3rd NATURAL SCIENCE OLYMPIAD

GRADE 7 TO 9

08 MAY 2013

09:00 – 12:00

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 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 – 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 2013
Grade 7 to 9

Matter & Materials

1. The total number of atoms contained in $5NaHCO_3$ is...

   A 20
   B 25
   C 30
   D 35

2. Which one of the following reaction equations is written incorrectly?

   A $2Mg + O_2 \rightarrow 2MgO$
   B $2Na + O_2 \rightarrow 2NaO$
   C $2Zn + 4HCl \rightarrow 2ZnCl_2 + 2H_2$
   D $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

3. Which four quantities a, b, c and d are required to balance the following equation?

   $$\mathbf{a}Al_{(s)} + \mathbf{b}Fe_2O_{3(s)} \rightarrow \mathbf{c}Al_2O_{3(s)} + \mathbf{d}Fe_{(s)}$$

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

4. The formulae for copper sulphate, table salt and ammonia are :

	Copper sulphate	Table salt	Ammonia
A	$CuSO_4$	NaCl	NH_3
B	CuS	NaI	HNO_4
C	$CuSO_4$	HCl	NH_3
D	$Cu(OH)_2$	NaCl	NO_2

5. Iron(III)oxide is represented by …

   A FeO
   B Fe_2O_3
   C FeO_2
   D None of the above

6. Soluble metal oxides are ...

   A acidic
   B neutral
   C basic
   D halogens

7. The element magnesium is an example of a/an

   A halogen
   B alkali metal
   C alkali earth metal
   D noble gas

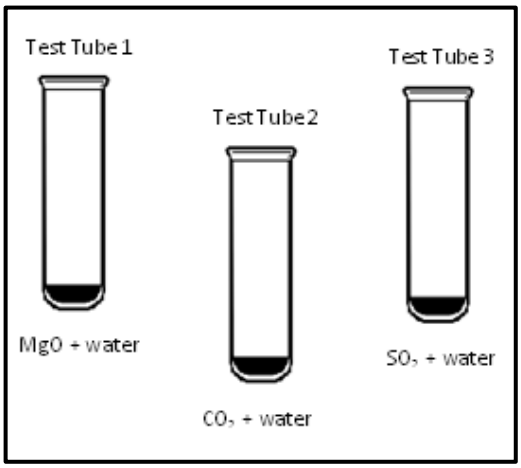
8. The most malleable metal is

   A Platinum
   B Silver
   C Gold
   D Iron

9. An example of a pure substance is ...

   A milk
   B table salt
   C salad dressing
   D Coke

10. Bromothymol blue is an indicator which is green in a neutral solution; yellow in an acidic solution; and blue in an alkaline solution



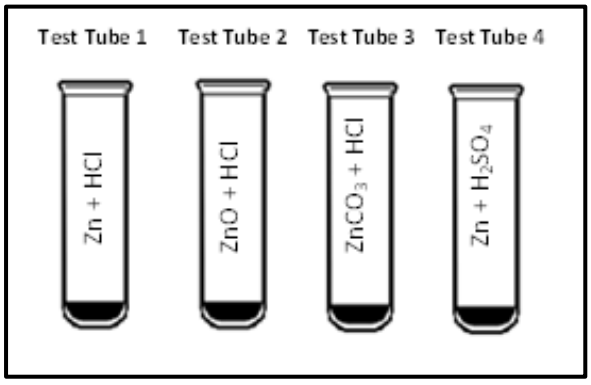
Bromothymol blue is added to each of the solutions. The correct combination in terms of colour in the various test tubes are represented by…

Solution	Test tube 1	Test tube 2	Test tube 3
A	Yellow	Blue	Blue
B	Blue	Blue	Yellow
C	Blue	Green	Yellow
D	Blue	Yellow	Yellow

11. Which one of the following unbalanced reactions represents a neutralization reaction?

A $Hg + O_2 \rightarrow HgO$
B $Na + H_2O \rightarrow NaOH + H_2O$
C $Ca(OH)_2 + HCl \rightarrow CaCl_2 + H_2O$
D $C + O_2 \rightarrow CO_2$

12. A chemical reaction is taking place in each of the following test tubes:



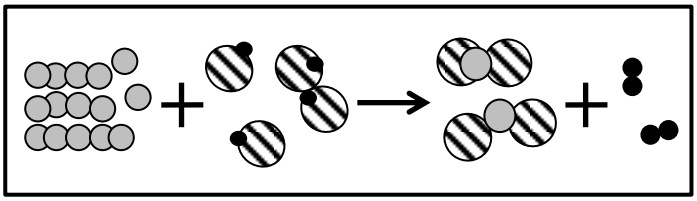
Zinc chloride is formed in…

A Test tube 1.
B Test tubes 2 and 3.
C Test tubes 1, 2 and 3.
D Test tube 4.

