

## Past Semester's Exam Questions

### ASTR 220 Discussion # 8

Mar. 27, 2019

Name: \_\_\_\_\_

Section: \_\_\_\_\_

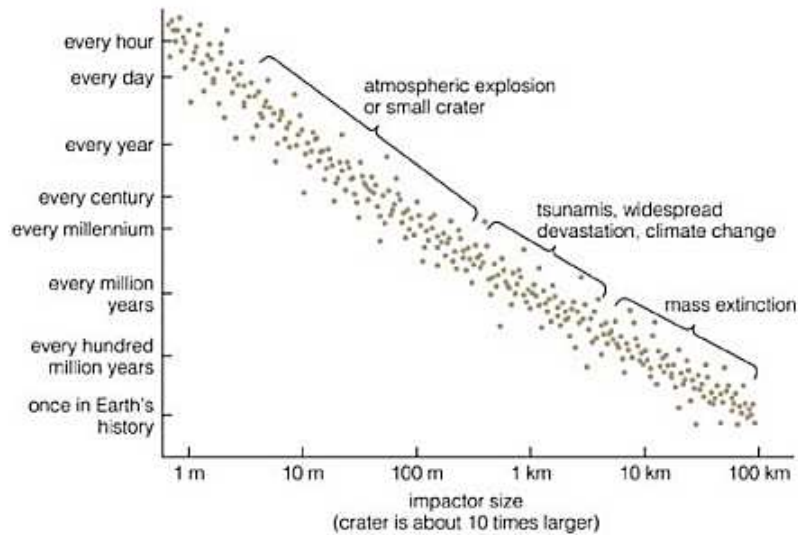
1. Why do small meteors have the appearance of a shooting star when they travel through the Earth's atmosphere?
  - A. The meteor leaving behind many pieces of dust in a trail.
  - B. The meteor is burning due to a chemical reaction with the oxygen in the air.
  - C. The outer layers of the meteor are heating up and vaporizing, which produces light.
  - D. The meteor is reflecting sunlight.
2. Suppose a 100-m meteor impacted the solid surface of the Earth. Which of these impact effects would cause physical destruction (such as destroying buildings) the farthest away from the site of the impact?
  - A. The radioactive decay
  - B. The shockwave
  - C. The heat
  - D. The creation of the impact crater
3. What causes a small meteor to fragment in mid-air?
  - A. It collides with other objects in the atmosphere
  - B. Pressure building up on it from its travel through the atmosphere, along with ablation
  - C. Parts of it melt in the atmosphere
  - D. It reaches terminal velocity, which destroys it
4. What happens to a 100-m meteor when it hits the Earth's surface?
  - A. It flattens like a pancake.
  - B. It embeds itself deep in the ground.
  - C. It vaporizes.
  - D. It breaks into many small pieces.

5. When this question was first written (Apr. 21, 2016), the near-Earth asteroid 2014 QS295 is going to pass closely by the Earth, only 0.14 AU away.

(a) The near-Earth asteroid is about 180 m in diameter. If it did hit the Earth, the impact speed would be  $1.3 \times 10^4 m/s$ . What size impact crater would it make? **Show your work, including your original equation.** (The gravitational acceleration of the Earth is  $10m/s^2$ .)

(b) In the previous part, you assumed the near-Earth asteroid was made of typical, porous, rocky material. What if the asteroid was made of solid rock or metal instead? How would the impact crater size be different? Would you be able to calculate the impact crater size using the previous equation? **BE SURE TO ANSWER ALL PARTS.**

6. From the diagram below, you can see that a 1-km object impacts the Earth every 1 million years on average, while a 100-m object impacts the Earth every 1000 years on average. Which one will hit the Earth first in the future: a 1-km object or a 100-m object?
- A 100-m object
  - One thousand 100-m objects will hit the Earth before the next 1-km object hits the Earth
  - We cannot tell for certain which one will hit the Earth first in the future.
  - A 1-km object



7. How do astronomers search for new near-Earth asteroids?
- They look for objects that have round shapes, since stars are too far away to show any shape.
  - They look for the brightness of a possible asteroid to change over time as the asteroid rotates.
  - They observe the color of a possible asteroids, because the colors of asteroids are distinctly different from those of stars.
  - They look for the asteroids to move compared to the more distant stars.
8. Why isn't the Earth covered with impact craters?
- Tectonics and volcanism have altered or destroyed the surface layers of the Earth, and erosion has obliterated the more recent impact craters.
  - The Moon protected the Earth from most impacts.
  - All of the potentially damaging interplanetary bodies were stopped by the Earth's atmosphere.
  - By luck, few meteoroids have impacted the Earth during its history.