PHSC 1000 – Interdisciplinary Physical Science
Midterm Exam
Professor David Black

Name:

1) Give the five steps in the scientific method as given in our book. Give me a sentence or two telling me how you understand them, i.e. tell me what they mean in your own words.
   i.

   ii.

   iii.

   iv.

   v.

2) Which of the following diagrams could represent a lunar eclipse?
   a.

   b.

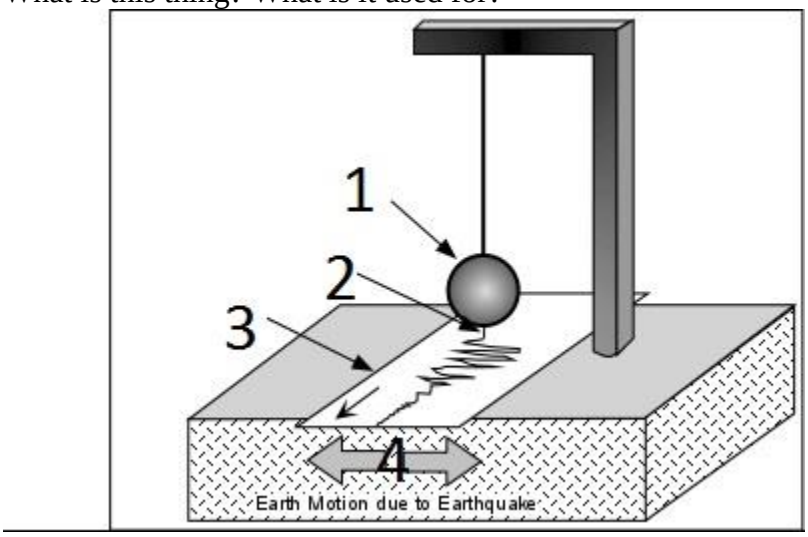
   c.

   d.

   Your answer _____

3) Where is the body of Alfred Wegener, one of the main men who proposed the theory of plate tectonics?

4) What is this thing? What is it used for?



5) Name the three different types of rock and tell how each is formed.
   a.

   b.

   c.

6) Which is on the x-axis for the Hertzsprung-Russell Diagram?
   a. Luminosity b. Size c. Number of planets d. Temperature

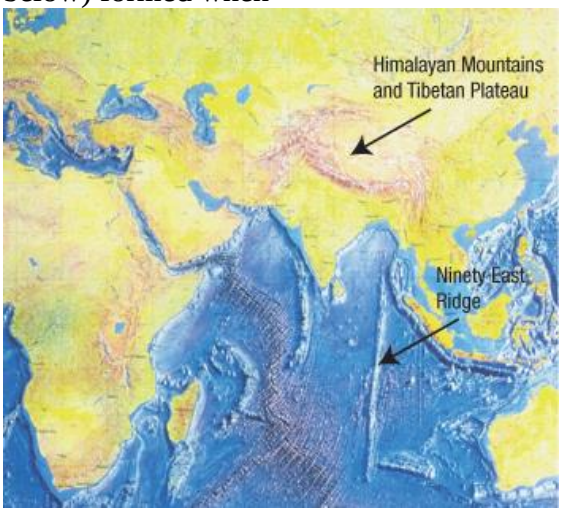
   Your answer _____

7) Which is on the y-axis for the Hertzsprung-Russell Diagram?
   a. Luminosity b. Size c. Number of planets d. Temperature

   Your answer _____

8) Did you read this question?

9) 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

Your answer _____

10) There are two forces in balance in a star. I'll give you a brief description, you give me the name for each.
    a. Particles slam into each other (like the paper we threw.) When they hit hard enough, they turn into other particles and release energy. This is called

       _____

    b. All particles with mass exert a pull on the others around them. This is called

       _____

11) TRUE or FALSE The majority of the first machines sent into space had successful missions. (Hint: The lectures about the planets or the Wikipedia article for List of Solar System probes

