



# SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT

## 12<sup>th</sup> NATURAL SCIENCE OLYMPIAD

GRADES 7 - 9

2023

### 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.

**Two hours** are allowed to answer the questions.

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**Turn page over to start**

1. The three-wheeler bike rider ...



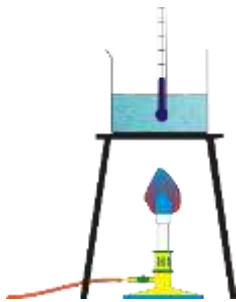
- A. Is losing potential energy and gaining kinetic energy.
- B. Is gaining potential energy and losing kinetic energy.
- C. Has no energy because he is in free fall.
- D. Is flying because he is weightless.

2. The following is an example of "Field Forces."



- A. Tension in the towrope.
- B. The mass of the wrecked car.
- C. Electromagnetic forces.
- D. Glue fixing a broken shoe.

3. A learner used the apparatus illustrated on the right to determine the Boiling Point of pure water at her school. She found that the water boiled at a temperature of 95°C. Where is her school situated?

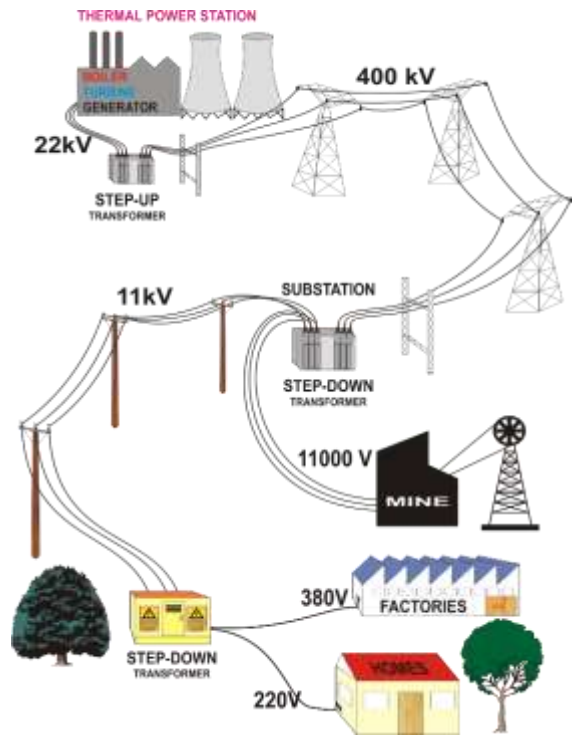


- A. Cape Town.
- B. Durban.
- C. Gqeberha.
- D. Johannesburg.

4. A learner is wearing a T-shirt. When she stands in sunlight, the dye in the cloth absorbs red and blue light. What colour does her shirt seem to be in sunlight?

- A. Black.
- B. Red.
- C. Blue.
- D. Green.

Question 5 and 6 are related to this diagram of the National Grid



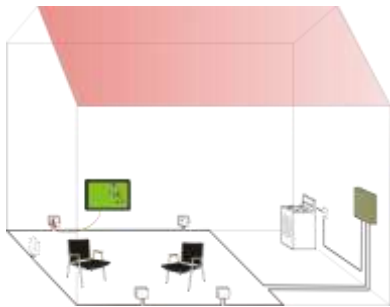
5. The voltage is stepped UP to 400 kV as it leaves the Power Station and is then stepped DOWN closer to the end user. When the voltage is raised, the current in the high-tension cables is lowered. An advantage of this is that ...

- A. Less electric energy is lost as heat.
- B. AC is converted to DC.
- C. Cable thieves will be discouraged.
- D. There is less smoke pollution from the Cooling Towers.

6. Further advantages are ...

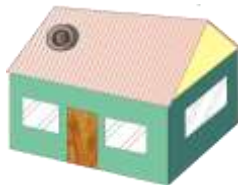
- A. Thinner cables are used to carry the smaller current.
- B. Less sturdy pylons are needed to support the thinner cables.
- C. Pylons can be placed further apart.
- D. All three of these are actually advantages saving materials and costs.

7. The diagram represents the wiring of the plugs circuit in a small house. Which one of the following statements is correct?



- A. All the plug sockets are connected in series.
- B. All the plug sockets are connected in parallel.
- C. Only the stove is connected in parallel.
- D. Only the TV is connected in series.

8. Which one of the following statements about lightning strikes is true?



- A. An old car tire placed on the roof of a house will protect it against lightning strikes.
- B. During a thunderstorm it is safe to sit under a tree.
- C. During a thunderstorm it is safe to sit in a car because of the rubber tires.
- D. It is safe to sit in a car during a thunder storm, because the metal frame will conduct the lightning around the outside of the car to the ground (N.B. It has nothing to do with the tires).

