Section 1 Astronomy 150 Fall 2009

Midterm

Test Form A

1. **DO NOT OPEN THIS EXAM UNTIL INSTRUCTED TO DO SO.**
2. Write the multiple-choice answers on your Scantron form.
3. Make sure to mark your test form, name, and NetID on your form. I do not need your social security number.
4. Answer *ALL* of the questions. There is no penalty for guessing.
5. Don't get stalled on any one question.
6. Choose the **best** answer for each problem.

DO NOT FORGET TO FILL IN "TEST FORM" A

1. This object did not impact the ground, instead exploding around 8km off the ground. Nonetheless, it caused extensive damage, knocking down 2000 km^2 of trees. Luckily it impacted a sparsely inhabited region in Siberia. What do we call this incident?
   A) Apophis
   B) Manicouagan
   C) Chicxulub
   D) Shoemaker-Levy 9
   E) Tunguska

2. What type of crater has a central uplift in the center of the crater?
   A) round crater
   B) lunar crater
   C) simple crater
   D) complex crater
   E) elliptical crater

3. How do we know that meteorites are 4.6 billion years old?
   A) By using the formation of the Solar System as a guide.
   B) By Carbon-14 dating.
   C) By measuring the amount of a long-lived radioactive parent and its daughter species.
   D) By guessing.
   E) By their oxygen isotope ratios.

4. Why does a meteor glow?
   A) fission
   B) ram pressure
   C) neon
   D) friction
   E) fusion

5. Which of the following is **NOT** a consequence of a large impact?
   A) Devastating Earthquakes.
   B) For oceanic impacts, global tsunamis.
   C) Global winter and global darkness.
   D) The Moon's orbit will be dragged Earthward.
   E) For a terrestrial impact, rock will be vaporized and thrown into the stratosphere.

6. Why can asteroids cause so much damage? Hint, which property is the most important.
   A) Their impact angle, straight down.
   B) Their material.
   C) Their velocity.
   D) Their mass.
   E) Their color.

7. If you see a small meteorite hit the ground and rush to touch it, it will feel
   A) sharp.
   B) very hot, likely burning you if it is any size.
   C) like nothing you have ever felt before.
   D) very hot, likely burning you if it is the size of a golf ball or bigger.
   E) cool or at ambient temperature.

8. Why is Pluto no longer a planet?
   A) Its rotational energy decreased, which pushed it out of planetary orbits.
   B) The definition of planet was modified.
   C) It just plain ran out of luck.
   D) With higher resolution, we found out that Pluto is not a planet.
   E) Many other objects that are much bigger than Pluto were discovered.

9. How would a gravity tractor work?
   A) The spaceship is attached to the asteroid with rockets and pushes it away, using Newton's third law.
   B) A solar sail is attached to the asteroid, and then the pressure from light moves the asteroid.
   C) The spaceship is attached to the asteroid with cables and pulls it away, using Newton's third law.
   D) They are fictional; they will always be impossible.
   E) The asteroid is gravitationally attracted to the spacecraft, which uses rockets to keep the asteroid-spacecraft distance constant.

10. Asteroids are mostly in the _____ , and comets are mostly in the _____.
    A) orbit of Earth, Sun.
    B) space around us, outer reaches of the Solar System.
    C) sky, sky.
    D) Kuiper belt, elliptical orbits.
    E) asteroid belt, Oort cloud.

11. Why are most all craters round?
    A) Most impactors are round.
    B) Since all impactors fall straight down.
    C) Wrong, they are all eroded from weather.
    D) Impactor is vaporized, effectively exploding.
    E) Wrong, they are all shapes and sizes.

12. What well explains the orbital motions of the planets?
    A) The direction of the jet or outflow of the young Sun.
    B) The rotation of the Sun.
    C) The molecules that were in the interstellar medium.
    D) The small rotation of the cloud from which the Sun formed.
    E) Nothing, just random.

13. What can we say about the planets' motion around the Sun?
    A) They orbit the same direction in a uniform sphere.
    B) Uniform motion, like a rotating disk (DVD?).
    C) Random orbits defined by the original molecular cloud.
    D) They orbit the same direction in a flat plane.
    E) They orbit in opposite directions in a flat plane.

14. A meteorite hits the Moon. When it was 100 km away from the Moon, it was traveling at 10 km/s. What is its speed right before it hits the Moon? Hint, think of terminal velocity and falcon feathers.
    A) 0
    B) more than 10 km/s
    C) It depends on the properties of the meteorite.
    D) less than 10 km/s
    E) 10 km/s

15. The Sun rises in the East and sets in the West because
    A) the Earth orbits the Sun.
    B) the Earth has a slight (23 degree) tilt to its rotation axis.
    C) it wants to.
    D) the Earth rotates on its axis.
    E) the Sun moves in the Sky due to gravity and the original rotation of the Sun's molecular cloud.

16. Why did Leslie delay HW2 until Oct 26th?
    A) He forgot to set the date properly.
    B) To allow some students to leave out the pan during the Orionids shower.
    C) He is too cute to be bothered with due dates. We don't need no stinking pans.
    D) To keep those students with too much spare time in check.
    E) It was too hard to do in one week.

17. Aphohis will come very close in 2029. How close is close?
    A) So close that in East Asia, commercial flights will probably be cancelled in case an airline jet collides with it.
    B) Between the Earth and our geosynchronous satellites.
    C) Between the Earth and Moon.
    D) 100 km.
    E) Between the Earth and the Sun.

