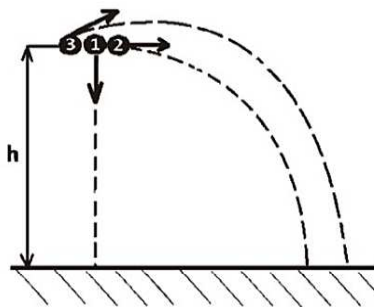


All questions worth 4 points.

1. Dietary fibre:

- A) is found in fruits, vegetables and meat
- B) is digested by enzymes from the digestive juices
- C) ensures normal intestinal transit
- D) can be absorbed in the small intestine
- E) causes diabetes if it is used for eating

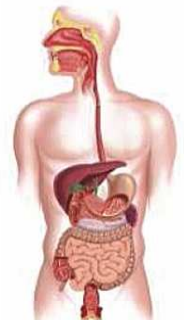
2. Three equal mass projectiles are launched from the height h as shown. The relation between their (mechanical) works L_1, L_2, L_3 of the weight forces is:



- A) $L_1 > L_2 > L_3$
- B) $L_1 = L_2 > L_3$
- C) $L_1 < L_2 < L_3$
- D) $L_1 = L_2 = L_3$
- E) $L_1 = \frac{3}{2}L_2 = 3L_3$

3. Digestive system produces simple substances that pass into the blood stream. Select the correct statement about the digestive system and its role:

- A) Germs are destroyed by saliva and gastric juice
- B) Gastric juice goes into stomach and digests proteins and carbohydrates
- C) The pancreas produces pancreatic juice which flows into stomach
- D) Large intestine has 1 million intestinal villi
- E) Liver is located on the left side of the abdominal cavity



4. A body is thrown vertically upwards, in the earth's gravitational field (with the gravitational acceleration g), from a ground level where it is assumed that the potential energy is null. If the initial speed of the body is v_0 and the air-friction is negligible, the height at which the kinetic energy becomes a quarter of the potential energy is:

- A) $\frac{v_0}{4g}$
- B) $\frac{2v_0^2}{5g}$
- C) $\frac{v_0^2}{4g}$
- D) $\frac{v_0^2}{2g}$
- E) $\frac{3v_0^2}{4g}$

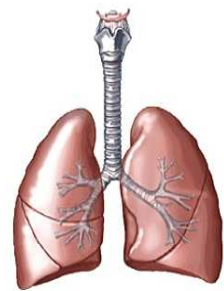
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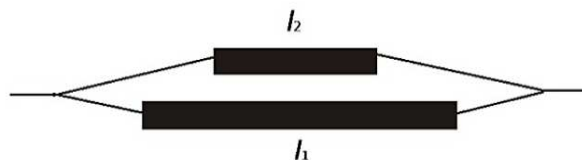
Time Allowed: 90 minutes

5. The respiratory system supplies the body with oxygen. Select the incorrect statement about respiratory system organs:

- A) The respiratory organ that contains the vocal cords is located in the throat
- B) The unique organ with complete cartilaginous rings is located in the chest box
- C) The organs that have cilia inside, which purify the air, are in the chest cavity
- D) The organ where the digestive and the respiratory tract cross each other is in the throat
- E) The organs that contain lung alveoli are in the chest cavity



6. An electrical conductor is cut into two pieces with lengths l_1 and l_2 , such that $l_1 = 2 l_2$. The two pieces overlap and are joined at their ends. Compared to the initial resistance of the conductor, the new electrical resistance:



- A) increases twice
- B) decreases twice
- C) increases three times
- D) decreases 4.5 times
- E) decreases three times

7. Capillaries are blood vessels that allow the exchange of substances between blood and cells. They have the following characteristics:

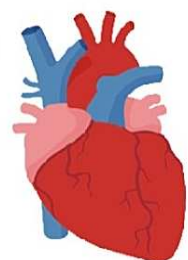
- A) They are formed by veins ramification and continue with the arteries
- B) Those found around the intestinal villi absorb nutrients
- C) Capillaries allow the passage of carbon dioxide from the blood into the cells
- D) They have high blood pressure to facilitate the exchanges
- E) The heart capillaries represent ramifications of the coronary artery

8. A child can see objects clearly (without glasses) at 10 cm in front of his eyes. What convergence should his glasses have to see clearly when he holds a book at 25 cm from the eye?

- A) 6 dioptries
- B) 4 dioptries
- C) 2 dioptries
- D) -6 dioptries
- E) -4 dioptries

9. The heart works like a pump that sucks the blood and pushes it through the body. Select the correct statement about the heart:

- A) It is located in the chest cavity above the diaphragm
- B) The blockage of the coronary arteries produces a cardiac arrest
- C) The left atrium contains oxygenated blood and has 4 holes
- D) A pacemaker is implanted in case of coronary artery blockage
- E) Oxygenated blood is pushed into the pulmonary artery when the valves are open



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10. Which of the following statements is true if we refer to the spark-ignition engine?

