SCIENCE 10

FINAL EXAM REVIEW BOOK 4

THE FORMATION OF THE UNIVERSE CAN BE EXPLAINED BY THE BIG BANG THEORY.

NAME: _____ BLOCK: _____

Universe 101 Practice Test Questions

Part I – Multiple Choice – Circle your answer AND fill in the blank to the left of each question

____ 1. Which of the following is supported by evidence from red-shifted starlight?

a. galaxies are not moving

b. galaxies are generally moving away from each other

c. galaxies are generally moving toward each other

d. movement of galaxies cannot be measured due to the "shifting" of star light

____ 2. What does much of the evidence for the big bang theory depend on?

a. accepting ideas that you cannot understand

b. correctly interpreting all of the new data gathered with ever-improving technology

c. reading as much as you can about space and believing what you read

d. coming up with creative ideas and seeing if scientists will think that they are true

____ 3. Light elements form in big bang → nuclear fusion begins, stars are formed → _____ → supernovas eject heavy elements which get incorporated into planets forming around new stars.

Which of the following statements best fills in the blank for the life cycle of high mass stars?

a. nuclear fusion stops, stars turn into black holes

b. nuclear fusion stops, stars enter the main sequence

c. lighter elements continue to fuse into heavier elements until the star runs out of lighter elements

d. heavier elements continue to fuse into lighter elements until the star runs out of heavier elements

____ 4. Which of the following is **NOT** a major evidence of the Big Bang Theory?

a. the stretching out of starlight

b. the fact that most galaxies are spiral

c. the leftover energy from the big bang

d. all of these are major evidences of the big bang

____ 5. What does Cosmic Background Radiation have to do with the big bang theory?

a. it is part of the theory that has never been explained

b. it is leftover radiation from the big bang that was spread all over during universe expansion

c. it was radiation in space that got moved out of the way as the universe expanded

d. it is when blue-shifted waves change and suddenly become red-shifted waves

____ 6. Which of the following best represents the life cycle of our sun?

a. birth → angry teenage years → adulthood → old person → death → this is the wrong answer

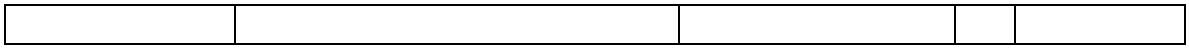
b. nebula → protostar → main sequence → red giant → planetary nebula → white dwarf

c. nebula → protostar → main sequence → red super giant → supernova → black hole

d. main sequence → red giant → red super giant → white dwarf → supernova → black hole

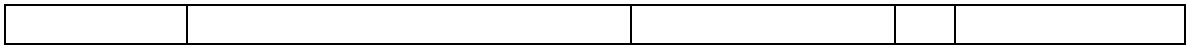
Use the following spectra of hydrogen to answer the next two questions.

Spectrum of hydrogen on Earth:



Red Blue

Spectrum of hydrogen from a distant galaxy:



Red Blue

____ 7. How would an astronomer explain the difference between the two spectra shown above?

a. hydrogen gives off light differently if the gravity of the star is large

b. light traveling through space is warped by the vacuum

c. the distant galaxy is traveling away from us, stretching its light waves

d. the distant galaxy has a slightly different kind of hydrogen being fused in its stars

____ 8. Which of the terms below ***best*** describes the spectrum of hydrogen from the distant galaxy?

a. reflected

b. red-shifted

c. four-shifted

d. blue-stretched

____ 9. How does the data collected from starlight support the Big Bang Theory? It shows that…

a. most objects in space are moving away from one another

b. the universe is collapsing again

c. the Big Bang happened slowly over millions of years

d. most of the light from objects in space is "blue shifted"

____ 10. What evidence do we have that nuclear fusion is an ongoing process in the core of stars?

a. powerful telescopes allow us to view the nuclear fusion occurring

b. scientific study reveals that star cores have temperatures hot enough for nuclear fusion to occur

c. studies have shown that Earth's core is similar to the core of the sun

d. the leftover energy found spread throughout the universe is evidence of nuclear fusion in stars

