



**SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT  
13<sup>th</sup> NATURAL SCIENCE OLYMPIAD 2024**

**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.

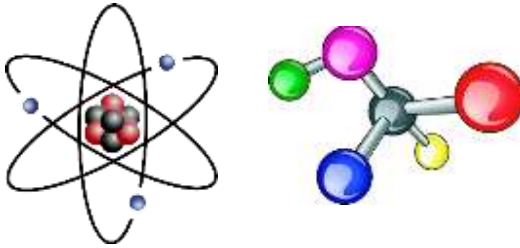
**To avoid disqualification** - You are required to complete **all** the information requested on the answer sheet. Please complete the information in script, as well as shade the corresponding blocks. If the corresponding blocks are not shaded appropriately, your results will be returned without a name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

Two hours are allowed to answer the questions

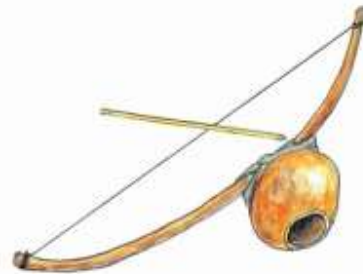
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1. What is the smallest unit of matter?

- A) Atom
- B) Molecule
- C) Cell
- D) Organism



2. This is a picture of an indigenous musical instrument used in Africa. It has a bent bow and a playing stick. It also has a calabash attached to the wooden bow.



**What is the purpose of the calabash?**

- A) It raises the pitch of the sound produced.
- B) It gives the musician a handle to hold.
- C) It amplifies the sound i.e. It makes the music louder.
- D) It lowers the pitch of the sound produced.

3. Which life process is common to all living organisms?

- A) Reproduction
- B) Germinations
- C) Hunting for food
- D) Photosynthesis



4. The picture below is that of our moon. What makes the moon light up at night?



- A) It reflects the light of the Sun.
- B) It reflects the light coming from the Earth during the day.
- C) This photo is fake – we never see the Moon in daylight.
- D) This photo is impossible – half the Moon is missing.

5. How does an increase in the temperature affect the state of matter?

- A) It has no effect.
- B) It causes matter to solidify.
- C) It causes matter to freeze.
- D) It causes particles of matter to move faster.

6. When a taxi is driving, only some of the chemical energy released when the fuel burns in the engine is used to move the vehicle. What is the rest of the energy converted to?



- A) Electric energy to charge the battery
- B) It is wasted as heat energy
- C) Both A & B are true
- D) Both A & B are false

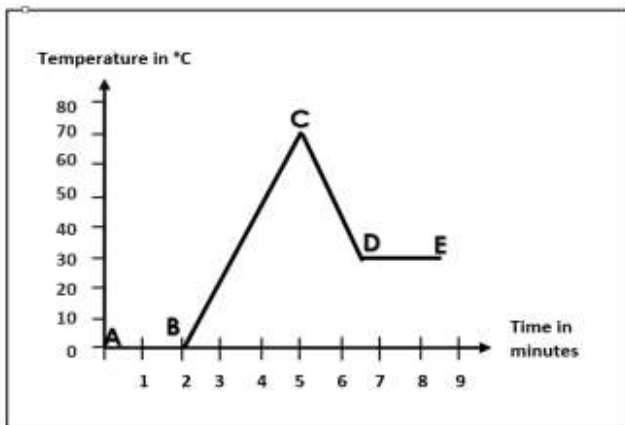
7. Which of the following is not a function of the skeletal system?

- A) Protecting internal organs.
- B) Providing support for the body.
- C) Producing red blood cells in bone marrow.
- D) Contracting to produce movement.

8. What is the huge Radio Telescope being built in the Northern Cape Province of South Africa called?



- A) SALT  
B) The Square Kilometre Array  
C) The Hubble Space Telescope  
D) The James Webb Space Telescope.
9. Kunene took some ice cubes from the freezer and put them in a container. He heated the ice cubes. After a while, the container was left to cool down in a room. The room temperature was 30°C. He plotted a graph to show the changes in the temperature of the content over time as shown in the diagram below.



Between which two points on the graph did the cooling of hot water to room temperature occur?

