

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 km² 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 only 1 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.