earth's gravity.

Composition

Rock



Earth



Digging for Groundwater

Earth



**The 3rd Planet from
the Sun (Card 3 of 3)**

Atmosphere Reservoir

3 

On average, Earth's atmosphere contains 0.4% water vapor.

Gravity

In this deck, we compare other objects' gravity to Earth's gravity.

Composition

Rock



Earth

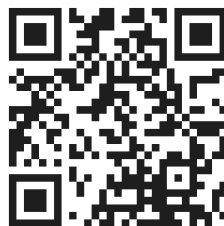


Earth's atmosphere

Enceladus

A Moon of Saturn

(Card 1 of 2)



Subsurface Reservoir

81



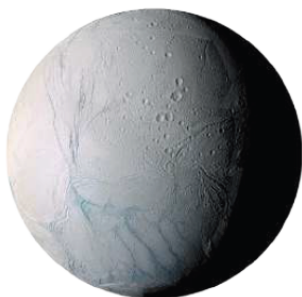
Enceladus may contain a subsurface ocean of liquid water.

Gravity

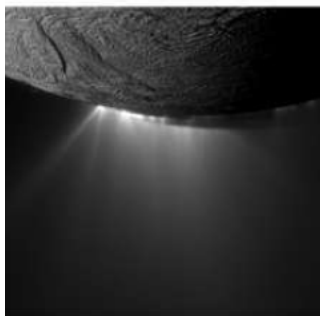
Enceladus' gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Enceladus

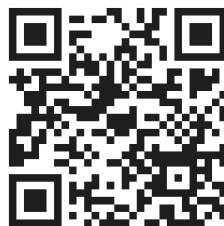


*Water vapor and ice jet
Photo credit: Cassini*

Enceladus

A Moon of Saturn

(Card 2 of 2)



Surface Reservoir

9



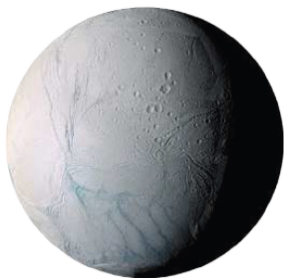
The surface of Enceladus is covered in water ice.

Gravity

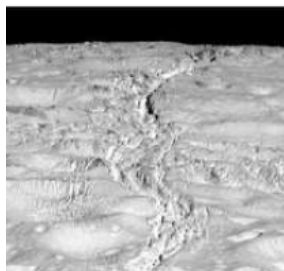
Enceladus' gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Enceladus

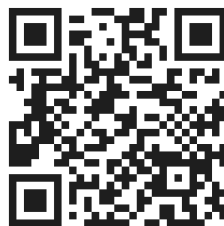


*North pole of Enceladus
Photo credit: Cassini*

Europa

A Moon of Jupiter

(Card 1 of 2)



Subsurface Reservoir

175 

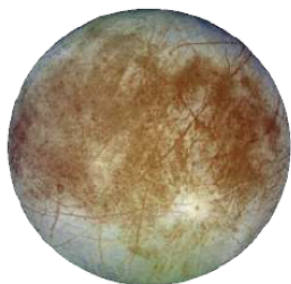
Deep beneath Europa's icy shell may be a layer of liquid water.

Gravity

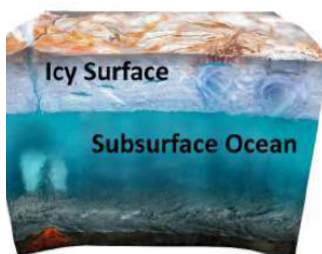
Europa's gravity is 0.13 times the gravity of Earth.

Composition

Rock & Ice



Europa



Model of Europa's liquid water ocean

Europa

A Moon of Jupiter (Card 2 of 2)



Surface Reservoir

19 

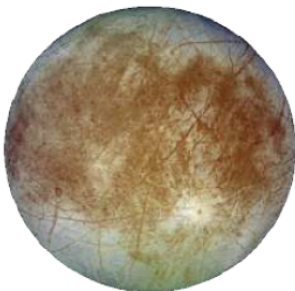
The surface of Europa is covered in water ice.