18. NASA was mandated to find nearly all of the near-Earth asteroids >1 km in size. What is the status of this?
    A) NASA is about to launch the Asteroid Finder spacecraft to accomplish this task.
    B) Incorrect, NASA was mandated to find extrasolar planets, not asteroids.
    C) NASA has just started, and has already found Apophis.
    D) Incorrect, the funding was pulled by the current administration.
    E) NASA has found >90% of all 1 km objects, about 1000.

19. The Sun is not expanding or collapsing on human time scales. What is this called?
    A) Stellar equilibrium.
    B) Fusion.
    C) Fission.
    D) Hydrostatic equilibrium.
    E) Big Bunny Ballast

20. What can we say about Near Earth Asteroids?
    A) That they were formed in situ (in place) during the formation of the Earth.
    B) That they typically travel in unique orbits that move them from Mercury to Venus to Earth, and to Mars, with a 10% chance of collision at each body.
    C) That they are 90% of the time, old comets.
    D) That they can only exist in near Earth orbit for a few million years.
    E) That they are all made of mostly iron.

21. What do meteor showers come from?
    A) Planetesimals.
    B) Left over dust from comets.
    C) Asteroids.
    D) Satellites.
    E) Dust-sized particles left over from the formation of the Solar System.

22. Why does the Sun shine?
    A) Gravitational collapse
    B) Nuclear fusion
    C) TNT explosions.
    D) Chemical burning.
    E) Nuclear fission.

23. What force allows a helium nucleus to not fly apart with its two positively charged protons?
    A) gravitation
    B) electromagnetic
    C) strong nuclear
    D) passion
    E) weak nuclear

24. Which of the following is **NOT** evidence of a massive impact 65 million years ago?
    A) The remains of a large crater in Mexico.
    B) Spherules, melt droplets, found globally.
    C) Detection of a thin layer of ash from global wildfires in the KT boundary.
    D) Detection of iridium in the KT boundary.
    E) Dino fossils below the KT boundary, but no dino fossils above it.

25. We know that the energy delivered by a meteorite strike is related to its kinetic energy. Which of the following properties of a meteorite would impart the most energy onto the Earth? (Warning a little math thinking necessary.)
    A) 1 kg and 400 km/hr.
    B) 2000 kg and 100 km/hr.
    C) 1000 kg and 100 km/hr.
    D) 10,000 kg and 1km/hr.
    E) 2000 kg and 50 km/hr.

26. Although a 30 meter impact happens every 100 years or so, why haven't more people been killed?
    A) Small meteorites can easily be dodged.
    B) These size meteorites will always fracture into smaller and harmless meteorites.
    C) Early warning systems work.
    D) Atmosphere protects us from everything but the very largest rocks (i.e. 1 km).
    E) Low population density before the 20th century, so lower likelihood for someone being affected.

27. Why are comets more troublesome (impact-wise) than asteroids?
    A) Orbit is unpredictable.
    B) Moving faster.
    C) Maybe only1 month of warning.
    D) Orbit more likely to decay into the Earth.
    E) Made of ice and organic compounds.

28. What type of meteorites are we trying to find in HW2?
    A) rocky
    B) radioactive
    C) size of marbles
    D) chondrules
    E) iron

29. The recent impact on Jupiter emphasizes that impacts do happen in the Solar System. The comet broke apart and
    A) hit the planet's rocky core moving at speeds in excess of 10 km/s.
    B) hit the Great Red Spot.
    C) missed the planet.
    D) the small pieces did not make any serious impact sites; only astronomers with fancy equipment could see them.
    E) created numerous impact sites, many of which were the size of the Earth.

30. The majority of all meteorites are
    A) stolen.
    B) stony.
    C) steel.
    D) iron.
    E) stony-iron.

31. Which of the following is **NOT** a reason for there being so few craters on the Earth's surface?
    A) The heat of atmospheric friction, often vaporizes the smallest meteoroids
    B) Many meteorites land in water.
    C) Plate tectonics/volcanism erase craters.
    D) Jupiter "vacuums" up all the asteroids before they can hit the Earth.
    E) Water erosion wears away craters.

32. Why is the term shooting star incorrect?
    A) The star is only an optical illusion.
    B) It was a star billions of years ago, but is now extinct.
    C) It is a piece of rock from the early Solar System that is heated by friction.
    D) It is not shooting anything.
    E) It is only a rock, heated by ram pressure.

33. Stars are born
    A) in supernovae.
    B) in black holes.
    C) on Broadway.
    D) in empty space.
    E) in molecular clouds.

34. Death by asteroid is more likely than a shark attack because
    A) Even though someone is less likely to be killed by an asteroid than a car accident does not mean that it is more likely than a shark attack.
    B) An asteroid is more likely to hit water, which is very likely to kill all the local sharks.
    C) Sharks are uncommon in Illinois.
    D) Even though asteroid impact is lower chance, they have higher risk (more people killed).
    E) This doesn't make sense.

35. What's the best way to prevent an asteroid from hitting the Earth?
    A) Blow up the asteroid.
    B) Remove the asteroid from the Solar System.
    C) Blow up the Earth.
    D) Move the Earth.
    E) Delay the asteroid by a small amount.