

**60 QUESTIONS – 50 POINTS:** Part I of the midterm constitutes the “Take-Home” part of the entire Midterm Exam. Additionally, this “Take-Home” part is divided into two sub-parts.

The second sub-part of the “Take-Home” is given below with 40 questions for a total possible of 40 points (1 point per question). Clearly print the answers to these questions on the answer form provided. Return the answer form (separate sheet) to the White Box by NOON, Friday, **March 20**. [Note: Spelling and units count on this exam!!!]

Part II can be found in your *MasteringAstronomy* account and is labeled “Midterm – Online Portion”. The questions asked there are directed at the first chapter listed in your reading assignment for Week 9 of the course (see your *General Schedule of Activities* document) and is conducted in the same manner as done with your weekly homework exercises where each question is worth 0.5 point. Therefore, this portion of the midterm has 20 questions for a total possible of 10 points. This is due by **Thurs., March 19** at 11:59 pm.

**IMPORTANT INFORMATION:** Part III of the Midterm (worth 50 points) will be given in the week beginning **March 16** in your scheduled 3<sup>rd</sup> hour. Part II of the midterm will require a Scantron 882 form and #2 pencil. Midterm parts I, II and II are worth 100 points total!

1. See FIGURE ‘A’. This person in the FIGURE discovered that this planet had phases (name the planet)?
2. See FIGURE ‘B’. What is the name of this telescope?
3. See FIGURE ‘D’. What time does the object in the FIGURE **rise** on April 13 according to this year’s the *Sky Gazer’s Almanac*?
4. See FIGURE ‘E’. Which solar system model, the heliocentric or the geocentric, did the person in the FIGURE support?
5. See FIGURE ‘C’. In the Renaissance times, he proposed this model of the solar system (name this person).
6. See FIGURE ‘F’. If an astronaut’s mass at the surface of the Earth is 55 kg, what would her mass be on the surface of the object pictured in the FIGURE?
7. See FIGURE ‘G’. What is the planetary configuration of the planet Mars?

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8. See FIGURE 'H'. Was this picture taken by a spacecraft far from Earth or something on (or orbiting) Earth?
  9. See FIGURE 'I'. In the FIGURE the planet goes around in a counterclockwise direction around the Sun. Which point is perihelion?
  10. What is the phase of the moon during a total lunar eclipse?
  11. Suppose you are riding in your car and approaching a red light. How fast would need to go in order to make the red light ( $\lambda_{\text{rest}} = 640. \text{ nm}$ ) appear to turn into a green light ( $\lambda_{\text{shift}} = 530. \text{ nm}$ )? Give your answer in terms of km/sec.
  12. See FIGURE 'J' What is the magnification power of this telescope?
  13. What is the light gathering power of this telescope (FIGURE 'J') compared to the human eye (diameter of eye lens = 5 mm)?
  14. What constellation would the Full Moon occupy if the Full Moon occurred on Jan. 1?
  15. For an observer in Des Moines, Iowa, what constellation would the sun appear to occupy on November 10?
  16. Is the ratio of diameters between Jupiter and Venus larger or smaller than between ratio of diameters of Saturn and Mars?
  17. An observer in Minneapolis, MN, would observe the North Star at what altitude (to the nearest degree)?
  18. The Sun **rises** earliest in the day at the onset of what season?
  19. Which of the following constellations would you not expect Jupiter to occupy at sometime in the next 15 years: Taurus, Pisces, Hydra, or Virgo?
  20. Suppose you have discovered a new celestial body going around the sun. If it requires 512 years to complete one orbit around the sun, what is its average distance from the sun (give answer in AU)?

