



7th NATURAL SCIENCE OLYMPIAD

GRADE 7 TO 9

11 MAY 2017

09:00 - 12:00

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 most 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. The student number allocated to you can be obtained from your teacher and consists of eight digits e.g. 08149701

Do not fold the answer sheets.

Three hours are allowed to answer the questions

Natural Science Olympiad 2017

Grade 7 to 9

1. Bees must collect nectar from flowers in order to make honeycomb. Approximately how many flowers must they (bees) collect to make 0.453 kg (one pound) of honeycomb?

A 2 million
B 453
C 200
D 20 million

2. 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.

3. Up until World War II, chewing gum was made from ...

A ...rubber.
B ...chicle.
C ...cartilage.
D ...the bark of a gum tree.

4. The social groups which lions form are called ...

A ...herds.
B ...memories.
C ...zeal.
D ...prides.

5. Which of the following insects cannot be described as "social insects"?

A Termites
B Wasps
C Locusts
D Ants

6. What body function are rats unable to fulfill which makes them extra vulnerable to poisoning?

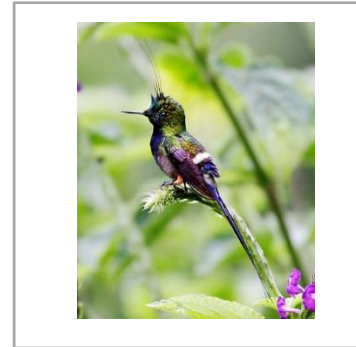
A Sweat
B Breath
C Release tears

D Vomit

7. Which of the following animals will last the longest without drinking water?

A Elephants
B Kangaroo Rats
C Camels
D Elephants

8. What is the heart rate of a hummingbird?



A Exactly 20 beats per minute
B At most 72 beats per minute
C More than 1 200 beats per minute
D None of the above

9. Name the type of camel that has two humps.



A The Dromedary camel
B The Bactrian camel
C The Desert camel
D None of the above

10. What do we call a person having more than 5 fingers per hand or 5 toes per foot?

A Polydactyl
B Polyandry
C Polyfingers
D Polyfoot

11. In daylight, the human eye is most sensitive to light
- A red
 - B green
 - C blue
 - D orange
12. Which layer of the earth's atmosphere contains the ozone layer?
- A Stratosphere
 - B Mesosphere
 - C Exosphere
 - D Ionosphere
13. The large dark areas of the moon known as maria are easily visible from Earth. Which of the following statements best explains the presence of these dark areas?
- A Massive volcanic eruptions emptied underlying magma caverns, causing their collapse and the formation of calderas.
 - B Shortly after the formation of the moon, Earth's strong gravitational pull on the moon caused the release of magma from fissures in the crust.
 - C Large meteorites excavated huge craters that filled with low-viscosity basalt flowing from the fractures created in the underlying crust.
 - D When the moon was still semi-molten, these areas of crust collapsed due to tectonic activity, creating low areas that trapped sediments.
14. Which one of the following stars is situated closest to the Sun?
- A Sirius
 - B Alpha Centauri
 - C Procyon
 - D All three stars mentioned above are situated at the same distances away from the Sun.
15. Which of the following physical characteristics of a main-sequence star is the most important factor in determining its luminosity?
- A Chemical composition
 - B Strength of the magnetic field
 - C Total mass
 - D Size of the corona
16. How often does Haley's comet appear in Earth's night sky?
- A Every 48 years
 - B Every 100 years
 - C Every 30 years
 - D Every 76 years
17. What colour is planet Mercury?
- A Red
 - B Dark-grey
 - C Yellow
 - D Red-orange
18. What is the name of the smallest planet with regards to both mass and volume in our Solar System?
- A Mercury
 - B Jupiter
 - C Earth
 - D Venus
19. How long does it take light from the nearest star excluding the light from the sun to reach the Earth?
- A Less than one second
 - B 1 hour
 - C 4.2 years
 - D 1.2 years
20. Which one of the following planets is named after a Greek god?
- A Mercury
 - B Jupiter
 - C Neptune
 - D Uranus
21. Which planet in our solar system spins backward on its axis relative to the other planets in our solar system?
- A Mars
 - B Venus

- C Mercury
- D Uranus

22. When did John Glenn use the space capsule "Friendship 7", to first orbit the Earth?

- A 1907
- B 1972
- C 1994
- D 1962

23. What is planet Jupiter famous for?

- A It's a big hole.
- B It's big red spot.
- C It's big black spot.
- D It's coloured spots.

