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Science Theoretical Examination I

1. Classify the following body parts to the body system they belong (respiratory, nervous, cardiovascular, digestive, reproductive, urinary, skeletal).

- A. Cerebellum
- B. Scapula
- C. Vas deferens
- D. Liver

- E. Kidney
- F. Cartilage
- G. Bronchi
- H. Vena Cava

2. Which of the following is acidic?

- A. Baking soda dissolved in water
- B. Inside the stomach
- C. In the intestinal tract
- D. Blood of a healthy person

3. The development of the modern atomic theory started with the appreciation of the experimental works of J.J. Thomson, Ernest Rutherford, and R.A. Millikan among others. In modern model of the atom,

- A. the center of the atom is empty.
- B. the center of the atom has a negative charge.
- C. atomic mass is spread over the whole atom.
- D. most of the atom is empty.

4. The two forms of photoluminescence are fluorescence and phosphorescence, which are defined by the length of time the emitted light continues to glow. Fluorescence refers to the immediate release of light, while phosphorescence refers to the release of light that last longer. Which element causes a fluorescent lamp to give out white light when turned on?

- A. Mercury
- B. Sodium
- C. Chlorine
- D. Gold

5. Vhonz did an experiment on the physical properties of some substances. He found out that one of the following substances will not freeze at -90°C . Which substance is it?


- A. Seawater
- B. Methanol freezes at -130°F .
- C. Diethyl ether melts at 156.85K .
- D. Diesel

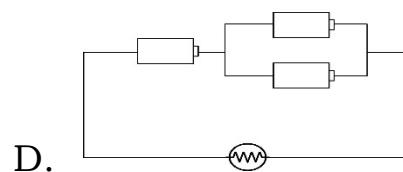
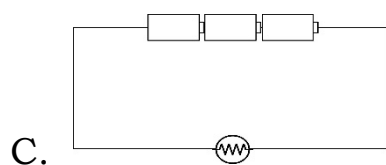
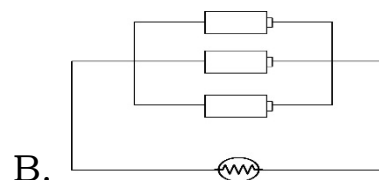
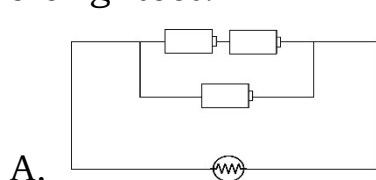
6. In our universe, most of the visible matter that we see moves on a certain path. The moon revolves around the earth. The earth revolves around the sun. While the sun moves with respect to the motion and its position to the Milky Way galaxy. The apparent path of the sun on the celestial sphere is called

- A. Ellipse
- B. Eclipse
- C. Ecliptic
- D. Equinox

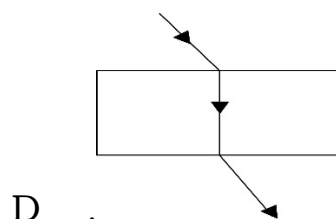
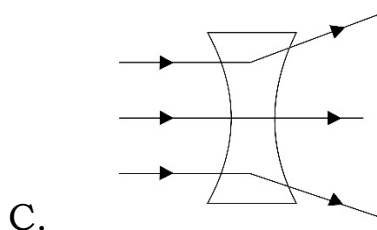
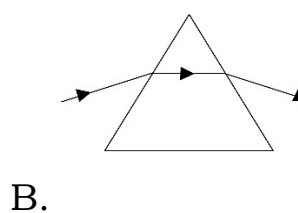
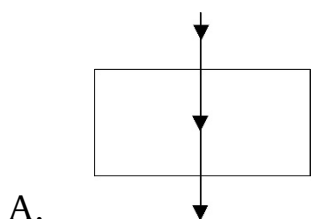
7. The rusting of iron occurs when iron reacts with oxygen. This chemical reaction is classified as:

- A. Combination reaction
- B. Single displacement reaction
- C. Double displacement reaction
- D. Decomposition reaction

