The Venn diagram shown describes the characteristics of Terrestrial and Jovian planets. At which lettered location would the characteristic **small masses** best be placed?

- **(A)** small radii
- **(B)** large radii
- **(C)** near the sun
- **(D)** far from the sun
- **(A)** few moons
- **(B)** many moons
- **(A)** no rings
- **(B)** many rings

Terrestrial

Jovian
The Venn diagram shown describes the characteristics of Terrestrial and Jovian planets. At which lettered location would the characteristic no solid surfaces best be placed?
The Venn diagram shown describes the characteristics of Terrestrial and Jovian planets. At which lettered location would the characteristic **nearly coplanar orbits** best be placed?

- **A**: small radii near the sun few moons no rings
- **B**: large radii far from the sun many moons many rings
- **C**: Terrestrial
- **D**: Jovian
Some planets are closer to the sun* than others…

*the solar system’s “heater”
What are the characteristics of the gas giant planets?
## Surface temperatures of gas giant planets

<table>
<thead>
<tr>
<th>Planet</th>
<th>“Surface” (cloud top) Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jupiter</td>
<td>-243° F</td>
</tr>
<tr>
<td>Saturn</td>
<td>-301° F</td>
</tr>
<tr>
<td>Uranus</td>
<td>-353° F</td>
</tr>
<tr>
<td>Neptune</td>
<td>-373° F</td>
</tr>
</tbody>
</table>
What are the characteristics of the gas giant planets?
Jupiter

The largest planet in the solar system.

A gas giant – made mostly of Hydrogen and Helium. You can’t stand on it!
Jupiter has a very dynamic atmosphere

The great red spot (the size of the Earth)
Jupiter’s largest moons (It actually has at least 63 moons)

Which of the moons are geologically active?

- Io
- Europa
- Ganymede
- Callisto
Saturn

The second largest planet in the solar system.

A gas giant – made mostly of Hydrogen and Helium.

Largest ring system.
Saturn’s north pole has a hexagon!
The Cassini spacecraft looks back at the Earth
Actually, all of the giant planets have rings

Jupiter

Uranus

Neptune
Largest moons of Saturn
(Saturn has at least 60 moons)
Saturn’s largest moon Titan

View of surface from Huygens probe

atmosphere

surface
The Ice Giants: Uranus and Neptune
Uranus was discovered in 1781.

Neptune was discovered in 1846.

Is it easy to see and identify Uranus and Neptune as planets? Why or why not?
Uranus was discovered in 1781.

Neptune was discovered in 1846.

Is it easy to see and identify Uranus and Neptune as planets? Why or why not?

How are they identified as planets?
Uranus and Neptune are made mostly of ice.

They have rocky cores.

Their atmospheres are made of water, hydrogen, helium and methane.
Why are Uranus and Neptune blue?
Why are Uranus and Neptune blue?

Methane absorbs red light, so all we see reflected is blue.
Some of the moons of Uranus
Uranus is tilted by ~90 degrees.

What are seasons like on Uranus?

How did Uranus end up like this?
How do you think these moons formed?
Here are the large moons of Uranus

Do they look geologically dead or geologically active?
Neptune has one large moon, Triton
A picture of Triton from the Voyager spacecraft

Does it look geologically dead or geologically active?
Triton has a ‘retrograde’ orbit (it goes around Neptune the wrong way)

How do you think Triton became a moon?