Your answer _____

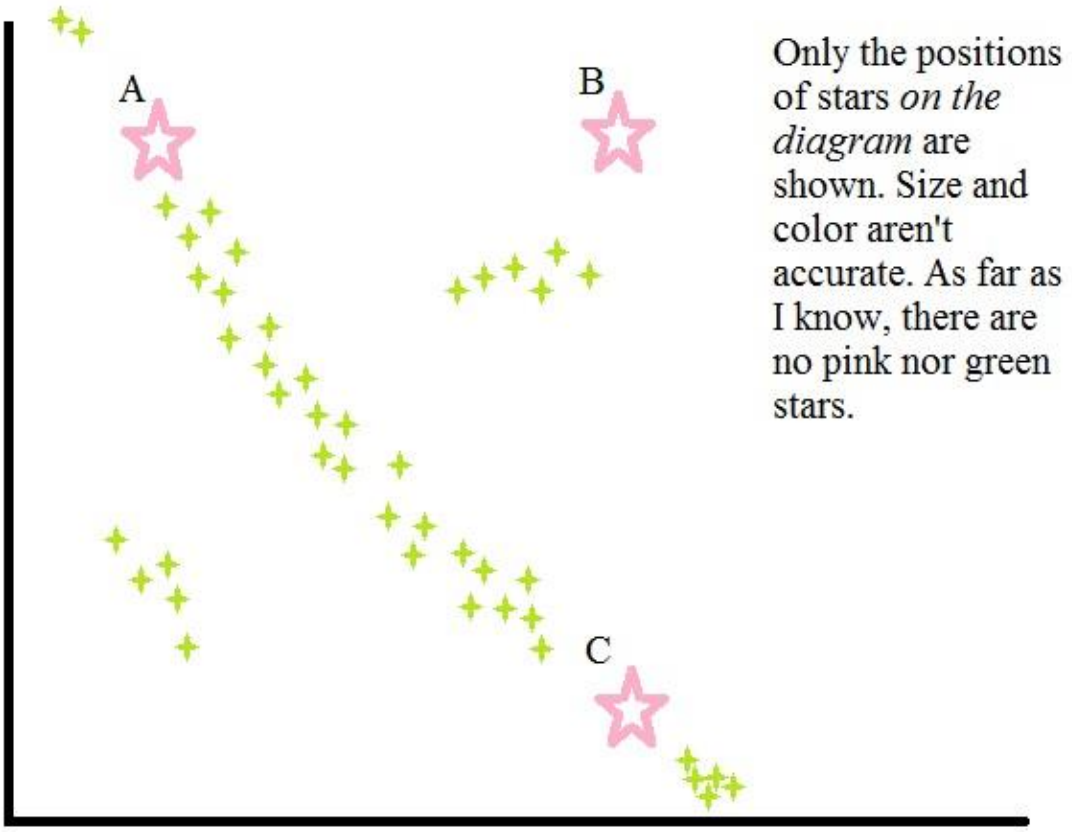
12) Which technique of dating rocks was developed first?
    a. Relative dating b. Radioactive dating

Your answer _____

13) If you ask Professor Black if he's a tree, what will his response be?

His response _____

Below, I have a representation of the H-R Diagram. The three stars, A, B, and C, will be the subjects of the next questions



14) Which star is the biggest? (A, B, or C?)

Your answer _____

15) Which star is the hottest? (A, B, or C?)

Your answer _____

16) Which star is the dimmest (A, B, or C?)

Your answer _____

17) Professor Black showing you the exploding watermelon video 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

Your answer _____

18) Professor Black and Sione putting rubber bands around the pumpkin is an example of which step in the scientific method?

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

Your answer _____

19) Astronomy 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

Your answer _____

20) Write a joke. We'll probably use quite a few of yours in class.

21) The planet, Saturn, has which of the following characteristics? (Choose one.)

a. Biggest planet b. About the same size as Earth c. Cannibalistic and filicidal
d. It has the biggest and most visible ring system

22) Match the following sciences with their description:

a. Astronomy	i. The study of such concepts as motion, force, energy, matter, heat, light, and the components of atoms.
b. Earth Science	ii. The application of physics, chemistry, and principles of earth science to things that are not part of Earth.
c. Chemistry	iii. The study of our planet as a whole, including the processes that were involved in forming both the land and water phenomena.
d. Physics	iv. The study of how atoms combine to form molecules and how the molecules combine to make the materials around us.