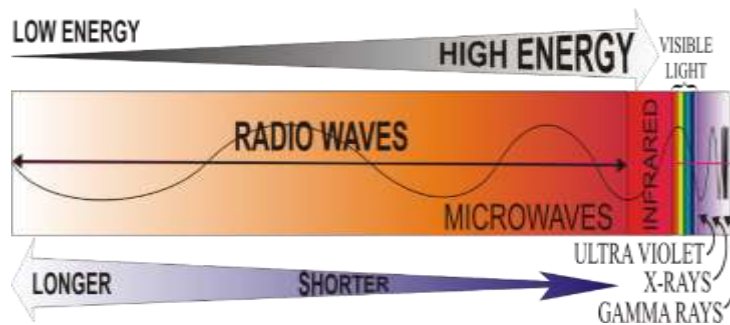
**Question 9 and 10 refers:**

Electromagnetic waves are the foundation of modern technological life. Electromagnetism is a fundamental force of nature that describes the relationship between electrically charged particles and magnetic fields. It is one of the four fundamental forces, along with gravity, the strong nuclear force, and the weak nuclear force.

While electromagnetic waves are a manifestation of electromagnetism, electromagnetism itself is a broader concept that includes many other phenomena related to electric and magnetic fields. It is also this form of energy that is used by humans and animals for our vision AND for digital video as well as radio and television.

Furthermore, cell phone communications, computer games and the Internet are all based on electromagnetic waves, and so are X-rays and CT Scans in medicine.

9. Which of the following electromagnetic waves is most dangerous?



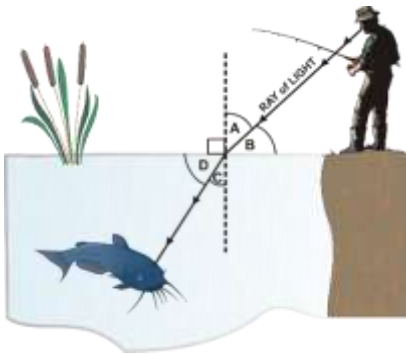
- A. Microwaves
  - B. Infrared
  - C. X-Rays
  - D. Gamma Rays
10. Which of the electromagnetic waves are responsible for skin damage (like sunburn) and are absorbed by O<sub>3</sub> (ozone gas) in the upper atmosphere?

- A. Microwaves.
- B. Infrared rays.
- C. Ultraviolet rays.
- D. Gamma rays.

11. If you are studying Coding & Robotics, you may be given the task of Designing & Making a model of a robotic crane to be used in a scrapyards to sort magnetic (e.g. iron) and non-magnetic metals (e.g. copper). For this task you will have to build an electromagnet to be carried by the crane. Which of the following items will you need for your electromagnet?

- A. A soft iron core, about 5 metres of insulated wire, a 6 volt battery and a switch.
- B. A steel bolt, about 5 metres of insulated wire, a 6 volt battery and a switch.
- C. A wooden dowel, about 5 metres of bare wire, a 6 volt battery and a switch.
- D. A plastic ruler, about 5 metres of bare wire, a 6 volt battery and a switch.

12. A fish is swimming in a water pond. It sees a fisherman on the bank. The following diagram shows the path of the light ray involved. Which labelled angle is the angle of refraction?



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

13. A chef is using a pressure cooker to cook a meal. The closed pressure cooker allows the water in the pot to reach a temperature of 120°C while the lid is on. Because he is in a hurry, the chef opens the lid while the temperature is still high. Predict what will happen in the kitchen.



- A. Since the water is above its normal boiling point it will “flash” instantly into steam and blast the hot food all over the kitchen severely burning the chef and his assistants.
- B. Nothing will happen because the water temperature will instantly drop to its normal boiling temperature.
- C. The water will instantly turn into steam but the food will remain in the pot.
- D. The water will instantly turn into steam but this will lower the temperature to normal.

14. The four best electrical (and thermal) conductors in order are ...

- A. Gold > Copper > Silver > Aluminium.
- B. Copper > Aluminium > Gold > Silver.
- C. Silver > Copper > Gold > Aluminium.
- D. Aluminium > Copper > Silver > Gold.