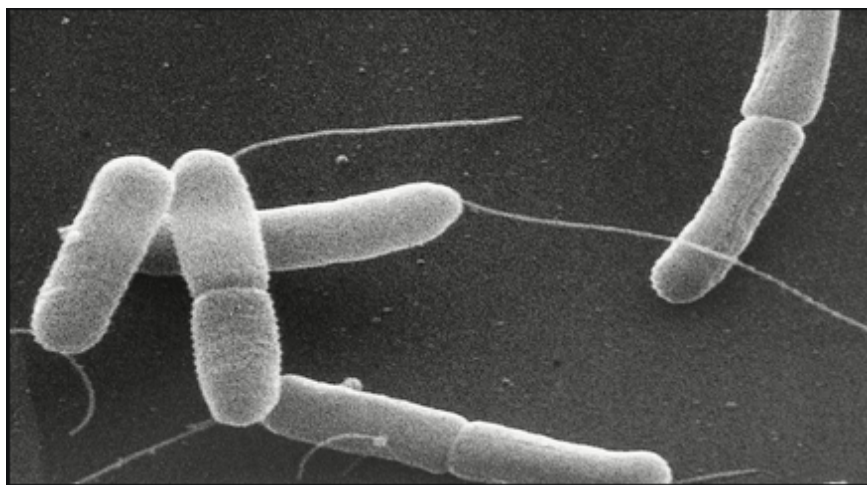
8. Look at the circuit shown below. In which circuit will the bulb () be the brightest?



9. The central dogma of molecular biology is an explanation of the flow of genetic information within a biological system. It starts with DNA to RNA and finally to the proteins. What do you call the transfer of information from DNA to RNA?
- Translation
 - Encoding
 - Transcription
 - Replication
10. Which pair of parents cannot have an offspring with blood type O?
- Blood type A and Blood type A
 - Blood type AB and Blood type O
 - Blood type A and Blood type O
 - Blood type O and Blood type B
11. **Algae** are eukaryotic organisms that have no roots, stems, or leaves but have chlorophyll and other pigments for carrying out photosynthesis. Which kingdom does algae belong to?
12. A ray of light is allowed to fall on different glasses. Which of the following does **not** show the correct path of the ray of light?



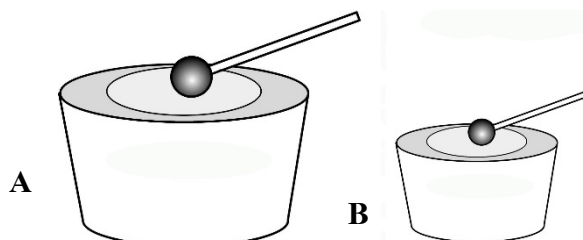
13. Bacterial cell wall provides structural integrity to the cell that protects itself from internal turgor pressure. The shape of the bacterial cell wall and its rigidity is due to presence of peptidoglycan, which is located immediately outside of the cytoplasmic membrane. Which type of bacteria has a thick peptidoglycan layer in its cell wall?



14. There are some bacterial species that cause diseases such as typhoid fever, tuberculosis and cholera. Throat infections is caused by *Streptococcus* bacterium. Some *Streptococcus* species are fatal as they reproduce very fast which can cause epidemic. How do bacteria reproduce?

- A. Binary fusion
- B. Binary fission
- C. Ternary fission
- D. Sexual reproduction

15. Two drums made of the same material are shown below. Drum A is bigger than drum B. Which statement is correct?



- A. A is louder but B has higher frequency.
- B. A is louder and has higher frequency than B.
- C. B is louder and has higher frequency than A.
- D. Both drums have the same pleasant sound.

16. Which of the following have the same form of potential energy?
- I : A wound-up toy car
 - II : A stretched sling-shot
 - III: A bowling ball
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
17. Which of the following are the reasons why we use biotechnology to genetically modify some plants?
- I. The harvested products are tastier and more nutritious.
 - II. The harvested products stay fresh longer.
 - III. The crops can grow and survive in harsh conditions.
 - IV. The crops are more resistant to diseases and pests.
- A. I and IV only
 - B. I, II and III only
 - C. I, III and IV only
 - D. I, II, III and IV
18. The cell is the basic unit of life. It is compartmentalized into its organelles. Which organelle produces most of the cell's energy or adenosine triphosphate (ATP)?
- A. Peroxisome
 - B. Mitochondrion
 - C. Endoplasmic reticulum
 - D. Golgi bodies
19. When doing vigorous activities, the best snack to eat is peanut butter sandwich. Which produces more energy per gram, fat or carbohydrates?
- A. Fat
 - B. Carbohydrates
 - C. Both will produce the same amount of energy
 - D. It is not possible to compare the two.

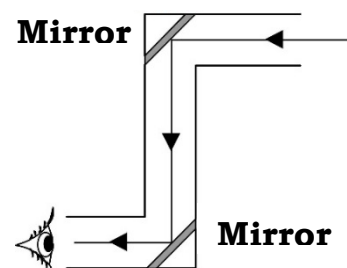
20. Which of the following are conditions that may cause all the populations in a land habitat to wipe out?

- I: Drought
- II: Fire
- III: Flood
- IV: Presence of disease-causing microorganisms

- A. I, II and III only
- B. I, III and IV only
- C. II, III and IV only
- D. I, II, III and IV

21. The figure below shows a periscope, which is used in submarines to see above surface water. What is the use of the two plane mirrors in the periscope?

