



SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT

9th NATURAL SCIENCE OLYMPIAD EXAM

GRADES 4 – 6

2019

INSTRUCTIONS

Please read the instructions carefully before answering the questions

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.

Three hours are allowed to answer the questions

1. In which hospital in South Africa did Dr Christiaan Barnard first successfully performed a human heart transplant?

- A Charlotte Maxeke Academic Hospital in Johannesburg.
- B Groote Schuur Hospital in Cape Town.
- C Chris Hani Baragwanath Hospital.
- D Nelson Mandela Academic Hospital.

2. Cholera is caused by?

- A Not exercising regularly.
- B Not eating food containing Vitamin C.
- C Polluted water.
- D Eating a lot of sugar.

3. Which body system is responsible for detecting environmental changes?

- A Respiratory system
- B Nervous system
- C Excretory system
- D Circulatory system

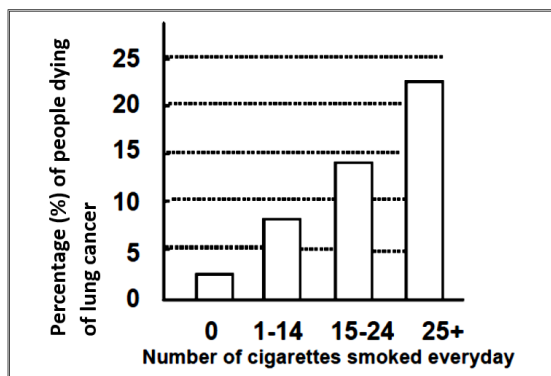
4. Which one of the following human senses develops first?

- A Hearing
- B Sight
- C Smell
- D Touch

5. Which is the hardest working muscle in the human body?

- A. The leg
- B. The foot
- C. The heart
- D. The brain

6. The graph below shows the relationship between the number of cigarettes smoked per day and the percentage of people dying from lung cancer.



Consider the graph and decide which one of the following statements is true.

- A 25% of people who smoke more than 25 cigarettes per day, will die of lung cancer.
- B All people who smoke will die of lung cancer.
- C Less than 15% of people who smoke 15 – 24 cigarettes per day will die from lung cancer.
- D You will not get lung cancer if you don't smoke.

7. Which one of the following statements is true based on the graph in question 6?

- A Smoking reduces the chances of a person to die from lung cancer.
- B Lung cancer is caused by smoking only.
- C Smoking increases a person's chances of dying from lung cancer.
- D You will not get lung cancer if you don't smoke.

8. What part of the body does a butterfly taste with?

- A Feet
- B Ears
- C Mouth
- D Eyes

9. What mammal has the world's longest tongue?

- A A rabbit
- B A horse
- C A giraffe
- D A blue whale

10. This small child with the swollen stomach and skinny legs is suffering from a lack of protein in his diet. A build-up of fluid in the body causes the stomach to swell.



The disease suffered by the child is called ...

- A Kwashiorkor
- B Obesity
- C Cancer
- D Smallpox

11. Food passes through the digestive system in the following order:

- A. Mouth, stomach, oesophagus, small intestine, large intestine
- B. Mouth, small intestine, large intestine, oesophagus, stomach
- C. Mouth, oesophagus, stomach, large intestine, small intestine
- D. Mouth, oesophagus, stomach, small intestine, large intestine

12. What is the correct order for the levels of classification of animals?

- A. class, kingdom, order, phylum, genus, species, family
- B. kingdom, phylum, class, order, family, genus, species
- C. kingdom, phylum, species, family, genus, order, class
- D. class, order, family, kingdom, genus, species, phylum

13. 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.

14. Apart from the two colours, black and white, which is the third colour that new born babies can see?

- A Grey
- B Yellow
- C Green
- D Red

15. 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

16. A dog's sweat glands are located around its ...

- A nose and ears.
- B paws and eyes.
- C nose and paws.
- D ears and paws.