Gravity

Europa's gravity is 0.13 times the gravity of Earth.

Composition

Rock & Ice



Europa



Grooves on ice

Credit: Galileo Spacecraft

Ganymede

A Moon of Jupiter

(Card 1 of 2)



Subsurface Reservoir

285



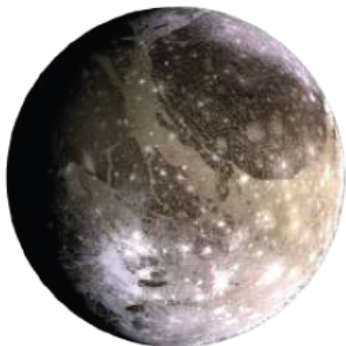
Ganymede may have an ocean of liquid water deep in the subsurface.

Gravity

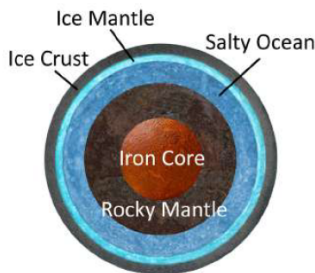
Ganymede's gravity is 0.15 times the gravity of Earth.

Composition

Rock & Ice



Ganymede



Model of the interior of
Ganymede.

Model of Ganymede's Interior

Ganymede

A Moon of Jupiter

(Card 2 of 2)



Surface Reservoir

32 

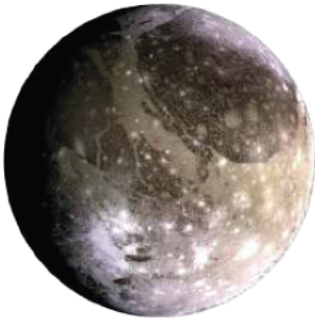
Water ice is widespread on the surface of Ganymede.

Gravity

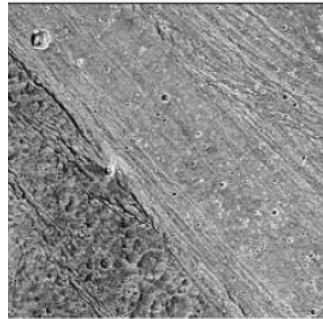
Ganymede's gravity is 0.15 times the gravity of Earth.

Composition

Rock & Ice



Ganymede



*Ganymede's icy crust
Credit: Galileo spacecraft*

Iapetus

A Moon of Saturn

(Card 1 of 2)



Subsurface Reservoir

153



Based on its density, Iapetus is made of mostly water ice.

Gravity

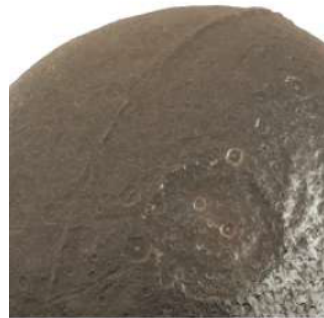
Iapetus' gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Iapetus



*High ridge along equator
Credit: Cassini Spacecraft*

Iapetus

A Moon of Saturn

(Card 2 of 2)



Surface Reservoir

17 

Iapetus' surface is mostly made of water ice.

Gravity

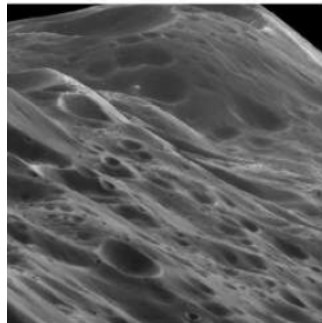
Iapetus' gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Iapetus



Mountains & Craters
Credit: Cassini Spacecraft

Io



A Moon of Jupiter

(Card 1 of 1)

Surface Reservoir

0



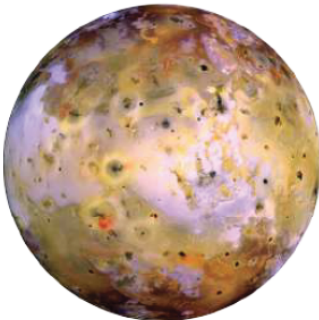
Io is the most volcanically active body in the solar system, but has no water.