____ 11. A high-power telescope scans a patch of space and detects several elements, including carbon. The presence of carbon in this region suggests that…

a. life exists in this region

b. you are likely to find either stars or leftover stardust in this region

c. the telescope is most likely malfunctioning

d. this region of space has been untouched since the big bang

____ 12. Which of the following most accurately pairs up the events on the left with the elements that they create on the right?

a. big bang = heaviest elements
nuclear fusion = medium elements
supernovas = lightest elements

b. big bang = lightest elements
nuclear fusion = heaviest elements
supernovas = medium elements

c. big bang = medium elements
nuclear fusion = lightest elements
supernovas = heaviest elements

d. big bang = lightest elements
nuclear fusion = medium elements
supernovas = heaviest elements

____ 13. Most human cultures have explanations for the origin of the universe. How is the scientific explanation different?

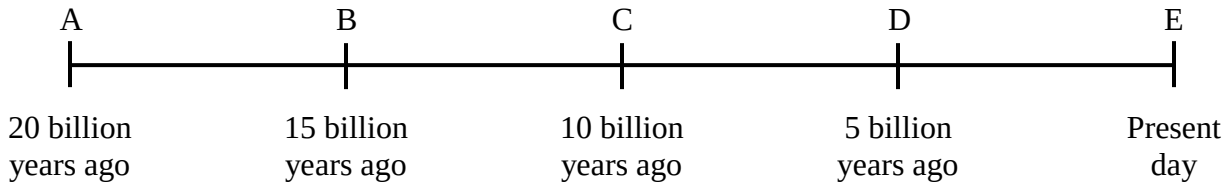
a. all scientists agree on one theory and therefore no further research is needed

b. it cannot be changed, unlike most other explanations

c. it relies on evidence from starlight and other types of radiation

d. it is widely accepted by all cultures, religions and organizations

Use this time line of the universe (which spans a ridiculously large amount of time) to answer the next question.



____ 14. Which of the following statements best describes when the big bang occurred?

a. between points ‘A’ and ‘B’

b. between points ‘B’ and ‘C’

c. between points ‘C’ and ‘D’

d. sometime after point ‘E’