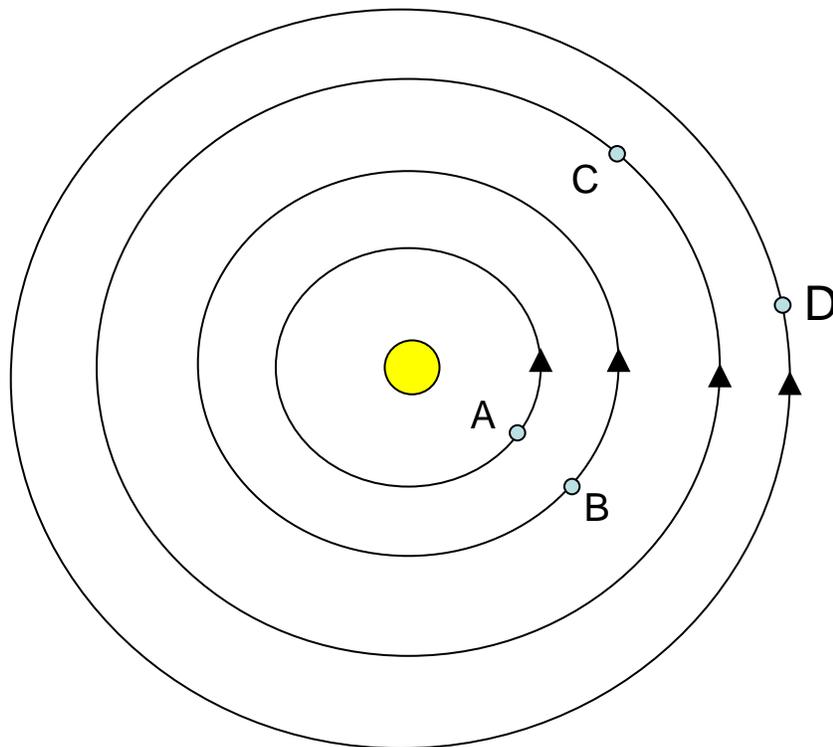
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**For the following eight questions, match the descriptions on the left to the people on the right (put the letter corresponding to the person on the answer sheet; letters are not repeated):**

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|---|------------------------|
| 21. Discovered that the Earth precesses like a top          | a) Johannes Kepler     |
| 22. Invented the first reflecting telescope                 | b) Eratosthenes        |
| 23. First to measure the size of the Earth to good accuracy | c) Aristarchus         |
| 24. Ancient Greek who believed in a sun-centered universe   | d) Galileo             |
| 25. Discovered mountains on the Moon using a telescope      | e) Nicolaus Copernicus |
| 26. First to consider ellipses as orbits                    | f) Ptolemy             |
| 27. Was the greatest naked-eye astronomer                   | g) Aristotle           |
| 28. Foremost ancient Greek philosopher                      | h) Hipparchus          |
|   | i) Tycho Brahe         |
|   | j) Isaac Newton        |

**Answer the following three questions (29-31) using the solar system diagram below. The spot in the center is the Sun and A, B, C, D represent 4 planets which orbit it and all planets go counterclockwise around the Sun. The diagram is to scale and planet C is 1 AU from the Sun:**



29. Which planet (A,B,C,D) goes slowest around the Sun?
30. From planet B, which planet or planets could be seen in opposition at sometime in the future?
31. Given the current positions of the planets A, B, C & D, which of the planets will planet C see in conjunction (with the sun) next?

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32. An object is observed from Earth to have its spectral lines red-shifted. Is the object moving away from Earth or towards the Earth?
  33. Which planet has the shortest sidereal rotation period?
  34. Which planet has the longest revolution period?
  35. If the net force upon an object is zero, can it have a non-zero acceleration?
  36. Are the largest telescopes used by astronomers refractors or reflectors?
  37. According to this year's *Sky Gazer's Almanac*, what is the first day this year when Mercury rises at 4 am?
  38. Of the 6 types of eclipses we can have (total lunar, partial lunar, penumbra lunar; total solar, annular solar or partial solar), which one would no longer be possible if the Moon's current distance from Earth were twice as large (assume the eccentricity and inclination of the Moon's orbit remains the same)?
  39. Suppose Tom and Joe are observing the sky shortly after sunset. Tom spots a very bright object rising in the east and both he and Joe know it must be a planet. Joe claims it must be Venus but Tom insists that it's Jupiter. Who must be wrong?
  40. Starting from 10 days after the due date of this part of this exam, when is the next day in which the Sun will set directly and exactly due West (from Rocklin)?

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## FIGURES PAGE