24. Which planet in our solar system is famous for the beautiful rings surrounding it?

- A Mars
- B Mercury
- C Venus
- D Saturn

25. Who was the first man to hit a golf ball on the moon?

- A Alan Shepard
- B Tiger Woods
- C Gerald Golf
- D Golf Moon

26. Who discovered the planet Uranus in 1781?

- A Anousheh Ansari
- B Sir Frederick Herschel
- C Uranus Circle
- D John Glenn

27. Who was the first person to reach into outer space?

- A Neil Armstrong
- B Namira Salim
- C Alexei Leonov
- D Yuri Gagarin

28. Where is the "Edge of space" located?



The Edge of space

- A 100 km above Mount Everest
- B Along the equator
- C 100 km above the sea level
- D 100 m above the sea level

29. The temperature at the surface of the Sun is in the region of ...

- A 2000 °C
- B 5 600 °C
- C 2 000 000 °C
- D 15 000 000 °C

30. Which female astronaut holds the record for the longest space flight by a woman?

- A Sunita Williams
- B Kalpana Chawla
- C Lisa Norwak
- D Valentina Tereshkova

31. An astronaut in outer space will observe space as ... in colour.

- A white
- B blue
- C red
- D black

32. When was Sputnik, the first artificial satellite sent into space?

- A 12 September 2012
- B 3 November 1957
- C 4 October 1957
- D 31 January 1958

33. When was the first Pioneer space probe launched by the United States of America?

- A 1974
- B 1958
- C 1961

D 1962

34. What is the name of the first woman space tourist?

- A Jullian Moore
- B Namira Salim
- C Paula Radcliffe
- D Anousheh Ansari

35. As the height of an orbiting satellite above the Earth's surface decreases, the speed of the satellite ...

- A ...increases
- B ...decreases
- C ...remains the same
- D none of the above

36. In which year was the first space station launched?

- A 1971
- B 1951
- C 1981
- D 1961

37. What is the meaning of "tinnitus", which is considered to be one of the potential health effects as a result of exposure to high levels of noise?

- A A temporary loss of hearing, especially of upper frequencies.
- B Abdominal discomfort from low-frequency noise.
- C A persistent ringing or hissing in the ears.
- D A permanent loss of hearing.

38. What is the term that is used for the layer of loose, heterogeneous weathered material lying on top of rocky hill slopes?

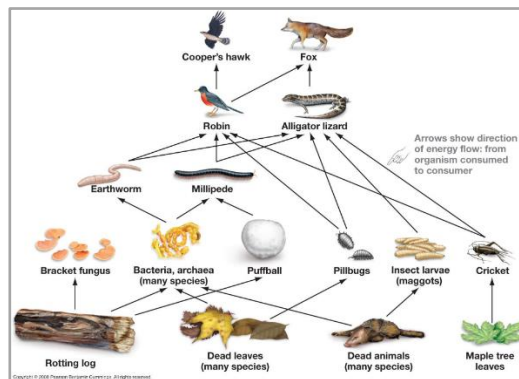
- A Soil
- B Alluvium
- C Weathering profile
- D Regolith

39. What does a dendrochronologist do?

- A She specializes in teeth of animals

- B She studies the age of a tree using tree rings
- C She studies the age of a dinosaur using its skull
- D She studies the age of animal using its skull.

40. The diagram below shows a food web. Which one of the following may result in the population of Cooper's hawks decreasing and that of earthworms increasing?



- A An increase in earthworms
- B Abundance in food for Cooper's hawks
- C A deadly disease affecting robins
- D Robin population bloom

41. Which one of the following statements best describes the surface of the Earth over billions of years?

- A High mountains and flat plains stay side by side for billions of years with little change over time.
- B High mountains gradually wear down as new mountains are continuously being formed.
- C A flat surface is gradually pushed up into higher and higher mountains until the Earth is covered with mountains.
- D High mountains gradually wear down until most of the Earth is at sea level.