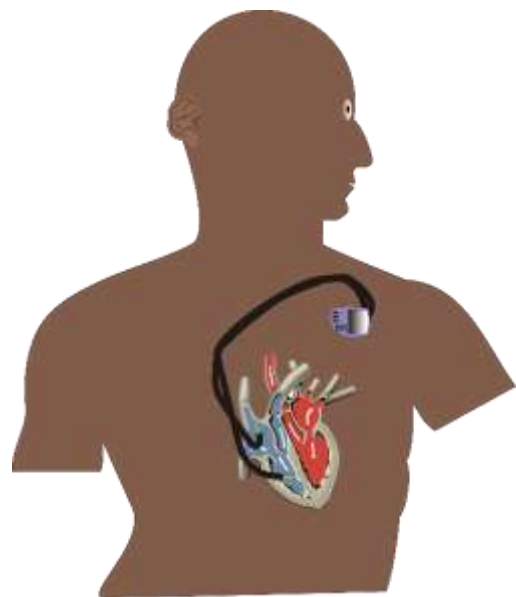
15. Why is wind power not suitable as “baseline” power?

- A. Wind is unreliable.
- B. Wind varies in energy.
- C. Both A & B are correct.
- D. Both A & B are false.



16. Modern medicine can improve the quality of your life and can extend your lifespan. While Pacemakers are usually used in elderly patients, they can also be used in patients of any age who have certain heart-health issues. A pacemaker is inserted inside the chest cavity. It has a battery which can last for up to 10 years. The pacemaker...

- A. Controls the build-up of cholesterol in the arteries.
- B. Sends electrical impulses to control the heart beats.
- C. Triggers an alarm just before a heart attack.
- D. Sends a shock to restart the heart after a heart attack.



17. Thabo went to school complaining of feeling unwell. His teacher measured his body temperature. He had a temperature of 40°C and said that he had lost his sense of smell. Which one of the following options should the principal choose?

- A. Isolate Thabo by letting him sit in the back of the classroom.
- B. Let the class monitor escort him to the sick room.
- C. Isolate him and arrange for his mother or father to fetch him as soon as possible.
- D. Let him complete the school day but tell him not to return until his temperature is normal.

18. Your heart beats faster during exercise so that ...

- A. Blood can collect carbon dioxide from the lungs and carry it to the muscles.
- B. Hydrogen can combine with oxygen to form water needed to cool you by perspiration.
- C. Carbon dioxide in your lungs can break down to form oxygen for your muscles.
- D. Oxygenated blood can be carried from your lungs to your muscles so that they can do work.

19. What feature is shared by ALL insects?

- A. They are endothermic.
- B. They pollinate flowers.
- C. They have an exoskeleton.
- D. They have a stinging mechanism for defence.

20. Sunscreen is used to protect the skin from damage caused by ...

- A. Ultraviolet radiation in sunlight.
- B. Ozone.
- C. X-Rays.
- D. Microwaves.

21. Seedlings growing in a forest typically have large dark green leaves so that ...

- A. They can gather as much sunlight as possible for photosynthesis.
- B. They can provide shade for their roots.
- C. They can get rid of excess water by transpiration.
- D. They can withstand damage by grazing herbivores.

**Background to questions 22 and 23:** When Earth was less than two billion years old the early atmosphere consisted mainly of carbon dioxide and nitrogen. There was no free oxygen. We know this because the oldest rocks do not contain oxides. The ancient biosphere was made up of archaic lifeforms which were all single-celled anaerobic bacteria. During the next billion years, tiny single-celled cyanobacteria (aka 'blue-green algae') evolved in the shallow seas that covered much of the planet. They were vitally important because they gathered the energy from sunlight using photosynthesis.

They lived in colonies we call stromatolites which used the CO<sub>2</sub> to build structures and released free oxygen (O<sub>2</sub>) as a waste product (poisonous to archaic non-aerobic {anaerobic} bacteria). Over the next billion years oxygen was released into seawater initially causing the formation of banded ironstones (i.e. iron ore), and thereafter there was enough free oxygen to enter the atmosphere and create the atmosphere we breathe today (i.e. 78% nitrogen, 21% oxygen and traces of other gases).

A few living stromatolite colonies still exist today e.g. Shark Bay in NW Australia.



2,5-Billion-year-old Stromatolites which formed these structures releasing oxygen into seawater. (Sterkfontein dolomites)



2,3-Billion-year-old Banded Ironstone with iron oxide (rust) – this is typical of the iron-ore mined at Sishen and Thabazimbi.

22. Early simple lifeforms created the atmosphere that was breathed by later complex lifeforms – including humans. Sunlight is polychromatic consisting of a spectrum of colours. Human beings perceive sunlight as trichromatic consisting of THREE primary colours (RED; GREEN; BLUE). **Only two of these colours are used to energise two stages of the chemical reaction called photosynthesis.**

These are ...

- A. RED & BLUE but not GREEN.
- B. RED & GREEN but not BLUE.
- C. GREEN & BLUE but not RED.
- D. ALL THREE colours are used.

23: **Apart from Green Plants, what other lifeforms listed below use sunlight to energise photosynthesis?**

- A. Fungi e.g. white mushrooms.
- B. Phytoplankton.
- C. Fish.
- D. Mammals.

