



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

**GRADE 4 TO 6**

**12 MAY 2016**

**09:00 - 12:00**

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### 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 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.

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**Three hours are allowed to answer the questions**

# Natural Science Olympiad 2016

## Grade 4 to 6

1. Which one of the following is an instinctive behaviour?

- A A person talking.
- B A baby born knowing how to cry.
- C A girl born with blue eyes.
- D Pulling out of a tooth.

2. Apart from the four familiar tastes we have come to know best, there is a fifth taste known as ....

- A hearing
- B Sight
- C Crying
- D Umami

3. Which two processes occur during the life spans of all animals?

- A Hibernation and migration.
- B Growth and development.
- C Changing colour and shedding fur.
- D Building nests and communication.

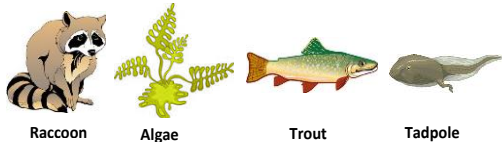
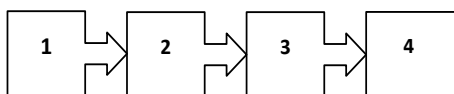
4. How many eyespots does a 7-armed starfish have?



- A 5
- B 10
- C 7
- D 14

5. A food chain which consists of four living organisms is indicated below. Place each of these living organisms in the correct box to complete this food chain.

Pond Food Chain



Raccoon      Algae      Trout      Tadpole

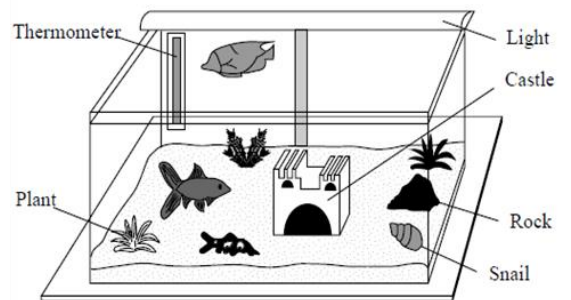
- A Box 1: Algae, Box 2: Trout, Box 3: Tadpole, Box 4: Raccoon
- B Box 1: Algae, Box 2: Tadpole, Box 3: Trout, Box 4: Raccoon
- C Box 1: Raccoon, Box 2: Trout, Box 3: Tadpole, Box 4: Algae
- D Box 1: Trout, Box 2: Tadpole, Box 3: Algae, Box 4: Raccoon

6. Consider the food chain in question 5 and answer the following question.

Which one of the following statements is correct if you can assume that the tadpole population suddenly increases in the area?

- A The trout population would increase.
- B The raccoon would have less trout to eat.
- C The trout would have fewer tadpoles to eat.
- D The algae would grow tall.

7. An aquarium with six labelled items is represented below.



Which item in the diagram above produces its own food by absorbing light?

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

8. With what does a butterfly taste its food?

- A Tongue
- B compound eyes
- C Antennae
- D Feet

9. An eagle's eye is almost as large as that of a human, but its sharpness is at least \_\_\_\_\_ that of a person with perfect vision.



- A half
- B twice
- C four times
- D twenty times

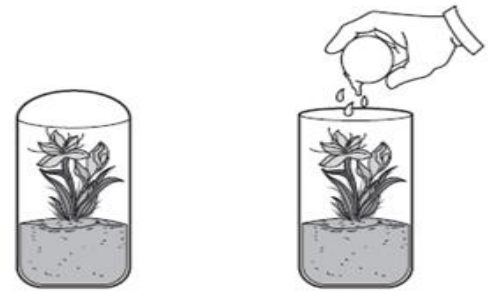
10. Three birds with different shaped beaks are shown below



Not to scale

The differences in the birds' beaks are examples of...