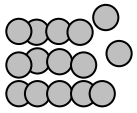
Study the information in the table and the example that follows:

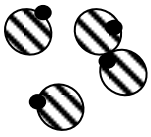
Name of substance	Formula	Structure used to represent the atoms of various elements
Zink	Zn	
Chlorine	Cl	
Hydrogen	H	

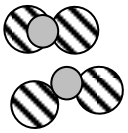
Consider the following graphical representation of a chemical reaction:

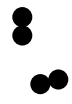


13. Which one of the substances in the chemical reaction can be considered being in the solid phase?

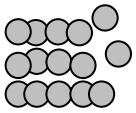
A 

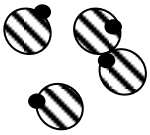
B 

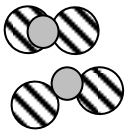
C 

D 

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

A 

B 

C 

D 

15. Which one of the following mixtures can be classified as a homogeneous mixture?

    A Sand and water
    B Cooking oil and water
    C Alcohol and water
    D Breakfast cereal

16. Which one of the following separation methods will be best suited to separate the components of a mixture of olive oil and water?

    A Filtration
    B Distillation
    C Chromatography
    D With a separation funnel

17. A gas which is so dense that it can be "poured" is...

    A hydrogen
    B oxygen
    C carbon dioxide
    D water vapour

Life & Living

18. Which one of the following is the best definition of pollination?

    A transfer of pollen from anther to a stigma
    B the germination of pollen grains
    C the growth of the pollen tube in the ovule
    D when insects visit flowers.

19. From where will plants mainly receive their nutrients?

    A chlorophyll
    B atmosphere
    C light
    D soil

20. In which parts of the plant does photosynthesis mainly take place?

    A leaf and other chloroplast bearing parts
    B stem and leaf
    C roots and chloroplast parts
    D bark and leaf

21. From which component does a plant synthesize protein

    A starch
    B sugar
    C amino acid
    D fatty acid

22. Which one of the following is not a function of bones

    A muscle attachment
    B protection of vital organs
    C secretion of hormones for calcium regulation in blood and bones
    D production of blood corpuscles

23. Which one of the following is a process whereby the plant can form new cells through cell division?

    A heterosis
    B mitosis
    C fusion
    D fission

24. Which one of the following is regarded as the most intelligent mammal?

    A whales
    B elephants
    C dolphins
    D kangaroos

25. During the process of photosynthesis, the oxygen that is released by the plant, comes from:

    A carbon dioxide
    B water
    C sugar
    D proteins

26. A potato is a modified

    A root
    B fruit
    C stem
    D leaf

27. Plants that prefer to live in dry conditions are referred to as:

    A xerophytes
    B lithophytes
    C hydrophytes
    D mesophytes

28. Wilting in plants is caused by excess…

    A transpiration
    B absorption
    C photosynthesis
    D difficult to determine

29. Osmosis can be described as the flow of solution from higher concentration to a solution of lower concentration through a semi-permeable membrane. What is incorrect in this statement?

    A Exact concentration of solution is not stated
    B Character of semi-permeable membrane is not stated
    C The flow of solution is not possible through a semi-permeable membrane
    D All are incorrect

30. Night blindness is caused by a lack of the following vitamin:

    A vitamin A
    B vitamin B
    C vitamin C
    D vitamin D

31. Radioactivity takes place when there is a spontaneous release of…

    A protons and electrons
    B energy and matter
    C neutrons
    D x-rays

32. Our major food, fiber, spices, fruit, herbs and beverage crops are…

    A flowering plants
    B gymnosperms
    C ferns
    D mosses

33. Mumps are caused by…

    A bacteria
    B fungi
    C virus
    D mosquitoes

34. What is the name of the iron rich component that transports oxygen in the human blood?

    A collagen
    B keratin
    C melanin
    D hemoglobin

35. In the beginning of June, you one day wake up with a headache, sore throat and a runny nose. Your doctor takes a cell swab of your throat and he sends it to a pathologist. He phones you the next day and tells you that taking an antibiotic will not help you to feel better. Which one of the following may be a reason for your doctors' recommendation?

