

**Section 1**

**Astronomy 150**

**Fall 2010**

**Exam 1**

**Test Form E**

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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 anything else.
  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.

<b>DO NOT FORGET TO FILL IN "TEST FORM" E</b>
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1. What is the important lesson learned from Shoemaker-Levy 9?
  - A) We are protected from all asteroids by the atmosphere.
  - B) A comet is more likely to hit the Earth than an asteroid.
  - C) Jupiter will suck-up all of the dangerous asteroids.
  - D) A once-in-a-lifetime impact can easily destroy a city.
  - E) Large impacts can happen today.
  
2. 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) 200 kg and 100 km/hr.
  - C) 100 kg and 100 km/hr.
  - D) 10,000 kg and 1km/hr.
  - E) 2000 kg and 50 km/hr.
  
3. Death by asteroid is more likely than a shark attack because
  - A) Sharks are uncommon in Illinois.
  - B) 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.
  - C) This doesn't make sense.
  - D) An asteroid is more likely to hit water, which is very likely to kill all the local sharks.
  - E) Even though asteroid impact is lower chance, they have higher risk (more people killed).
  
4. What is the typical size of the objects, before they hit the atmosphere, that cause meteor showers?
  - A) planetesimals
  - B) small pebbles
  - C) dust
  - D) boulders
  - E) a range of sizes that can not be predicted
  
5. The European Space Agency is already testing the kinetic energy deflection of an asteroid (i.e. using an impact to move an asteroid). This mission is called?
  - A) The Great Impactor
  - B) Alexander the Great
  - C) Don Quijote
  - D) Churchill
  - E) Project Dino

6. Which of the following is evidence of a massive impact 65 million years ago?
  - A) The change in dinosaur fossils above the KT boundary; there was an abrupt change in the dinosaur population.
  - B) Detection of iridium in the KT boundary.
  - C) Detection of burnt dinosaur bones in the KT boundary.
  - D) Detection of shredded rocks from massive volcanoes in the KT boundary.
  - E) The remains of a large crater in Canada.
  
7. In Class, Leslie used Liquid Nitrogen to demonstrate
  - A) the balance of forces in the Sun.
  - B) the coldness of space.
  - C) gravity.
  - D) the affect of asteroids on bananas.
  - E) why it is important to weigh risks carefully.
  
8. If you see a small meteorite hit the ground and rush to touch it, it will feel
  - A) sharp.
  - B) cool or at ambient temperature.
  - C) very hot, likely burning you if it is the size of a golf ball or bigger.
  - D) like nothing you have ever felt before.
  - E) very hot, likely burning you if it is any size.
  
9. If you take 4 protons and make a helium atom, what do you get out?
  - A) energy
  - B) a protostar
  - C) an explosion
  - D) fission
  - E) a star
  
10. What is the origination for the planets to be orbiting the same direction around the Sun?
  - A) Nothing, just random.
  - B) The rotation of the Sun.
  - C) The slight rotation of the cloud from which the Sun formed.
  - D) The spin and direction of the jet or outflow of the young Sun.
  - E) The rotation of the supernova that exploded near the young Sun.
  
11. Why is the term shooting star incorrect?
  - A) It was a star billions of years ago, but is now extinct.
  - B) It is only a rock, heated by ram pressure.
  - C) It is a piece of rock from the early Solar System that is heated by friction.
  - D) It is not shooting anything.
  - E) The star is only an optical illusion.

