

# 14<sup>th</sup> INTERNATIONAL KANGAROO SCIENCE CONTEST 2021

Cadet Level (Class 7 & 8)

Time Allowed: 90 minutes

## ALL QUESTIONS WORTH 4 POINTS

1. We pull a body by a horizontal wire such that it moves uniformly on a horizontal surface. When a dynamometer is attached to the wire, the indicator needle stops in front of mark 5. What does this value represent?

- A) The body's weight
- B) The friction force
- C) The normal pressing force
- D) The elongation of the dynamometer's spring
- E) The elasticity constant of the dynamometer's spring

2. Select the correct statement about the alveoli of the lungs:

- A) Only a few blood vessels surround their wall
- B) Oxygen passes from the blood into the air
- C) Their wall is thick
- D) Carbon dioxide passes from the air into the blood
- E) They are formed from the branching of the bronchioles

3. In order to magnetize an iron nail we have to:

- A) orient the nail in the geographic North-South direction
- B) rub the nail with a magnet
- C) heat the nail, then cool it
- D) wrap the nail with a piece of string, then connect the conductor to an electric generator
- E) orient the nail in the magnetic North-South direction



4. Some chemical elements form positive ions. Which of the following sequences contains only such chemical elements?

- A) Aluminium, nitrogen, sulphur, sodium
- B) Chlorine, iodine, bromine, sulphur
- C) Sodium, aluminium, iodine, bromine, sulphur
- D) Aluminium, iron, magnesium, sodium
- E) Magnesium, nitrogen, sulphur, iodine

5. Many diseases can affect the organs of the human body. Which one of the following is a wrong association between the disease and the affected organ?

- A) angina - heart
- B) ulcer - stomach
- C) pneumonia - lung
- D) constipation - stomach
- E) emphysema - lung

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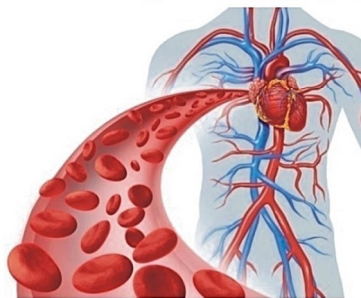
6. Which of the following statements is true about the stars?

- A) They all have the same temperature
- B) They are all of the same color
- C) The hottest stars look red
- D) The sun is the star with the highest temperature on its surface
- E) The hottest stars look blue

7. Which of the following methods will dissolve a sugar cube the fastest?

- A) Stir the sugar cube in vinegar
- B) Put the sugar cube in carbonated water
- C) Put the sugar cube in alcohol
- D) Put the sugar cube in cold water and stir vigorously
- E) Stir the sugar cube in hot water

8. The heart pumps blood by contracting and relaxing. The path of blood in heart is:



- A) Artery → atrium → ventricle → vein
- B) Vein → ventricle → atrium → artery
- C) Artery → ventricle → atrium → vein
- D) Vein → atrium → ventricle → artery
- E) Artery → vein → atrium → ventricle

9. When a body is heated:

- A) the kinetic energy of the body's molecules decreases
- B) the intermolecular distance decreases
- C) the internal energy of the body decreases
- D) the magnitude of the interaction force between its molecules increases
- E) the thermal agitation of its constituent molecules increases

10. Caustic soda solution is used for removing the impurities from the shredded wood used in paper production. In order to prepare 500g of caustic soda solution of concentration  $c = 20\%$ , we need:

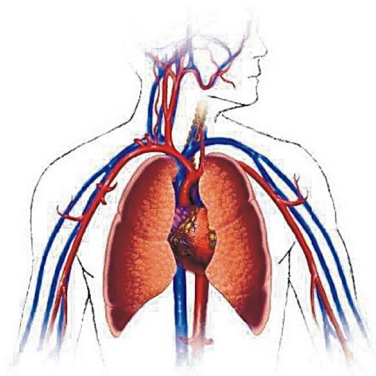
- A) 100g NaOH
- B) 100g H<sub>2</sub>O
- C) 400g NaOH
- D) 200g NaOH
- E) 300g NaOH

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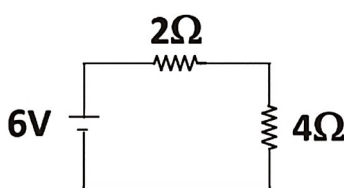
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11. Which of the following blood vessels carry blood with fresh oxygen from the lungs to the heart?



- A) Aortic artery                      B) Vena cava                      C) Pulmonary artery  
D) Pulmonary veins                E) Capillary
12. Which of the following statements is true about the electrical circuit in the diagram?