- A physical adaptations.
  - B hibernations.
  - C migrations.
  - D seasonal changes.
11. How does a lion's special colouring help it to survive?
- A It helps protect the lion from predators.
  - B It helps the lion sneak up on predators without being heard.
  - C It helps the lion hunt prey without being seen.
  - D It makes the lion completely invisible.
12. What is the mass of the smallest mammal in the world?
- A 20 g
  - B 2 g
  - C 50 g
  - D 10 g
13. Teresa and Rafael set up their terrariums for a class project as shown. Teresa never had to water hers but Rafael had to water his almost every other day. Why do you think this happened?



Teresa

Rafael

- A Teresa poured more water in hers before closing it up.
  - B Rafael used a different shape soda bottle to set his up.
  - C Rafael decided to leave the top off and water evaporated quickly.
  - D Teresa used plant food and Rafael did not.
14. Which of the following statements is not true about an ostrich?
- A It is native to South America.
  - B It can run at about 70 km/h.
  - C It can weigh up to about 145 kg.
  - D It is native to Africa.
15. What is the lightest organ in the human body?
- A The liver.
  - B The heart.
  - C The intestine.
  - D The lung.
16. The Black mamba, one of Africa's most feared and respected snakes, is the largest venomous snake in Africa and the second longest poisonous snake in the world. The "Black" is associated with \_\_\_\_\_
- A the colour inside its mouth.
  - B the colour of its intestines.
  - C the fact that it only attacks people wearing black clothes.
  - D the fact that it is mostly found in Black Forest in Germany.
17. Which of your body systems lets you know when water is hot?
- A Respiratory system.
  - B Nervous system.
  - C Circulatory system.
  - D Skeletal system.
18. Which of the following living things have the same function?

- A Seed and ear.
- B Root and wing.
- C Tree bark and skin.
- D Leaf and wing.

19. A student chooses a bag of almonds and raisins for a snack. Why can this be considered as a healthy snack?

- A It provides the greatest amount of sugars.
- B It provides a high amount of calories.
- C It provides vitamins and minerals.
- D It provides proteins and a high amount of fats.

20. What can sharks do that humans cannot?

- A Smell
- B Sense electricity
- C Hear
- D Taste

21. Peach trees have sweet-smelling blossoms and produce rich fruit. What is the main purpose of the flowers of a peach tree?

- A To attract bees for pollination.
- B To tell us that spring time has begun.
- C To create flower arrangements.
- D To feed migratory birds.

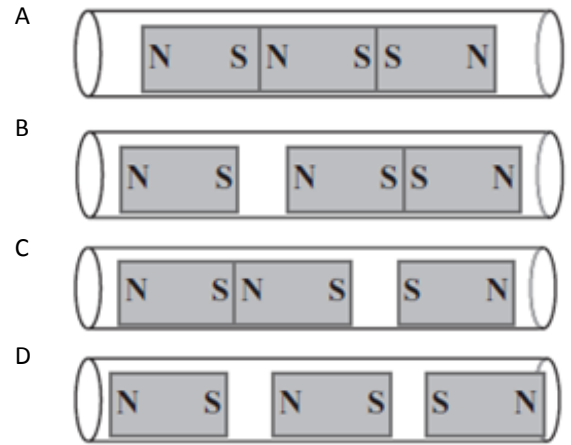
22. Fossil fuels are not renewable. What will happen if people continue to consume these fossil fuels?

- A Cars will be able to move faster.
- B We will need to make more fossil fuels.
- C Conditions will remain the same.
- D These resources will disappear.

23. A toaster changes electrical energy to .....

- A Heat energy.
- B Solar energy.
- C Sound energy.
- D Magnetic energy.

24. Three bar magnets are placed inside a plastic tube. Which of the following pictures best shows how the three bar magnets will move after being placed inside the tube?



25. What will happen if you add more cells in series to an electrical circuit containing two light bulbs, also connected in series?