Gravity

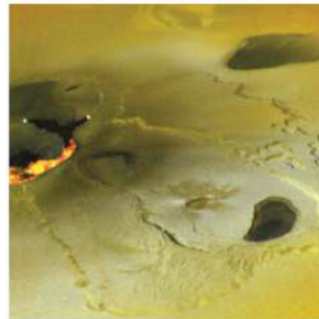
Io's gravity is 0.18 times the gravity of Earth.

Composition

Rock



Io



*Active volcanoes on Io
Credit: Galileo Spacecraft*

Jupiter

The 5th Planet from
the Sun (Card 1 of 1)



Atmosphere Reservoir

77 

Jupiter's atmosphere contains traces of water vapor.

Gravity

Jupiter's gravity is 2.53 times the gravity of Earth.

Composition

Gas



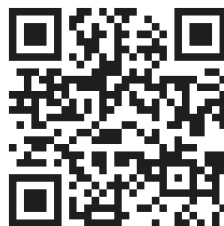
Jupiter



*Juno spacecraft
orbiting Jupiter*

Mars

The 4th Planet from
the Sun (Card 1 of 3)



Subsurface Reservoir

22



Water ice is found on Mars as ground ice and glacial deposits.

Gravity

Mars' gravity is 0.38 times the gravity of Earth.

Composition

Rock



Mars



Ground ice

Credit: Phoenix Lander

Mars

**The 4th Planet from
the Sun (Card 2 of 3)**



Surface Reservoir

42



Water ice is found on Mars at the polar caps.

Gravity

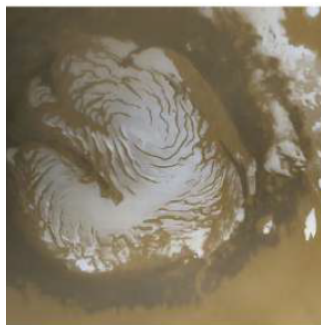
Mars' gravity is 0.38 times the gravity of Earth.

Composition

Rock



Mars

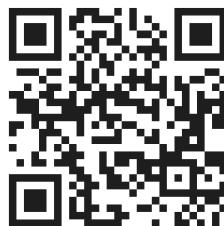


Martian north polar cap

Credit: Mars Orbiter Camera

Mars

The 4th Planet from
the Sun (Card 3 of 3)



Atmosphere Reservoir

2



Mars' atmosphere contains traces of water, often visible as water-ice clouds.

Gravity

Mars' gravity is 0.38 times the gravity of Earth.

Composition

Rock



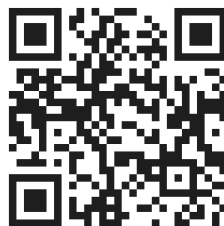
Mars



*Clouds at Endurance Crater
Credit: Opportunity Rover*

Mercury

The 1st Planet from
the Sun (Card 1 of 1)



Surface Reservoir

16



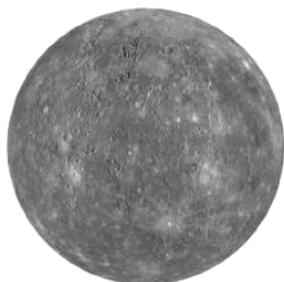
Water ice is present on Mercury in permanently shadowed craters near the poles.

Gravity

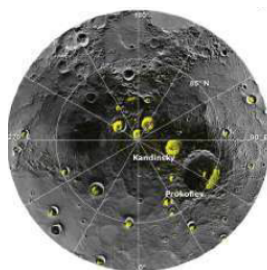
Mercury's gravity is 0.38 times the gravity of Earth.