- A) AB  
B) BC  
C) CD  
D) DE

10. Which one of the following groups of energy sources are ALL forms of renewable energy?



- A) Solar, wind and natural gas  
B) Wave, tidal and coal  
C) Diesel, solar and wind  
D) Wind, solar and wave
11. Which one the following processes best describes the life cycle of a butterfly?
- A) Changing  
B) Evolving  
C) Dependant  
D) Metamorphosis

12. Palaeontologists found evidence that birds evolved from dinosaurs because they discovered fossils which show that ...



- A) some dinosaurs had feathers.  
B) some dinosaurs could fly  
C) some dinosaurs had beaks.  
D) some dinosaurs had claws.
13. Which of the following is an example of a chemical change?
- A) Melting ice  
B) Boiling water  
C) Burning wood  
D) Cutting paper
14. What type of power station is mainly responsible for climate change?
- A) A nuclear power station like Koeberg Power Station.  
B) A pumped-storage power station like Drakensberg Pumped Storage Scheme.  
C) A coal-fired power station like Kusile Power Station.  
D) A hydroelectric power station like Gariep Hydro Power Station.
15. What is the process of photosynthesis?
- A) Process called Respiration  
B) Process called Transpiration  
C) Conversion of light energy into chemical energy  
D) Conversion of chemical energy into light energy

16. The photograph below was taken in the Sahara Desert near Cairo, 60 km from the Mediterranean coast. It shows a fossilised skeleton of a whale that died about 40 000 years ago.



How is it possible for a whale skeleton to be found so far from the sea? Choose the best solution below to answer this question.

- A) Sea-levels were lower during an ice-age at that time.  
B) Sea-levels were higher after the end of an ice-age at that time.  
C) Dinosaurs had dragged the whale carcass far inland.  
D) None of the above.

17. Compare and contrast the properties of metals and non-metals.



Sulphur

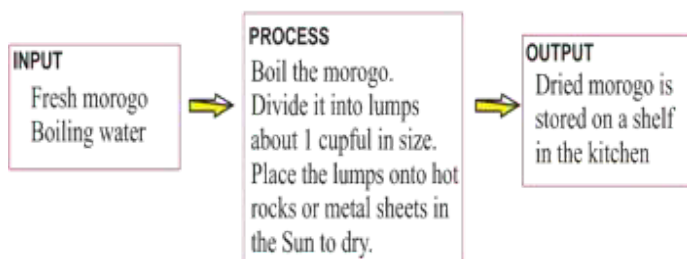


Carbon

- A) Metals are malleable, non-metals are not.
- B) Metals are good conductors of heat and electricity.
- C) Metals are shiny, non-metals are not.
- D) All the above

18. This is a Systems Diagram detailing the processing of Morogo (wild spinach) in South Africa:

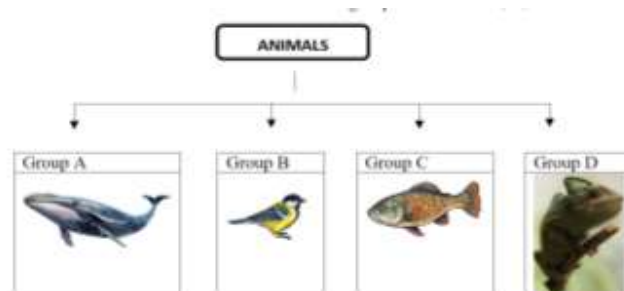
**SYSTEMS DIAGRAM**



One *disadvantage* of drying Morogo in this way could be that...

- A) the food is preserved naturally without refrigeration.
- B) the process does not require any electricity.
- C) rainy weather can ruin the product.
- D) the dried Morogo can easily be rehydrated and cooked.

19. The classification chart below shows four different groups of animals: A, B, C and D.



If animal X has hair on the body, in which group would you classify it?

- A) Group A
- B) Group B
- C) Group C
- D) Group D

20. Large Dinosaurs became extinct...



- A) 230 million years ago
- B) 195 million years ago
- C) 141 million years ago
- D) 66 million years ago

21. Which one of the following best explains why oil floats on water?



- A) Oil is less dense than water.
- B) Oil and water have similar polarities.
- C) Oil is denser than water.
- D) Water serves as a solvent for oil.