17. An adaptation that allows animals to blend in with certain aspects of their environment.

- A mimicry
- B camouflage
- C behaviour
- D copying

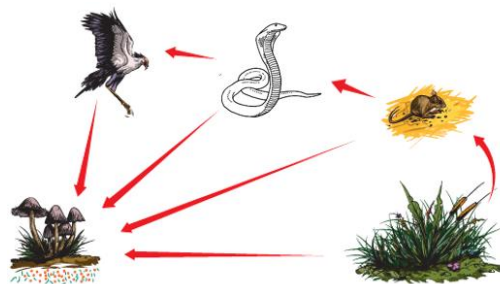
18. What is the only creature that can turn its stomach inside out?

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

19. In an ecosystem, birds depend on insects to survive. If pesticides are used to control the insect population, the bird population will most likely ...

- A increase.
- B decrease.
- C decrease, then increase.
- D increase, then decrease

20. Use the following diagram of a food chain and identify a secondary consumer.



- A Mouse
- B Bird
- C Snake
- D Grass

21. Which one of the following statements is true when considering the information in the food chain in question 20?

- A The bird, snake, and mouse are all producers.
- B The bird, snake, and mouse are all consumers.
- C The mushrooms and the grass are both decomposers.
- D The mushrooms are producers, and the grass is a decomposer.

22. A _____ eats primary consumers.

- A producer
- B secondary consumer
- C decomposer
- D tertiary consumer

23. The only vitamin that is not found in an egg is

- A Vitamin D
- B Vitamin A
- C Vitamin C
- D Vitamin E

24. The average human tongue has approximately ___ taste buds.

- A 10
- B 100
- C 10,000
- D 10,000,000

25. At what age do we usually start to get permanent teeth?

- A Ninety-nine years
- B Sixteen years
- C Two months
- D Six years

26. Ants live in groups called ...



A group of ants

- A Packs
- B Herds
- C Colonies
- D Swarms

27. 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.

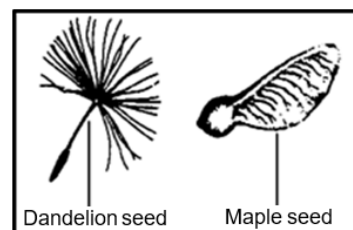
28. What is the most important reason why endangered species should be protected?

- A People pay a lot of money to visit zoos and see endangered animals.
- B Protecting endangered species removes pollution from the environment.
- C Endangered species are viewed as unique by the people in the community.
- D When any endangered species dies out, it affects other animals within the ecosystem.

29. Why is watering plants and grass in the early morning a way to conserve water?

- A Water used in the morning can be recycled.
- B Grass can absorb water only in the morning.
- C There is always more water available in the morning.
- D Smaller amounts of water evaporate in the cool morning.

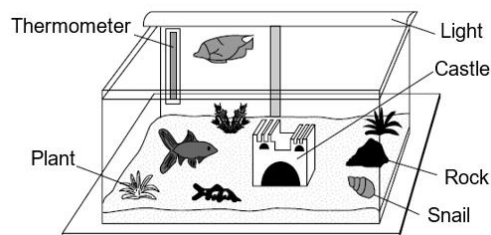
30. Two different seeds are shown in the diagram below.



How are these seeds most likely dispersed in nature?

- A Eaten by animals
- B On an animal's fur
- C By water
- D By wind

31. The figure below shows an aquarium with six items.



Which item in the diagram above gets its energy by absorbing light?

- A Plant
- B Thermometer
- C Fish
- D Snail

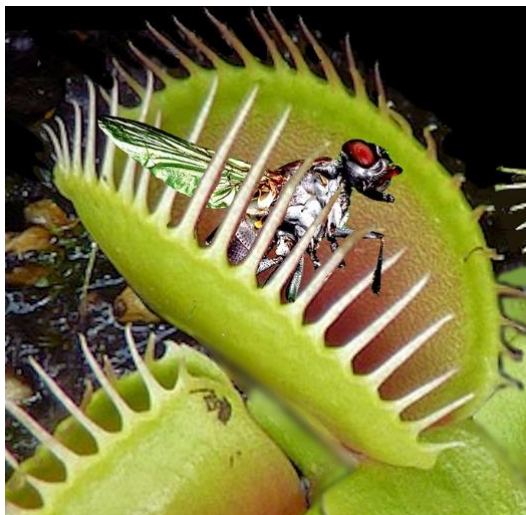
32. How long does it take the leaves of “the sensitive” plant shown in the figure below to fold up after the leaves have been touched?