- A) It works in three stages
- B) During compression the pressure of the fuel mixture decreases
- C) During the evacuation, the fuel mixture is removed
- D) It uses a mixture of petrol vapors and air as fuel
- E) It is an external combustion engine

11. Andrei placed a plant pot on a plate containing ice and noticed that the plant withers. This is due to the reduction of the following process:



- A) Transpiration
- B) Respiration
- C) Photosynthesis
- D) Absorption
- E) Circulation of the elaborated sap

12. In a calorimeter of negligible calorific capacity, we add 1kg of water at 20°C and 1kg of ice at -20°C. After the system reaches the thermal equilibrium, in the calorimeter we have:

- A) Water and ice
- B) Only water at 0° C
- C) Only ice at 0° C
- D) Water at $t > 0^{\circ} \text{C}$
- E) Only ice at $t < 0^{\circ} \text{C}$

13. The environmental factors modify the plant functions. Select the wrong statement about the influence of the environment on the plants:

- A) The plant damage causes a decrease in breathing in the affected area
- B) Placing the plant in low-temperature areas decreases photosynthesis
- C) Placing the plant in the flooded area decreases photosynthesis
- D) The damage of the Liberian tissue causes the thickening of the plant above the damaged part
- E) Placing the plant in areas with very high temperatures reduces its breathing

14. About sounds we can say that:

- A) those with frequency greater than 20000Hz are called infrasound
- B) their intensity is measured in decibels
- C) they can propagate in vacuum
- D) in compact metals, they propagate at a lower speed than in the air
- E) they propagate at the same speed in the air at any temperature

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15. Which of the following plants have an asexual reproduction through stem?



A) Potatoes and Strawberries



B) Onions and Carrots



C) Fern and Wheat



D) Apple tree and Fir tree



E) Tulip and Cactus

16. The magnifying glass is:

- A) a divergent lens
- B) a convergent lens with a large focal length
- C) a tool that is used to produce a real image
- D) a convergent lens with a small focal length
- E) used to observe distant objects

17. The animals that cannot meet in the natural environment are:



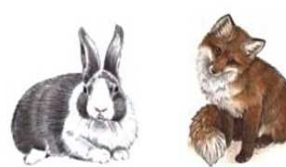
A) Lion and Hyena



B) Bat and Butterfly



C) White bear and Penguin



D) Rabbit and Fox



E) Ladybug and Plant lice

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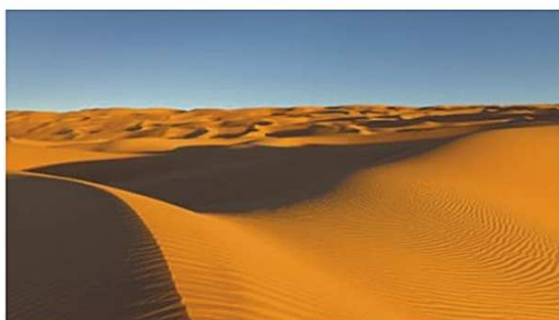
Cadet Level (Class 7 & 8)

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18. About the shunt resistance we can say that:

- A) It increases the measuring range of a voltmeter
- B) It is connected in series with the ammeter which it protects
- C) It decreases the measuring range of the ammeter
- D) It increases the measuring range of the ammeter with which it is mounted in parallel
- E) Whatever its value is, it increases the measuring range of the ammeter only twice

19. The dry environment determines the following adaptations of living creatures:

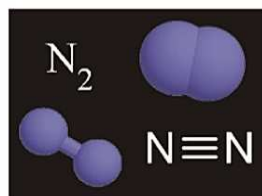


- A) The cacti have the stem transformed into spines
- B) The camel stores water in the hump
- C) The lizards have thick skin, with scales
- D) The crocodile has interdigital membranes
- E) The snake has variable temperature

20. When short circuited, a battery dissipates power $P = 600W$. The maximum power that the battery can transfer to the external circuit is:

