

NATURAL SCIENCES
OLYMPIAD EXAMINATION (GRADES 4-6)
2023

1. **ANSWER B:**

Four separate phases of matter indicated.
Other 3 answers has duplication of the state of matter.

2. **ANSWER: D**

Only Dick can hear her clearly, because the string is straight and tight. This makes it easier to transfer soundwaves. When the string is slack/loose the waves do not move easily.

3. **ANSWER: C**

Mark Shuttleworth is a South African entrepreneur that developed software that he sold for millions. He received British citizenship and currently resides on the Isle of Man.

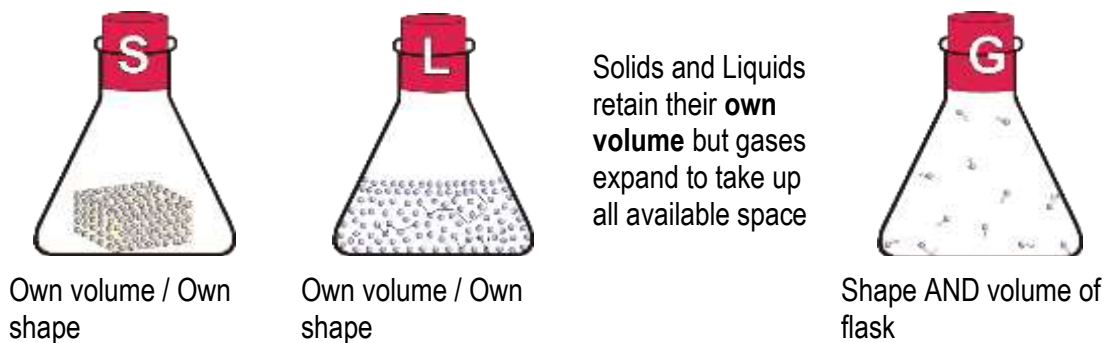
False:

- A. Mark Zuckerberg started Facebook.
- B. Mark Twain is a fictional character from a novel, Huckleberry Finn.
- C. Mark van Rensburg is just a made up South African name.

4. **ANSWER: B**

5. **ANSWER: B**

As explained in the diagram.



6. **ANSWER: A**

Food provides chemical energy that is stored in our muscles to do various activities.

7. **ANSWER: C**

SANSA is the abbreviation for South African National Space Agency. We have a SANSA office in Hermanus.



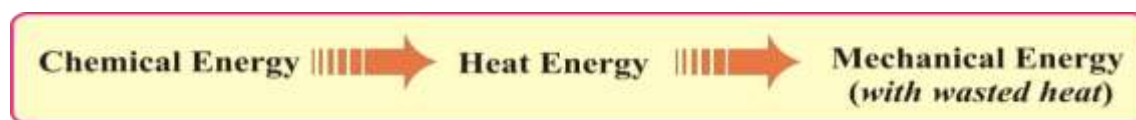
False:

- A. South Africa does not have a Science Association rather a Science Agency.
- B. Science and Nautical Shipping Association does not exist.
- D. South Africa does not have a Native Science Agency.

8. **ANSWER: D**

9. **ANSWER: B**

Energy cannot be destroyed, but it can be transformed into other forms of energy. This is the First Law of Thermodynamics. In most cases the energy ends up as low level thermal energy, as shown in the energy sequence diagram:



10. **ANSWER: C**

To identify the brightest bulb by merely relying on visual perception is a matter of individual opinion. Thus, the best way to determine the brightest burning light, would be to measure the brightness.

11. **ANSWER: C**

When the Moon is furthest away from the sun, we see the sun's light reflected by the full Moon.

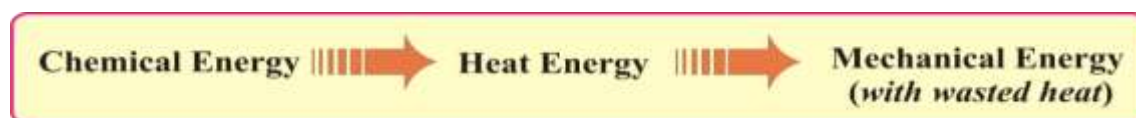
False:

During New moon, the moon is in between the Sun and Earth.

B&D. During first and third quarter, the moon is next to earth. Thus only a portion can be observed as reflection.

12. **ANSWER: B**

13. **ANSWER: C** Petrol is being used to power a car



14. **ANSWER: C**

The length of the ruler affects the pitch of the sound. A longer vibrating object will have a low pitch where a shorter vibrating object will have a higher pitch.

False:

A. Not all objects plucked will make a sound.

B. Pitch is indicative of the vibrating speed but is not the cause of the pitch.

C. The length affects the vibrating speed which in turn affects the pitch (i.e. number of vibrations per second)

D. Not all objects will vibrate if they are plucked.

15. **ANSWER: A**

Jeff Bezos, Sir Richard Branson and Elon Musk are all billionaires entrepreneurs with private space programs.

Jeff Bezos – Blue Origin

Richard Branson – Virgin Galactic

Elon Musk – SpaceX

16. **ANSWER: D**

17. **ANSWER: A**

18. **ANSWER: B**

The "Lemon Battery" is a simple battery which typically consists of zinc metal (paper clip) and piece of copper (bronze drawing pin) inserted in the lemon. The potential difference generated between the drawing pin and paper clip produces an electrical current that makes the lightbulb light up.