- A) The  $2\Omega$  resistor will get more current than the  $4\Omega$  resistor because it has less resistance  
B) The voltage drop across the  $2\Omega$  and  $4\Omega$  resistors will be the same  
C) The  $4\Omega$  will get more current than the  $2\Omega$  resistor because it has less resistance  
D) The  $2\Omega$  and  $4\Omega$  resistors will get the same current  
E) The voltage drop across the  $4\Omega$  resistor will be less than that across the  $2\Omega$  resistor
13. Unlike aluminium, sulphur:
- A) Conducts electric current                      B) is malleable and ductile  
C) is light    D) oxidizes releasing a foul-smelling gas  
E) melts in the melt of another metal forming alloys
14. Select the correct statement about the route of water throughout the body of the plant:
- A) Mainly, water absorption takes place in the stem  
B) Water evaporates at the level of leaves  
C) Phloem conducts water to the leaves  
D) Water evaporates through the roots  
E) Xylem conducts water to the leaves



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**15. If an electron is added to an atom, the atom is said to be:**

- A) neutralized                      B) positively ionized              C) a molecule  
D) unchanged                      E) negatively ionized

**16. Silicon is a chemical element discovered by Berzelius and it is present in sand as silicon dioxide. We know that the silicon atom contains 14 times more protons than hydrogen and that the number of electrons in its shell is equal to the number of neutrons. Which of the following statements is true about the particles in the atomic nucleus of silicon?**

- A) it has 28 nucleons              B) it has 28 neutrons              C) it has 28 electrons  
D) it has 10 neutrons              E) it has 1 proton

**17. Which of the following is a correct association between the plant and its asexual mode of reproduction?**

- A) hydra → budding              B) fern → spores              C) rose → runners  
D) apple → stamens              E) pine → carpels

**18. The total internal reflection occurs when:**

- A) the light passing through glass is reflected inside the glass  
B) the light passes from water into glass  
C) the angle of the incident beam is less than the critical angle  
D) the light passes from air into water and, in this case, the light frequency decreases  
E) the angle of incidence is equal to the angle of refraction

**19. In 1829, Johann Wolfgang Dobereiner grouped the known chemical elements into sequences of three elements called triads, for example: chlorine, bromine, iodine (I); calcium, strontium, barium (II); sulphur, selenium, tellurium (III); lithium, sodium, potassium (IV). Triads containing non-metals are:**

- A) I and II                      B) II and III                      C) III and IV  
D) I and III                      E) II and IV

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**20. Which of the following are wind-pollinated plants?**



Cherry tree



Tomato



Pepper



Rose



Maize

**21. A concave lens:**

- A) Is thin in the middle and thickest round the edge
- B) Gathers the light rays that are parallel to the optical axis into the focus
- C) Forms an equal and inverted image if the object in front of it is at a distance twice the focal length
- D) Is always the lens of the human eye
- E) Becomes convergent when introduced into the water

**22. In the word "NICE" we identify the symbols of the chemical elements**

- A) nitrogen, iodine, caesium
- B) nickel, caesium
- C) nitrogen, caesium
- D) niobium, iodine, cerium
- E) nitrogen, iodine, cerium

**23. Select the correct association between the organism and the trophic category to which it belongs:**

- A) grass - secondary consumer
- B) grass-hopper- primary consumer
- C) snake - producer
- D) frog - tertiary consumer
- E) hawk - decomposer

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**24. If a metallic body is heated:**

- A) The body volume and density increase in value
- B) The body volume and mass increase in value
- C) The density of the body increases in value and the mass does not change
- D) The density of the body decreases in value and the mass remains the same
- E) The body's mass, density and volume decrease in value

**25. Acid rain contains oxides of non-metals, which, in reaction with water droplets, form corrosive acids. The acid rains contain the oxides of the following non-metals:**



- A) Carbon and sulphur
- B) Nitrogen and sulphur
- C) Phosphorus and carbon
- D) Carbon and hydrogen
- E) Chlorine and hydrogen

**26. Select the wrong association between the organs that make up the central nervous system and their role:**

- A) The cerebellum → coordinates muscular movements
- B) The medulla oblongata → regulates breathing
- C) The spinal cord → coordinates the defence reflex
- D) The cerebrum → is the upper centre of coordination of the body
- E) The spinal nerves → connect the body to the spinal cord

**27. It is true that:**

- A) The spectrum of white light is a band of 6 colours
- B) Raindrops in the air act like a plane mirror
- C) A red object appears red because absorbs red colour of light and reflects all the other colours
- D) Black objects absorb all the colours of light
- E) An object that absorbs all the colours of light appears white



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**28. Ammonium phosphate is an inorganic substance used in agriculture as a fertilizer. Regarding the ammonium phosphate,  $(\text{NH}_4)_3\text{PO}_4$ , we can state that:**

(Atomic masses: H-1; N-14; O-16; P- 31)

- A) its mass ratio is N: H: P: O = 14: 12: 31: 64
- B) its atomic ratio is N: H: P: O = 3: 7: 1: 4
- C) it contains 0.8% H
- D) it contains 28.8% P
- E) it contains 43% O



**29. Deforestation has the following effect on the environment:**



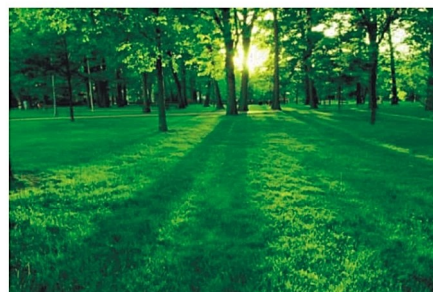
A) It decreases the risk of landslides



B) It increases the amount of precipitation



C) It decreases the amount of carbon dioxide in the air



D) It increases the amount of oxygen in the air



E) It causes floods

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**30. It is not true that the sound waves:**

- A) Are caused by vibration
- B) Are longitudinal waves
- C) Always need a material to travel through
- D) Can travel through solids, liquids and gases
- E) Travel with the same speed when they are refracted