42. Which solution is used to test for the presence of starch?

- A Benedict solution
- B Tollens solution
- C Iodine solution
- D None of the above

43. Who was the first person to use the term "gene"?
- A Wilhelm Roux
 - B William Bateson
 - C Wilhelm Johannsen
 - D David Moyes
44. ... is an illness most commonly caused by smoking.
- A Cancer
 - B HIV
 - C TB
 - D Emphysema
45. Why are desert animals more active at nighttime than during daytime?
- A Desert animals can see better during the night.
 - B More food is available during the night.
 - C It is more difficult to retain water during day time.
 - D Competition for food during night time is less problematic.
46. The vitamin which is essential for blood clotting is:
- A Vitamin-A
 - B Vitamin-B
 - C Vitamin-C
 - D Vitamin-K
47. A girl found the skull of an animal in a field. She did not know what animal it was but she was sure that it preyed on other animals for its food. Which of the following clues could have led her to this conclusion?
- A There was a projecting ridge along the top of the skull
 - B Four of the teeth were long and pointed.
 - C The eye sockets faced sideways
 - D The skull was much longer than it was wide
48. Which of the following statements best explains why green marine algae are most often restricted to the top 100 meters of the ocean?
- A The water pressure is too great for them to survive below 100 meters.
 - B If the algae lived below 100 meters, it would be eaten by animals.
 - C Algae has no roots to anchor it to the ocean floor.
 - D Algae can only live in areas where it is exposed to light.
49. What is the name of the deepest part of the world's oceans?
- A Ocean Basket
 - B Ocean Hill
 - C Mariana Hill
 - D Mariana Trench
50. Most scientists use _____ life processes or characteristics to determine whether something is living or non-living.
- A seven (7)
 - B eight (8)
 - C three (3)
 - D five (5)
51. Hermit crabs gain its protection from predators by its relationship with the ...
- A ...purple pincher.
 - B ...sea anemone.
 - C ...Whelk.
 - D ...lobster.
52. An organism whose cells contain a nucleus.
- A parasitic
 - B eukaryotic
 - C prokaryotic
 - D unicellular
53. Which one of the following is an egg-laying mammal?
- A Crocodile
 - B Whale
 - C Chicken
 - D Platypus
54. Taxol is a drug currently being used to treat cancer, particularly resistant forms of breast cancer. A natural source of Taxol is ...
- A ...ginkgo leaves

- B ...bark and leaves of the yew tree
- C ...apricots pits
- D ...periwinkle flowers

55. What tree is the only tree known to live longer than the Giant Sequoia?

- A Ponderosa pine
- B Bristlecone pine
- C Grey Oak
- D Alerce trees

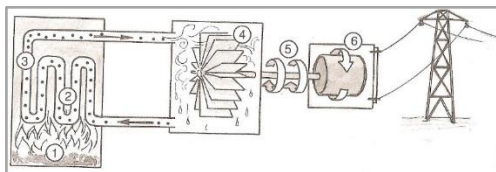
56. What animal has the shortest lifespan of any animal on Earth?

- A Dragonfly
- B Mayfly
- C Chameleon
- D Snake

57. During which of the following phase changes would the greatest amount of energy per gram of water be released to the environment?

- A On an early summer morning, dew forms on a field.
- B Ice sublimate on a very cold and dry day.
- C On a cold fall morning, frost forms on a lawn.
- D Water evaporates from a reservoir on a hot and dry day.

58. The following diagram shows how electricity is generated at a coal-fired power station.



What energy conversion takes place at stage six (6) of the power plant?

- A Heat energy into electrical energy.
- B Kinetic energy into electrical energy.
- C Electrical energy into potential energy.
- D Electrical energy into kinetic potential energy.

59. Which form of solar radiation causes sunburn?

- A Visible light radiation

- B X-ray radiation
- C Infrared radiation
- D Ultraviolet radiation

60. Consider three types of cars; an electric car, a hybrid car, and a hydrogen fuel cell car. Which one of these cars emits a substance which does not pollute the environment?

