



**SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT  
12<sup>th</sup> NATURAL SCIENCE OLYMPIAD 2023**

**GRADES 4 - 6**

**INSTRUCTIONS**

Please read the instructions carefully before answering the questions

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This is a multiple choice paper. Please answer all the questions on the answer sheet provided. Each question is followed by answers marked A, B, C, and D. **Only one answer is correct.** Choose the correct answer and shade the corresponding circle on the answer sheet completely, using an HB pencil.

NB! The answer sheets are marked electronically – do not make any other dots or marks on the answer sheet. Select only one answer for each question or your answer will be discarded. **Ensure that you shade your selection clearly.**

Note that the question numbers 1 to 100 on the answer sheet moves from top to bottom in several columns. Ensure that the number of your selection on the answer sheet corresponds with the number of the question in your examination paper. Should you make a mistake, please erase the incorrect answer completely

The use of **non-programmable** electronic calculators is permitted.

**To avoid disqualification** - You are required to complete **all** the information requested on the answer sheet. Please complete the information in script, as well as shade the corresponding blocks. If the corresponding blocks are not shaded appropriately, your results will be returned without a name and you will be disqualified. Do not fold the answer sheets.

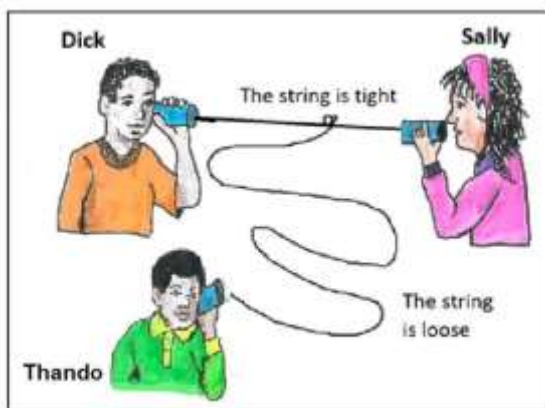
**1½ hours** are allowed to answer the questions

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1. Which one of the following represents four states of matter?

- A. Liquid, gas, vapor, ice
- B. Gas, liquid, solid, plasma
- C. Solid, liquid, gas, pressure
- D. Ice, water, liquid, steam

2. The picture shows Dick and his friends playing with a string-telephone. Sally is speaking. Dick and Thando are trying to listen. Which of them can hear her speak?



- A. Both can hear equally clearly.
- B. Neither of them can hear.
- C. Only Thando can hear clearly.
- D. Only Dick can hear clearly.

3. This photo depicts the first South African "Afronaut" who paid to visit the International Space Station on board the Soyuz TM34 mission in 2002. Who is he?



- A. Mark Zuckerberg
- B. Mark Twain
- C. Mark Shuttleworth
- D. Mark van Rensburg

4. When animals breathe, they take in \_\_\_\_\_ and breathe out \_\_\_\_\_ which of the following gases respectively

- A. Oxygen, Nitrogen
- B. Oxygen, Carbon Dioxide
- C. Hydrogen, water vapour
- D. Carbon, Carbon Dioxide

5. What state of matter will always completely fill a container?

- A. Liquid
- B. Gas
- C. Solid
- D. None of the above

6. Keisha is pushing her bicycle up a hill. Where does Keisha get the energy to push her bicycle?

- A. From the food she ate.
- B. From the exercise she did earlier.
- C. From the ground she is walking on.
- D. From the bicycle she is pushing.

7. Which South African organisation's logo is represented below?



- A. Southern African National Science Association
- B. Science and Nautical Shipping Association
- C. South African National Space Agency
- D. South African Native Science Agency

8. Which of the following are all examples of living things?

- A. Humans, Fossils, Lions, Birds and Trees
- B. Hills, Mountains, Valleys, Rivers and Oceans
- C. Boats, Cars, Aeroplanes, Taxis and Ships
- D. Dogs, Cats, Grass, Trees and Fish