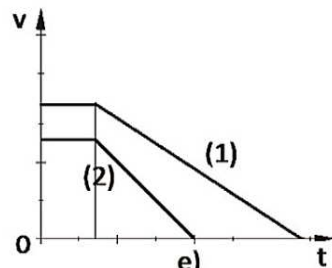
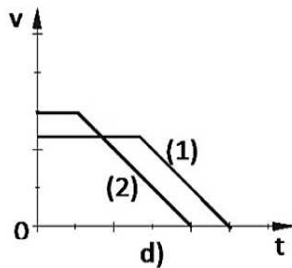
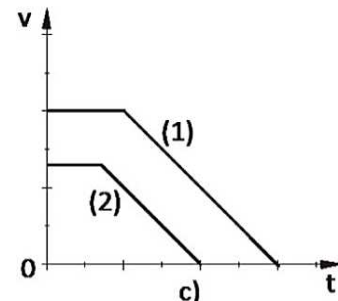
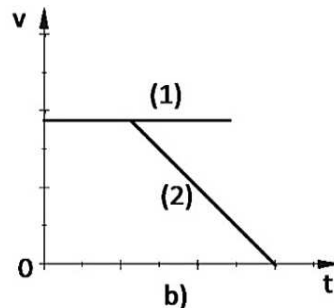
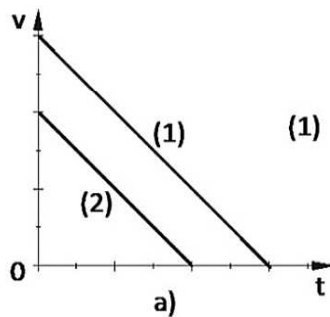
- A) 150W
- B) 2400W
- C) 600W
- D) Null
- E) Infinite

21. Which of the following statements about the nitrogen and the nitrogen cycle in nature is correct?



- A) Its percentage in the atmospheric air is 21%
- B) The plants grown in nitrogen-rich soil have a small amount of protein
- C) Plants can use nitrogen directly from the atmospheric air
- D) The nitrogen becomes gaseous in the blood of the divers at a small depth
- E) Peas and beans are plants that have a high amount of protein

22. Two moving objects start to slow down at the same time, with equal decelerations, the initial speeds being different. Which of the following graphs describes the movement of these objects?



A) *c* and *d*
D) *a*

B) *a* and *e*
E) *c*

C) *a* and *c*

23. The organs of the central nervous system are the center of some reflexes. Select the correct association between the central nervous system organs and the consequence of damaging them:

- A) Spinal cord injury causes the disappearance of the blinking reflex
- B) Brainstem injury results in the disappearance of the patellar reflex
- C) The cerebellum damage causes disorders in muscular movements
- D) Spinal nerve damage causes the disappearance of the defense reflex
- E) The cerebral hemispheres damage causes the disappearance of the respiratory reflex

24. Two cylindrical conductors, both made of silver, have radii in the ratio $\frac{1}{2}$ and lengths in the ratio $\frac{1}{4}$. What is the ratio of the currents established through them if we connect them simultaneously between the same two terminals?

A) 2
D) 8

B) 0.5
E) 0.125

C) 0.25

25. The spinal cord is the center of the following reflexes:

- A) knee-jerk and defense reflexes
- B) knee-jerk and respiratory reflexes
- C) respiratory and swallowing reflexes
- D) pupillary light reflex and blinking reflex
- E) heartbeat and digestive reflexes

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26. A glass ball of mass m and the volume V , is being placed into the water with uniform motion. Knowing that the densities of the water and the glass are ρ_{water} and ρ_{glass} , respectively, find the heat energy released when the ball is immersed in water to a depth h .

A) mgh

B) $\rho_{glass}Vgh$

C) $(\rho_{glass} - \rho_{water})Vgh$

D) $(\rho_{glass} + \rho_{water})Vgh$

E) 0

27. The excretory system has the function of filtering the blood and urine formation. Select the correct statement about excretion:

A) Urine is produced at the level of the kidneys, which are in the pelvis

B) The lizard can produce solid or semi-solid urine

C) Saltwater fish eliminates a large amount of diluted urine

D) Ureters propel urine from urinary bladder to kidneys

E) The filtered blood comes out from kidneys through the renal artery

28. A battery with e.m.f. E and the internal resistance r is connected to a resistor with the resistance R . Determine the efficiency of the battery, knowing that by doubling the resistance of the resistor R , the circuit current decreases by 25%.

A) 33.33%

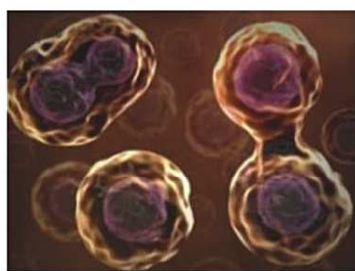
B) 25%

C) 75%

D) 66.66%

E) 50%

29. Cell division assures the growth and the development of the organisms. Select the correct statement:



A) Before the cell division, each chromosome has 2 chromatids

B) After mitosis, the daughter cells have the number of chromosomes reduced by half

C) Fecundation causes the formation of cells with a set of chromosomes

D) After meiosis, daughter cells and the mother cell have the same number of chromosomes

E) During the interphase stage, chromosomes can be observed under a microscope

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Time Allowed: 90 minutes

30. If a solid body is placed on the surface of a homogenous liquid with the same density as the body, then:
- A) The body floats on the surface of the liquid without sinking into it
 - B) The body sinks into the liquid, reaching the bottom of the vessel
 - C) The body floats inside the liquid, completely submerged
 - D) The body floats inside the liquid, partially submerged
 - E) None of the above situations occurs