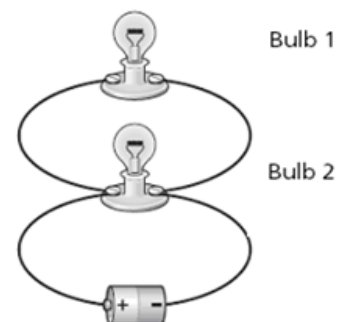
- A Nothing will happen.
- B The bulbs will dim.
- C The bulbs will shine brighter.
- D The bulbs will last longer.

26. A teacher places four small cubes on a table in front of a science class. Each cube is the same size and painted the same colour. However, each cube is made of a different material: copper, iron, wood, or plastic.

Which of the following tools would best help the students identify the cube made of iron?

- A Magnifying lens
- B Bar magnet
- C Metric ruler
- D Hot plate

27. A circuit with two bulbs connected in parallel is shown in the figure below.



Which of the following statements **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 and will become less bright.
- D Bulb 1 will stay lit and will continue to glow with the same brightness as before.

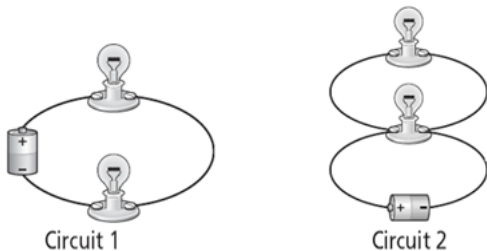
28. The breakdown in voltages used by ESKOM, from the high voltage transmission cables (on electricity pylons) to substations (in local areas) and then finally for domestic use, is as indicated in the figure below.



The above explanation in terms of voltages is as shown in

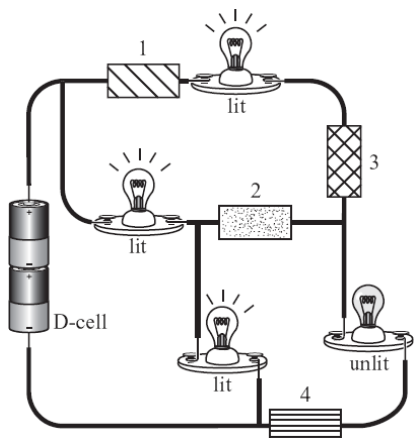
- A 11 000 V → 132 000 V → 220 V
- B 132 000 → 11 000 V → 220 V
- C 132 000 V → 220 V → → 11 000 V
- D 220 V → 11 000 V → 132 000 V

29. In which of the two circuits shown below will the bulbs be brighter?



- A Circuit 1.
- B Circuit 2.
- C Both circuits 1 and 2.
- D None of the circuits.

30. The circuit diagram below shows D-cells connected to four light bulbs and four different materials labelled 1, 2, 3, and 4.



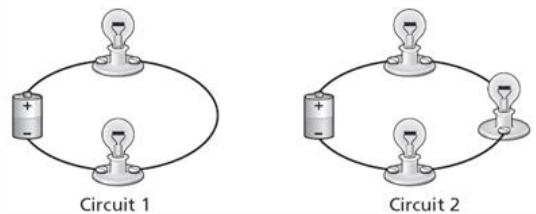
Which one of the materials is not a conductor of electrical current?

- A 1
- B 2
- C 3
- D 4

31. Which of the following statements best explains why magnets usually stick to a refrigerator door?

- A A refrigerator door is a good conductor.
- B A refrigerator door has electric wires in it.
- C A refrigerator door is smooth.
- D A refrigerator door contains iron.

32. A student observed the circuits shown below and noticed the light bulbs in Circuit 1 were brighter than the light bulbs in Circuit 2



Which of the following statements **best** explains the student's **observation**?

- A If more bulbs are added to a series circuit, then the bulbs will become brighter.
- B If more bulbs are added to a series circuit, then the bulbs will become less bright.
- C If longer wires are used in a series circuit, then the bulbs will become brighter.
- D If longer wires are used in a series circuit, then the bulbs will become dimmer.