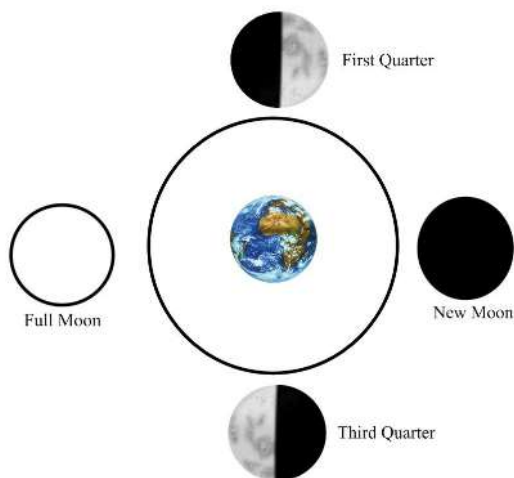
9. When a taxi is running, most of the chemical energy released when the fuel burns in the engine is not used to move the vehicle. What is the chemical energy changed to?

- A. Electric energy for the battery.
- B. It is wasted as heat energy.
- C. Mechanical energy for the generator.
- D. All of the above.

10. Some children were trying to find out which one of three light bulbs was the brightest. Which one of the following statements gives the BEST START toward finding the answer?

- A. "One bulb looks brightest to me, so I already know the answer."
- B. "All the bulbs look bright to me, so there cannot be an answer."
- C. "It would help if we had a way to measure the brightness of a light bulb."
- D. "I give up. There is no way to find a solution."

11. During which of the lunar phases shown is the Moon furthest from the Sun?

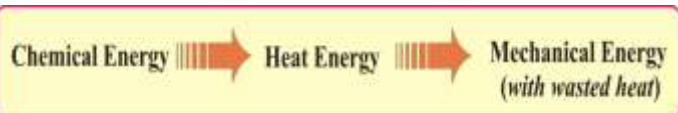


- A. New moon
- B. First quarter moon
- C. Full moon
- D. Third quarter moon

12. Which of the following parts of a plant is usually the first to sprout from a seed?

- A. The leaves
- B. The root
- C. The fruit
- D. The flower

13. This diagram shows an energy sequence:



This energy sequence could explain what is happening in which one of the following?

- A. A flashlight (torch) is on.
- B. A candle is burning.
- C. Petrol is being used to power a car.
- D. An electric current is running a refrigerator.

14. The diagrams below show an investigation conducted by a student. The student fixed one end of a ruler to a table, and then plucked the other end of the ruler. The pitch of the sound made by the vibrating ruler was noted.

NOTE: Each time the ruler was plucked with the same force

This is what the student did:



From the options below select the most likely aim for the investigation above.

- A. When an object is plucked it will make a sound.
- B. The speed of a vibrating object affects the pitch of the sound made.
- C. The length of a ruler affects the pitch of the sound made.
- D. When an object is plucked it will vibrate.

15. What do these three gentlemen in the photo most likely have in common?



- A. They are all entrepreneurs, with private space programs.
- B. They are all South Africans.
- C. They are all trying to establish a colony on Mars.
- D. They are all astronauts.

16. What nutritional value does the learner get from eating a mealie?



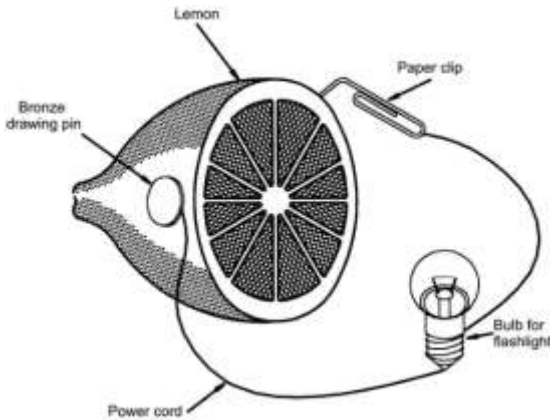
Choose from the following:

- A. It tastes nice.
- B. It fills his tummy.
- C. It is easy to chew.
- D. The mealie provides his body with energy.

17. Air pollution is one of the leading causes of global warming. What is a major world-wide predicted consequence of global warming?

- A. A rise in sea level.
- B. An increase in the number of severe earthquakes.
- C. Awakening of dormant volcanoes.
- D. The thinning of the ozone layer.

18. The diagram shows an electrical system made up of different objects. Which is the energy source of the electrical system in the diagram?