**Background:** In the predator/prey relationship, predators like lions, leopards and tigers make use of camouflage when stalking their prey. However, a tiger has very distinctive orange coloured fur and black stripes. See illustration below left. This makes the tiger clearly visible to most humans because most of us are not colour-blind. The illustration below right shows the scene as viewed by the colour-blind prey – it is clearly less visible here.

N.B. The ability to perceive colours depends on cone-shaped photoreceptors in the eye. The ability to see well into the dark depends on rod-shaped photoreceptors in the eye.

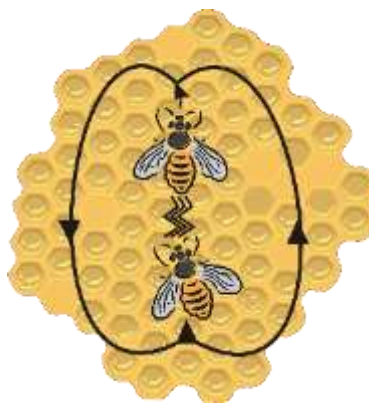


24. **How do we humans know that these animals are colour-blind?**

- A. People who are not colour-blind have both types of photoreceptors in their eyes.
- B. People who are colour-blind have fewer cone-shaped photoreceptors in their eyes.
- C. Animals like cats and dogs have rods, but no cone-shaped photoreceptors in their eyes.
- D. Insects like bees and butterflies can see more colours (even ultraviolet) than humans.

25. **What “waggle-dance” activity of honeybees is illustrated in the accompanying diagram?**

- A. A drone mating with the queen.
- B. A worker communicating information on a food source.
- C. A worker building a honeycomb.
- D. A drone fighting for the right to mate.



26. **The duties of the workers in a swarm of bees do NOT include...**

- A. Cleaning the hive.
- B. Defending the hive against invaders.
- C. Ventilating the hive to keep it at an optimum temperature.
- D. Mating with the queen.

27. **Sensory messages are taken to the brain by...**

- A. arteries and veins
- B. arteries and hormones
- C. nerves and hormones
- D. muscles and veins

28. The picture shows a “spider-hunting wasp which has stung a tarantula and paralysed its victim. It has laid an egg on the abdomen of the spider. Why does the wasp do this?



- A. This will provide the wasp larva with a source of fresh food when it hatches.
- B. So that the wasp larva will be able to use the spider’s poison for its stinger.
- C. This is a symbiotic behaviour which benefits both the wasp and the spider.
- D. Wasp larvae eat the fresh spiders alive.

29. Which one of the following characteristics is most likely to be found in predators that prey on other mammals for food?

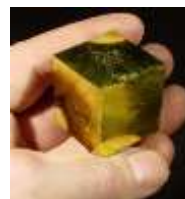
- A. Teeth that are ideal for chewing tough vegetation.
- B. Eyes that are forward facing giving binocular vision.
- C. Hooves on the feet.
- D. Ears that cannot move.

30. A male turkey puts on a display in order to...



- A. Attract the farmer to beg for food.
- B. Show off and impress females for mating.
- C. Dry his feathers after a rainstorm.
- D. Trap air between the feathers and his body in order to stay warm in winter.

31. You are asked to determine the value of a golden-coloured cube handed to you.



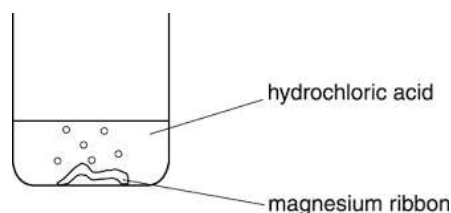
You measure the cube and find that it is 2 cm on each side, and weighs 40 g. In a mineral table, you find the following information:

	PYRITE (FOOL'S GOLD)	GOLD
DENSITY (g/cm <sup>3</sup> )	5	19,3
PRICE PER GRAM	R 5.50	R 1 070

Your calculations will show that:

- A. The cube is gold with a value of R 42 800
- B. The cube is pyrite with a value of R 220
- C. The cube is gold with a value of R 21 400
- D. The cube consists of a mixture of gold and pyrite

32. A learner investigated how the length of the magnesium ribbon would affect the amount of hydrogen gas produced when reacted with hydrochloric acid. She thought that a longer piece would release more hydrogen gas. She carried out an experiment to investigate her hypothesis.



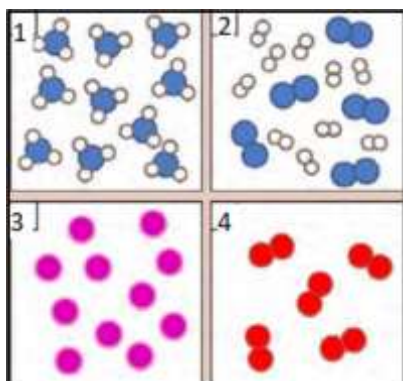
Which ONE of the following is CORRECT regarding the variables for the investigation?