a. _____ b. _____ c. _____ d. _____

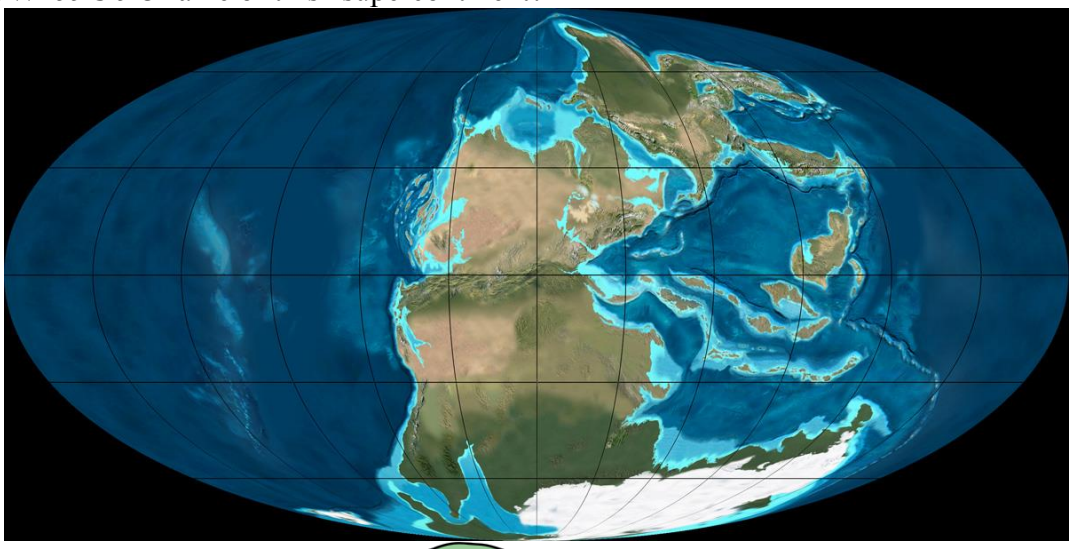
23) Which of the following is an evidence of plate tectonics?

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

Your answer _____

24) Write a conclusion (as in the last step to the scientific method) that addresses the following question and our experiment to test it: Is the claim made by cereal makers that there is iron in the cereal true? (If you only write "yes" or "no," you'll get -1 point.)

25) What is the name of this "supercontinent?"



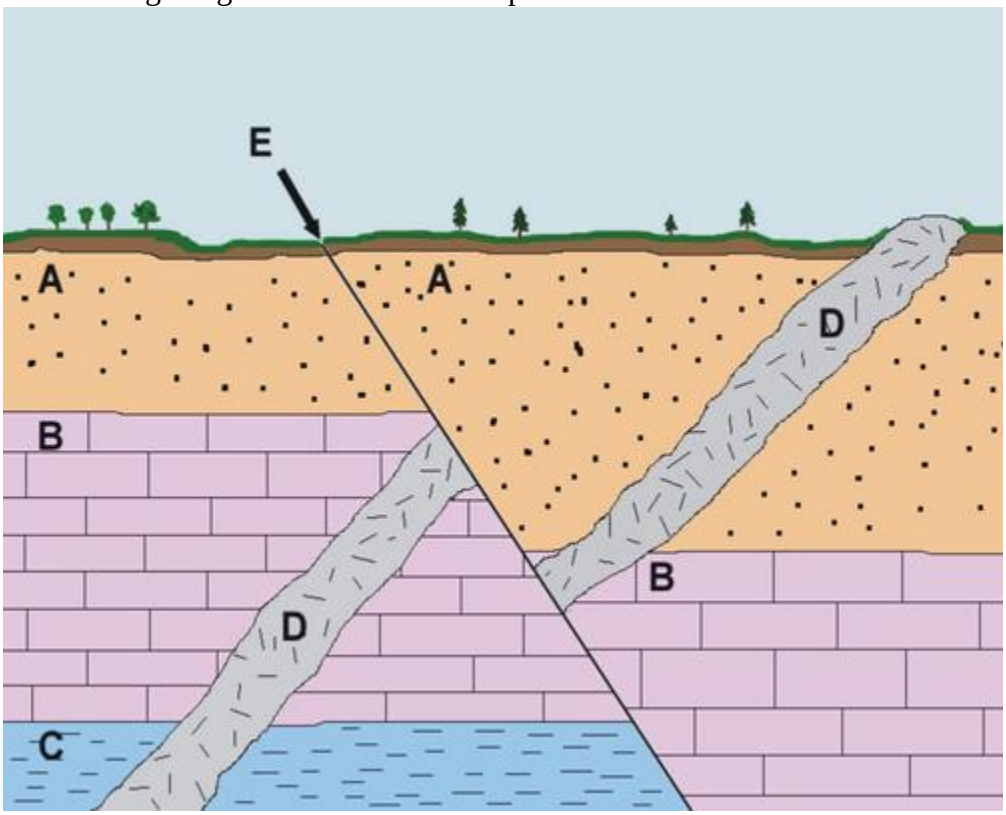
Name of supercontinent _____

26) Pick two of the following terms to explain (as they relate to geology)
Dike, Batholith, Laccolith, Sill, Volcanic pipe, Lava flow