33. In which year was the Earth Day first celebrated?

- A 2002
- B 1970
- C 1976
- D 1994

34. How long does it take glass to naturally degrade in nature?

- A One day.
- B One month.
- C Five years.
- D One million years.

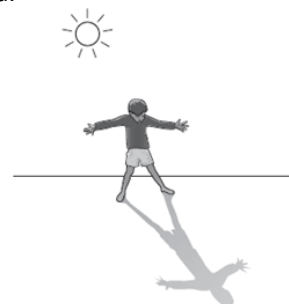
35. World Water Day is celebrated every year on \_\_\_\_\_
- A one day.
  - B 14 February.
  - C 22 March.
  - D 25 December.
36. Why is watering plants and grass in the early morning a way to conserve water?
- A There is always more water in the morning.
  - B Smaller amounts of water evaporate in the cool morning.
  - C Water used in the morning can be recycled for afternoon use.
  - D Grass can absorb water only in the morning.
37. Which region on Earth receives the most direct sunlight?
- A The deserts.
  - B The South Pole.
  - C The equator.
  - D The Western Hemisphere.
38. Which of the following cannot be recycled?
- A Milk cartons.
  - B Plastic water bottles.
  - C Glass containers.
  - D None of the above.
39. During which process are pieces of rock material being moved over the Earth's surface by water and wind?
- A Conduction
  - B Deposition
  - C Erosion
  - D Revolution
40. The formation of tides is based on \_\_\_\_
- A the position of the Earth's axis.
  - B the Earth's tilted axis.
  - C the moon's position relative to the Earth.
  - D the height of the Sun in the sky.
41. A cloud that touches the earth is called \_\_\_\_\_
- A Snow
  - B Fog
  - C Sleet

D water vapour

42. A smog alert is issued when there is a high concentration of smog in a specific area. Why should people avoid doing things outside when there is a smog alert?
- A A smog alert means that it is so cold that people might get frostbite.
  - B A smog alert means that it is so hot that people might get heatstroke.
  - C It is not healthy to inhale smog.
  - D The smog will cause people to get addicted to smoking.

43. In what way are molecules in a solid different from molecules in a liquid?
- A Molecules in a liquid are more tightly packed than molecules in a solid.
  - B Molecules in a liquid cannot move, but molecules in a solid can.
  - C The open spaces in-between solid molecules are smaller than the spaces in-between liquid molecules.
  - D Solid molecules are loosely packed and easily turn into steam.

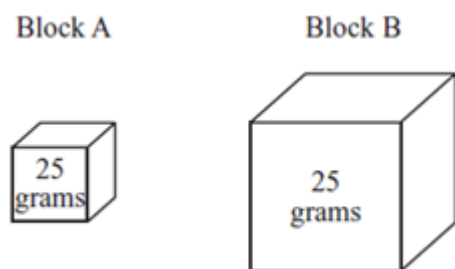
44. The picture below shows Brandon and the shadow he creates while standing on the playground.



Which of the following statements best explains why Brandon creates a shadow on the ground?

- A Brandon bends light waves from the Sun.
  - B Brandon reflects sunlight onto the ground.
  - C Brandon changes the colour of sunlight hitting the ground.
  - D Brandon's body blocks out the sunlight.
45. Two empty metal cans, one black and one white, were placed outside on a hot day. Both cans were the same size and were left in the Sun for 3 hours. Compared to the white can, the black can would most likely be \_\_\_\_\_
- A cooler, because it absorbs less sunlight.
  - B cooler, because it absorbs more sunlight.
  - C warmer, because it absorbs less sunlight.
  - D warmer, because it absorbs more sunlight.

