

ESS 200 (Stapleton)
Midterm Review Answers

Physical Properties Test:

1. A 2. D 3.E 4.A 5.b 6.C 7. B 8.B 9.a 10.A 11.A 12. D
 13.b 14.d (actually 14.7psi) 15.6 16.4 17.2 18.a 19.d 20.b 21.c 22.a
 23.e 24.a
 25. drawing
 26. a. Volume usually increases when a substance is heated
 b. Heating causes particles to move faster. When particles move faster, they push away from one another with more force. This causes them to spread out, so the substance expands.
 27. When air is rapidly compressed, something pushes the air particles together. This *push* causes the particles to move faster. Faster particles have a higher temperature.
 28. The universe is getting colder because it is expanding. Expansion causes objects to cool down.
 29. Sources of the Earth’s interior heat: 1) Compression of the Earth; 2) Energy from radioactive elements inside the Earth; 3) Collisions with asteroids and other objects during the Earth’s formation; 4) Friction from dense objects sinking and rare (less dense) objects rising during the time when the Earth was molten.
 30. There are two acceptable ways to answer this question – either the volume of the balloon remains essentially the same while mass decreases, or the mass remains essentially the same while the volume increases. The first answer is probably more correct, so that is the way I will answer it... a) The mass of the balloon is decreasing. b) As the air heats up, it expands. It can’t all fit inside the balloon, so it begins to leave through the hole in the balloon. C)The volume does not change. D) There is a hole in the balloon, so the expanding air can’t build up pressure to cause the balloon to expand; instead, the expanding air just leaves the balloon. E) Density is crowdedness. A decrease in mass (stuff is leaving) without any change in volume (size is the same) means that the balloon will be less crowded (less dense).

Astronomy Test:

- 1.c 2.e 3.c 4.d 5.c 6.a (and also helium) 7.b 8.d 9.b 10.d 11.b 13.b 14.d
 15.b 16.e 17.A 18.b 19.e 20.a 21.d 22.c 23.d 24.a
 25. A) Nuclear fusion B)Hydrogen C) Helium D) decrease E)When hydrogen atoms fuse to form helium, the total mass of the new helium is less than the total mass of the helium that fused.
 26. A) Momentum (or inertia) B) Gravity
 27. Most fossil fuel began as plants that died long ago.

Extended Response #1:

Change	Cause
The nebula contracted (pulled together)	Gravity
The rate of spinning increased	Contraction (pulling together)
The nebula heated up	Compression
The nebula formed a disk	Increased spinning speed caused momentum to stretch it out at its middle
Nuclear fusion began in the center (the sun was born)	Pressure/high temperatures in the center of the nebula caused hydrogen to fuse
Frozen gases near the center of the solar system were vaporized and blown away	The <u>newborn sun’s heat and solar wind</u> vaporized and blew away the gases.
Planets clumped together	Gravity
Inner planets formed as rocky spheres, while outer planets have rocky cores surrounded by large gas layers	<u>Frozen gas near the sun was vaporized and blown away, so there was no gas to be collected by the inner planets.</u> But there was frozen gas where the outer planets were forming.

Extended Response #3:

Time	Stage	Energy Source (fuel)	What causes the transition to this stage?
Present	Main sequence star	Mostly <u>Hydrogen</u> fusion near the sun's core	NA
Future	Red Giant	Hydrogen fusion in a shell farther from the sun's core. (<u>Shell hydrogen fusion</u>) Possibly some Helium fusion in the core.	1. <u>Helium sinks to the core, pushing the fusing hydrogen outward.</u> 2. <u>Hydrogen fusion farther from the core (shell hydrogen fusion) is less intense</u> , so it produces a red (cooler) color.
More Distant Future	White Dwarf	Compression	1. <u>Fusion stops.</u> 2. <u>Gas pressure decreases.</u> 3. <u>The sun shrinks.</u> 4. <u>Compression heats it up</u> , so it turns white (a hotter color).
Final Stage	Final Stage -- Black Dwarf	Nothing	The star is fully compressed. It is not generating energy from compression. It is only losing energy. Over time, the star cools down until it no longer glows.

Extended Response #5:

Big Bang Theory: The Universe began to form 13.8 billion years ago, as it expanded from an infinitely small point. It continues to expand today.

Evidence #1: The Universe is expanding. We know this because other galaxies have red-shifts, which means that they are moving away from us.

Evidence #2: We can use special telescopes to look into space and "see" heat that was released in the Big Bang. This energy is in the form of Microwaves, so we can't really see it with our eyes. It is called the Cosmic Microwave Background Radiation (CMBR).

Earth Rotation and Moon Phases Quiz:

- 1.d 2.a 3.a 4.6pm 5.3pm 6.  7. Waning Crescent 8. Waxing Quarter (1st quarter) 9. Spring
10. Waning quarter (last quarter) 11.d 12.a

Plate Tectonics Test:

- 1.A 2.B 3.A 4.B 5.B 6.B 7.A 8.B 9.A
 10.E 11.G 12.D 13.C 14.A 15.B 16.F
 17.D 18.A 19.C 20.B 21.F 22.E 23.G

24. A B C D E F G
 25. A B C D E F G
 26. A B C D E F G
 27. A B C D E F G
 28. A B C D E F G
 29. A B C D E F G
 30. A B C D E F G
 31. A B C D E F G
 32. A B C D E F G
 33. A B C D E F G
 34. A B C D E F G
 35. A B C D E F G
 36. A B C D E F G

Final Question: Water Cycle Extended Response

	Change	Reason(s)
1.	Water evaporates	As water heats up, water molecules move fast enough to separate from their neighbors and fly freely into the air.
2.	Air density decreases	1) Heating causes air to expand 2) Evaporation puts water in the air, and water (H ₂ O) is a lighter molecule than the nitrogen (N ₂) that makes up most of air.
3.	Air rises	The air's density decreases.
4.	Rising air encounters lower pressure	Air pressure is caused by the weight of air above. As a blob of air rises, there is less air above that blob.
5.	Rising air expands	When pressure around the blob of air decreases, the pressure inside the air is stronger, so it pushes outward (like eardrums), causing the air to expand.
6.	Rising air cools	Expansion causes cooling.
7.	Water in the air condenses	Condensation is caused by cooling. When water vapor in the air cools (loses energy), it turns from a gas to a liquid.
8.	Clouds form	Clouds are made of tiny liquid (or solid) droplets (or ice crystals) that form when water condenses in the sky. <i>[If it's cold enough, the condensed water freezes.]</i>
9. (Not required in your answer. I am including it to provide some resolution)	<i>Rain (or snow) falls</i>	<i>When water droplets (or ice crystals) are large enough, they fall fast enough to make it to the ground. Very small droplets at such a slow rate their falling is negligible.</i>