	DEPENDENT VARIABLE	INDEPENDENT VARIABLE	CONTROL VARIABLE
A	Length of the magnesium ribbon	Concentration of hydrochloric acid	Volume of hydrogen gas
B	Volume of hydrogen gas	Concentration of hydrochloric acid	Length of the magnesium ribbon
C	Length of the magnesium ribbon	Volume of hydrogen gas	Concentration of hydrochloric acid
D	Volume of hydrogen gas	Length of the magnesium ribbon	Concentration of hydrochloric acid

33. Study the following equations and indicate the correct balanced equation.

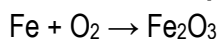
- A  $2\text{Na} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2\text{O}$
- B  $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- C  $\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
- D  $2\text{Na} + \text{H}_2\text{O} \rightarrow 2\text{NaOH} + 2\text{H}_2$

34. Each of the four blocks below (labelled 1 to 4) contain some matter. You must answer the following question using the blocks in the diagram.

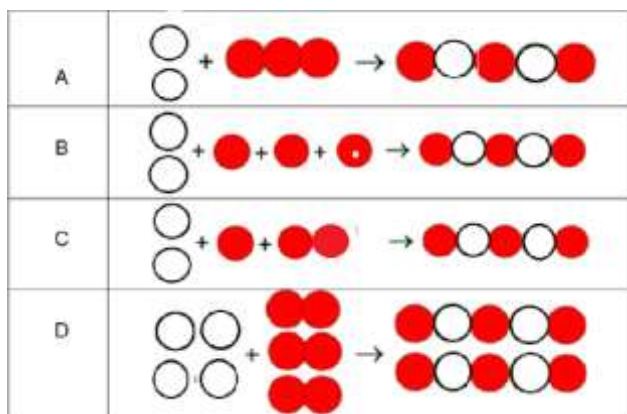


	Which blocks represents the particles of an element or elements?	Which blocks represents the particles in a compound?	Which blocks represents the particles in a mixture?
A	3	1 & 2	2
B	3	1	2
C	2, 3 & 4	1	2
D	2, 3 & 4	1	1 & 2

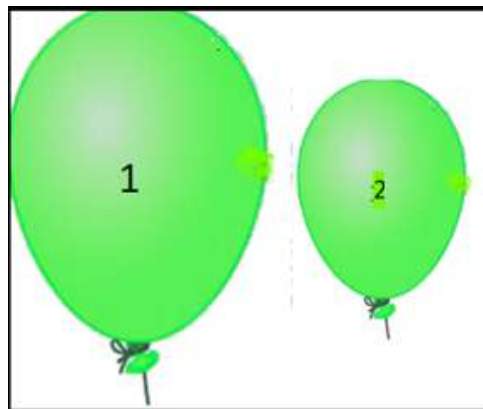
35. Iron rusts when it reacts with oxygen according to the following UNBALANCED equation.



Which of the following illustrates the correct way in which the particles will react?



36. The two identical balloons numbered 1 and 2 illustrated below were both filled with 1,5 g oxygen gas. Balloon 1 was further inflated by adding Helium gas to it until the volume increased to double that of balloon 2.



Which of the following statements is correct?

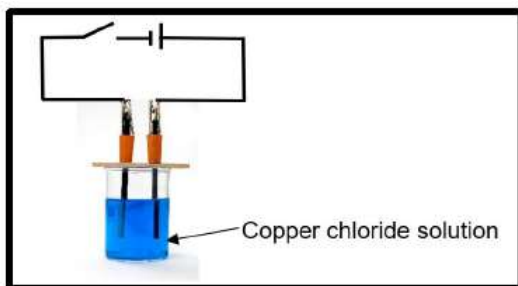
- I Balloon 1 contains more oxygen particles than balloon 2
  - II The pressure in balloon 1 is more than the pressure in balloon 2
  - III The oxygen particles in balloon 1 is further apart than in balloon 2
- A. I and II is correct.
  - B. I and III is correct
  - C. II and III is correct
  - D. I, II and III is correct

37. Water is different from other substances because it is ...

- A. more dense as a solid than as a liquid.
- B. less dense as a solid than as a liquid.
- C. more dense as a solid than as a gas.
- D. less dense as a solid than as a gas.