Composition

Rock



Mercury



*Yellow areas mapped with radar
represent possible water ice*

Mimas

A Moon of Saturn

(Card 1 of 2)



Surface Reservoir

9



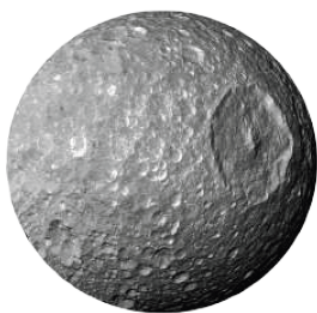
Mimas' surface is mostly water ice.

Gravity

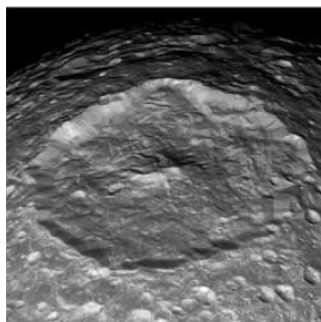
Mimas' gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Mimas



*Herschel impact crater
130 km across*

Credit: Cassini Spacecraft

Mimas

A Moon of Saturn

(Card 2 of 2)



Subsurface Reservoir

79



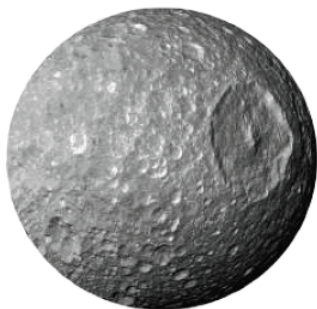
Based on its density, Mimas is made of mostly water ice.

Gravity

Mimas' gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Mimas



*Enhanced colors represent possible different types of ice
Credit: Cassini spacecraft*

Miranda

A Moon of Uranus

(Card 1 of 2)



Subsurface Reservoir

86



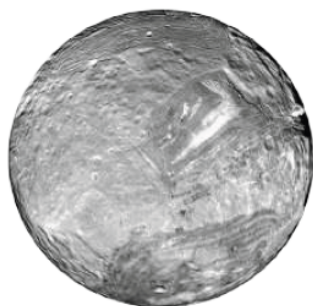
The density of Miranda suggests that it is mostly water ice.

Gravity

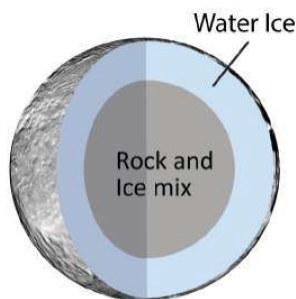
Miranda's gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Miranda

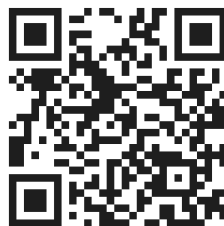


Model of Miranda's Interior

Miranda

A Moon of Uranus

(Card 2 of 2)



Surface Reservoir

10



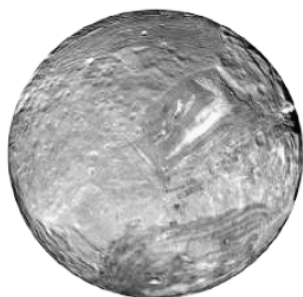
The surface of Miranda is covered in water ice.

Gravity

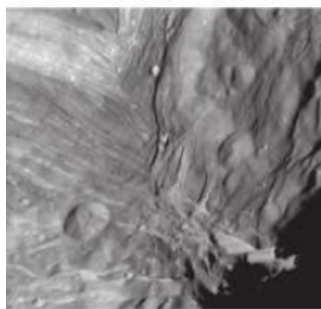
Miranda's gravity is 0.01 times the gravity of Earth.

Composition

Rock & Ice



Miranda



Surface of Miranda

Credit: Voyager 2 spacecraft

Moon



Earth's Moon

(Card 1 of 1)

Surface Reservoir

4 

Earth's Moon has small amounts of water frozen in permanently shadowed craters.