22. A house is normally wired using parallel circuits. The most important reason for this is that...

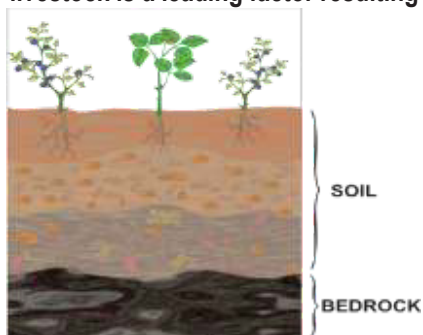
- A) during loadshedding there is less likely to be damage done to electrical appliances.
- B) this ensures that the voltage is the same (230V) throughout the whole house.
- C) this ensures that the same current flows through every part of the circuit.
- D) this is false – houses are wired in series.



23. Urban expansion leads to destruction of habitats resulting in:

- A) increased competition amongst remaining species.
- B) loss of pollination services offered by insects.
- C) decrease in overall population numbers across affected areas.
- D) All of the above

24. Topsoil is a valuable resource. Overgrazing by livestock is a leading factor resulting in...



- A) contamination of ground water sources
- B) increased pollution
- C) soil Erosion
- D) all of the above

25. We can describe water as follows: It can flow and it takes the shape of the container. When classifying substances based on their properties, which category would you place iron filings into?



- A) Solid
- B) Liquid
- C) Gas
- D) Plasma

Consider the data given in the table below. Answer questions 26 and 27.

	Average Surface Temperature	Composition of the Atmosphere	Average Distance from the Sun	Days needed to orbit the Sun
Mercury	300°C	None	58 000 000 km	88 days
Venus	470°C	Mostly Carbon Dioxide	108 000 000 km	225 days
Earth	17°C	78% Nitrogen and 21% Oxygen with 0.3% Carbon Dioxide	150 000 000 km	365 ¼ days

26. Which one of the following reasons correctly explains why Venus is hotter than Mercury?

- A) Mercury absorbs less sunshine because it lacks an atmosphere.
- B) The large amount of CO<sub>2</sub> in the atmosphere of Venus creates a 'greenhouse effect.'
- C) The longer time Venus uses to orbit the Sun causes it to heat up more.
- D) Mercury has a rocky surface, which reflects most of the Sun's heat away.

27. Look at the table again. Mercury and Venus do not support life. What special attributes does Earth have that allows the existence of millions of different species of life?

- A) Earth is at an ideal distance from the Sun called the habitable zone.
- B) Surface temperature averages 17°C, which is in the range that allows liquid water to exist.
- C) The concentration of oxygen is high enough to support complex forms of life.
- D) ALL of the above are necessary for the known forms of life.

28. What was the main medium for representing and transmitting indigenous knowledge in South Africa?

- A) Oral traditions
- B) Visual arts
- C) Practical activities
- D) Written language

29. Which one of the following four major planets is described as rocky?



This photograph shows rocks on the surface of Mars.

- A) Saturn
- B) Venus
- C) Neptune
- D) Jupiter

30. Study the following items carefully.

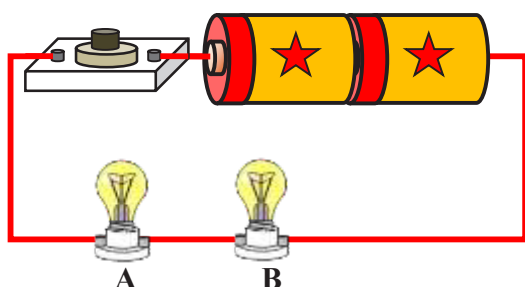


Materials used to make the items above, should be \_\_\_\_\_.

1. flexible
2. waterproof
3. able to sink in water

- A) 3 only
- B) 1 & 2 only
- C) 2 & 3 only
- D) 1, 2 & 3

31. The picture shows a simple electric circuit with 2 cells in series, a switch and two identical lamps (A & B) connected in series. The direct current flows anticlockwise. Which one of the following statements is correct?



- A) Lamp A is brighter than Lamp B.
- B) Lamp B is brighter than Lamp A.
- C) Both Lamps are equally bright.
- D) Lamp A will be brighter if the lamps were connected in parallel.

32. What is the function of a flower in a plant?



- A) Water absorption
- B) Reproduction
- C) Food production
- D) Anchor the plant in the ground

33. Galileo designed and built a telescope in 1610 and discovered that Jupiter has moons orbiting around it. How many moons did Galileo identify around Jupiter?

