AP Physics — for the NOVA video: Einstein Revealed

Please **DO NOT WRITE ANYTHING** on this piece of paper. Be sure to return it at the end of class. Answer the following questions **according to the NOVA video.**

1. What fact did Albert Einstein understand when his father showed him a compass when he was four or five?
   a. The force that made the compass turn is special because of its relationship to light;
   b. The force that made the compass turn is special because it can act through the fulcrum;
   c. The force that made the compass turn is special because it can act on the compass without contact.

2. At ten, Einstein selfstudied Euclid's theories. Euclid is the inventor of
   a. fraction; b. geometry; c. algebra; d. trigonometry.

3. At 16, he learned that light is an electromagnetic wave. He wondered what he would see if
   a. he was moving along at a slower rate than the light wave;
   b. he could catch up with the light wave;
   c. light could not move.

4. It was thought that if light is a wave, it must move through some type of substance (medium). This substance was called aether (also: ether). It was known that the Earth orbits the sun at 20 miles a second which means the earth moves through an aether wind of 20 miles a second. Therefore, when people measured the light speed at different directions, they found
   a. light speed is the same in all directions;
   b. light speed only changes during certain time of the day;
   c. light speed is slightly faster from west to east (than from east to west) because the Earth revolve around the sun from west to east;
   d. light speed is much faster from west to east (than from east to west) because the Earth evolve around the sun from west to east.

5. By 1905 Einstein simply accepted that the speed of light is a constant. But what allowed the two jugglers to agree on the speed of light? He asked. If speed = the distance traveled per unit of time, and the speed of light is a constant, then something else must change. So between the two jugglers,
   a. the definition of speed must change;
   b. the flow of time must change;
   c. the way we calculate relative speed must change.

6. In the train and lightening thought experiment, did the person on the moving train see both poles struck by lightening at the same time?
   a. yes; b. no.

7. The train and lightening thought experiment showed that
   a. distance; b. speed; c. light speed; d. time;
   must be relative.

8. Einstein's special theory of relativity says that compared to a stationary observer, the faster you move
   a. the slower your clock ticks; b. the faster your clock clicks.

CONTINUE ON THE BACK!!!!

Please do not write on this page!!!

9. According to Einstein's special theory of relativity, when you ride a beam of light, something very strange happens:
   a. your length becomes infinity, your time stands still;
   b. your length becomes zero, your time stands still;
   c. your length becomes infinity, your clock clicks extremely fast;
   d. your length becomes zero, and your clock clicks extremely fast.

10. Einstein wrote this famous equation: $E = mc^2$. According to this equation, mass has energy and energy has mass. Every second, the Earth is struck by about
    a. 450 lbs; b. 45 lbs; c. 4.5 lbs; d. 0.45 lbs
    of sunlight.

11. When Einstein was asked to summarize all aspects of his special relativity, he saw that his theory encompassed all of physics except for one crucial gap. What is the gap?
    a. mechanics; b. gravity; c. electricity; d. magnetism; e. light.

12. According to the equivalence principle, if acceleration can bend light, can gravity bend light?
    a. yes; b. no; c. sometimes.

13. By the fall of 1915, Einstein was ready to put his general theory of relativity to test. At that time, the orbits of the planets were all well-understood except for the orbit of
    a. Mercury; b. Venus; c. Earth; d. Mars; e. Jupiter.

14. What did Einstein use to successfully predict the precession of the perihelion of Mercury?
    a. space-light is curved; b. mass-time is curved; c. mass-energy is curved; d. space-time is curved.

15. Einstein's general theory of relativity is also called Einstein's
    a. theory of light; b. theory of mass-energy; c. theory of space-time; d. theory of gravity.

16. According to the general theory of relativity, light warps around the sun so that during a total eclipse of the sun, one
    a. can see more stars than one would if the light does not warp around the sun;
    b. can see fewer stars than one would if the light does not warp around the sun;
    c. can see the same number of stars as one would if the light does not warp around the sun;