12. Why does the Sun shine?
- A) Gravitational collapse
  - B) Nuclear fusion
  - C) Nuclear fission.
  - D) TNT explosions.
  - E) Chemical burning.
13. Stars are born
- A) in black holes.
  - B) in molecular clouds.
  - C) in empty space.
  - D) in supernovae.
  - E) on Broadway.
14. Why does a meteor glow?
- A) friction
  - B) ram pressure
  - C) fusion
  - D) fission
  - E) neon
15. Which of the following made Pluto become a dwarf planet with the new definition of planet.
- A) It was too small.
  - B) Its orbit is not circular enough.
  - C) Its moon Charon was too close.
  - D) Its composition is incorrect.
  - E) It had not cleared its orbit of other similar sized bodies.
16. A nearly spherical meteorite hits the Earth. When it was 100 km away, it was traveling at 12 km/s. What is its speed right before it hits the ground? Hint, think of terminal velocity and falcon feathers.
- A) 10 km/s
  - B) It depends on the properties of the meteorite.
  - C) 0
  - D) more than 12 km/s
  - E) less than 12 km/s
17. Now that NASA has found >90% of all 1km or larger NEA, Congress has mandated that NASA find by 2020 >90% of all these.
- A) Objects with a 10% of higher chance of hitting the Earth by 2880 AD.
  - B) Torino ranked 1 or higher NEAs.
  - C) Incorrect, the funding was pulled by the current administration.
  - D) 14 meter NEAs.
  - E) 140 meter NEAs.

18. If this once-in-a-century event had happened over a city, it would likely destroy most of it.
- A) Shoemaker-Levy 9
  - B) Tunguska
  - C) Manicouagan
  - D) Chicxulub
  - E) Apophis
19. Where do Near Earth Asteroids come from?
- A) They typically come from the Kuiper belt.
  - B) They are leftovers from the formation of the Earth 4.5 billion years ago.
  - C) They typically come from the asteroid belt.
  - D) They typically come from the Oort cloud.
  - E) 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.
20. How do we know the age of meteorites?
- A) By using the formation of the Solar System as a guide.
  - B) By Carbon-14 dating.
  - C) By their oxygen isotope ratios.
  - D) By measuring the amount of a long-lived radioactive parent and its daughter species.
  - E) By guessing.
21. A 30-40 meter rock is heading right for us. Which of the following is incorrect?
- A) Can easily wipe out a city.
  - B) Many structures damaged or destroyed by hurricane force winds out to 15 km of impact site.
  - C) Likely to trigger a small extinction event.
  - D) Most likely to hit the ocean or a sparsely populated area.
  - E) Very unlikely to have any warning of any kind.
22. Why are most all craters round?
- A) Since all impactors fall straight down.
  - B) Impactor is vaporized, effectively exploding.
  - C) Most impactors are round.
  - D) Wrong, they are all shapes and sizes.
  - E) Wrong, they are all eroded from weather.
23. Why is the Apophis "keyhole" a concern?
- A) It is an orbit interaction region that will cause Apophis to collide with the Earth in 2036.
  - B) It is the location of the possible impact site in 2036, right over the U.S.
  - C) It is a small (600 meters in diameter) region in space that will create an Earth-Moon imbalance that could dramatically increase the chance of more impacts later.
  - D) It is the location that we need to place a large floating blob of paint in order to change its orbit by 2036.
  - E) It isn't anymore. The likelihood of impact is tiny in 2029 and 2036.

24. Which of the following is a consequence of a large asteroid (~1 km) impact?
- A) No global consequences, all local, where the destruction is mindboggling.
  - B) Global winter and global darkness.
  - C) Radioactive fallout that destroys much of the bio-diversity.
  - D) The likely creation of another Moon.
  - E) The Moon's orbit will be dragged Earthward.
25. A 60 meter asteroid impacts the Earth every 1000 years or so. Why haven't we heard more about these?
- A) Early warning systems work.
  - B) Low population density before the 20th century, so lower likelihood for someone being affected.
  - C) Atmosphere protects us from everything but the very largest rocks (i.e. 1 km).
  - D) These size meteorites will always fracture into smaller and harmless meteorites.
  - E) Small meteorites can easily be dodged.
26. What force holds the helium nucleus together since it has two positively charged protons?
- A) Electromagnetic
  - B) The force
  - C) Weak Nuclear
  - D) Gravity
  - E) Strong Nuclear
27. What type of crater mentioned in class does not have a central uplift in the center of the crater?
- A) simple crater
  - B) round crater
  - C) lunar crater
  - D) complex crater
  - E) elliptical crater
28. The stars rise in the East and set in the West because
- A) they are placed on a crystal sphere, and that is the direction that the crystal sphere rotates.
  - B) the Earth has a slight (23 degree) tilt to its rotation axis.
  - C) the Earth rotates on its axis.
  - D) the Earth orbits the Sun.
  - E) the stars move in the sky due to gravity and the original rotation of the Big Bang.
29. The Sun is in a stalemate between gravity and heat pressure. What is this called?
- A) Fission.
  - B) Fusion.
  - C) Hydrostatic equilibrium.
  - D) Stellar equilibrium.
  - E) Big Bunny Ballast