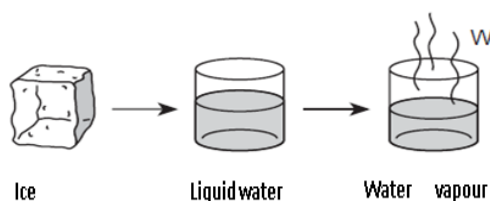
46. The food we eat is nearly always cooked. Why?
- Food changes colour when it is cooked and looks more appealing.
  - Cooking causes chemical and physical changes in food.
  - Food cannot be digested if eaten raw.
  - Food has to be cooked for us to chew it.
47. The following diagram shows two blocks that consist of different substances.



If Block A is located on the Moon and Block B is located on Earth, what property do these two blocks have in common?

- They have the same weight.
  - They have the same volume.
  - They have the same surface area.
  - None of the above.
48. Sugar is an example of a compound. Which of the following is not part of the composition of sugar?
- Sodium
  - Hydrogen
  - Oxygen
  - Carbon

The diagram below show the three phases of water. Use the diagram and answer **questions 49 and 50**.



49. The type of energy that must be added for the ice to change to liquid water is \_\_\_\_\_
- light energy.
  - mechanical energy.
  - sound energy.

D heat energy.

50. In which state does water have the smallest spaces in-between their particles?
- Ice.
  - Liquid water.
  - Water vapour.
  - None of the above.
51. Why can we say that exploding fireworks is an example of a chemical reaction?
- It is easy to reverse the explosion.
  - They are only used for special occasions.
  - Energy is given off and a colour change can be observed.
  - They are made of chemicals.
52. What is the name of a place that uses telescopes and other scientific equipment to research space and astronomy?
- Laboratory
  - Spaceship
  - Observatory
  - Telescope room
53. On earth, heat travels by radiation, convection, and conduction, but in space heat travels by \_\_\_\_\_ only.
- Radiation
  - Convection
  - conduction
  - None of the above
54. What sort of creatures were Laska and Benjy who went into space in 1958?
- Hares
  - Mice
  - Cats
  - Dogs
55. The **Square Kilometer Array (SKA)**, a radio telescope in development in Australia and South Africa, will have a total collecting area of approximately\_\_\_\_\_.



The Square Kilometre Array (SKA)

- A 1 000 000 km<sup>2</sup>
- B 1 00 km<sup>2</sup>
- C 1 000 000 m<sup>2</sup>
- D 1m<sup>2</sup>

56. Challenger's mission had aboard 5 astronauts and 3300 \_\_\_\_\_

- A bees.
- B mice.
- C ants.
- D packets of snacks.

57. Who was the only Apollo moonwalker to also fly in the Space Shuttle?

- A Neil Armstrong
- B Mark Shuttleworth
- C Galileo Galilei
- D John Young

58. Mark Richard Shuttleworth (born 18 September 1973) was the first citizen of an independent African country to go into space in 2002.



Mark Shuttleworth

How much time did he spend in space while on this mission?

- A Six months.
- B Three months.
- C One year and seven months.
- D Eight days.

59. Yuri Gagarin was the first human to travel into

space. What were his first words upon getting there?

- A "I wish I can stay here for good."
- B "Jane, get me off this crazy thing."
- C "I see Earth! It is so beautiful!"
- D "I don't see any god up here."

60. While in space in 2002, Mark Shuttleworth had a radio conversation with two South Africans. One of them was the late former president, Nelson Rolihlahla Mandela, and the other one was \_\_\_\_\_.



Nelson Mandela

- A His father, a surgeon, Dr Richard Dalton Shuttleworth.
- B His mother, a nursery school teacher, Mrs Ronelle Shuttleworth.
- C A 14-year-old terminally ill girl, Michelle Foster, who asked him to marry her.
- D Archbishop Emeritus Mpilo Desmond Tutu.

61. What experiments did Mark Shuttleworth participate in while in space?

- A Electricity
- B HIV and genome research
- C Light
- D Ebola

62. When were the first rockets made?

- A 1000 years ago
- B 100 years ago
- C 250 years ago
- D 2016 years ago

63. What do we call an object that moves around another object in space?

- A A planet.
- B A spaceship.
- C A satellite.
- D An electron.



