



SOUTH AFRICAN AGENCY FOR SCIENCE AND TECHNOLOGY ADVANCEMENT
8th NATURAL SCIENCE OLYMPIAD EXAM
GRADES 4 – 6
2018
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.

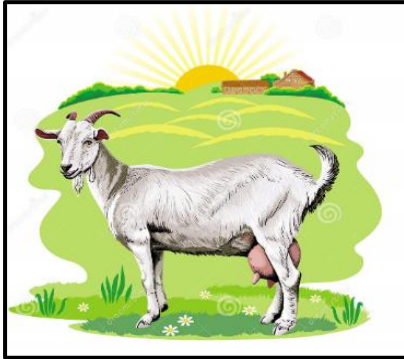
The use of **non-programmable** electronic calculators is permitted.

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

Natural Science Olympiad 2018

Grade 4 to 6



Consider the figure above and answer the questions (1 to 8) below:

- 1. The goat is an example of ...**
 - A. a herbivore.
 - B. a carnivore.
 - C. an omnivore.
 - D. a scavenger.
- 2. The main source of energy for the plants in the picture is ...**
 - A. their flowers.
 - B. water.
 - C. soil.
 - D. the Sun.
- 3. Green plants are also called...**
 - A. greenery.
 - B. consumers.
 - C. producers.
 - D. decomposers.
- 4. A fully-grown plant is called ...**
 - A. an adult.
 - B. a pupa.
 - C. a branch.
 - D. a decomposer.
- 5. What is the role of a flower?**
 - A. Flowers make the plant look beautiful.

- B. Flowers produce food for the plant.
- C. Flowers produce seeds.
- D. Flowers smell good.

- 6. The main function of plant leaves is to ...?**
 - A. breathe in oxygen.
 - B. breathe in carbon dioxide.
 - C. breathe in water.
 - D. absorb water.
- 7. The process by which plants use light to make their own food is called ...**
 - A. reproduction.
 - B. production.
 - C. foodination.
 - D. photosynthesis.
- 8. Which of the following two life processes takes place during the normal life span of a goat?**
 - A. Hibernation and migration
 - B. Growth and reproduction
 - C. Changing colour and growth
 - D. Grazing and playing

Consider the picture of the child shown below and answer the following questions (9 to 16).



- 9. A substance needed by the child for growth, energy, repair and maintenance is called a ...**
 - A. nutrient.
 - B. carbohydrate.
 - C. milk.
 - D. vitamin.
- 10. The child's body needs vitamins and minerals because ...**

- A. it gives her body energy.
- B. it helps carry out metabolic reactions.
- C. it insulates her body's organs.
- D. it withdraws heat from her body.

11. A chemical element that the body needs for building strong bones and to work properly is ...

- A. calcium.
- B. silver.
- C. gold.
- D. lead.

12. In a healthy diet, the child can get most of her fat from ...

- A. beef, chicken, and fish.
- B. vegetables oils, nuts, and fish.
- C. fats, oils, and sweets.
- D. milk, yogurt, and cheese.

13. Which of the following food groups is the best source of energy?

- A. Meat group
- B. Fats, oils and sweets
- C. Bread and cereals
- D. Milk and cheese

14. Which of the following is mainly found in milk?

- A. B vitamins
- B. Vitamin E
- C. Carbohydrates
- D. Calcium

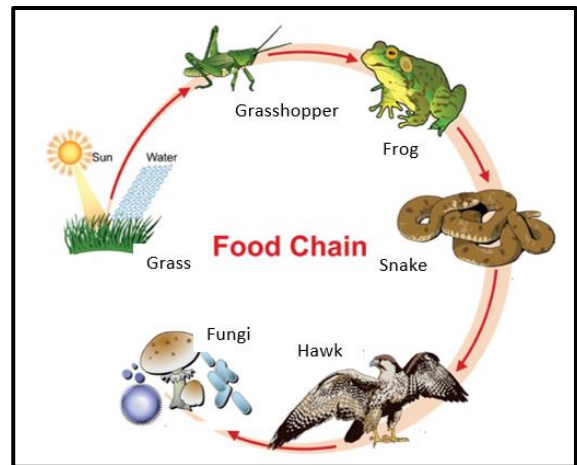
15. Which nutrient is needed for making healthier skin?

- A. Fat
- B. Carbohydrate
- C. Fibre
- D. Vitamins

16. Fruits and vegetables are usually considered as good sources of ...

- A. protein.
- B. vitamins and minerals.
- C. unsaturated fats.
- D. calcium.

Consider the figure below and answer questions 17 to 23.



17. The frog in this food chain represents a ...

- A. prey.
- B. predator.
- C. producer.
- D. scavenger.

18. Which of the following represents a primary consumer?

- A. Plant
- B. Grasshopper
- C. Frog
- D. Snake

19. The fungi in this food chain represents a...

- A. producer.
- B. final predator.
- C. decomposer.
- D. prey.

20. If the frog in this food chain dies, then ...

- A. the number of grasshoppers will decrease.
- B. the number of the snakes will increase.
- C. the number of snakes will not change.
- D. the number of grasshoppers will increase

21. The snake in the figure above is ...

- A. a consumer and a producer.
- B. a prey and a consumer.
- C. a consumer and a decomposer.