- A An electric car
- B A hybrid car
- C A Hydrogen fuel cell car
- D Both hybrid and hydrogen fuel cell cars

61. Which one of the following statements is **NOT CORRECT** about hybrid cars?

- A They use only one means of energy source for power.
- B They are designed specifically to maximise fuel efficiency.
- C They produce 25% to 35% less in CO₂ emissions than regular cars.
- D They are less powerful than electric cars.

62. Water heating for domestic use can be done by using an electric geyser, solar water geyser, heat pump or coal-fired water heater. Which of these methods is the most user-friendly but least energy efficient?

- A Solar water geyser
- B Heat pump
- C Electric geyser
- D Coal-fired water heater

63. Campers often use propane-fueled lanterns as a source of light at campsites in the evening.

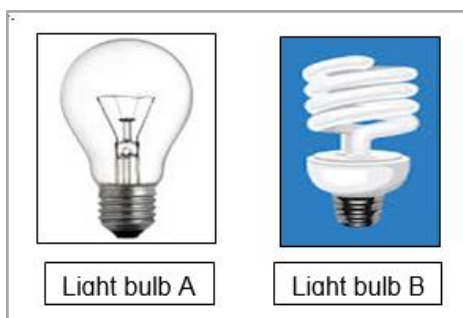


As propane burns, it undergoes a change that is...

- A ...chemical and exothermic
- B ...physical and endothermic

- C ...potential and endothermic
- D ...mechanical and exothermic

64. Consider the light bulbs shown below and choose the **CORRECT** statement.



- A Light bulb A is more expensive and gives dimmer light compared to light bulb B.
- B Light bulb A is more expensive and uses more electricity than light bulb B.
- C Light bulb A is less expensive and it is more energy efficient than light bulb B.
- D Light bulb A is less expensive and it is not energy efficient.

65. A house has **three** 75 W incandescent light bulbs and **ten** 20 W CFL light bulbs that are switched on for 730 hours per month. The cost of electricity is R1.20 per kWh. Which one of the following statements is **TRUE**?

- A The monthly cost of electricity used by the ten CFL bulbs is equal to that used by the three incandescent bulbs.
- B The monthly cost of electricity used by the ten CFL bulbs is less than that used by the three incandescent bulbs.
- C Total energy used by all the bulbs in the house per month is 499kWh.
- D Total energy used by the ten CFL bulbs is greater than that used by the three incandescent bulbs.

66. The total cost of electricity used by all bulbs in question 65 (above), per month is

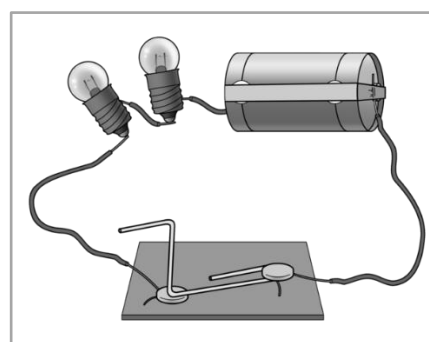
- A R11 541.30
- B R1 081.86
- C R3 723.00
- D R372.30

67. Consider two resistors R_1 and R_2 where the resistance of R_1 and R_2 are both **GREATER** than

one (1) ohm. The total resistance of R_1 and R_2 connected in parallel is...

- A ...always greater than the sum of the same resistors connected in series.
- B ...always less than the sum of the same resistors connected in series.
- C ...always equal to the sum of the same resistors connected in series.
- D ...greater or less than the sum of the same resistors connected in series.

68. Consider the diagram shown below and choose the **CORRECT** answer from the four statements.

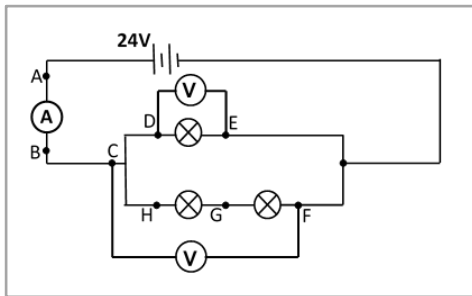


- A When the circuit is switched on the bulbs will produce light one after the other.
- B Each bulb will convert electric current into light.
- C Energy conversions take place in the battery and bulbs.
- D Each bulb will convert electric voltage into light.