    A You need a vaccination instead of antibiotics
    B The doctor has insufficient training
    C You are infected by bacteria
    D You are infected by a virus

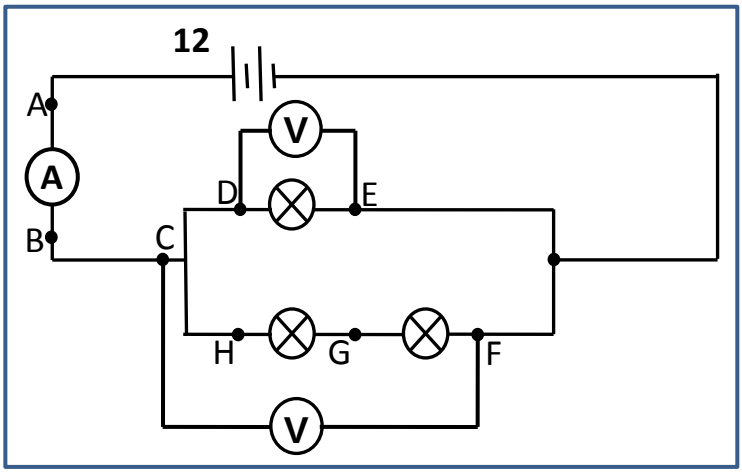
36. The inherited traits of an organism are controlled by…

A RNA molecules
B nucleotides
C DNA molecules
D enzymes

Energy and Change

Study the diagram of the electric circuit and answer questions 37 to 40

All bulbs have the same resistance and the battery can supply a total potential difference of 12V.



37. The battery is able to supply…

A 12 coulomb of charges per second
B 12 joules of energy per second
C 12 volts of charges per coulomb of energy
D 12 joules of energy per coulomb of charge

38. The relationship between the readings on <u>voltmeter</u> V_{DE} and <u>voltmeter</u> V_{CF} are…

A $V_{DE} = V_{CF}$

B $V_{DE} < V_{CF}$

C $V_{DE} > V_{CF}$

D $V_{DE} = \frac{1}{2} V_{CF}$

39. A third voltmeter is now connected across DG. The reading on this voltmeter will be…

A 12V
B 24V
C 6V
D none of the above

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

A increase
B decrease
C be zero ampere
D remain the same

41. How does a material acquire a positive electrical charge?

A By losing electrons
B By losing protons
C By gaining electrons
D By switching the position of electrons and protons in the atom

42. A negatively charged balloon is brought neat a metal can that rests on a wooden table. The side of the can opposite the balloon is momentarily touched. The can is then….

A positively charged
B negatively charged
C no change in net charge
D neutral

43. Two electro-statically charged objects X (50 protons and 40 electrons) and Y (50 protons with and an unknown number of electrons) are brought closer to one another and allowed to make contact with one another. The number of electrons on X after contact increased to 46. What was the number of electrons on Y before contact?

A 40
B 46
C 52
D 36

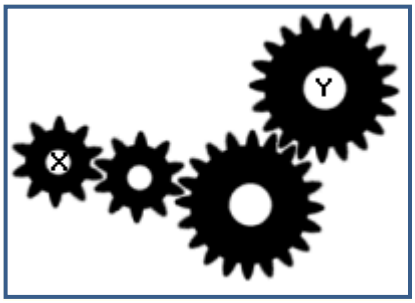
44. The potential energy of a box on a shelf, relative to the floor, is a measure of…

A the work done putting the box on the shelf from the floor
B the weight of the box times the distance from the floor
C the energy the box has because of its position above the floor
D all of the above

45. What energy conversion takes place at the turbine of a 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

46. If gear X turns clockwise at a constant speed of 10 revolutions per minutes (rpm), how does gear Y turn?



A Anticlockwise at 10 rpm
B Clockwise at 10 rpm
C Clockwise at 5 rpm
D Anticlockwise at 5 rpm