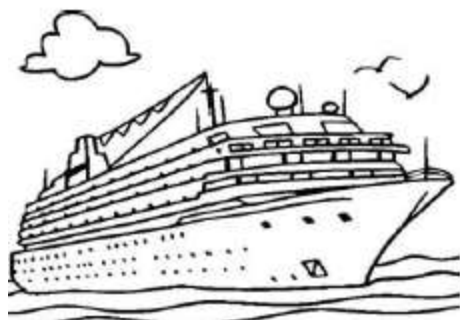
38. Electrolysis is used to decompose copper chloride. When the switch is closed the colour of the solution becomes lighter.



Which of the following statements is correct?

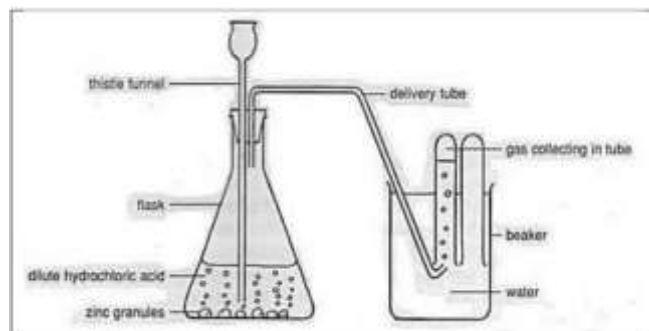
- I Electrical energy is converted to chemical energy
  - II Copper will form at the negative electrode called the anode
  - III Bubbles will be released at the positive electrode
- A. I and II is correct
  - B. I and III is correct
  - C. II and III is correct
  - D. I, II and III is correct

39. A boat floats in water because ...



- A. The air that is inside a boat is much less dense than water
- B. The metal the boat is made of has a lower density than water
- C. The water displaced by the boat is heavier than the boat itself
- D. The surface area of the boat that is in contact with the water is very big

USE THE FOLLOWING APPARATUS SETUP TO ANSWER QUESTIONS 40 TO 41.



40. A gas is released during the experiment. The following test is used to confirm the presence of this gas:

- A. A glowing wooden splint re-light
- B. A burning wooden splint produces a popping sound
- C. Clear lime water turns white (murky)
- D. Turns litmus paper white

41. Which of the following changes to the experiment will not speed up the reaction?

- A. Heating up the mixture
- B. Increase the volume of the dilute hydrochloric acid in the flask
- C. Use concentrated hydrochloric acid
- D. Grinding the zinc granules into powder before you add it in the flask

42. The following are common uses of certain elements on the periodic table.

- I The only metal that is in liquid form at room temperature and used inside thermometers.
- II Used to purify water
- III Found in table salt
- IV Used as a gas to fill light bulbs
- V Used to generate electricity

Which one of the following shows the elements in the correct order to match the uses above?

- A. Silver, chlorine, sodium, argon, carbon
- B. Mercury, chlorine, sodium, argon, uranium
- C. Silver, sodium, chlorine, argon, carbon
- D. Mercury, chlorine, sodium, oxygen, uranium

43. Which type of fire can be safely extinguished with water?

- A. Fire caused by oil
- B. Fire caused by petrol
- C. Fire caused by electrical equipment
- D. Fire caused by wood

44. Study the information given in the table.

Organic Compound	Melting Point (°C)	Boiling Point (°C)
Methane	-182.5	-161.5
Ethanol	-114.1	78.3
Acetone	-94.8	56.5
Butane	-138.3	-0.5
Benzene	5.5	80.1

Which of these organic compounds will be a liquid at room temperature?

- A. Methane and butane
- B. Ethanol, acetone and benzene
- C. Benzene
- D. None of the compounds

45. A learner wants to retrieve ...

- I iron filings from a mixture of iron and copper filings
- II salt from sea water
- III pure alcohol from a mixture of alcohol and water
- IV red ink from black ink

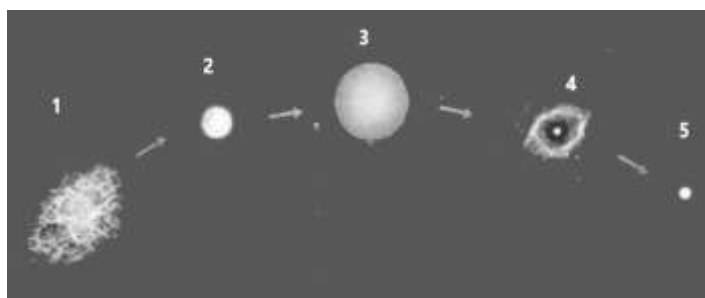
What would the best separation techniques be to separate the mixtures in the order they are listed above?