____ 15. Which of the following best describes the big bang?

a. all matter in the universe expanded outward from a tiny area

b. all matter in the universe was created in its current location

c. several galaxies collided together and exploded, creating matter

d. the Earth has gotten cooler since its original formation

____ 16. What has been happening to the matter in the universe since the big bang occurred?

a. little change has happened to matter

b. matter has moved outward and collected into galaxies and stars

c. almost all of the matter in the universe has collected here on Earth

d. matter is contracting and coming back together again

____ 17. Which of the following is the ***best*** reason why scientists accept the big bang theory?

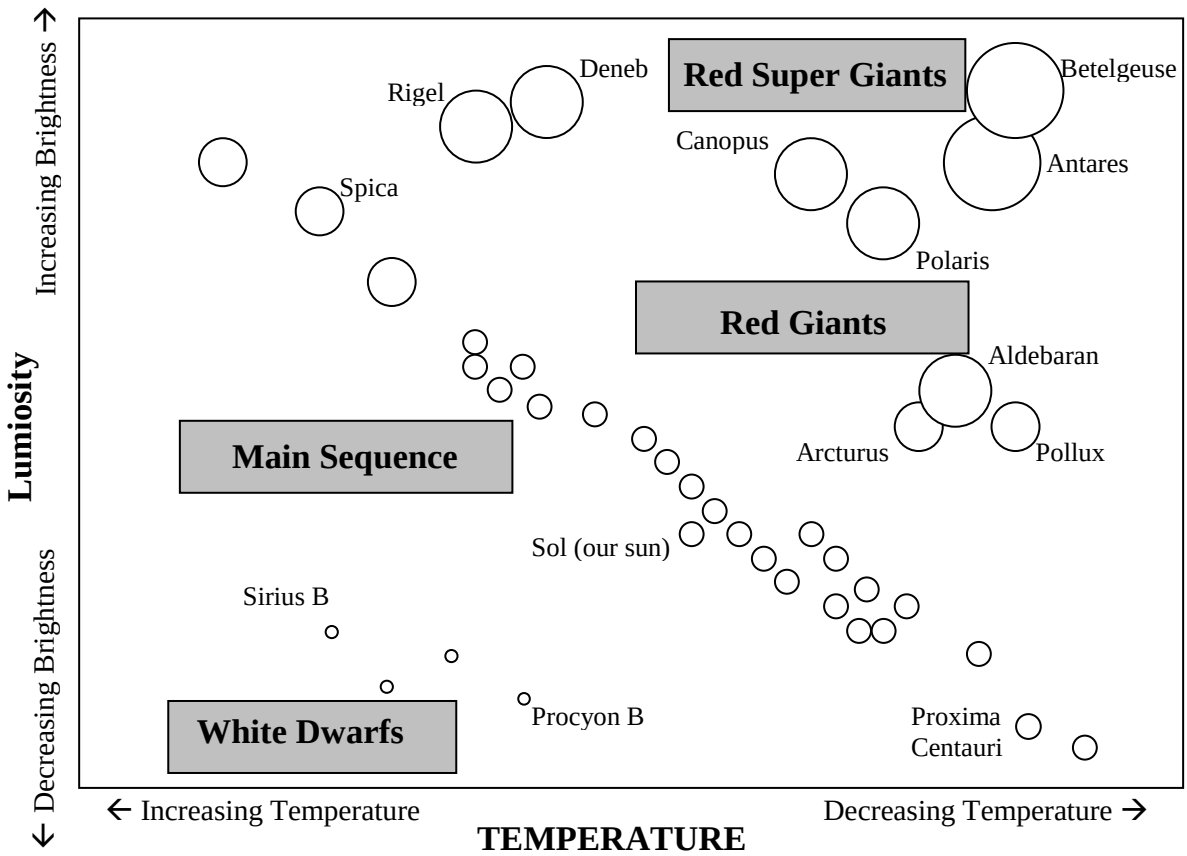
a. it is a belief based on faith

b. they trust other scientists

c. it seems to make sense

d. evidence supports it

Use the Diagram Below to answer questions 18-20



____ 18. Of the following stars, which one is **the hottest**?

a. Canopus
c. Sirius B
b. Sol
d. Deneb

____ 19. Of the following stars, which is **fusing hydrogen into helium?**

a. Canopus
c. Sirius B
b. Sol
d. Deneb

____ 20. Based on the HR diagram, which is the correct order of star types **from dimmest to brightest**?

a. White Dwarfs → Giants → Super Giants
b. White Dwarfs → Super Giants → Giants
c. Giants → Super Giants → White Dwarfs
d. Super Giants → Giants → White Dwarfs

____ 21. Which of these subjects should I study to ***best*** learn about the creation of elements ***heavier than iron***?

a. stars undergoing supernova explosions and the energy involved in such explosions
b. the earliest moments in the history of our universe, right after the big bang occurred
c. the core of our sun and the nuclear fusion that occurs there
d. the development of a protostar and its eventual transformation into a main sequence star

____ 22. Fill in the blanks. When a star leaves the main sequence it will become either a _____ or a _____ depending on whether it was a low mass or high mass star.

a. red super giant, white dwarf
c. red giant, red super giant
b. protostar, neutron star
d. planetary nebula, white dwarf

____ 23. Which of the following is evidence that the universe is **expanding**?

a. cosmic background radiation
b. red-shifted starlight
c. the amount of protons in a hydrogen atom
d. sound being stretched out or compressed by a car driving down the road

____ 24. What do we know about a star if it has a lot of Hydrogen in its core?

a. that it is young and ***has not*** left the main sequence
b. that it is young and ***has*** left the main sequence
c. that it is old and about to leave the main sequence
d. that it is old and about to supernova

____ 25. If a newer, more powerful, and more accurate telescope were developed and it happened to show that distant galaxies alternate between moving closer and moving farther away, what would happen to the big bang theory as a result?