19. **ANSWER: D**

The Earth spins on its axis **from west to east**. This rotation causes us to see the rising of the Sun and the Moon in the east and setting in the west.

20. **ANSWER: B**

21. **ANSWER: C**

Call it anaerobic re-composition rather than decomposition.

In South Africa Coal formed from ancient trees (e.g. Glossopteris, Tree Ferns and Cycads) that were submerged in swamps under anaerobic conditions around 300 million years ago during the Carboniferous Era.

Oil and Natural Gas are formed when the dead remains of tiny oceanic organisms called Phytoplankton sank to the bottom of shallow seas and were covered by layers of silt. At certain depths the temperatures were between 100°C and 150°C (The "Oil Window") and gradually they turned into Oil (petroleum). This was common in Angola and Nigeria. In South Africa the temperatures were higher and the deposits turned

into Natural Gas. We have not yet found any significant quantities of oil. Apart from the gas found off-shore, we may be able to access gas reservoirs in Karoo strata by using Fracking (which is not very environmentally friendly).

22. **ANSWER: C**

C is connected in an "outside" parallel circuit (branch), whereas A, B & D are in the "inside" circuit (main current). If C blows, the outside circuit is broken, however current can still pass through A,B and D.

23. **ANSWER: C**

The moon orbits around the Earth. The Earth and The Moon Orbits the Sun.

24. **ANSWER: D**

25. **ANSWER: C**

Combustion is an exothermic chemical reaction between carbon atoms in the wood and oxygen atoms in the air, forming carbon dioxide molecules and releasing heat energy.



Fanning removes the CO₂ and brings O₂ closer to the Carbon.

26. **ANSWER: D**

Higher wind speeds do produce more electricity in a wind turbine.

Wind turbines convert the kinetic energy of the wind into electrical energy by using the wind to turn the blades of the turbine, which in turn rotate a generator that produces electricity. The amount of electricity that a wind turbine can generate depends on the speed of the wind, with higher wind speeds resulting in greater power output.

The power output of a wind turbine is proportional to the cube of the wind speed. This means that a small increase in wind speed can result in a much larger increase in power output. For example, if the wind speed doubles, the power output of the wind turbine will increase by a factor of eight..

27. **ANSWER: A**

The deeper you go into the Earth the more pressure is exerted. The centre of the Earth experiences the most pressure. This is so hot that the rock particles are molten.

C. Is the outer core, even if it under tremendous pressure it is plastic. Warmer than the crust and the mantel but not as warm as the inner core.

B Is the mantel, even though it is warmer than the crust, the crust does not exerts a lot of pressure on it. It is mostly solid rock.

D. Constitutes the crust where moderate temperatures are prevalent.

28. **ANSWER: A**

29. **ANSWER: D**

The chemical reaction is Iron + Oxygen forms Iron Oxide [this can be either black ferrous oxide (FeO) OR red Ferric oxide (Fe₂O₃)].



NOTE: Option A: N₂ does not react with iron at all.

Option B: CO₂ does not react with iron at all.

Option C: Is added as a distractor.

30. **ANSWER: B**

When the candle is lit and the jar is sealed, the flame uses all the oxygen over time to stay alight. This means that the oxygen is gradually reduced until there is nothing left and the flame dies. Container B is bigger and houses the most oxygen.

31. **ANSWER: D**

Fossils are the preserved remains of animals and plants more than 10 000 years old.

A, B & C are all older than the designated 10 000 years to be classified as a fossil; thus all of them are fossils.

32. **ANSWER: B**

33. **ANSWER: B**

Solutions are homogenous mixtures. In a solution substances are dissolved completely and no readily distinguishable particles can be observed.

34. **ANSWER: D**

The candle is a chemical compound, producing chemical energy in the form of heat and light. The heat energy causes the lantern to move up into the air (kinetic energy) When the candle is burnt out, gravity will influence the movement of this lantern in that it will gradually be pulled towards the earth again.

35. **ANSWER: B**

Length of day is caused by the period of rotation of the planet around its own axis.

False:

- A. Mass is a fundamental property of matter that refers to the amount of matter contained in an object.)
- C. Density is a substance's mass per unit of volume.
- D. Revolution refers to the orbit of a celestial body. A revolution around the sun causes a year.

36. **ANSWER: C**

Giraffes inhabit savanna, grasslands, deserts and open woodlands. Savannas are a form of bushveld.

37. **ANSWER: D**

The sun is the main source of energy to our planet and in our solar system.

38. **ANSWER: A**

This electric sports car uses of lithium-ion batteries to produce electric power.

39. **ANSWER: A**

S.A.L.T (Southern African Large Telescope) is the largest optical telescope in the Southern hemisphere and is situated in the Northern Cape town of Sutherland. The mirror size is 9.8 meters.

- B. The Square Kilometer Array is an intergovernmental international radio telescope project being built in Australia and South Africa, Northern Cape town of Carnarvon.
- C. Big Ben is the clock tower in London.
- D. South African Astronomical Observatory

40. **ANSWER: A**