- A. Hand-sorting, filtration, evaporation, distillation
- B. Magnetism, evaporation, distillation, chromatography
- C. Sieving, filtration, evaporation, chromatography
- D. Magnetism, evaporation, filtration, distillation

46. Which one of the following astronomical developments were published by Sir Isaac Newton in 1687?

- A. The sun is at the centre of the universe
- B. Use of mathematics to describe orbits accurately
- C. Showed that gravity held the Solar System together
- D. Made the first telescope to observe planets

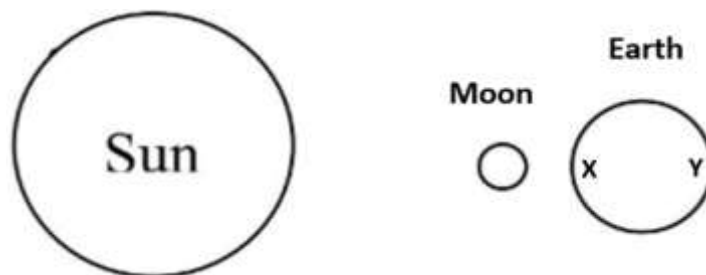
47. The following diagram illustrates the evolution of a star:



Which one of the following is the correct order of the stages depicted in the diagram?

	1	2	3	4	5
A	Clouds of gas and dust called nebulae	White dwarf	Red giant	Expanding cloud called a planetary nebula	Hydrogen changes into Helium
B	Clouds of gas and dust called nebulae	Hydrogen changes into Helium	Red giant	Expanding cloud called a planetary nebula	White dwarf
C	Expanding cloud called a planetary nebula	Hydrogen changes into Helium	Red giant	Clouds of gas and dust called nebulae	Black dwarf
D	Expanding cloud called a planetary nebula	Black dwarf	Red giant	Clouds of gas and dust called nebulae	Hydrogen changes into Helium

48. The following illustration shows the moon in a position between the sun and the earth. X and Y are positions on opposite sides of the earth.



Which ONE of the following statements regarding the experience of people situated at positions X and Y is correct?

**12<sup>th</sup> NATURAL SCIENCE OLYMPIAD**  
**GRADES 7 - 9**

	X	Y
A	Observe New Moon High tide	Observe New Moon High tide
B	Observe New Moon High tide	Observe New Moon Low tide
C	Observe Full Moon High tide	Observe New Moon High tide
D	Observe Full Moon High tide	Observe Full Moon Low tide

49. **Global Positioning Systems (GPS) technology was primarily developed by two people: Albert Einstein, whose theories of special and general relativity both play an important role, and Gladys West, a still-living and largely unheralded black woman whose scientific contributions enabled us to understand geodesy and the shape of the Earth well enough to make GPS technology possible.**



**Which ONE of the following is NOT an advantage of GPS?**

- A. monitoring movement of an object
- B. creating maps of the world
- C. navigating from one location to another
- D. can penetrate solid walls and structures

**READ THE FOLLOWING PARAGRAPH AND ANSWER QUESTIONS 50 TO 52.**

Airlander, the new airship of the 21st century, can carry heavier loads farther and cheaper than helicopters can, with lower emissions than fixed-wing aircraft—potentially zero emissions, if the airships are powered by hydrogen fuel cells. Although hydrogen is used to propel the ship forward, Helium is now used as lifting gas in place of the reactive hydrogen to fill the huge body of the ship to prevent explosions.

50. **Which of the following is the correct overall reaction of a hydrogen-oxygen fuel cell?**



- A.  $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
  - B.  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
  - C.  $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$
  - D.  $\text{O}_2 + 2\text{H}_2\text{O} \rightarrow 4\text{OH}^-$
51. **Which one of the following is the main reason that hydrogen gas was replaced by helium gas?**
- A. Helium is cheaper than hydrogen
  - B. Helium is lighter than hydrogen
  - C. Helium is less reactive than hydrogen
  - D. Helium is more abundant than hydrogen
52. **Which of the following is true for helium gas?**
- A. It is lighter than hydrogen gas
  - B. It has the same mass as hydrogen gas
  - C. It is twice as heavy as hydrogen gas
  - D. It is 4 times heavier than hydrogen gas
53. **In which of the following layers of the earth do earthquakes originate?**
- A. Crust
  - B. Mantle
  - C. Outer core
  - D. Inner core

54. Indigenous farmers used the constellation below to mark the beginning of the planting season. According to Sotho, Tswana and Venda traditions, these stars were called *Dithutlwa*, meaning "The Giraffes".



This group of stars can also be used to determine South and is named the ...

- A. Orion
- B. Seven Sisters
- C. Southern Cross
- D. Libra

55. In South Africa, 133 parabolic dishes will be added to the existing 64 of the SKA-precursor telescope MeerKAT to form a mid-frequency instrument, shortened as "SKA-Mid". Once completed (as planned for 2024), it will consist of 197 fully-steerable dishes covering a collection area of 33,000m<sup>2</sup>.