The Sensitive Plant

- A About an hour
- B 4 - 5 seconds
- C About a day
- D About a week

33. A Venus flytrap is one of a few plants that can eat animals. When a fly or other small animal lands in its trap, the Venus flytrap snaps shut and eats it.

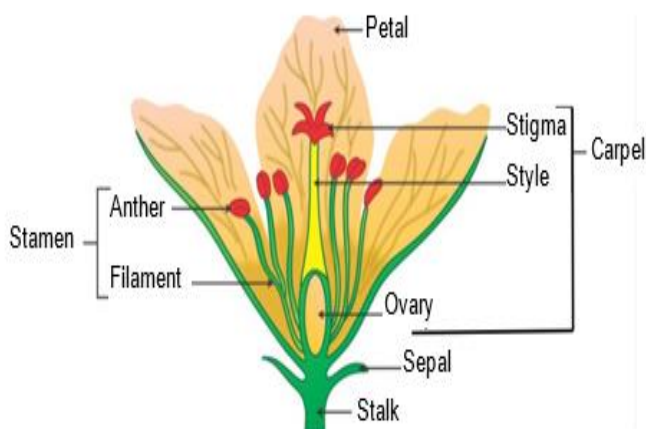


Venus Flytrap

Venus flytraps can eat ...

- A ants, beetles and birds.
- B flies, ants and spiders.
- C flies, beetles and frogs.
- D lizards, beetles and frogs.

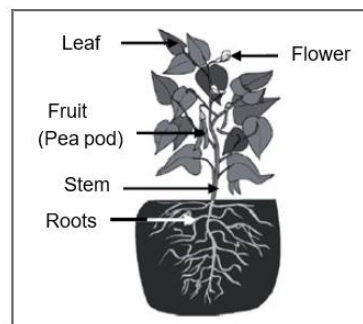
34. Consider the diagram of a flower
What is the name of a female reproductive structure that includes the ovary?



Flower

- A Ovary
- B Carpel
- C Stamen
- D Sepal

35. Study the diagram of the pea plant below and answer the question that follows:



A pea plant

The plant's stem is used to ...

- A support the leaves.
- B produce seeds for the plant.
- C absorb water and minerals from the soil.
- D all of the above.

36. Which one of the following is NOT an essential component/condition which plants need in order to grow?

- A Soil
- B Light
- C Water
- D Air

37. Amongst the four given elements, which one is most abundant in a plant?

- A Carbon
- B Manganese
- C Iodine
- D Nitrogen

38. One year on Earth lasts 365 days. Which of the following definitions could be used to define an Earth year?

- A The time it takes the Earth to complete one rotation on its axis.
- B The time it takes the Moon to travel around Earth twelve (12) times.
- C The time it takes the Earth to travel around the Sun.
- D The time it takes the Moon to complete all of its phases.

39. On average, how many high tides and low tides are there each day?

- A There is one **high tide** and one **low tide** each day.
- B There is one **high tide** and two **low tides** each day.
- C There are two **high tides** and one **low tide** each day.
- D There are two **high tides** and two **low tides** each day.

40. **Oceans have a huge effect on weather and climate mainly because ...**
- A of the effect of waves near coast lines.
B oceans are very salty.
C the fish and sea creatures give off heat.
D ocean currents are able to transport heat around the world.
41. **Saltwater ecosystems include**
- A lakes and ponds.
B oceans and estuaries.
C rivers and streams.
D dams and reservoirs
42. **The Earth's axial tilt affects**
- A days.
B years.
C seasons.
D weight.
43. **Which one of the following is an example of weathering?**
- A Mountains are built
B Water freezes
C Plant roots widen cracks in rocks
D A volcano erupts
44. **Sandstone, shale, and limestone are examples of ___ rock.**
- A sedimentary
B igneous
C metamorphic
D volcanic
45. **Shaking of the ground, caused by a sudden movement of the Earth's crust, is called a(n) ...**
- A volcano.
B earthquake.
C sinkhole.
D jitter.
46. **_____ is the geological process in which sediments, soil and rocks are added to a landform or land mass.**
- A Weathering
B Deposition
C Erosion
D Crystallization
47. **Which planet was classified as a dwarf planet in 2006?**
- A. Venus
B. Pluto
C. Mars
D. Earth
48. **Which one of the following is not an inner planet?**
- A Mercury
B Mars
C Uranus
D Earth
49. **Which one of the following is the hottest planet in our Solar system?**
- A Venus
B Mercury
C Earth
D Mars
50. **Mercury was named after the god of ...**
- A war.
B love.
C travelers.
D the sea.
51. **What is the difference between the outer planets and the inner planets?**
- A The outer planets have many moons while inner planets have a small number or no moons.
B The outer planets orbit in an anticlockwise direction while inner planets orbit in a clockwise direction.
C The outer planets have high densities while inner planets have lower densities.
D The outer planets have small diameters while inner planets have larger diameters.
52. **How old is our Sun?**
- A 1 000 000 24 years
B 4,5 000 000 years
C 2019 years
D 4,500 000 000 years