Choice 1: _____ Description:

Choice 2: _____ Description:

27) The oldest geological formation in this picture is



a. A b. B c. C d. D e. E

Your answer _____

28) Which of the following spacecraft visited Jupiter, Saturn, Uranus, and Neptune?
a. Luna 3 b. Sputnik c. Voyager 2 d. Apollo 13

Your answer _____

29) Which is the biggest?
a. Galaxy b. Planet c. Big Mac d. Star

Your answer _____

30) Try and make sugar rock crystals by following the following procedure:

Boil one cup of water then pour in a glass or jar
Slowly stir in about 3 cups of sugar
Add a small amount at a time until no more will dissolve
If desired, add a drop or two of food coloring
Tie a piece of string to a pencil and then a paper clip to the other end
Drop the clip end into the sugar solution until it is just off the bottom
Allow the solution to sit in a vibration free area for a few weeks.
Check periodically to see the crystals forming
(An internet search on rock candy or crystal experiments might be useful)

Did you set up the crystal project? _____

31) 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.

32) Based on our in-class, scientific look at the exploding watermelon, what do you think would happen if we were to put a lot of rubber bands around an apple?

33) If a sample of rock we are dating has a radioactive parent-daughter system and there are 20 parents and 60 daughters, how many half-lives have gone by since the formation of the rock?

a. 1 b. 2 c. 3 d. 4 e. 5

Your answer _____

34) The planet, Venus, has which of the following characteristics? (Choose one.)

a. An active volcanic pizza moon b. Lots of love c. More than one moon
d. A thick atmosphere made of CO_2 e. Oceans made of water

Your answer _____

35) 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.

e.

f.

36) Describe the erosion, transportation, and sedimentation of particles

37) Describe in detail three life forms that were found during the Paleozoic era.

38) What is a Quasar?

39) Which planet has more rings than LeBron (James?)
    a. Saturn b. Mercury c. Mars d. Earth

    Your answer _____

40) Describe how thick the crust is on the continents and under the ocean.

41) For each of the following statements, tell me whether or not it is testable at the present time. Give me a reason why or why not. You will be graded on whether your explanation shows an understanding of what it means to be testable testable. One way to make sure you're doing it right is to think of what kind of experiment you could do to test the statement. Note that the fact that something is true doesn't necessarily mean it's testable. Some information below might help:

- The fastest that any man-made object has gone is 150 000 miles per hour, which was achieved by the Helios spacecraft.
- The fastest "human-ish-sized" object (visible to the eye, but smaller than a star) that was also close enough to observe in a scientific way is the comet, ISON, at 850 000 miles per hour. That's about 0.1% the speed of light.

    a. Inside a black hole, the matter all becomes purple.

    b. My great-aunt was annoyed by my great uncle's friends.

    c. Metal can be levitated by putting it in a magnetic field.

    d. If I move a piece of iron at 10 million (10 000 000) miles per hour, it will always become spherical.

e. The Earth is round.

f. The Earth goes around the sun.

g. Jupiter's moon, Io, smells bad.

h. On Jupiter's moon, Io, a working human nose can detect a smell.

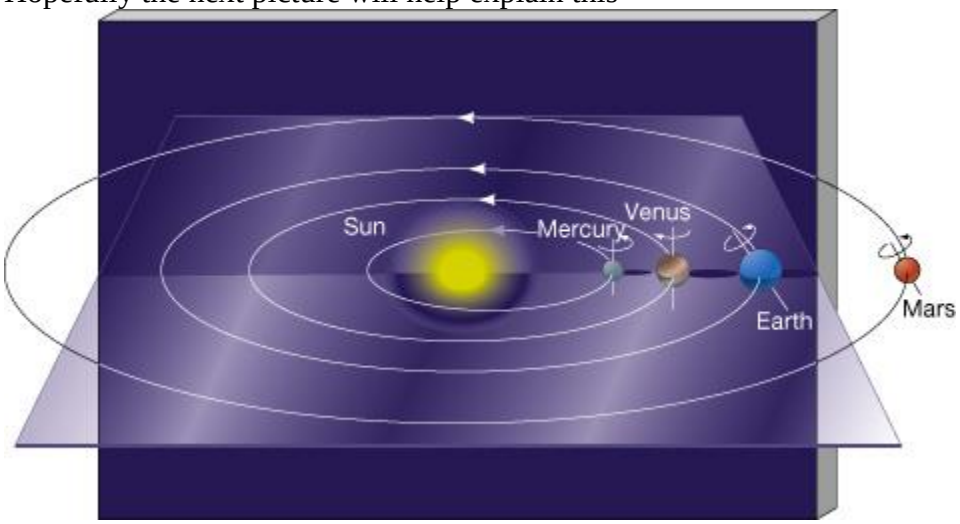
i. The closest that Jupiter and Saturn get to each other is 680 million km.