47. Energy resources derived from natural organic materials are called:

A geothermal energy resource
B biomass
C fossil fuels
D all of the above

48. The radiations emitted by the Sun and responsible for the cause of skin cancer are

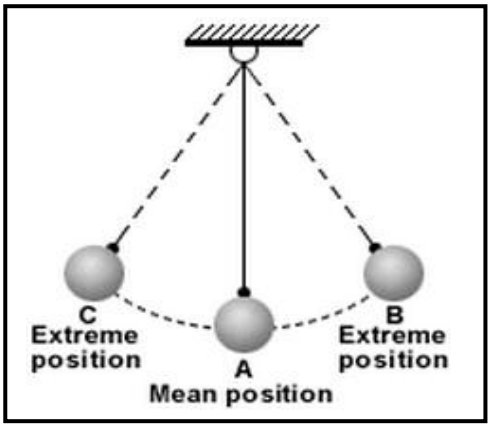
A ultra-violet rays
B X-rays
C micro-waves
D infra-red rays

49. Power is a measure of the…

A rate of change of momentum
B force which produces motion
C change of energy
D rate of change of energy

50. The type of energy that a simple pendulum possesses, when it is at the mean position, is….

A kinetic energy
B potential energy
C potential + kinetic energy
D sound energy



General Knowledge

51. The only vitamin that is not found in a chicken egg is…

A. vitamin D
B. vitamin A
C. vitamin C
D. vitamin E

52. How many eyes does a bee have?

A. 6
B. 4
C. 2
D. 5

53. What letter does not appear in the periodic table of the elements?

A. Q

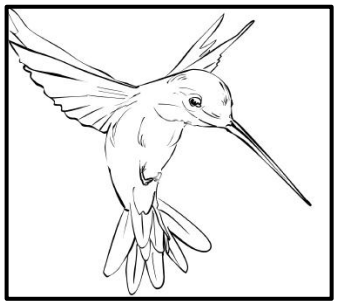
B. Y
C. J
D. Z

54. What essential pigment is missing in people with the condition of albinism?

A. Niacin
B. Carotin
C. Cytoxin
D. Melanin

55. What is the name of the musical bird that can fly backwards?

A. The humming-bird
B. The Cape eagle-owl
C. The olive sunbird
D. The Cape sparrow



56. Which animals can live longest without water?

A. Kangaroo rats
B. Camels
C. Elephants
D. Human beings

57. Where in the human body is the skin the thinnest?

A. Eyelids
B. Nose
C. Neck
D. Ears

58. What part of a horse would one examine to tell its age?

A. Neck
B. Ribs
C. Tail
D. Teeth

59. What are scotopic people?

A. People who live in water
B. People who can see in the dark
C. People who neither have hands nor legs
D. People who sleeps only during the day

60. Which of the following senses develop first?

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

61. Approximately how many muscles are there in the human body?

A. 500
B. 600
C. 700
D. 800

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

A. Starfish
B. Earthworm
C. Cuttlefish
D. Octopus

63. The following is only a source of either heat or light and not both:

A. Fire
B. Lightning
C. Sun
D. Light bulb

64. One of the following animals walks by moving its front and hind legs on one side, then on the other (side). Which animals is it?

A. Dog
B. Goat
C. Lion
D. Cat

65. Sand consists of two chemical elements namely:

A. Oxygen and nitrogen
B. Carbon and oxygen
C. Oxygen and silicon
D. Hydrogen and sodium

66. Which part of the human body contains the most gold?

A. Bones
B. Stomach
C. Liver
D. Toenails

67. What would a polydactyl person have that an able person wouldn't?

A. More than two eyes
B. More than ten fingers
C. More than 32 teeth
D. More than two legs

68. Who invented the television?

A. Marie Curie
B. Albert Einstein
C. John Logie Baird
D. Tele Aerial Vision

69. Where was South Africa's second satellite, SumbandilaSat, launched in September 1999?

A. Northern Cape (South Africa)
B. Western Cape (South Africa)
C. Kazakhstan (Russia)
D. London (Britain)

70. Which of the following is correct when detecting taste with the tongue?

A. Sweet - on the sides
B. Bitter - on the tip
C. Sour - in the back
D. Salty - the front edge

Astronomy

71. What is the fuel that powers our Sun?

A. Petrol
B. Oxygen
C. Diesel
D. Hydrogen

72. As in the saying "once in a blue moon", what is a blue moon?

A. The first new moon that occurs in the same month.
B. The second full moon that occurs in the same month.
C. The first full moon that occurs in the same month.
D. The second new moon that occurs in the same month.