69. Besides iron, what other three elements make up the alloy alnico, used for making magnets?

- A Aluminium, Nickel, and Cobalt
- B Magnesium, Nickel, and Cobalt
- C Nickel, Gold, and Cobalt
- D Cobalt, Aluminium and Magnesium

Study the diagram of the electric circuit and answer **questions 70 to 73**. All bulbs have the same resistance and the battery can supply a total potential difference of 24V.



70. The battery is able to supply ...
- A 24 coulomb of charges per second
 - B 24 joules of energy per second
 - C 24 volts of charges per coulomb of energy
 - D 24 joules of energy per coulomb of charge

71. The relationship between the readings on voltmeter V_{DE} and voltmeter V_{CF} is ...

- A V_{DE} equals V_{CF}
- B V_{DE} is greater than V_{CF}
- C V_{DE} is less than V_{CF}
- D V_{DE} equals $\frac{1}{2} V_{CF}$

72. What will the total resistance of all the three bulbs be, if each bulb has a resistance of $4\ \Omega$?

- A $12\ \Omega$
- B $\frac{18}{4}\ \Omega$
- C $\frac{4}{3}\ \Omega$
- D $\frac{3}{4}\ \Omega$

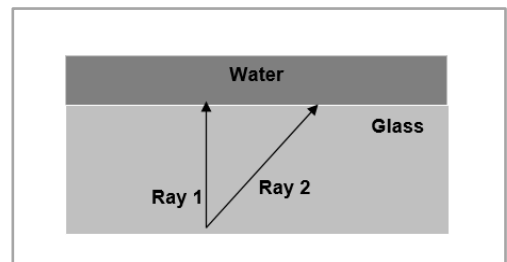
73. If the bulb connected between DE blows out, then the ammeter reading between AB will ...

- A ...be zero amperes.
- B ...be zero ampere.
- C ...increase.
- D ...decrease.

74. Where can the only Nuclear Power Station in Africa be found?

- A Abuja, Nigeria
- B Koeberg, South Africa
- C Addis-Ababa, Ethiopia
- D Cairo, Egypt

75. Consider two light rays emanating (moving) from the glass into the water as shown in the figure below. Which one of the following statements is **CORRECT**?



- A Ray 2 will not be refracted
- B Ray 1 will not be refracted
- C Ray 1 and ray 2 will be refracted away from the normal
- D Ray 1 and ray 2 will be refracted towards the normal

76. Soluble metal oxides are ...

- A ...Halogens
- B ...Neutral
- C ...Acidic
- D ...Basic

77. Alcohol mixed with water is and examples of a...

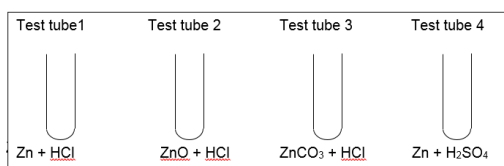
- A ...liquid-solid mixture
- B ...heterogeneous mixture
- C ...homogeneous mixture
- D None of the above

78. Which of the four combinations of quantities a, b, c and d are required to balance the equation:



- A 2 3 2 3
- B 3 1 1 3
- C 1 2 2 1
- D 2 1 1 2

79 In which of the following test tubes will a chemical reaction take place?

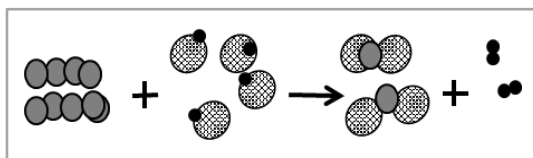


- A test tube 1.
- B test tubes 2 and 3.
- C test tubes 1, 2 and 3.
- D All of the above

Study the information in the table and the example that follows:

Name of substance	Formula	Structure used to represent the atoms of various elements
Zink	Zn	
Chlorine	Cl	
Hydrogen	H	

Consider the following graphical representation of a chemical reaction before answering **questions 80 and 81**.