42) Name any color.

43) Name three things that can happen when tectonic plates collide.

44) Here's a problem where your thought process will be worth more than whether the answer is right. I will state both problems and then include a diagram that I hope will help illustrate the problems.

a. If we looked down from above the solar system (that is, above the North Pole of the Earth,) all of the inner planets except Venus rotate counter-clockwise. Hopefully the next picture will help explain this



Write down a possible explanation (remembering things like the formation of the solar system) for this.

b. If we view the solar system the same way as in part (a), all of the planets except Uranus would have their rotational axes pointing close to straight up. The axis of Uranus, though, is at 90° to normal. It's like its "spinning stick" from the picture above is pointing right into the "glass table" that is in the picture. Write down a possible explanation for this.
(Hint, the two might be related.)

45) Which planets have moons?

For the next two questions, remember that both the moon and the sun appear to be the same size in the sky.

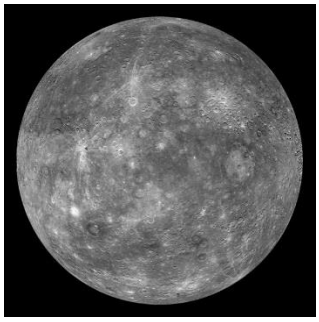
46) Which is bigger, the moon or the sun?

47) Which is closer, the moon or the sun?

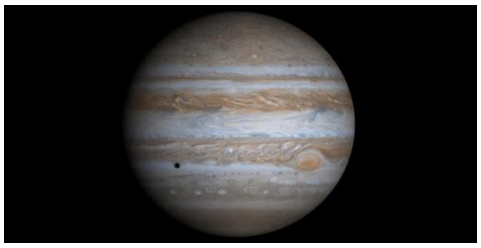
48) Use the answers from the last two questions to describe how we can tell distances in space? (Most of the points from this question will come from completion. Just give an attempt.)

49) Which of the following planets is Jupiter?

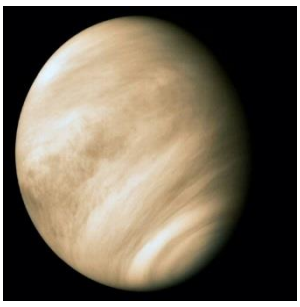
a.



b.



c.



d.

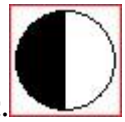
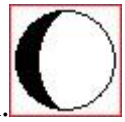
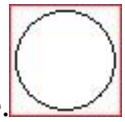
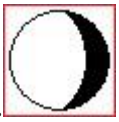
50) Each of the pictures (diagrams) on the next pages show the Earth, the Moon, and the Sun. There will be a list of images of the disc of the moon at the bottom of each of the next pages. Give the letter for the correct picture of the disc of the moon as seen from Earth. Also, tell me the name of the phase of the moon.
Note, the pictures of the Sun, the Earth, and the Moon have no shadows on them, but the Earth and the Moon should have shadows. Also, I'd suggest you draw the kind of diagram we used in class. It will help you to be ready for the final. Also, when determining what comes first (e.g. "first" before "last" or "waxing" before "waning," remember that the Moon orbits the Earth in a counter-clockwise direction.

i. Matching disc picture _____ Name of phase _____

---

ii. Matching disc picture _____ Name of phase _____

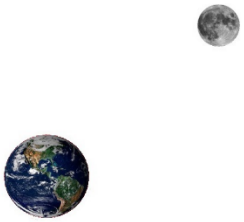
Disc Pictures

a.  b.  c.  d.  e.  f.  g.  h. 

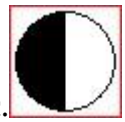
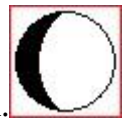
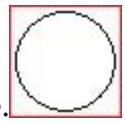
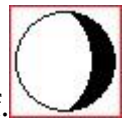
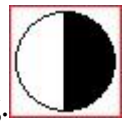
iii. Matching disc picture _____ Name of phase _____

---

iv. Matching disc picture _____ Name of phase _____



Disc Pictures

a.  b.  c.  d.  e.  f.  g.  h.