a. the new data would be ignored because it does not support current evidence of the big bang
b. the big bang theory would be abandoned and scientists would start over using new telescopes
c. theories about the universe's origins would need to be changed to include any new evidence
d. galaxies would begin to collide with one another at a faster rate

____ 26. What do we know about a star if it has a lot of iron in its core?

a. that it is young and ***has not*** left the main sequence
b. that it is young and ***has*** left the main sequence
c. that it is old and about to leave the main sequence
d. that it is old and about to supernova

____ 27. Which of the following ***best*** explains the presence of heavy elements here on Earth?

a. heavy elements were created from fusion in the Earth's core
b. heavy elements were made from the big bang and later moved out to collect into planets
c. heavy elements were placed on Earth after being sucked through a black hole
d. heavy elements from the explosion of an ancient star clumped into planets as our star system formed

Part II - Written Portion

1. ***Explain*** how red shift and cosmic background radiation are evidences of the big bang.
Don't just explain the terms – tell me how they are evidences of the big bang! (4 points)

a. Red Shift is evidence of the big bang because…

b. Cosmic Background Radiation is evidence of the big bang because…

2. What two elements did the big bang create ***and*** where did the rest come from? (2 points)

a. The big bang created…

b. The rest of the elements came from…

3. What energy-producing event is occurring in the core of main sequence stars? (1 point)

4. Name three things that an astronomer can know about a star just by analyzing its light? (3 points)

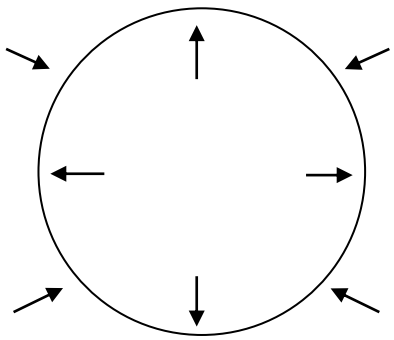
5. When we analyze stars using a spectroscope, each unique "barcode" that we see represents a different

_____ (think of our lab and what we were looking at) (1 point)

6. What two forces must a star constantly balance in order to stay alive?
Also, be sure to label these two forces on the diagram to the right (4 points)

a. One of the forces is…

b. The other force is…



A star balancing two forces

7. ***Draw*** and ***label*** a diagram describing the Doppler Effect. Be sure to ***be descriptive enough*** in your diagram so that someone that knows nothing about the Doppler Effect would be able to understand it (3 points)

Spectroscope Analysis – use the element key below to answer the next few questions

8. You analyze a star's light using a spectroscope and see the following spectrum:

Which two elements are in this star? (1 point)

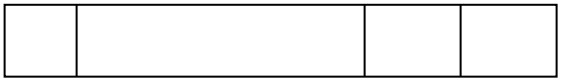
Is this star younger or older and **why**? (2 points)

9. You analyze a star's light using a spectroscope and see the following spectrum:

Which two elements are in this star? (1 point)

Is this star younger or older and **why**? (2 points)

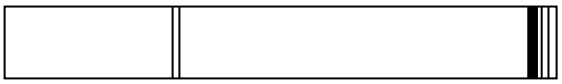
Element Key



Hydrogen

Helium

Iron



Oxygen

Carbon

Nitrogen

BONUS QUESTIONS (optional) – Use the periodic table on the back of this test to answer these questions.

1. What would you get if you fused Na and F?
2. Name three different elements that can be fused together to make Silver.
3. Which element would be the result of the following craziness? (Fr + Y + Co + O + K) – (Ba + Co + N)

The Periodic Table of the Elements

(Use this as a reference if needed)

