In-class activity 12

Assemble Your Group

1. Find your assigned group members, and sign in below.

Team member: _____ Team member: _____

Team member: _____ Team member: _____

Planet Definitions and Discoveries

2. (Cf. Seeds and Backman, *ASTRO3,* Brooks/Cole Cengage Learning (2018), pp. 153-155.) Table 1 below lists four different historical definitions of planets. On the next page, Table 2 lists "planet" discovery dates up until 2005.

Table 1: "Planet" Definition Timeline

Date	Definition of "Planet"
(Start)	"Wanders" (prograde/retrograde loops) across the night sky.
1500s	Orbits the sun (excludes moons).
1860	As above, but also excludes "asteroids" (bodies orbiting between Mars and Jupiter).
2006	International Astronomical Union (IAU) Classification Scheme—planets must meet all three qualifications below (dwarf planets only meet qualifications I and II): I. Orbits the sun. II. Shape "rounded-out" by gravity. III. Cleared/dominates orbit around sun.

Table 2: "Planet" Discovery Timeline

Date	"Planet"	Shape	Location
(Start)	Mercury, Venus, Mars, Jupiter, Saturn	Round	In night sky; orbits sun
1500s	Earth	Round	Orbits sun
1781	Uranus	Round	
1801	Ceres	Round	In asteroid belt, between Mars/Jupiter
1802-1845	Pallas, Juno, Vesta, Astraea	Irregular?	
1846	Neptune	Round	Orbits sun
1847-1859	Hebe, Iris, Flora, Metis, Hygiea, Parthenope, Victoria, Egeria, Irene, Eunomia, Psyche, Thetis, Melpomene, Fortuna, Massalia, Lutetia, Kalliope, Thalia, Themis, Phocaea, Proserpina, Euterpe, Bellona, Amphitrite, Urania, Euphrosyne, Pomona, Polyhymnia, Circe, Leukothea, Atalante, Fides, Leda, Laetitia, Harmonia, Daphne, Isis, Ariadne, Nysa, Eugenia, Hestia, Aglaja, Doris, Pales, Virginia, Nemausa, Europa, Kalypso, Alexandra, Pandora, Melete, Mnemosyne[1]	Irregular	In asteroid belt, between Mars/Jupiter
1930	Pluto	Round	In Kuiper belt, out beyond Neptune
1977-2005	Hidalgo, Chiron, Damocles, Pholus, QB1, and 1,242 other large bodies	Irregular	
2004-2005	Eris, Haumea, Makemake[2]	Round	

(a) According to the original definition ("wanders across the night sky"), there were five planets. List these planets below.

Original planets:

_____, _____, _____, _____, _____.

[1] "List of minor planets: 1–1000," wiki.pe/List_of_minor_planets:_1%E2%80%931000.

[2] "List of Known Trans-Neptunian Objects (and other outer solar system objects)," as of August 2010, johnstonsarchive.net/astro/tnoslist.html.

(b) According to the 1500s redefinition ("orbits the sun"), there were six planets. List the new sixth planet that was added to the original five listed above, and briefly explain why it was not considered a planet before the 1500s.

"New" planet added in the 1500s: _____.
Explanation:

(c) In 1859, there were 65 planets ("orbits the sun"). After the 1860 redefinition ("asteroids are not planets"), there were only eight planets. List four that were demoted from planet status in 1860, and then list the eight "official" planets, according to the 1860 redefinition.

Demoted planets in 1860:

_____, _____, _____, _____, (and 53 others).

Planets, according to 1860 redefinition:

_____, _____, _____, _____,

_____, _____, _____, _____.

(d) In 2005, there were 1,259 planets ("asteroids are not planets"). After the 2006 redefinition (the IAU classification scheme), there were only eight planets. List four that were demoted from planet status in 2006, and then list the eight "official" planets, according to the 2006 redefinition.

Demoted planets in 2006:

_____, _____, _____, _____, (and 1,247 others).

Planets, according to 2006 redefinition:

_____, _____, _____, _____,

_____, _____, _____, _____.

(e) According to the 2006 redefinition (the IAU classification scheme), there are five *dwarf planets*. List these dwarf planets below.

List of dwarf planets, according to 2006 redefinition:

_____, _____, _____, _____, _____.

(f) Discuss a plausible motivation for why it was necessary to revise the definitions of planets in 1860 and again in 2006.

Explanation:

Planet Switcheroo

3. Review the 2006 definition (the IAU classification scheme), and answer the questions below by circling your choice, and then briefly explain your choice. (The planet Mercury is spherical in shape and larger, but would not significantly gravitationally influence its neighbors much more than Ceres.)

(a) If Mercury were placed in the asteroid belt, it would become [a moon / solar system debris / a dwarf planet / a planet].

Explanation:

(b) If Ceres replaced Mercury in its orbit, Ceres would become [a moon / solar system debris / a dwarf planet / a planet].

Explanation: