

PHSC 1000 – Interdisciplinary Physical Science
Final Exam, Spring 2015
Professor David Black
One 8 ½" x 11" Paper of Notes Allowed

Name: _____

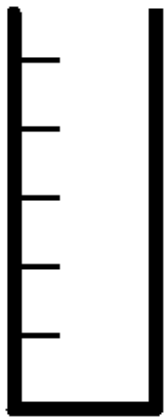
Location: _____

- 1) The main (biggest) object pictured here is a(n)

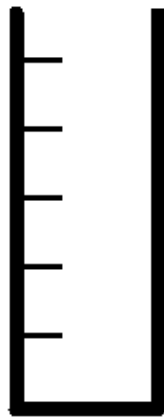


- a. Star b. Planet c. Volcano d. Galaxy e. Ion
- 2) To save on gas, Professor Black gets up to a high speed and then turns his engine off, letting the car coast. Which physics principle is he using?
- a. Conservation of momentum b. Heat c. Quantum mechanics
d. Action/reaction pair (Newton's third law) e. Inertia
- 3) Which planet is furthest from the sun?
- a. Mercury b. Saturn c. Neptune
d. That planet in "The Hitchhiker's Guide to the Galaxy"
- 4) Chemistry is
- a. The study of planets, stars, galaxy, and the large-scale universe
b. The study of how atoms interact
c. The study of rocks and minerals as well as how our planet is shaped
d. The study of energy, motion, and the mathematical principles that govern events

- 5) The molecule CH_4 is split into its elements. Pretend that each of the elements could settle down to the bottom of a cup. Draw here how much each cup would be filled.



C



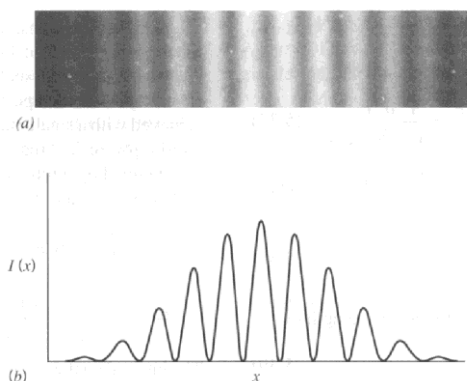
H

- 6) Protons are
a. Positive b. Negative c. Neutral d. Yellow
- 7) The same water balloon launcher throwing a water balloon 50 feet, but a steel ball only 3 feet is an example of
a. Newton's 1st Law b. Newton's 2nd Law c. Newton's 3rd Law
d. Newton's Law of Cooling
- 8) There are two forces which must be in balance in a star. One is a repulsive force (a force which pushes things apart) which comes when the nuclei of atoms smash together and join to form bigger atomic nuclei. What is the other force called?
a. Gravity b. The Electromagnetic Force c. Kinetic Energy d. Light
- 9) Which of the following is not testable?
a. Metal can be levitated by putting it in a magnetic field
b. All matter inside a black hole becomes purple
c. The Earth is round
d. $F = ma$
- 10) If a sample of rock we are dating started with 80 parent particles, how many parent particles will remain after three half-lives?
a. 640 b. 3 c. 40 d. 99 e. 10

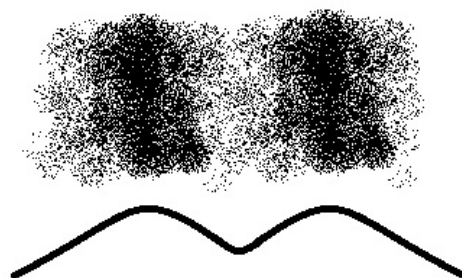
- 11) There are two atoms of phosphorous (this isn't a joke.) One has a mass that is almost exactly 31 times the mass of a proton. The other has a mass that's almost exactly 32 times the mass of a proton. What are these two called?
- a. Isotopes b. Polymers c. Mixtures d. Sub-shells

For the next problem, you will refer to the following two images. Only one could result from the experiment described in the next problems. Put the roman numeral (i or ii) corresponding to the correct image as your answer.

i.

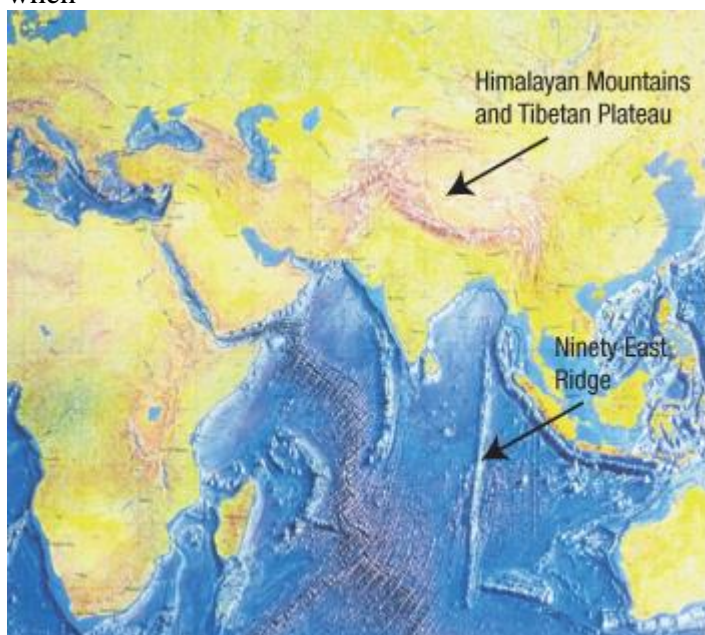


ii.



- 12) a. Bullet holes from a machine gun going through two slits.
- b. Light from a laser pointer going through two slits (as was shown in class.)
- c. Electrons being shot through two slits when we DON'T have any way of telling which slit each went through.
- d. Water waves going through two slits.
- e. The spray paint in class going through two slits.
- 13) Which is the biggest?
- a. Galaxy b. Planet c. Big Mac d. Star
- 14) Which is on the x-axis for the Hertzsprung-Russell Diagram?
- a. Luminosity b. Size c. Number of planets d. Temperature
- 15) Which is on the y-axis for the Hertzsprung-Russell Diagram?
- a. Luminosity b. Size c. Number of planets d. Temperature

16) According to plate-tectonic theory, the Himalayan mountains of Asia (see the picture below) formed when



- a. Asia and Australia separated
- b. Africa ran into the Middle East
- c. Southern-central Asia was hit by a large meteorite
- d. India ran into southern-central Asia

17) Briefly tell me the difference between an ionic bond and a covalent bond.

18) Below, I show a basic picture of the periodic table with the box for Carbon highlighted. How many protons does Carbon have?

- a. 8
- b. 6
- c. 14
- d. 5

19) How many **valence** electrons does Carbon have?

- a. 12
- b. 8
- c. 21
- d. 4

20) Which of the following diagrams could represent a solar eclipse?

a.



b.



c.



d.



21) Professor Black lighting the balloons on fire so you could *see* what happens is an example of which step in the scientific method?

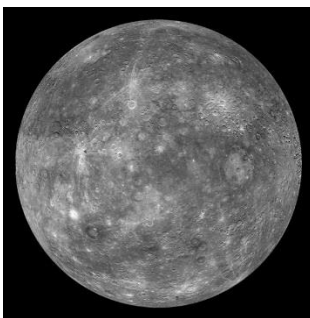
- a. Observe b. Question c. Predict d. Test predictions
- e. Draw a conclusion

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23) Which of the following planets is Mars?

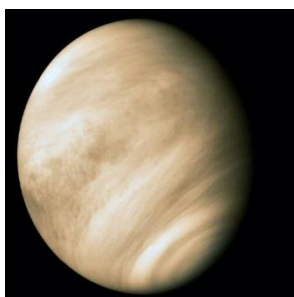
a.



b.



c.

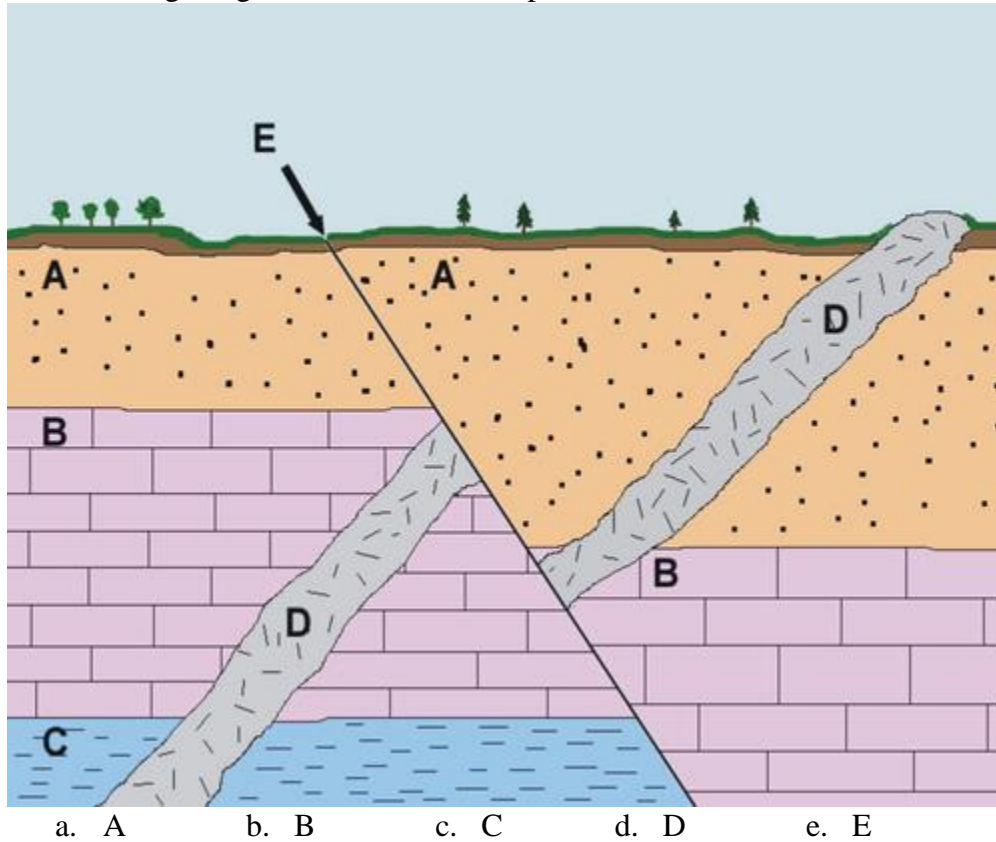


d.