64. Which planet has no surface for spacecraft to land on?
- A Mars
  - B Venus
  - C Saturn
  - D Jupiter

65. What kind of diving training do astronauts undergo which helps them to deal with space walks
- A Helmet (Hard-Hat) diving.
  - B Free (Breath-Hold) diving.
  - C Saturation diving.
  - D Scuba diving.

66. Which of the following statements is not regarded to be important when designing spacesuits for astronauts?
- A To protect astronauts from radiation in space.
  - B To make astronauts look fashionable.
  - C To protect astronauts from being injured from impacts of small bits of space.
  - D To protect astronauts from extreme temperatures.

67. How many people have set foot on the Moon?
- A 2
  - B 12
  - C 6
  - D 10

68. \_\_\_\_\_ are basically dusty snowballs which orbit the Sun
- A Flying saucers
  - B Comets
  - C Spaceships
  - D Sedimentaries

69. In 1985, the Giotto spacecraft set a new record for the closest visit to \_\_\_\_\_
- A the core of a comet.
  - B the red spot of Jupiter.
  - C an active solar flare.
  - D the rings of Saturn.

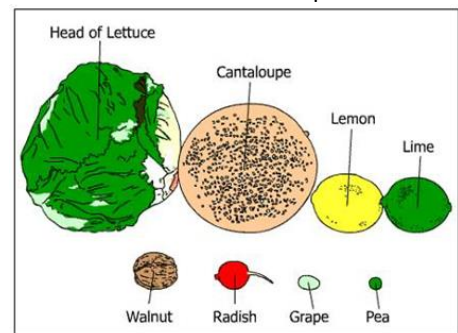
70. Which gas is circulated inside the helmet of a spacesuit?

- A Carbon dioxide.
- B Nitrogen.
- C Oxygen.
- D Helium.

71. A refracting telescope uses \_\_\_\_\_ to form an image.

- A mirrors
- B film
- C television systems
- D lenses

72. A student chose food items from her kitchen to model the size of the planets in our solar system. She chose one food item to represent each planet. The **walnut** is used to represent Earth.



Food of different sizes.

Which statement correctly matches the food items with the planets they represent?

- A The cantaloupe represents Jupiter, and the grape represents Mercury.
- B The lemon represents Uranus, and the lime represents Neptune.
- C The pea represents Neptune, and the radish represents Venus.
- D The radish represents Mars, and the head of lettuce represents Saturn.

73. The appearance of the Moon as observed from Earth changes over time because of the Moon's \_\_\_\_\_

- A orbit around Earth.
- B rotation.
- C gravity.
- D temperature.

74. What is responsible for the formation of tides?

- A The Earth's tilted axis.
- B The Earth's rotation around its own axis.
- C The moon's position relative to the Earth.
- D The height of the Sun in the sky.

75. Consider the following table showing characteristics of objects found in our Solar system. Each characteristic is numbered (1 – 9)

Size	Colour	Composition
(1) ¼ of Earth's diameter	(4) Red	(7) Rock
(2) 11 times Earth's diameter	(5) Yellow	(8) Ice
(3) 110 times Earth's diameter	(6) Blue	(9) Gas

Which combination of characteristics best describes the sun?

- A 2, 6, 8  
 B 3, 5, 9  
 C 1, 5, 7  
 D 3, 4, 8
76. The surface of Mercury can get as hot as \_\_\_\_\_.
- A 100 °C  
 B 247 °C  
 C 427 °C  
 D 742 °C
77. Planets that are close to the Sun \_\_\_\_\_
- A continuously move closer and closer to the Sun.  
 B orbit faster than the outer planets.  
 C orbit slower than the outer planets.  
 D move through the asteroid belt.
78. What is the name of the star that is the **brightest** in Earth's night sky?
- A Sirius A  
 B Atlas  
 C Alpha  
 D Omega
79. About how many Earths could one fit inside Jupiter?
- A 40  
 B 365  
 C 1 million  
 D 1000

80. Which planets have rings?
- A Jupiter, Saturn, Uranus and Neptune.  
 B Saturn, Pluto, Neptune, and Venus.  
 C Mars, Jupiter, and Saturn.  
 D Jupiter, Saturn, Neptune, and Venus.

