

Team Name & Number: _____

1. _____ HAT-P-11b
 - a. _____ Transmission spectroscopy
 - b. _____ Water vapor (also accept hydrogen gas or H₂)
2. _____ (D) 10 -> 5
3. _____ (C) 3 -> 1 -> 5 -> 30
4. _____ 16, 20, 22, 14
 - a. _____ Image 17
 - b. _____ Hot Jupiters
5. _____ 10, 6, 8, 4
 - a. _____ It is much less luminous or absolutely bright than the others
 - b. _____ Image 8 because it has the highest mass
6. _____ 55 Cancri f
 - a. _____ The habitable zone or Goldilocks zone
 - b. _____ Kepler 186f is a rocky planet, while 55 Cancri f is a gas giant (one expects similar planets to have similar sorts of life)
7. _____ Debris disk
 - a. _____ Infrared or IR
 - b. _____ Protoplanetary disks are more opaque
8. _____ Direct imaging
 - a. _____ A coronagraph
 - b. _____ Face-on
9. _____ Radial velocity
 - a. _____ Higher mass exoplanets are more easily observed and increase the host star's orbital velocity
 - b. _____ Hot Jupiters migrate inwards as they develop, which takes away material that could form Earth-like planets closer to the star in the habitable zone

10. _____ Image 1
 - a. _____ Absorption/dark nebula or molecular cloud
 - b. _____ Dust
11. _____ The Orion Nebula or M42
 - a. _____ Image 3
 - b. _____ Comets
12. _____ 2MASS J22282889-431026
 - a. _____ They demonstrate probing atmospheric conditions at different altitudes
 - b. _____ Clouds
13. _____ AB Aurigae
 - a. _____ Transitional disk
 - b. _____ Gravitational tug of a companion or unevenness in the rotating disk producing density waves
14. _____ Direct imaging
 - a. _____ L-types
15. _____ The HD 106906 system
 - a. _____ The semi-major axis or orbital distance the planet is from its star
16. _____ Those stars are smaller, so an orbiting planet will block out the light of these stars more
 - a. _____ 4 Planets
 - b. _____ Orbital period
17. _____ The temperature at different layers and the amount and distribution of water vapor
 - a. _____ WASP 43b has water vapor in its atmosphere; Jupiter's water is ice closer to the surface
 - b. _____ Emission spectroscopy
18. _____ T Tauri star
 - a. _____ Herbig Ae/Be star
 - b. _____ 16, 17, 22, 24, 29
19. _____ 55 Cancri, HR 8799, T Tauri, HL Tauri, M42
 - a. _____ 51 Pegasi b and WASP 43b

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20. _____ 25.0 pc

21. _____ 0.263 AU

22. _____ 6710 K

23. _____ 12.3 solar luminosities

24. _____ 236 K

25. _____ 2.5 Earth radii

26. _____ 12.2 km/s

27. _____ 5.54 Jupiter masses

28. _____ 0.485 g/cm³

29. _____ 33 m/s²