- A) 95
- B) 9
- C) 61
- D) 4

34. Stephen has two bags, each containing 200 g of ice. Each bag is made up of 200g of water. The two bags are of the same material and size. Bag P contains one large block of ice while bag Q contains many small blocks of ice.



Bag P

Bag Q

Which of the following observations will Stephen make at the end of the experiment and the correct explanation for it?

	OBSERVATION	EXPLANATION
A	The ice cubes in Bag Q will melt completely in a shorter period of time than the large block of ice in Bag P	The ice cubes have a larger exposed surface area compared to the large block of ice.
B	The large block of ice in Bag P will melt completely in a shorter period of time than the cubes in Bag Q	The large block of ice has larger exposed surface area compared to the ice cubes.
C	The ice cubes in Bag Q will melt completely in a shorter period of time than the larger block of ice in Bag P.	The temperature of the surrounding air is higher than the temperature in the plastic bag.
D	The large block of ice in Bag P will melt completely in a shorter period of time than the cubes in Bag Q.	The temperature of the surrounding air is higher than the temperature in the plastic bag.

35. A San hunter needs to shoot an impala to feed his family. What energy changes will occur when he shoots the arrow?



- A) Kinetic energy stored in the bow is transferred to the arrow.  
B) Potential energy in the bow becomes kinetic energy in the arrow.  
C) Kinetic energy in the arrow becomes heat energy in the impala.  
D) Heat energy in the arrow kills the impala.
36. Which marine organism is responsible for producing most of Earth's oxygen and plays a vital role in the marine food web?



- A) Coral  
B) Jellyfish  
C) Phytoplankton  
D) Sea turtle
37. The Moon appears to change shape, steadily waxing and waning during a monthly cycle. The best explanation for this series of shape changes (called phases) is...

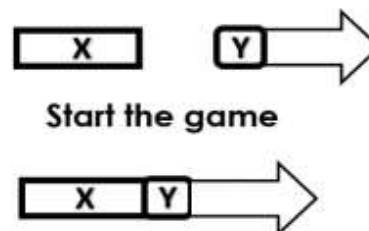


- A) The Moon turns on its axis once a month.  
B) The Moon orbits the Earth once a month.  
C) The Earth orbits the Sun once a year.  
D) Clouds cover part of the Moon.

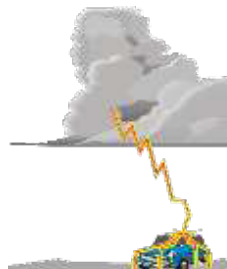
38. Jabu and Sethu played a game as shown in the diagram. The aim of the game is to make use of object X to pick up object Y. Object Y is attached to a paper arrow, shown below the diagram.

Which of the following could represent X and Y?

	Object X	Object Y
A	Magnet	Aluminum block
B	Plastic block	Magnet
C	Magnet	Iron block



- A) A only  
B) C only  
C) B and C only  
D) A, B and C
39. The reason the occupants of a car will be safe from lightning strike is because...

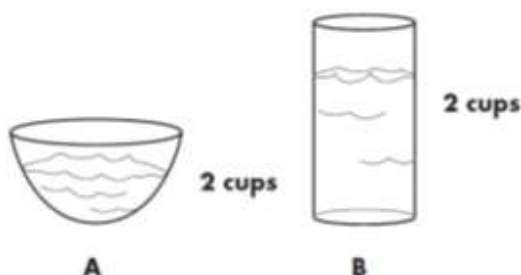


- A) it has rubber tyres.  
B) the metal body conducts the electricity around the car.  
C) the electric charge of lightning is very small.  
D) this is incorrect – they are NOT safe at all.
40. Which of the following was established to document the global conservation status and extinction risk of species of animals and plants?

- A) Ecosystem data book  
B) Green data book  
C) Red data book  
D) Biodiversity data book



41. Each of the open containers shown in the figure below, contains two cups of water.

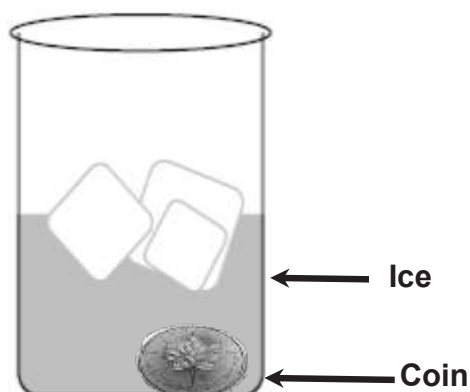


Containers A and B each containing 2 cups of water.