- 24) Which of the following is an evidence of plate tectonics?
- a. Similar fossils on either side of the Atlantic Ocean
 - b. A guy buried under 100 m of ice
 - c. The tilt of the Earth
 - d. The tides

- 25) The oldest geological formation in this picture is



- 26) Give me an example of each of the following (and explain)
- a. Something that is testable and that is accepted as true.
 - b. Something that is testable but that is accepted as false.
 - c. Something that is not testable.

- 27) For the next few pictures, give a possible explanation for how these geological features might have formed. You won't be graded on whether or not you give the scientifically-accepted reason, but you will be graded on whether or not your answer shows a knowledge of things that shape the Earth's surface.

a.



b.



c.

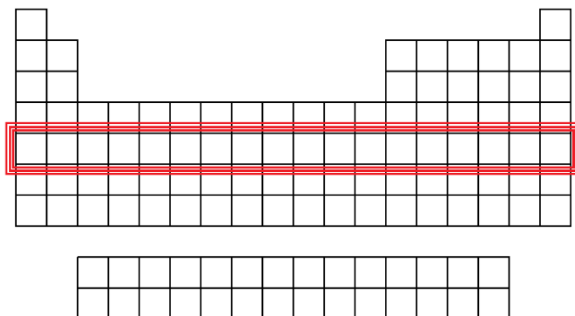


d.

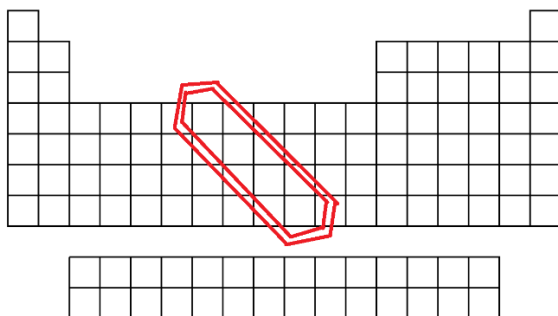


28) Elements in the periodic table which are in the same _____ often have similar properties. (An example of what each word represents is highlighted, so the elements inside the “highlighted thing” should be similar.)

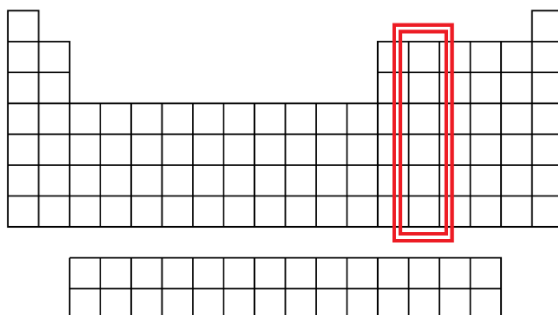
a. Row



b. Diagonal



c. Column



d. Spiral pattern



29) Name the planets. I'll give you the mnemonic: My Very Educated Mother Just Served Us Nachos.

30) Draw the basic positions of the Earth, moon, and sun for the following phases of the moon.

a. Waxing gibbous

b. Last Quarter

c. New Moon

31) What is the name of this class?

a. Advanced General Relativity

b. Organic Chemistry

c. Interdisciplinary Physical Science

d. Intro to Painting

32) Quantum mechanics is:

a. weird

b. the use of such formal mathematics as wave equations, matrices, and ultimately path integrals to describe the behavior of all matter, but especially of the smallest particles

c. a theory brought forward and developed in the late 1910's and early 1930's that finally brought a mathematical explanation to the behavior of electrons and thus the periodic table

d. usually taught in the third grade.

e. all of the above

f. If you didn't pick "e", please go back and pick "e."

If you would like the chance to get a point back (i.e. if you missed one problem, this will be a make-up point,) list ten elements here:

- 33) The lake pictured below consists of a ring of water about 60 miles across, and it's about 200 million years old. Scientists would tell us that it was probably formed by



- a. Aliens b. A meteorite c. Canadian nuclear tests d. A volcano

- 34) Write a question that you think should have been on this final, and then answer it.

Question:

Answer:

35) Tell me a few things about the class:

- a. Two or three things about this class which were the most surprising.

- b. Something you learned in this class that you had always wanted to know.

- c. Two or three questions that you still have.

HAVE A GREAT SUMMER!