- A. Power cord
- B. Lemon, paper clip and bronze drawing pin
- C. Light bulb
- D. All of the above

19. To an observer on the Earth's equator, the Moon and Sun appear to rise in the ... (column i) and set in the .... (column ii).

The statements above are completed by the information in row....

ROW	i	ii
A	west	east
B	west	west
C	east	east
D	east	west



20. Which of the following is an example of a food chain?

- A. Grass → Fire → Smoke
- B. Seeds → Mouse → Owl
- C. Boy → Girl → Teacher
- D. Dog → Mealie → Vulture

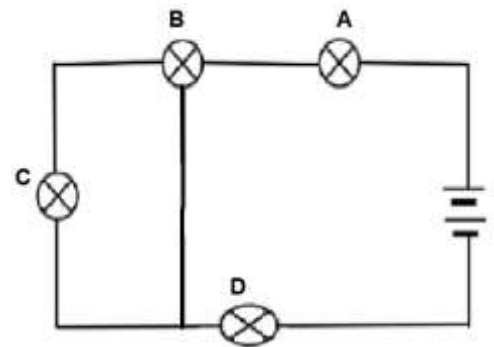
21. Fossil fuels are formed from...

- A. Atmospheric gases
- B. Rocks
- C. The remains of living organisms
- D. Water trapped inside rock

22. The diagram shows four bulbs A, B, C and D and two cells connected in a circuit. When one of the bulbs fused, the other three will remain lit.

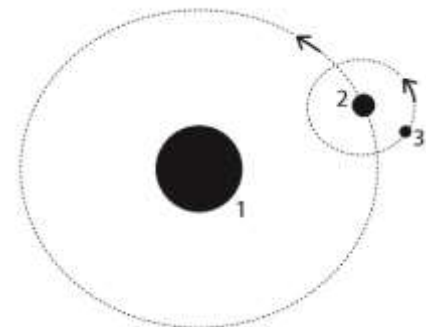
Which bulb is fused?

- A. A
- B. B
- C. C
- D. D



23. The figure below shows the Earth, the Moon, and the Sun. Each body is labelled by a number. The arrows show the direction in which each body is moving.

Which of these bodies represents the Moon?



- A. 1
- B. 2
- C. 3
- D. None of the above

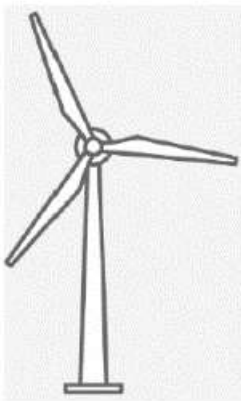
24. What can you do as a learner to limit climate change?

- A. Reduce waste by recycling plastics, paper and cans.
- B. Avoid starting veld fires.
- C. Reuse plastic shopping bags.
- D. All of the above.

25. Fanning a wood fire with a sheet of cardboard can make the fire burn hotter because doing this...

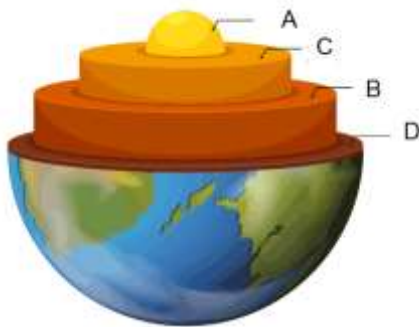
- A. Adds energy to the wood.
- B. Adds more wood sparks to the fire.
- C. Adds more oxygen needed by the burning process.
- D. Adds energy needed to keep the fire going.

26. The diagram shows a wind turbine. Which of the following is true about the wind turbine?



- A. Wind energy is non-renewable.
- B. Electricity can be produced without wind.
- C. Converts electric energy into kinetic energy.
- D. Converts kinetic energy into electrical energy.