Predict what will happen to the amount of water after two days have passed.

- A) The same amount of water will be left in both cups.
  - B) B will contain more water.
  - C) A will contain more water.
  - D) Both cups will still contain two cups of water.
42. Five (5) grams of baking soda and 20 grams of vinegar are added together. A bubbling reaction takes place. When the reaction is over, the solution weighs 24 grams. **How can this difference in mass be explained?**
- A) A gas has formed and escaped from the solution.
  - B) The vinegar has evaporated.
  - C) The molecules in the new solution is packed more densely.
  - D) Baking soda is lighter when dissolved in vinegar.
43. Which element on the Periodic Table is represented by the symbol Sn?
- A) Titanium
  - B) Silver
  - C) Silicon
  - D) Tin

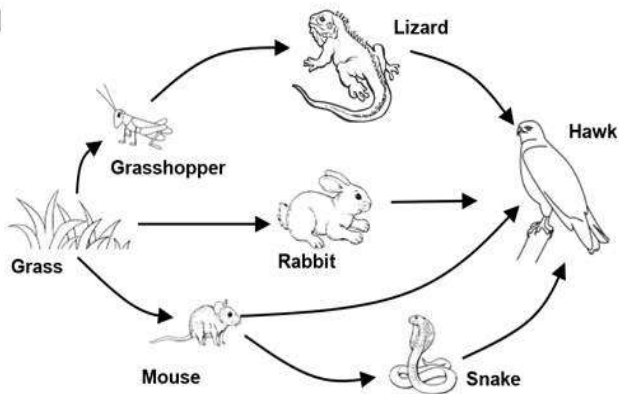
44. It is observed that a coin put in a glass beaker filled with water sinks to the bottom of the beaker. Ice cubes, which are much bigger and much heavier than the coin floats when put in the beaker.



Choose the correct explanation for this observation.

- A) Heavy objects, which are large in size float easier than lighter objects, which are smaller in size.
  - B) Ice floats on water because it has a lower temperature and is denser than water.
  - C) Ice floats on water because it is less dense than water.
  - D) The coin has a sharp edge, which cuts through the water surface, which then allows it to sink to the bottom of the beaker.
45. The ice cubes in question 44 will float higher in the water if one of the following changes is made.
- A) Heat up the water slightly
  - B) Break the ice cubes into smaller pieces.
  - C) Lower the ice cubes very slowly into the beaker.
  - D) Dissolve a few tablespoons of salt in the water before placing the ice cubes in the water.
46. What is currently the farthest man-made object from Earth?
- A) Sputnik 1
  - B) Voyager 1
  - C) Voyager 2
  - D) Alpha capsule
47. Which legendary astronaut walked on the moon and later commanded the first space shuttle flight?
- A) Neil Armstrong
  - B) Mark Shuttleworth
  - C) John Young
  - D) Galileo Galilei
48. How long does it take the Moon to orbit the Earth?
- A) Approximately 28 years
  - B) Approximately 1 day
  - C) Approximately 1 year
  - D) Approximately 27 days
49. What would happen if the Earth suddenly started to move faster in its orbit around the Sun?
- A) A year on Earth will become longer.
  - B) Earth's distance from the Sun would decrease.
  - C) A year on Earth will become shorter.
  - D) Earth's gravity would decrease.
50. What is the length of the equatorial diameter of the Earth?
- A) 15 000 kilometers
  - B) 12 756 kilometers
  - C) 10 500 kilometers
  - D) 36 525 kilometers

51. Identify which one of the following organisms supplies energy to more than one organism in the food web.



- A) Lizard
- B) Mouse
- C) Grass
- D) Hawk

52. The main purpose of an adaptation like a mutation or genetic change is to ...

- A) help an organism to survive.
- B) get food.
- C) provide a habitat.
- D) change the animal's appearance.

53. A viceroy butterfly looks like the monarch butterfly. The monarch tastes terrible to birds, so birds do not eat a viceroy butterfly. This kind of adaptation is called ...?