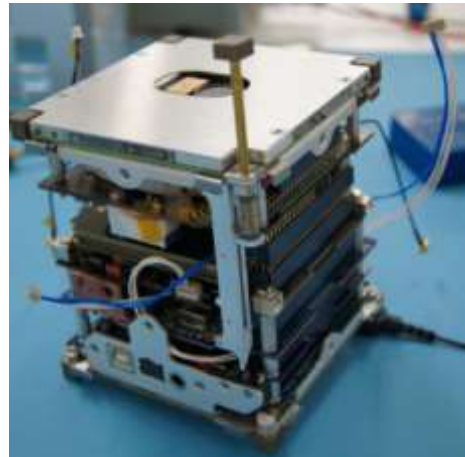


The SKA is a ...

- A. radio telescope situated outside Carnarvon in the Karoo
- B. radio telescope situated near Sutherland in the Karoo
- C. optical telescope situated outside Carnarvon in the Karoo
- D. optical telescope situated near Sutherland in the Karoo

56. Cape Peninsula University of Technology (CPUT) made history with the launch on 21 November 2013 of South Africa's first CubeSat, a type of nanosatellite, ZACUBE-1.

Running on the same amount of power as a 5-Watt bulb, ZACUBE-1 orbited Earth 15 times a day and its main mission was to gather data on space weather for South African National Space Agency (SANSA).



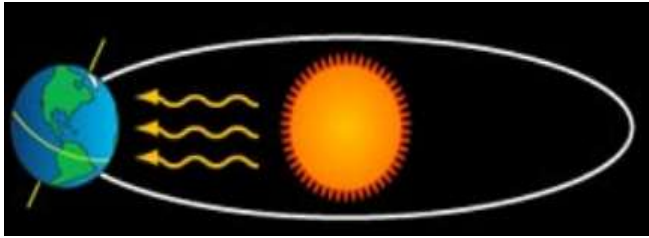
What was the time period of ZACUBE-1 to orbit the earth?

- A. 2 hours 45 minutes
- B. 1 hour 36 minutes
- C. 24 hours
- D. once a year

57. Which of the following statements is true for an object regarding the force of gravity and mass it will experience on Earth versus the Moon?

- A. The force of gravity and mass is greater on Earth than on the Moon.
- B. The force of gravity and mass is greater on the Moon than on Earth.
- C. The force of gravity is smaller on Earth than on the Moon, and mass is the same.
- D. The force of gravity is greater on Earth than on the Moon, and mass is the same.

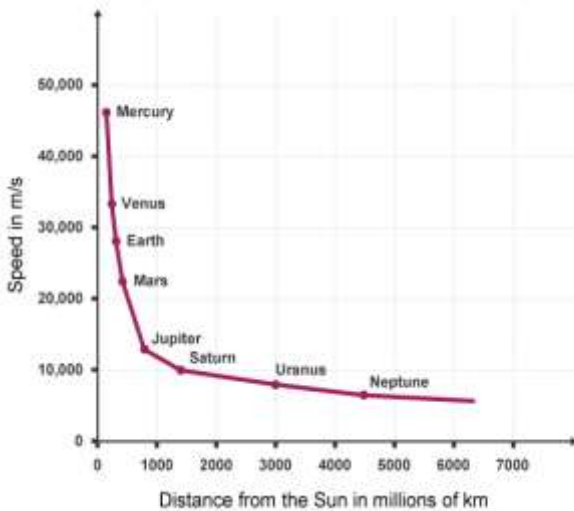
58. The sketch shows the position of earth in relation to the sun. The Northern hemisphere is tilted towards the sun.



Which of the following is most correct?

- A. South Africa experience winter because it is further from the sun
- B. South Africa experience winter because it does not receive direct sunlight
- C. South Africa experience summer because it is nearer to the sun
- D. South Africa experience summer because it receives direct sunlight

59. Which of the following is a correct assumption made from the graph below?



- A. Mercury is the nearest to the sun and travels the fastest
- B. Mercury is the nearest to the sun and travels the slowest
- C. Mercury is the furthest from the sun and travels the slowest
- D. Mercury is the furthest from the sun and travels the fastest

60. The diagram illustrates the rotation of the sun, earth and moon. The orbital paths of the Earth and Moon are also shown.



Which of the following indicates the correct revolution and rotational times?

	Earth around the sun	Moon around the earth	Earth around its axis
A	28 days	28 days	365 days
B	28 days	24 hours	365 days
C	365 days	28 days	24 hours
D	365 days	24 hours	28 days

The end

**12<sup>th</sup> NATURAL SCIENCE OLYMPIAD**  
**GRADES 7 - 9**

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