53. Outer planets are known as _____ planets while inner planets are known as _____ planets.
- A rocky, gaseous
B smooth, rocky
C gaseous, rocky
D rocky, smooth
54. A frozen chunk of ice and dust with an elliptical orbit around the Sun is called a(n)...
- A comet.
B meteoroid.
C asteroid.
D moon.
55. What can be found in the region of space between the orbits of Mars and Jupiter?
- A Nothing but space
B Meteorites
C An asteroid belt
D Stars
56. Which planet has a surface which is suitable for spacecraft to land on?
- A Mars
B Uranus
C Saturn
D Jupiter
57. Which of these planets would have the greatest gravitational pull on a nearby object?
- A Jupiter
B Mercury
C Earth
D Neptune
58. Our Sun consist mainly of ...
- A Hydrogen and Oxygen.
B Oxygen and Helium.
C Hydrogen and Helium.
D Hydrogen, Helium, and Sulphur.
59. Which one of the following planets has seasons that last for about 40 years?
- A Jupiter
B Neptune
C Uranus
D Earth
60. Which planet in our Solar System is known for extreme sulfuric acid rain showers?
- A Mars
B Jupiter
C Venus
D Earth
61. About how many Earths can fit inside the planet Jupiter?
- A 40
B 365
C 1 million
D 1320
62. 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.
63. Which one of the following planets has a year that is shorter than a day on the same planet?
- A Jupiter
B Mercury
C Earth
D Venus
64. The Sun is classified as a ...
- A star.
B planet.
C burning rock.
D giant comet.
65. What is the name of South Africa's second satellite? This satellite was launched in September 2009.
- A SumbandilaSat
B Da Vinci
C Fresco
D Rotor
66. In which year was Laska and Benji, the two mice, sent into space?
- A 1962
B 1972
C 1958
D 1994

67. How do astronauts warm their food aboard the Orbiter space capsule?



Astronauts aboard the Orbiter space capsule

- A Using a microwave oven.
 B Injecting the food with warm water.
 C Placing the food near the orbiter's exhaust system.
 D Placing the food in the food warmer.
68. 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
69. In what year did Mark Shuttleworth became the first South African to travel to space?



Mark Shuttleworth

- A 2002
 B 1994
 C 2010
 D 1985
70. 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

71. What is currently the farthest man-made object from Earth?

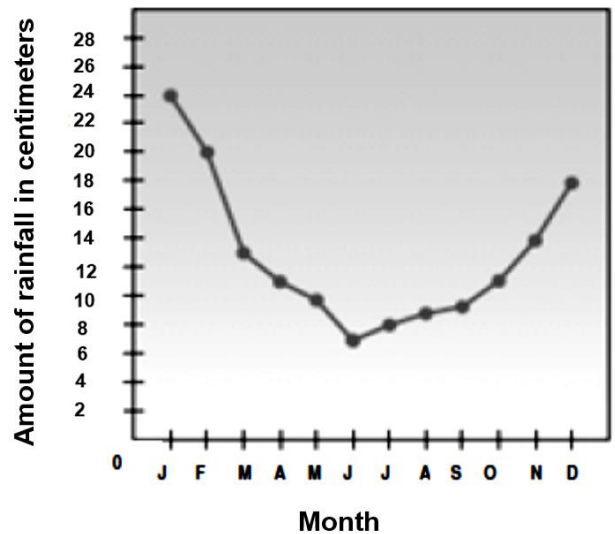
- A Sputnik 1
 B Voyager 1
 C Voyager 2
 D Alpha capsule

72. Neil Armstrong was the first person to set foot on the moon. Part of his mission mandate was to take as many photos as he could during his brief stay on the moon. For how long did he explore the moon by means of walking on the surface of the moon?