1 **H** Hydrogen 1.00794																	2 **He** Helium 4.003
3 **Li** Lithium 6.941	4 **Be** Beryllium 9.012182											5 **B** Boron 10.811	6 **C** Carbon 12.0107	7 **N** Nitrogen 14.00674	8 **O** Oxygen 15.9994	9 **F** Fluorine 18.9984032	10 **Ne** Neon 20.1797
11 **Na** Sodium 22.989770	12 **Mg** Magnesium 24.3050											13 **Al** Aluminum 26.981538	14 **Si** Silicon 28.0855	15 **P** Phosphorus 30.973761	16 **S** Sulfur 32.066	17 **Cl** Chlorine 35.4527	18 **Ar** Argon 39.948
19 **K** Potassium 39.0983	20 **Ca** Calcium 40.078	21 **Sc** Scandium 44.955910	22 **Ti** Titanium 47.867	23 **V** Vanadium 50.9415	24 **Cr** Chromium 51.9961	25 **Mn** Manganese 54.938049	26 **Fe** Iron 55.845	27 **Co** Cobalt 58.933200	28 **Ni** Nickel 58.6934	29 **Cu** Copper 63.546	30 **Zn** Zinc 65.39	31 **Ga** Gallium 69.723	32 **Ge** Germanium 72.61	33 **As** Arsenic 74.92160	34 **Se** Selenium 78.96	35 **Br** Bromine 79.904	36 **Kr** Krypton 83.80
37 **Rb** Rubidium 85.4678	38 **Sr** Strontium 87.62	39 **Y** Yttrium 88.90585	40 **Zr** Zirconium 91.224	41 **Nb** Niobium 92.90638	42 **Mo** Molybdenum 95.94	43 **Tc** Technetium (98)	44 **Ru** Ruthenium 101.07	45 **Rh** Rhodium 102.90550	46 **Pd** Palladium 106.42	47 **Ag** Silver 107.8682	48 **Cd** Cadmium 112.411	49 **In** Indium 114.818	50 **Sn** Tin 118.710	51 **Sb** Antimony 121.760	52 **Te** Tellurium 127.60	53 **I** Iodine 126.90447	54 **Xe** Xenon 131.29
55 **Cs** Cesium 132.90545	56 **Ba** Barium 137.327	57 **La** Lanthanum 138.9055	72 **Hf** Hafnium 178.49	73 **Ta** Tantalum 180.9479	74 **W** Tungsten 183.84	75 **Re** Rhenium 186.207	76 **Os** Osmium 190.23	77 **Ir** Iridium 192.217	78 **Pt** Platinum 195.078	79 **Au** Gold 196.96655	80 **Hg** Mercury 200.59	81 **Tl** Thallium 204.3833	82 **Pb** Lead 207.2	83 **Bi** Bismuth 208.98038	84 **Po** Polonium (209)	85 **At** Astatine (210)	86 **Rn** Radon (222)
87 **Fr** Francium (223)	88 **Ra** Radium (226)	89 **Ac** Actinium (227)	104 **Rf** Rutherfordium (261)	105 **Db** Dubnium (262)	106 **Sg** Seaborgium (263)	107 **Bh** Bohrium (262)	108 **Hs** Hassium (265)	109 **Mt** Meitnerium (266)	110 (269)	111 (272)	112 (277)	113	114				

58 **Ce** Cerium 140.116	59 **Pr** Praseodymium 140.90765	60 **Nd** Neodymium 144.24	61 **Pm** Promethium (145)	62 **Sm** Samarium 150.36	63 **Eu** Europium 151.964	64 **Gd** Gadolinium 157.25	65 **Tb** Terbium 158.92534	66 **Dy** Dysprosium 162.50	67 **Ho** Holmium 164.93032	68 **Er** Erbium 167.26	69 **Tm** Thulium 168.93421	70 **Yb** Ytterbium 173.04	71 **Lu** Lutetium 174.967
90 **Th** Thorium 232.0381	91 **Pa** Protactinium 231.03588	92 **U** Uranium 238.0289	93 **Np** Neptunium (237)	94 **Pu** Plutonium (244)	95 **Am** Americium (243)	96 **Cm** Curium (247)	97 **Bk** Berkelium (247)	98 **Cf** Californium (251)	99 **Es** Einsteinium (252)	100 **Fm** Fermium (257)	101 **Md** Mendelevium (258)	102 **No** Nobelium (259)	103 **Lr** Lawrencium (262)