Gravity

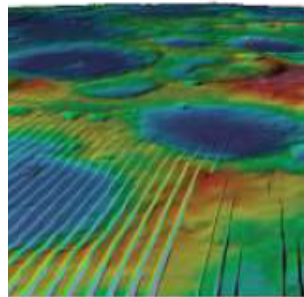
The Moon's gravity is 0.17 times the gravity of Earth.

Composition

Rock



The Moon



*Topographic image of South Pole
Credit: Lunar Reconnaissance Orbiter*

Neptune



The 8th Planet from
the Sun (Card 1 of 1)

Subsurface Reservoir

197 

Neptune is thought to have an icy mantle beneath its atmosphere.

Gravity

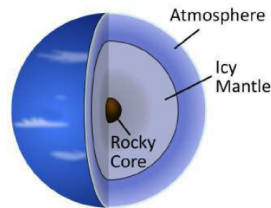
Neptune's gravity is 1.14 times the gravity of Earth.

Composition

Ice & Gas



Neptune



Model of Neptune's Interior

Oberon

A Moon of Uranus

(Card 1 of 2)



Surface Reservoir

17 

Oberon's surface is mostly water ice.

Gravity

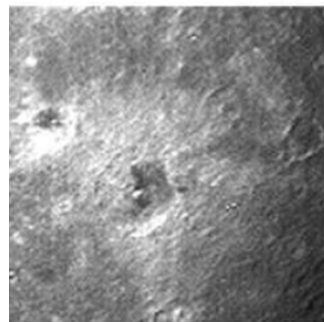
Oberon's gravity is 0.04 times the gravity of Earth.

Composition

Rock & Ice



Oberon



Oberon's surface

Credit: Voyager 2 spacecraft

Oberon

A Moon of Uranus

(Card 2 of 2)



Subsurface Reservoir

154



Based on its density, Oberon is made of about half rock and half water ice.

Gravity

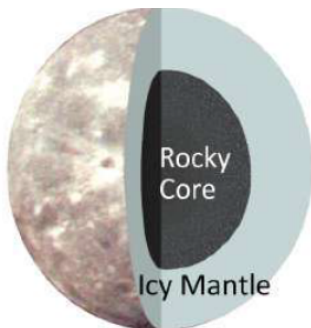
Oberon's gravity is 0.04 times the gravity of Earth.

Composition

Rock & Ice



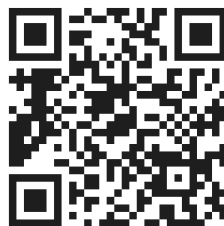
Oberon



Model of Oberon's interior

Pluto

A Dwarf Planet in the Kuiper Belt (Card 1 of 2)



Subsurface Reservoir

187



Pluto is thought to have a subsurface ocean, about 100 kilometers deep.

Gravity

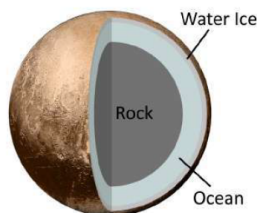
Pluto's gravity is 0.06 times the gravity of Earth.

Composition

Rock & Ice



Pluto



Model of Pluto's interior

Pluto

A Dwarf Planet in the Kuiper Belt (Card 2 of 2)



Surface Reservoir

21



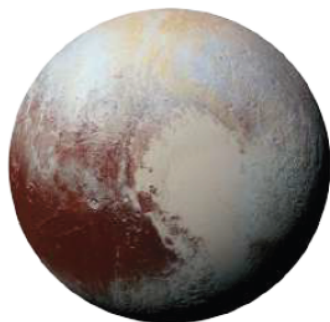
Pluto's surface is covered by a mix of nitrogen-rich ices and water ice.

Gravity

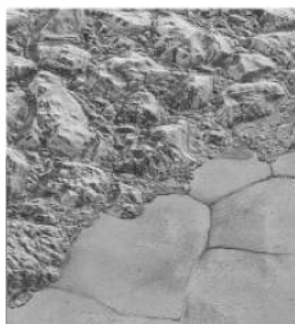
Pluto's gravity is 0.06 times the gravity of Earth.