81. Of the nine known planets, seven have one or more natural satellites. Name the only two moonless planets.

- A Pluto and Mars.  
 B Venus and Mercury.  
 C Jupiter and Mercury.  
 D Venus and Jupiter.

82. The Sun's internal structure is broken up into three zones?



The sun

These three zones are \_\_\_\_\_

- A The core, the radiative zone, the convective zone.  
 B The core, the helium zone, the convective zone.  
 C The core, the radiative zone, the hydrogen zone.  
 D The core, the helium zone, the hydrogen zone.
83. Which one of the following planets was known as the smallest planet in our solar system?
- A Pluto  
 B Jupiter  
 C Venus  
 D Mars
84. A \_\_\_\_\_ is a small solid rock travelling through the atmosphere.
- A meteor  
 B comet  
 C Star  
 D asteroid
85. What do the Earth and the Moon have in common?



The Earth and the Moon

- A Both have no atmosphere.
  - B Both are planets.
  - C Both revolve around a larger object.
  - D They have nothing in common.
86. A comet's tail points in which direction?
- A Toward the Sun.
  - B Toward the Earth.
  - C Behind the comet in its orbit.
  - D Away from the Sun.
87. The period in-between one full moon to the next is:
- A 30.3 days
  - B 30 days
  - C 29.5 days
  - D 28 days
88. Who was the first man to classify stars according to their brightness?
- A Aristarchus
  - B Pythagoras
  - C Copernicus
  - D Hipparchus
89. Apart from a flat main ring, what are the names of Jupiter's other major rings?



Jupiter

- A Marin and Halo.
- B Gossamer and Halo.
- C Go-Sam and Marin.
- D Marion and Gossamer.

90. On which one of the following planets would the Sun rise in the west?
- A Saturn
  - B Pluto
  - C Venus
  - D Mercury
91. Approximately how many stars can be seen with the naked eye on a clear, dark and moonless night?
- A 3000
  - B 1000
  - C 300
  - D 10 000
92. Which one of the following statements is true for **both** Saturn and Jupiter?
- A Both rotate faster than the Earth.
  - B Both rotate slower than the Earth.
  - C Only one rotates rapidly while the other rotates very slowly.
  - D Their periods of rotation are linked to their period of revolution.
93. Rounded to the nearest day, the Mercurian year is equal to \_\_\_\_\_ Earth days?
- A 365
  - B 366
  - C 88
  - D 1
94. How many teeth do humans have in their lifetime?
- A 20
  - B 32
  - C 16
  - D 52
95. Adults have \_\_\_\_\_ less bones in their bodies than infants?
- A 206
  - B 396
  - C 94
  - D 506
96. How long is an adult giraffe's tongue?
- A 47 cm

- B 102 cm
- C 20 cm
- D 15 cm

97. Which of the following can be considered as both a vegetable and a fruit?

- A Spinach
- B Onion
- C Cabbage
- D Tomato

98. Your sense of taste is dependent on your tongue. Which part of your tongue tastes the sweet stuff?

- A the sides of your tongue.
- B the centre of your tongue.
- C the back of your tongue.
- D the tip of your tongue.

99. Which one of the following animals has a four-chambered stomach?

- A Cow
- B Elephant
- C Pig
- D Crocodile

100. Which one of the following statements is correct about thunder and lightning?

- A You see thunder and hear lightning.
- B You see lightning and hear thunder.
- C You do not see any of them but hear both of them.
- D You see and hear both.

**The End**