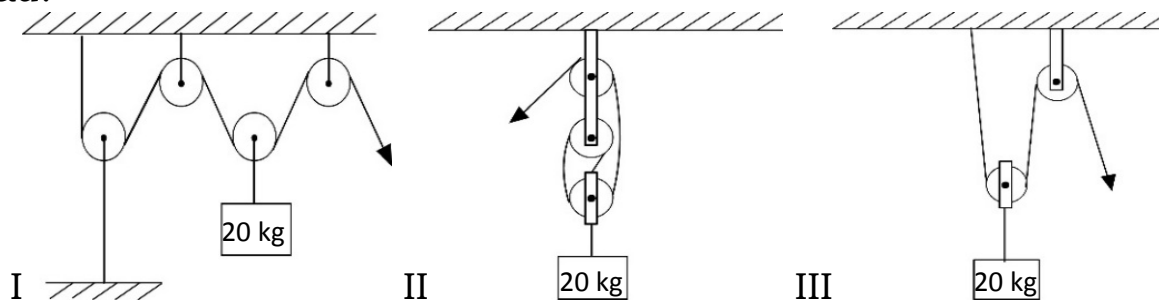
- A. to enlarge the image
- B. to reflect the ray of light
- C. to refract the ray of light
- D. to make the image clearer



22. Which of the following happens in the thorax during inhalation?

	Intercostal muscles	Diaphragm muscles
A	Relax	Relax
B	Relax	Contract
C	Contract	Relax
D	Contract	Contract

23. Which set of pulleys will require the same amount of force to lift the load?



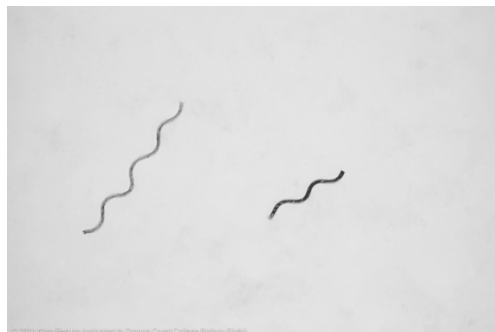
- A. I and II
- B. II and III
- C. I and III
- D. I, II and III

24. Bacteria are organisms that consist of a single cell.

The following key can be used to identify bacteria.

1. a) round in shape Go to 2
b) not round in shape Go to 4
2. a) found in clumps..... *Staphylococcus*
b) not found in clumps Go to 3
3. a) found in pairs *Diplococcus*
b) found in chains *Streptococcus*
4. a) shaped like rods *Bacillus*
b) not shaped like rods Go to 5
5. a) connected into long thread-like chains *Actinomyces*
b) not connected into long thread like chains Go to 6
6. a) short, comma shaped *Vibrio*
b) long, spiral shaped *Spirillum*

The diagram below shows two bacteria.



What is the name of these bacteria?

- A. *Vibrio*
- B. *Staphylococcus*
- C. *Spirillum*
- D. *Actinomyces*

25. Six months ago, when we observed the night sky, we found star X was at the right side of star Y. Six months later, we found star X was at the left side of star Y. Which of the following support these observations?

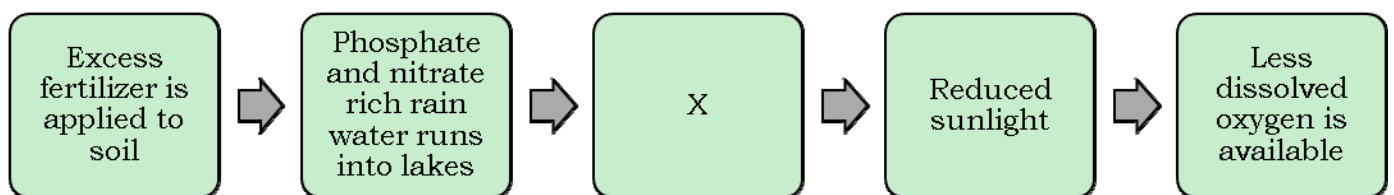
- I: star X is farther away from Earth than star Y
- II: star Y is farther away from Earth than star X
- III: because Earth orbits around the Sun
- IV: because Earth spins on its axis

- A. only I and III
- B. only II and III
- C. only I and IV
- D. only II and IV

26. A high concentration of nitrates and phosphates in rivers and lakes leads to excessive growth of algae which are food for aquatic animals.

The overabundance of algae reduces the amount of sunlight entering the water, which in turn causes much of the algae to die. The decomposition process uses up most of the oxygen dissolved in the water causing an entropic situation (eutrophication), causing the death of other organisms like fish.

Part of this process is represented by this flowchart.



