**S9 Space Unit Checklist and Vocabulary**

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| **Topic 1-2** |
| 1. **What did the following scientists contribute to the science of astronomy? Put them in order of earliest to most recent contribution. Galileo, Lippershey, Kepler, Ptolemy, Copernicus,Sir Issac Newton.**
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| **2. What are the steps to determine the altitude and azimuth of a celestial body?** |
| **3. What instrument do scientists use to measure azimuth? Altitude?**  |
| **4. How do you know if a reported altitude is wrong?** |
| **5a.** Describe the **geocentric model** **of the universe. 5b. Who proposed** the geocentric model of the universe 2000 years ago?**5c.**  Who modified the model by adding **epicycles**? What are epicycles, and why did he add them  to the model?**5d. Galileo found 4 moons of Jupiter**. Why did this disprove the geocentric model?  |
| **6a.** Describe the **current model of the universe:** **the heliocentric model.** **6b.** Who proposed the heliocentric model of the universe? |
| **7a.** What **shape are planetary orbits**? Draw this shape. **7b.** What **2 factors** combine to produce an orbit? How does **Newton’s Law of Universal  Gravitation** pg. 372, explain why orbits are elliptical?  |
| **8a.** What is a **constellation**? **8b**. How can we find the North star (Polaris) using the Big Dipper? |
| **9.** Diagram a **total solar eclipse** compared to a **total lunar eclipse.** |
| **10a.** What is the difference between r**evolution** and **rotation**. Which one corresponds to a day?  Which one corresponds to a year?**10b.** As planets get further from the sun their year increases/decreases (choose one). Why does  this make sense? Who has a longer year – Earth or Jupiter.? |
| **11.** What are differences between **refracting and reflecting telescopes**? Which was the first  type to be designed? |
|  **12a. I know the vocabulary for these topics.** **12b. I have taken the practice Science Focus online tests for these topics.** |
| **Topic 3-5**  |
| **13a.** If a star is approaching the earth it’s spectrum will be \_\_\_\_\_\_\_\_ shifted and the wavelength is  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (stretched out or compressed). If a star is going away from  the earth it will be \_\_\_\_\_\_\_\_\_\_\_\_\_ shifted and the wavelength is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  This is called the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ effect.**13b.** As a car races towards you **pitch** increases or decreases (choose one). Why does this make  sense? |
| **14a**. I can determine the element composition of stars using the Practice sheet “Analyzing  Spectral Patterns”. Describe briefly the steps you need to take to do this.**14b.** Why do the planets and the moon have the **same spectroscope pattern as the Sun?14c. How do stars produce so much heat and light?14d. What are the 2 main elements in stars?14e. What is the main element in Sol?** |
| **15a.** What is **AU? LY?****15b.** If a star is 8 light years away from Earth, how many AU away is it? Show your work.**15c.** If a star is 875000 AU away from Earth, how many LY away is it? Show your work. |
| **16a.** How do we measure the distance to things that are far away? What are 2 vocab  words used to describe this?**16b.** Calculate the distance of an object in the following **triangulation**: Baseline is 70 m, and the  angles are 58o and 84o. Attach your work, Include your scale.**16c.** What do scientists do to the **baseline** to make the most accurate triangulation  measurements? |
| **17.** Why do we use **diffraction gratings** instead of prisms in modern spectroscopes? |
| **18. Why do stars “twinkle”** to our naked eye and in optical telescopes on Earth? What are  **adaptive optics** used for? Optical telescopes use visible light energy/radio wave energy  (choose one). |
| **19.** What does **EMR** stand for? |
| **20a.** Why do radio telescopes have to be larger than optical telescopes?**20b.** What advantages do radio telescopes have over optical telescopes?**20c.** What do the false colors in a radio telescope image indicate?**20d.** Why do we connect radio telescopes’ signals with computers? What vocab word do we use  to describe this improvement in accuracy? **20e.** What is the **VLA**? **VLBI**?**20f.** What other types of EMR do we use to study space? |
|  **21a. I know my vocabulary for these topics.** **21b. I took the practice Science Focus online tests for these topics.** |
| **Topic 6-8** |
| **22.** Draw and label a diagram of **gravitational assist**. What is it used for? |
| **23.** What **3 parts do all rockets** have? |
| **24a.** How does the Law “for every action there is an equal and opposite reaction” explain how  rockets lift off? Use **exhaust velocity in your answer.** **24b.** Why do we use **liquid fuels** in rockets (give 2 reasons)? **24c.** What type of energy conversion happens in rockets? |
| **25a.** What do scientists use **probes** for? **25b.** What did scientists use the **space shuttles** for?**25c.** What do we use the **ISS** for?  |
| **26a.** Why does the Hubble Space telescope produce clearer images than similar telescopes on  Earth?**26b.** What are **CCDs**? How have they improved our ability to look at stars? |
| **27a.** What is the difference between geosynchronous and Earth orbit satellites. What are each of  them used for? **27b.** What do we mean by **remote sensing? What do we study with remote sensing?****27c.** How does **GPS** work?**27d.** What is another name for a **natural (**not an artificial satellite)? |
| **28.** The Americans and the Soviets solved the oxygen problem for their astronauts in different  ways. How did they do this, and what were the advantages and disadvantages of the 2  different solutions? |
| **29a.** Who was the 1st Canadian in space?**29b.** Who was the 1st Canadian to command the ISS?**29c.** Why should we be so proud of the **Canadarm?** What is it used for? |
| **30a.** What is a terrestrial planet? Name them. What is a gaseous planet? Name them.**30b.** Why are the terrestrial (rock) planets found close to the sun, and the gas and ice planets  found farther from the sun?**30c. What is the largest object in our solar system?****30d. Define and rank in order of size: galaxy, nebula, star, solar system, planets, asteroids,  comets. Where do we find asteroids in our solar system?** |
|  **31a. I know my vocabulary for these topics.** **31b. I took the practice Science Focus online tests for these topics. 31c. I took the quest aplus Science Test (or the science test in The Key).** |

S90 Unit 5 Space Vocabulary

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| Topic 1 | Topic 2 | Topic 3 | Topic 5 |
| Frame of reference | Telescope | **Spectroscopy/** **Spectroscope** | Electromagnetic radiation |
| Celestial body | Objective lens | Diffraction grating | **Radio telescope** |
| Constellation | Ocular lens | **Doppler effect** | **Interferometry** |
| Azimuth | Resolving power | Topic 4 | Very long baseline interferometry (VLBI) |
| Altitude | Refracting telescope | Adaptive optics | Topic 6 |
| Astrolab | Reflecting telescope | Triangulation/ parallax technique | Payload |
| Compass | Combination telescope | AU | Exhaust velocity |
| Earth-centered model (geocentric) | Ellipse | LY | Staged rocket |
| Sun-centered model (heliocentric) | Newton’s Law of Universal Gravitation |  | Ballistic missile |
| epicycles |  |  | Cosmonaut |

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| **Topic 6 (cont)** | Topic 7 |
| **Gravitational assist** | Solar wind |
| Charge coupled devices (CCDs) | Terrestrial (inner) planets |
| **Artificial satellite** | Gaseous (outer planets) |
| **Low Earth orbit** | galaxy |
| **Geosynchronous orbit** | nebula |
| Remote sensing | asteroid |
| Global positioning systems (GPS) | comet |
|  | microgravity |