Composition

Rock & Ice



Pluto



*Water ice on Pluto's mountains
Credit: New Horizons Spacecraft*

Rhea



A Moon of Saturn

(Card 1 of 2)

Subsurface Reservoir

141



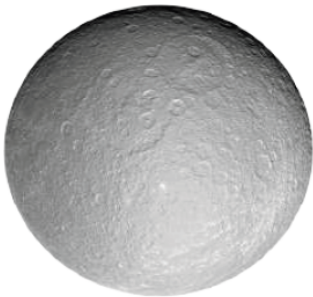
Based on its density, Rhea is made of mostly water ice.

Gravity

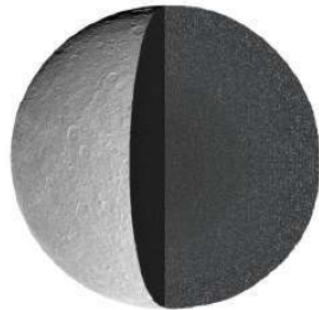
Rhea's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Rhea



Model of Rhea's Interior

Rhea

A Moon of Saturn

(Card 2 of 2)



Surface Reservoir

16 

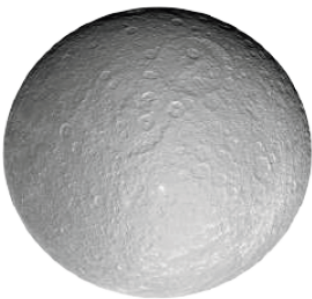
Rhea's surface is mostly made of water ice.

Gravity

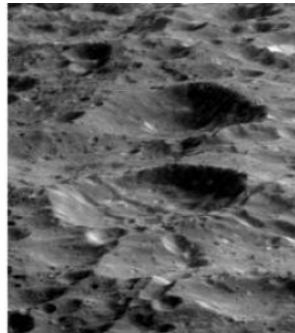
Rhea's gravity is 0.03 times the gravity of Earth.

Composition

Rock & Ice



Rhea



*Rhea's cratered surface
Credit: Cassini spacecraft*

Saturn

The 6th Planet from
the Sun (Card 1 of 2)



Rings Reservoir

91 

Saturn's rings are made mostly of water ice.

Gravity

Saturn's gravity is 1.06 times the gravity of Earth.

Composition

Gas



Saturn



*Color variations in Saturn's
rings Credit: Cassini spacecraft*

Saturn



**The 6th Planet from
the Sun (Card 2 of 2)**

Atmosphere Reservoir

72 

Saturn's atmosphere contains trace water vapor.

Gravity

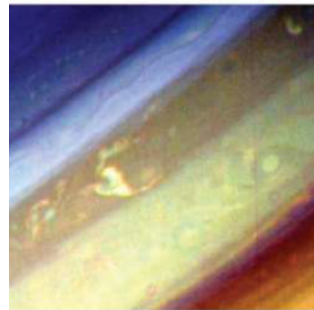
Saturn's gravity is 1.06 times the gravity of Earth.

Composition

Gas



Saturn



*Saturn's atmosphere (enhanced)
Credit: Cassini spacecraft*

Tethys

A Moon of Saturn

(Card 1 of 2)



Subsurface Reservoir

134 

Based on its low density, Tethys is made almost entirely of water ice.

Gravity

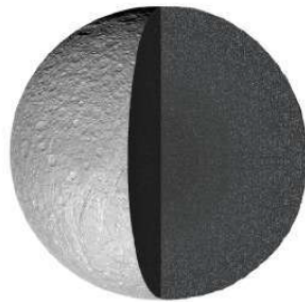
Tethys' gravity is 0.01 times the gravity of Earth.

Composition

Ice



Tethys



Model of Tethys' interior

Tethys

A Moon of Saturn

(Card 2 of 2)



Surface Reservoir

15 

Tethys' surface is made entirely of water ice.