- A 30 days and 3 hours
 B 5 hours and 20 minutes
 C 10 days and 5 hours
 D 2 hours and 36 minutes

The graph below shows the average rainfall in a specific area measured over a period of one (1) year. Study the graph and answer questions 73, 74, 75 and 76

Average rainfall in an area



73. What is the difference in rainfall figures when comparing the months of January and December?

- A 24 centimeters
 B 6 centimeters
 C 18 centimeters
 D 4 centimeters

74. Which month was the driest in this area?

- A August
 B June
 C January
 D All the months

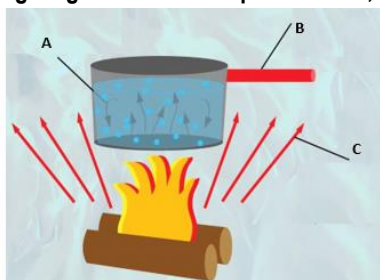
75. How much rain fell in that month mentioned in question 74?

- A 24 centimeters
- B 6 centimeters
- C 18 centimeters
- D 7 centimeters

76. What was the average rainfall during the first six months?

- A 24 centimeters
- B 6 centimeters
- C 14 centimeters
- D 85 centimeters

Use the following diagram to answer questions 77, 78 and 79.



77. Name the type of heat transfer taking place at position A in the diagram.

- A Radiation
- B Convection
- C Evaporation
- D Condensation

78. Name the type of heat transfer taking place at position B in the diagram.

- A Radiation
- B Convection
- C Evaporation
- D Conduction

79. Name the type of heat transfer taking place at position C in the diagram.

- A Radiation
- B Convection
- C Evaporation
- D Condensation

80. Which one of the following statements is correct regarding molecules in a gas and the molecules in a liquid?

- A The molecules in a liquid move over shorter distances than the molecules in a gas.
- B The molecules in a liquid cannot move, but the molecules in a gas can.
- C The molecules in a gas are more tightly packed than the molecules in a liquid.
- D The molecules in a gas cannot move, but molecules in a liquid can move.

81. Rain, sleet, hail, and snow are all part of the process of _____, which is found in the water cycle.

- A transpiration
- B evaporation
- C precipitation
- D condensation

82. Which of the following are all examples of fossil fuels?

- A Soil, rocks, and sand.
- B Coal, oil, and natural gas.
- C Plants, trees, and animals.
- D The Sun, gravity and wind.

83. Which one of the following is the best description of animals that live in a desert ecosystem?

- A They are light-coloured, camouflaged to blend in with their surroundings and are most active at night.
- B They are covered with fur to keep them insulated, and they require a lot of water.
- C They have webbed feet, and they stay in the water most of the day.
- D They are bright-coloured, easily seen in their surroundings, and active during the day.

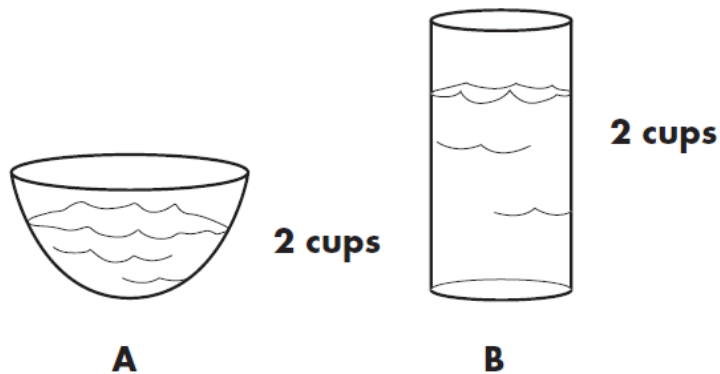
84. Which of the following substances can be separated by using filtration as the separation method?