Which of the following statements must be inserted into the flowchart to replace 'X'?

- A. Algae die
- B. Excessive algae growth occurs
- C. Organisms like fish die
- D. Fertilizer is removed from soil by rain

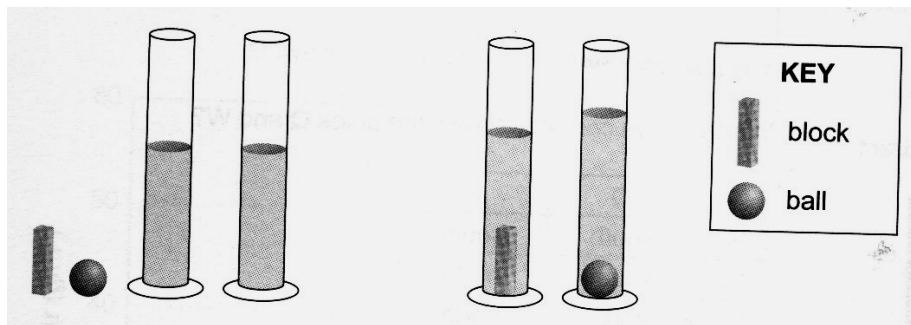
27. Marika found that she was often throwing away the end of a loaf of bread because of molds. She decided to test how molds grow on bread.

Using the same brand of pre-packaged bread, Marika placed moist pieces of bread under a warm lamp and checked for new mold growth every six hours.

The purpose of the warm lamp was to:

- A. provide adequate lighting
- B. keep the surrounding air dry
- C. speed up the growth of molds
- D. generate a variable temperature control

28. Andrew placed a block and a ball into identical containers with the same amount of water. The diagram showed what happened.



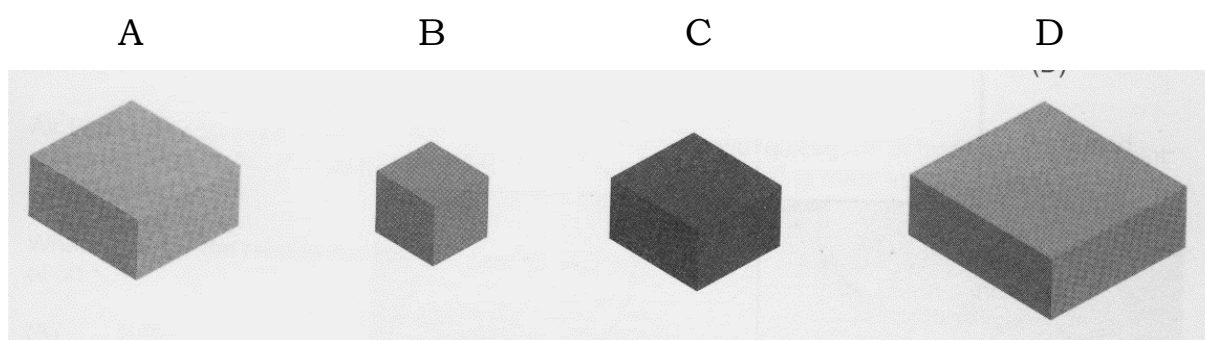
What conclusion can Andrew draw from this information only?

- A. The mass of the ball is larger than the mass of the block.
- B. The volume of the ball is larger than the volume of the block.
- C. The mass and the density of the ball are larger than the mass and density of the block.
- D. The volume and the density of the ball are larger than the volume and density of the block.

29. The table below gives the densities of four different types of wood.

Type of wood	Density (kilograms per cubic metre)
Bamboo	0.5
Gum	1.0
Pine	0.53
Teak	0.65

The scale diagrams show the relative volumes of a 1.0 kg mass of the four different types of wood, all of the same heights. Which option represents pine?



30. People perspire to cool down. One liter of perspiration has a mass of approximately one kilogram. Mary went for a two-hour bike ride. She weighed herself before and after the ride, and measured the amount of water she drank during the ride. After her ride, she calculated the rate at which she perspired, in liters per hour.

At what rate did Mary perspire?

Mary's Bike Ride	
Mary's body mass before ride	54 kg
Mary's body mass after ride	52 kg
Amount of water drank	1 L
Duration of the ride	2 hours

- A. 0.5 liters per hour
- B. 1.0 liters per hour

- C. 1.5 liters per hour
- D. 2.0 liters per hour

For questions 31 and 32,

Given below are melting points and boiling points of some elements.

Element	Melting Point (°C)	Boiling Point (°C)
A	-108	-10
B	-15	108
C	300	2550
D	10	50

31. Identify the physical state of each element at room temperature.
- A. _____
 - B. _____
 - C. _____
 - D. _____
32. What is the most volatile liquid among A, B, C and D?