Gravity

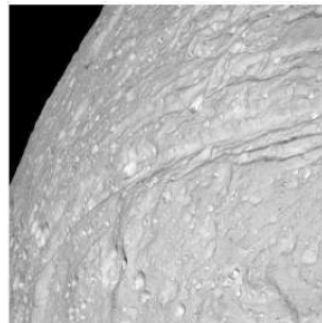
Tethys' gravity is 0.01 times the gravity of Earth.

Composition

Ice



Tethys



*Steep icy cliffs on Tethys
Credit: Cassini spacecraft*

Titan

A Moon of Saturn

(Card 1 of 3)



Atmosphere Reservoir

0



Titan's thick atmosphere contains nitrogen and methane, with very little water.

Gravity

Titan's gravity is 0.14 times the gravity of Earth.

Composition

Rock & Ice



Titan



*Titan's layered atmosphere
Credit: Cassini spacecraft*

Titan

A Moon of Saturn

(Card 2 of 3)



Surface Reservoir

28



Titan's surface is a mix of water ice and hydrocarbon ice.

Gravity

Titan's gravity is 0.14 times the gravity of Earth.

Composition

Rock & Ice



Titan



*Water ice on Titan
Credit: Huygens probe*

Titan

A Moon of Saturn

(Card 3 of 3)



Subsurface Reservoir

255



Titan is thought to have an extremely salty subsurface ocean of liquid water.

Gravity

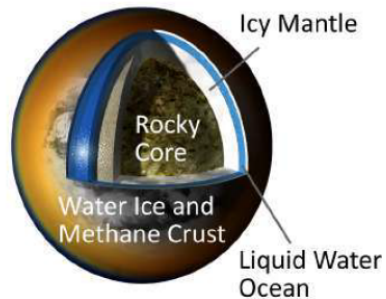
Titan's gravity is 0.14 times the gravity of Earth.

Composition

Rock & Ice



Titan



Model of Titan's interior

Titania

A Moon of Uranus

(Card 1 of 2)



Subsurface Reservoir

156



There may be a layer of liquid water at the boundary of Titania's core and mantle.

Gravity

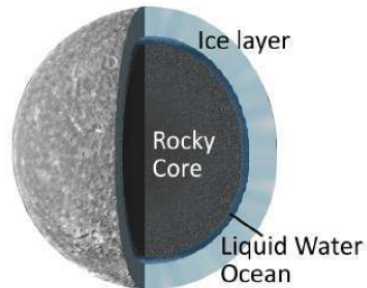
Titania's gravity is 0.04 times the gravity of Earth.

Composition

Rock & Ice



Titania



Model of Titania's interior

Titania

A Moon of Uranus

(Card 2 of 2)



Surface Reservoir

17 

Titania's surface is made of water ice and carbon dioxide ice.

Gravity

Titania's gravity is 0.04 times the gravity of Earth.

Composition

Rock & Ice



Titania



*Craters on Titania's Surface
Credit: Voyager 2 spacecraft*

Triton

A Moon of Neptune

(Card 1 of 2)



Subsurface Reservoir

213 

Triton may have a large liquid or slushy ocean beneath its frozen surface.

Gravity

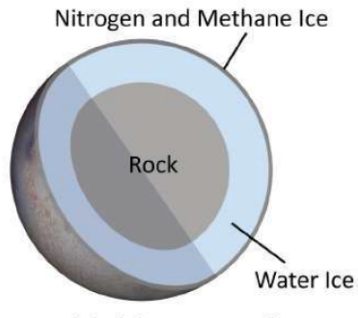
Triton's gravity is 0.08 times the gravity of Earth.

Composition

Rock & Ice



Triton



Model of Triton's Interior

Triton

A Moon of Neptune

(Card 2 of 2)



Surface Reservoir

24 

Neptune's moon Triton has a mostly water ice crust.