- A) mimicry
- B) camouflage
- C) hibernation
- D) migration

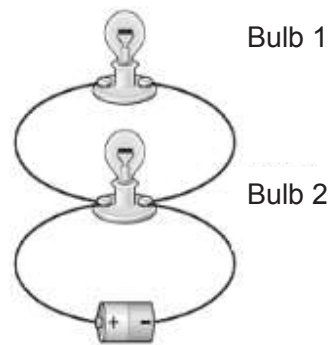
54. Which statement regarding muscles is true?

- A) Muscles in your brain help you think.
- B) Muscles help you digest food.
- C) All of your muscles are attached to bones.
- D) All of the above statements are true.

55. What is the only creature that can turn its stomach inside out?

- A) Starfish
- B) Earthworm
- C) Squid
- D) Octopus

56. Consider the circuit diagram and answer the question that follows:



- Which statement best describes what will happen if bulb 2 burns out?

- A) Bulb 1 will also burn out.
- B) Bulb 1 will flash on and off.
- C) Bulb 1 will stay lit.
- D) The current will stop flowing.

57. Students made an electromagnet by wrapping a piece of insulated wire in loops around an iron nail and attaching the wire to a cell as shown in the figure below.



**An Electromagnet**

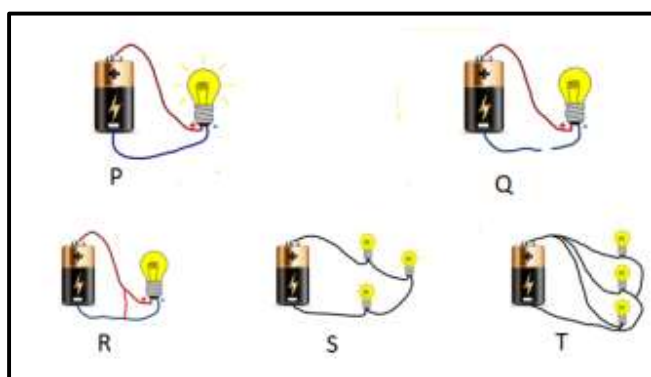
The students then conducted an experiment to learn how the number of wire loops affected the number of paper clips that can be picked up by the electromagnet. The table below shows the results of the experiment.

Number of wire loops	Number of paper clips picked up by the electromagnet
5	1
15	3
25	5
40	9

Based on the results in the table, which of the following is the best conclusion that can be made from the student's experiment?

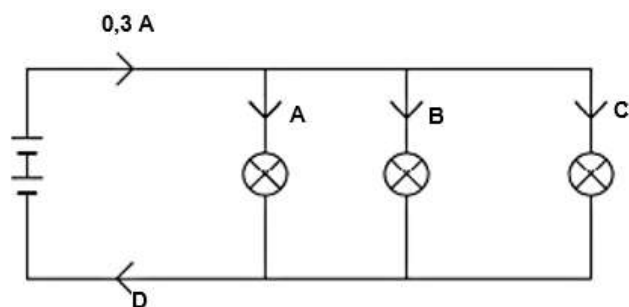
- A) Adding more wire loops makes an electromagnet weaker.
- B) Adding more wire loops makes an electromagnet stronger.
- C) Adding more wire loops makes an electromagnet use more electricity.
- D) Adding more wire loops makes an electromagnet use less electricity.

58. Consider the circuit diagrams shown below. In which circuit will the electric current flow but the bulb(s) will not produce light?



- A) Circuit S
- B) Circuit R and T
- C) Circuit R
- D) Circuits Q and R

Study the diagram below and answer QUESTIONS 59 AND 60: You can assume that all the bulbs in the circuit diagram are identical.



Choose the position in the circuit where the current will be 0,1 A.

- A) At A only.
- B) At A and B only.
- C) At A, B, and C.
- D) At D only.

60. What will happen to the current flowing through bulb B and the brightness of bulb A if bulb C burns out?

- A) The current flowing through bulb B will remain the same. The brightness of bulb A will remain the same.
- B) The current flowing through bulb B will increase. The brightness of bulb A will remain the same.
- C) The current flowing through bulb B will decrease. The brightness of bulb A will remain the same.
- D) The current flowing through bulb B will remain the same. The brightness of bulb A will increase.

**The End**