- A A mixture of mud and water.
- B A solution of vinegar and water.
- C A mixture of sand and sawdust.
- D A solution of salt and water.

85. Liquids have ...

- A definite shape and volume.
- B definite volume but not a definite shape.
- C definite shape but not a definite volume.
- D variable shape and volume.

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

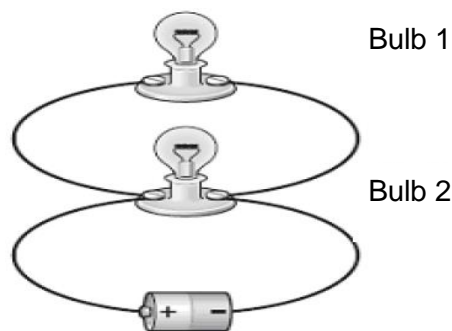


Containers A and B each containing 2 cups of water.

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

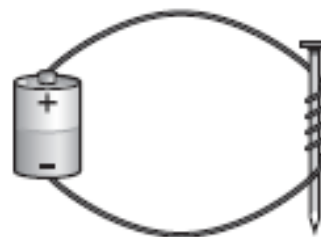
- A The same amount of water will be left in both cups.
 B B will contain more water.
 C A will contain more water.
 D Both cups will still contain two cups of water.
87. Sand consists of two chemical elements, namely:
- A Oxygen and Nitrogen
 B Carbon and Oxygen
 C Oxygen and Silicon
 D Hydrogen and Sodium
88. 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.
89. Which one of the following is an example of a temporary magnet?
- A Magnetite
 B. Electromagnet
 C. Bar magnet
 D. Horseshoe magnet

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



Which statement best describes what will happen if bulb 1 burns out?

- A Bulb 2 will also burn out.
 B Bulb 2 will flash on and off.
 C Bulb 2 will stay lit.
 D The current will stop flowing.
91. 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.

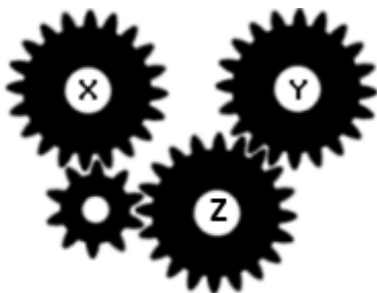
92. Most renewable energy originates from...

- A fossil fuels.
- B. the ground.
- C the Sun.
- D Uranium.

93. When using levers (all classes of levers), the force and the work needed to lift a load will be less, if we ...?

- A. move the load closer to the fulcrum.
- B. move the load away from the fulcrum.
- C. shorten the lever.
- D. The distance from the fulcrum does not matter.

94. How do gears X and Z turn when gear Y turns in a clockwise direction?



- A X turns clockwise and Z turns anti-clockwise.
- B Both X and Z turns clockwise.
- C X turns anti-clockwise and Z turns clockwise.
- D Both X and Z turns anti-clockwise.

95. A pulley is ...

- A a bar used to lift heavy objects.
- B a wheel with a groove which guides a rope or a cable.
- C made of two inclined planes.
- D a lever with an arm and a fulcrum.

96. In which way are tundra and desert ecosystems similar?

- A Both ecosystems have rich soil.
- B Both ecosystems support a lot of plant life.
- C Both ecosystems receive little rainfall.
- D Both ecosystems have extremely warm temperatures.

97. The correct order for fossil formation is:

- A Soft body parts decay, sediments are deposited and cover organisms, sediments and hard parts become rock.
- B Sediments are deposited and cover organisms, soft body parts decay, sediments and hard parts become rock.
- C Hard and soft body parts decay and become rock.
- D Sediments cover organism and all body parts decay.

98. How long does it take a sock made of wool to fully decompose when buried in soil?

- A 3 years
- B 1 year
- C 5 days
- D 10 years

99. Which element on the Periodic Table is represented by the symbol Au?

- A. Gold
- B. Silver
- C. Copper
- D. Tin

100. An atom consists of two different regions namely the _____ and the _____.

- A nucleus; proton cloud
- B proton; neutron region
- C electron cloud; electrons
- D electron cloud; nucleus

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