Gravity

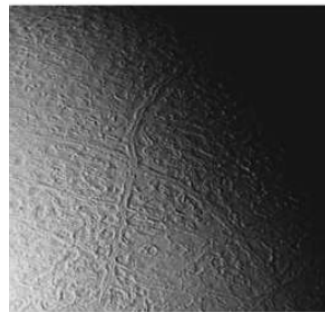
Triton's gravity is 0.08 times the gravity of Earth.

Composition

Rock & Ice



Triton

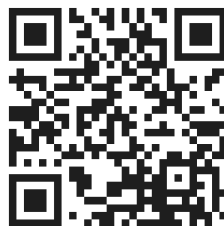


*Dirty water ice on Triton
Credit: Voyager 2 spacecraft*

Umbriel

A Moon of Uranus

(Card 1 of 2)



Subsurface Reservoir

138



Based on its density, Umbriel is made of mostly water ice.

Gravity

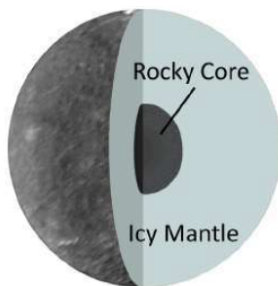
Umbriel's gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Umbriel

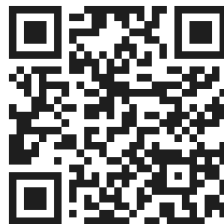


Model of Umbriel's interior

Umbriel

A Moon of Uranus

(Card 2 of 2)



Surface Reservoir

15



Umbriel's surface is made of water ice and carbon dioxide ice.

Gravity

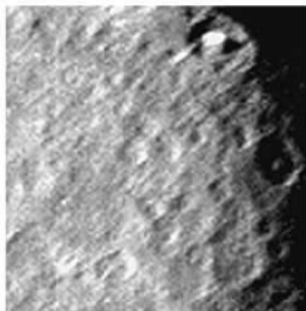
Umbriel's gravity is 0.02 times the gravity of Earth.

Composition

Rock & Ice



Umbriel

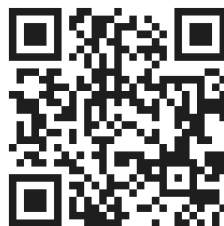


Umbriel's cratered surface

Credit: Voyager 2 spacecraft

Uranus

The 7th Planet from
the Sun (Card 1 of 1)



Subsurface Reservoir

200



The ice giant, Uranus, is thought to have an icy mantle beneath its atmosphere.

Gravity

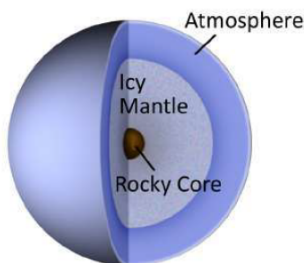
Uranus' gravity is 0.89 times the gravity of Earth.

Composition

Ice & Gas



Uranus



*Cross-section diagram
of the planet Uranus*

Venus



**The 2nd Planet from
the Sun (Card 1 of 1)**

Atmosphere Reservoir

46



The atmosphere of Venus consists of 0.002% water vapor.

Gravity

Venus' gravity is 0.90 times the gravity of Earth.

Composition

Rock



Venus



Venus' s atmosphere

Credit: Pioneer Venus Orbiter

Vesta

A Main Belt Asteroid

(Card 1 of 1)



Surface Reservoir

0



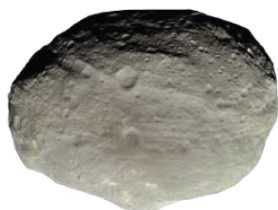
Vesta almost certainly does not have water ice today.

Gravity

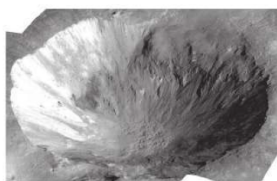
Vesta's gravity is 0.03 times the gravity of Earth.

Composition

Rock



Vesta



*Gullies in a crater on Vesta
Credit: Dawn spacecraft*