30. Why are comets more troublesome (impact-wise) than asteroids?
- A) Made of ice and organic compounds.
  - B) Moving faster.
  - C) Orbit is unpredictable.
  - D) Orbit more likely to decay into the Earth.
  - E) Maybe only 1 month of warning.
31. What is the reason for the seasons?
- A) The Earth's tilt, gives direct and less direct sunlight.
  - B) Space Monkeys.
  - C) The length of the day, longer in summer.
  - D) The orbit of the Sun.
  - E) The change in the Sun-Earth distance. The Sun is closer in summer.
32. What type of micro-meteorites are we trying to collect and find in our pans that are left outside?
- A) chondrules
  - B) size of marbles
  - C) iron
  - D) radioactive
  - E) rocky
33. Which of the following is a reason for there being so few craters on the Earth's surface?
- A) The Moon tends to pull all asteroids toward it, reducing the number of impacts on the Earth.
  - B) Jupiter "vacuums" up all the asteroids before they can hit the Earth.
  - C) The magnetic field of the Earth protects us from many of the iron asteroids.
  - D) Water erosion wears away craters.
  - E) The rocks are almost always deflected.
34. Aphohis will come very close in 2029. How close is close?
- A) 100 km.
  - B) Between the Earth and our geosynchronous satellites.
  - C) So close that in East Asia, commercial flights will probably be cancelled in case an airline jet collides with it.
  - D) Between the Earth and Moon.
  - E) Between the Earth and the Sun.
35. A large comet has been detected that will hit the Earth in 2020. What is the best chance for successful mitigation?
- A) Impact the comet with another asteroid, knocking it out of orbit.
  - B) Use a gravity tractor to tug it out of the way.
  - C) Use a large space mirror and focus the Sun on the comet's surface creating jets that move it.
  - D) Nuclear Weapon on the object's surface and blow it up.
  - E) Land a series of rockets on the comet and just move it.

36. Why is burning TNT not an option for powering the Sun?
- A) Too low energy/second.
  - B) Too loud.
  - C) Too yellow.
  - D) Too explosive.
  - E) Too short time.
37. NASA sends a spacecraft to Jupiter. How does it prepare for the asteroid belt?
- A) One top secret word: Laser.
  - B) Always sends the spacecraft up out of the ecliptic plane to avoid the majority of the asteroids, then gravity assists the spacecraft back into Jupiter's orbit.
  - C) Uses a camera to look for asteroids in its path, using a joystick to control the spacecraft.
  - D) The asteroid belt is mostly empty space, so it is very unlikely to hit one.
  - E) Carefully calculates the orbits of all the known asteroids to program avoidance systems.
38. How do the planets orbit around the Sun?
- A) They orbit the same direction in a uniform sphere.
  - B) They orbit in opposite directions in a flat plane.
  - C) Random orbits defined by the original molecular cloud.
  - D) Uniform motion, like a rotating disk (DVD?).
  - E) They orbit the same direction in a flat plane.
39. In the Asteroid Lab, you use
- A) radar detections to find asteroids.
  - B) an array of stars to measure the gravity of the nearby asteroids.
  - C) a computer to simulate the impact of a large asteroid.
  - D) an image of an asteroid to measure how close it is to Earth.
  - E) images of the sky to find asteroids and measure their positions.
40. Which of the following meteorites is the most rare?
- A) stony-iron.
  - B) stony.
  - C) steel.
  - D) organic
  - E) iron.