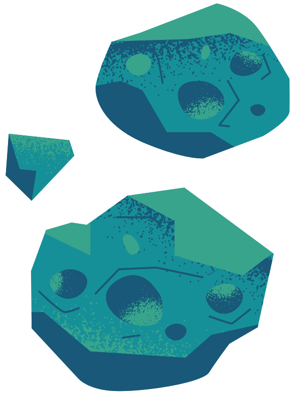
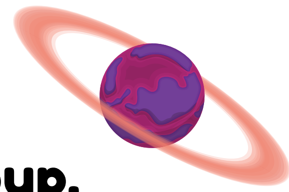


Space Rocks!

Instructor Guide



1. **Cut out and shuffle the cards, then give a set to each group.**
2. **Students work to sort the cards into categories based on appearance, diameter, and clues about what they contain.**

Suggested Categories:

Planets (can be further classified into Inner vs. Outer or Rocky vs. Gas):

- **Inner/Rocky: Mercury, Venus, Earth, Mars**
- **Outer/Gas: Jupiter, Saturn, Uranus, Neptune**

Dwarf Planets:

- **Pluto, Ceres (also an asteroid!), Eris, Haumea, Makemake**

Asteroids:

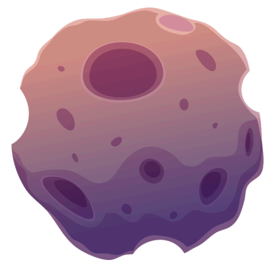
- **Ceres (also a dwarf planet!), Vesta, Bennu, Dimorphos, Psyche**

Comets:

- **Halley, 67P, Wild 2**

Moons:

- **Titan, Europa, Io, Enceladus**



Space Rocks!

Discussion Questions:

1. What properties did you use to group your objects?
2. Which objects could fit into more than one category?
3. Which object was the hardest to sort? Why?
4. What might an object's composition tell you about where it formed?
5. Which objects do you think we've visited with spacecraft?

Helpful facts and suggestions for further exploration:

- Closer to the Sun, temperatures are too hot for ice to exist. Objects that contain more ice, such as comets and icy moons, formed far away from the Sun. At great distances from the Sun, we even find frozen ammonia and methane ice.
- We have visited all of the 8 planets with spacecraft.

Other bodies that we have visited with spacecraft:

- Pluto (New Horizons), Ceres and Vesta (Dawn), Titan and Enceladus (Cassini), Europa (Galileo), Io (Galileo and Voyager 1 & 2), 67P (Rosetta), Wild 2 (Stardust), Tempel 1 (Deep Impact), Halley (Giotto), Bennu (OSIRIS-REx), Dimorphos (DART)

Planned future missions:

- Europa (Europa Clipper), Psyche (Psyche mission)