80. Which one of the substances in the above chemical reaction can be considered in a solid state?

- A
- B
- C
- D

81. Which one of the substances in the above equation is a salt?

- A
- B
- C
- D

82. Which one of the following substances can be added to soil with the aim to make the soil more alkaline, when planting potatoes?

- A CaCO_3 (Limestone)
- B NH_3 (Ammonia)
- C H_2O (Water)
- D CO_2 (Carbon dioxide)

83. The most important set of characteristics of the deep-sea includes:

- A Low temperature, low pressure, and a low oxygen level
- B Low temperature, high pressure, and a low oxygen level
- C High temperature, high pressure, and a high oxygen level
- D High temperature, low pressure, and a high oxygen level

84. The total number of atoms contained in 5NaHCO_3 is...

- A ...20
- B ...25
- C ...30
- D ...35

85. Sea water (i.e. saltwater) freezes at ...

- A ...the same temperature as fresh water.
- B ...a slightly higher temperature than fresh water.

- C ...a slightly lower temperature than fresh water.
D Sea water does not freeze.
86. How many naturally occurring elements exist on Earth (as of 2016)?
- A 94
B 92
C 114
D 118
87. Angelo required an aqueous solution of sodium chloride. He made the solution by dissolving table salt in ...
- A ...vinegar
B ...air
C ...oxygen gas
D ...water
88. Molecular compounds can be found in all three states of matter at room temperature.
- Which one of the following molecule compounds is a liquid at room temperature?
- A Rubbing alcohol
B Sugar
C Carbon dioxide
D Propane
89. The word atom is a Greek word meaning:
- A small
B indivisible
C unseen
D visible
90. The reason for the chemical similarity among elements of a given group in the periodic table is the ...
- A ...similarity in the highest orbit electrons.
B ...similarity in their nuclear structure.
C ...fact that they all have the same number of protons.
D ...fact that they all have the same number of neutrons.
91. Scientists have discovered a new element that they plan to name Bieberium. Based on naming rules, what would be the chemical symbol for Bieberium?
- A Bu
B BU
C bU
D bu
92. "Hard" water is related to the presence of high concentrations of primarily four metal ions in water supplies. Calcium and magnesium ions are the most common of the four. Another one of these hard water ions which are found in certain areas is ...
- A ...Oxygen
B ...Hydrogen
C ...Manganese
D ...Carbon
93. Which one of the following represents the correct chemical equation for the reaction between sodium oxide and hydrochloric acid?
- A $\text{Na}_2\text{O} + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O}$
B $\text{Na}_2\text{O} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2 + \text{O}_2$
C $\text{NaO} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2 + \text{O}_2$
D $\text{NaO}_2 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2 + \text{O}_2$
94. The difference in the effectiveness of intermolecular forces for gases, liquids, and solids are respectively best described as follows:
- A Strong, intermediate, weak
B Intermediate, strong, weak
C Weak, intermediate, strong
D Weak, strong, intermediate
95. The chemical symbol for which element was derived from the Greek word that means "liquid silver"?
- A Mercury
B Gold
C Lead
D Oxygen
96. Which element(s) were formed in large quantities during the creation of the universe?
- A Hydrogen
B Hydrogen and Helium

- C All the elements now present
 - D Only elements heavier than iron
97. Which one of the following materials is used along with iron ore and limestone to produce iron in a modern blast furnace?
- A Coke
 - B Cementite
 - C Coal
 - D Bauxite
98. Who was the first person to use the term “nanotechnology”?
- A Richard Feynman
 - B Albert Einstein
 - C Norio Taniguchi
 - D Gordon Gould
99. A tissue paper has its thickness measured to be 0.3 mm. What is the thickness of the tissue paper in nanometres?
- A 0.003 nm
 - B 300 nm
 - C 3 000 nm
 - D 300 000 nm
100. What is the name of the nanomaterial used to prevent clothing and other products from developing odour-causing bacteria?
- A Nanoscale titanium dioxide
 - B Nanowhisker
 - C Nanosilver
 - D Nanoscale silica

The End