27. The picture shows the main layers of the Earth. Where is it the hottest?



- A. Layer A
- B. Layer B
- C. Layer C
- D. Layer D

28. In a food chain herbivores are .....

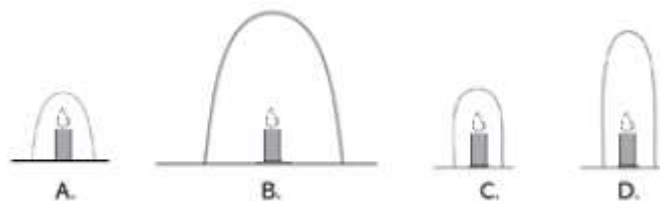
- A. Primary consumers
- B. Primary producers
- C. Secondary consumers
- D. Decomposers

29. Paint applied to an iron gate prevents the gate from rusting. Which one of the following is the best explanation for painting the gate?

- A. The paint prevents nitrogen in the air from coming into contact with the iron.
- B. The paint shields the iron from carbon dioxide in the atmosphere.
- C. The paint makes the iron surface smoother so rust cannot grip onto the iron.
- D. The paint prevents oxygen in the air from coming into contact with the iron.

30. The pictures below show four identical burning candles. Each is covered by a glass container of a different size.

Which candle flame will be the last to go out?



31. Which of the following can be considered a fossil?

- A. The skeletal remains of woman who lived 15,000 years ago found in a cave in Brazil.
- B. The mineralised remains of a penguin that lived 100,000 years ago found in a dry valley in Antarctica.
- C. A wasp inside a 30 million-year-old block of amber.
- D. All the above.

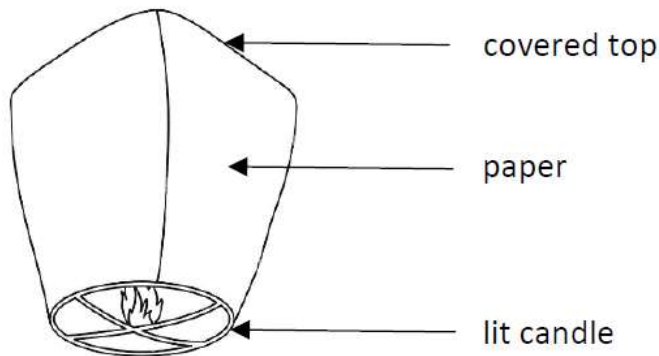
32. The basic process of photosynthesis in plants is to.....

- A. Make carbon dioxide from water.
- B. Turn sunlight into sugars.
- C. Absorb sugars through the leaves.
- D. Do all of the above.

33. In an experiment Sarah puts two teaspoons of sugar into a beaker of water and heats it until all the visible sugar is dissolved. The contents of the beaker is now called a.....

- A. Heterogenous mixture
- B. Solution
- C. Pure liquid
- D. Pure compound

34. The diagram below shows a sky lantern. A sky lantern is made of paper. It has a covered top and an opening at the bottom.



Which of the following correctly shows the energy changes when the candle is lit and the sky lantern rise in the air?

- A. Light energy → kinetic energy → heat energy + sound energy
- B. Kinetic energy → gravitational potential energy → heat energy + light energy
- C. Chemical potential energy → light energy + heat energy → gravitational potential energy
- D. Chemical potential energy → heat energy + light energy → kinetic energy + gravitational potential energy

35. The length of a planet's day is defined by its...?

- A. Mass
- B. Period of rotation on its axis
- C. Density
- D. Period of orbit around the sun

36. A giraffe belongs to which habitat?

- A. Antarctic region
- B. Rainforest
- C. Bushveld
- D. Polar region

37. Which is our main source of heat and light energy on Earth?

- A. ESKOM
- B. Charcoal
- C. Diesel
- D. The Sun

38. The South African-born entrepreneur, Elon Musk, developed this sports car that is called an electric car.

What energy source is it using?



- A. Lithium-Ion Batteries
- B. Diesel
- C. Hydrogen Batteries
- D. Electromagnets

39. This is the biggest optical telescope in the Southern Hemisphere. It is situated in the freezing town of Sutherland in the Northern Cape.



What is this telescope commonly known as?

- A. SALT
- B. SKA
- C. Big Ben
- D. SAAO

40. The rhinoceros has become an endangered species because their horns are believed to have medicinal properties. This is false because rhino horn is made up of keratin, which is the same protein that forms ...

- A. Our hair and fingernails
- B. Bone
- C. Cartilage
- D. Blood and muscle

---The End---