73. Who is considered to be the father of Astronomy?

A. Thomas Edison
B. Neil Armstrong
C. Carl Jamsky
D. Mark Shuttleworth

74. What was the name of the first spacecraft to orbit Jupiter?

A. Voyager 1
B. Pioneer 10
C. Pioneer 11
D. Galileo

75. Which of these is now classified as a dwarf planet?

A. Venus
B. Earth
C. Pluto
D. Mercury

76. The Scotsman who first built the reflecting telescope was

    A. Isaac Newton
    B. James Gregory
    C. Edward Jenner
    D. Neil Diamond

77. Which of these planets has the most moons?

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

78. Who was the second man on the moon after Neil Armstrong?

    A. Mark Shuttleworth
    B. Albert Einstein
    C. Buzz Aldrin
    D. Thomas Edison

79. Arrange the following planets in terms of the decrease in their sizes:

    A. Pluto, Mars, Earth and Saturn
    B. Jupiter, Uranus, Mars and Earth
    C. Saturn, Neptune, Earth and Mercury
    D. Pluto, Mercury, Earth and Venus

80. Which are the only two planets in the Solar System that do not have moons?

    A. Mars and Mercury
    B. Jupiter and Saturn
    C. Mercury and Venus
    D. Sun and Venus

81. On which planet in the Solar System does it constantly rain with sulphuric acid?

    A. Mars
    B. Jupiter
    C. Venus
    D. Earth

82. How long does it take for the Moon to orbit the Earth?

    A. Approximately 28 years
    B. Approximately 1 day
    C. Approximately 1 year
    D. Approximately 28 days

83. Which of the following planets has rings around it?

    A. Saturn
    B. Pluto
    C. Mars
    D. Venus

84. Which of the following is not applicable with regard to planets?

    A. They all orbit the Sun and they all rotate on their axis.
    B. They all have an atmosphere containing free oxygen.
    C. They all have seasons.
    D. They all have day and night.

85. Which planet has a year which is shorter than its day?

    A. Jupiter
    B. Mercury
    C. Earth
    D. Venus

Space Science

86. Which of the following may cause a black hole?

    A. Comets
    B. Meteors
    C. Satellites
    D. An exploding star

87. How often does Haley's comet appear?

    A. Every 72 years
    B. Every 76 years

C. Every 78 years
D. Every 74 years

88. What name is given to the time of the year when the Sun is directly over the Equator at noon?

A. Equi-sun
B. Equine
C. Equinox
D. Equidistant

89. Which gas is the main constituent of the atmosphere on Mars?

A. Carbon Dioxide
B. Nitrogen
C. Helium
D. Methane

90. The brightest star in the night sky is one of the closest to Earth and is often called the Dog Star. It is very easily spotted in winter and spring evenings. Its real official name is…

A. Sirius
B. Venus
C. Sun
D. Saturn

91. When did Mark Shuttleworth go to space?

A. April 2002
B. September 1973
C. November 2004
D. February 2000

92. The average distance from the Earth to the Sun is measured using a term known as an Astronomical Unit (AU). In km, this is equivalent to

A. 150 000 km
B. 1 500 000 km
C. 150 000 0000 km
D. 15 000 000 km

93. With which foot/feet did Neil Armstrong first step onto the moon?

A. Both his feet
B. His right
C. His left
D. None of his feet

94. Which of these is the hotter?

A. The surface of the Sun
B. The centre of the Earth
C. The centre of the Sun
D. The surface of the Earth

95. The Earth's axis is on a _____ degree angle compared to its orbit.

A. 30.5
B. 28.3
C. 23.5
D. 60

96. The announcement that a consortium of African nations, headed by South Africa and including Zambia, has won the mandate to host the biggest portion of the Square Kilometre Array (SKA) radio telescope project was made at…

A. OR Tambo International Airport, South Africa
B. Hamilton Airport, Australia
C. Kenneth Kaunda International Airport, Zambia
D. Schiphol Airport, Netherlands

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

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

98. Who was the first woman in space?

A. Sally Ride
B. Valentina Tereshkova

C. Lori Garvel
D. Christa McCauliffe

99. What are the three major stages of the space shuttle stack?

A. The cockpit, tail plane and wings
B. The orbiter, special logistics module and main engines
C. The flight deck, crew compartment and payload bay
D. The orbiter, external fuel tank and solid rocket boosters

100. In South Africa there is a famous south easterly wind that blows during the summer months from around September to March. It swirls down from False Bay to Cape Town and helps to keep the air fresh and the sea sparkling. What is its traditional name?

A. The Cape Wind
B. The Cape Nurse
C. The Cape Doctor
D. The Capability Wind

The End