- D. a producer and a prey.
22. Which one of following statements regarding living organisms is **NOT** correct?
- A. A mushroom is an example of a fungus.
 B. The disease, tuberculosis, is caused by a virus.
 C. Living organisms are classified according to their shared characteristics.
 D. Living organisms consist of bacteria, Protista, fungi, plants and animals only.
23. Which one of the following statements is **INCORRECT**?
- A. A crab, snail and fish are vertebrate animals.
 B. A frog, crab and fish are animals.
 C. A fish and a frog are vertebrate animals.
 D. Crabs and snails are invertebrate animals.
24. Which statement related to the plant in the picture is **CORRECT**?






- A. The plant shown above is a monocotyledon angiosperm.
 B. The plant shown above is a dicotyledonous angiosperm.
 C. The plant shown above is dicotyledonous gymnosperm
 D. The plant shown above is a monocotyledon gymnosperm
25. Which of the following is a sexual organ of a living organism?
- A. Pollen
 B. Sperm
 C. Flower
 D. Spores

26. Which of the following contains male cells of a living organism?
- A. Sperm
 B. Pollen
 C. Stigma
 D. Petals
27. Which of the following belongs to the species 'Homo sapiens'?
- A. Apes and a baboon
 B. Humans and apes
 C. Gorilla, apes, baboons and humans
 D. humans
28. Some of the basic needs of all living things includes ...
- A. food, water, and life.
 B. food, water, and living space.
 C. food, water, and grass.
 D. food, water, and love.
29. Which type of blood vessel carries blood away from the heart?
- A. Capillary
 B. Vein
 C. Artery
 D. Cell wall
30. Where does most of the water needed for photosynthesis come from?
- A. From air through the tiny pores in the leaf
 B. From the soil through the roots of the plant
 C. As a result of respiration within the leaf
 D. From water vapour in the air
31. Fracking, or hydraulic fracturing, is the process of fracturing rock by a pressurised liquid to extract natural gas from shale rock layers deep within the Earth. South Africa has a huge reserve of shale gas in the Karoo area which could benefit the economy of South Africa. Some people are opposed to possible fracking in the Karoo because it is suspected that ...
- A. fracking will not create many jobs.
 B. fracking will pollute the air.
 C. fracking will affect water resources badly.

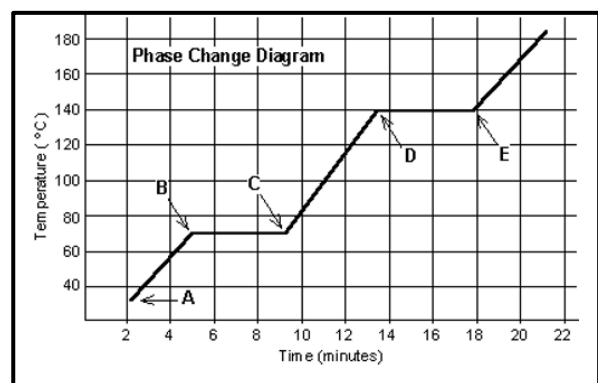
- D. fracking will cause veld fires.
- 32. Crude oil is a stored energy that is derived (originates) from ...**
- A. sedimentary rocks.
 B. mixture of air and oil.
 C. once-living plants and animals.
 D. water and mud.
- 33. Which one of the following is an example of 'clean energy'?**
- A. Nuclear energy
 B. Wind energy
 C. Fossil fuel
 D. Diesel energy
- 34. In a typical car, the percentage of energy from petrol that is converted into actual motion of the car is about ...**
- A. 90%, with 10% wasted as heat and sound.
 B. 50%, with 50% wasted as heat and sound.
 C. 30%, with 70% wasted as heat and sound.
 D. 5%, with 95% wasted as heat and sound.
- 35. It is advisable for parents not to carry or hold children when traveling because the mass of a child increase five-fold during an accident involving a moving vehicle, and a parent will not be able to hold onto the child in the event of an accident.**
- A. The statement is correct because mass increases with the increase in the speed of an object.
 B. The statement is not correct because mass decreases with an increase in the speed of an object.
 C. The statement is not correct because mass does not change with a change in the speed of an object.
 D. The statement is not correct because mass decreases with the increase in the speed of an object.
- 36. Which of the following statements is CORRECT?**
- A. Heat is transferred by conduction when grilling meat on a braai stand.
 B. Heat is transferred by convection when water is boiled in a kettle.
 C. Heat is transferred by radiation when baking a cake.
 D. All of the above are correct.
- 37. Which type of house will be cooler in summer and warmer in winter?**
- A. A house made of concrete bricks
 B. A house made of corrugated metal
 C. A house made of wood
 D. A house made of plastic sheets
- 38. Which of the following statements about a car travelling along a freeway is CORRECT?**
- A. Chemical energy in petrol is completely converted to useful kinetic energy.
 B. The output energy of the car is equal to the input energy.
 C. Wasted energy is produced in the form of potential energy.
 D. Sound is a form of wasted energy produced by the moving car.
- 39. Which of the following statements referring to the generation of electricity is CORRECT?**
- A. During electricity generation by coal fired power stations, chemical energy is converted into heat, then into kinetic energy, then into electricity.
 B. 95% of electricity generation in South Africa is from coal fired power stations because there is a lot of coal in South Africa and it is a cheap renewable energy resource.
 C. The advantage of a nuclear power station is that it does not generate any waste that can be harmful to the environment.
 D. Electricity produced by wind turbines and solar panels do not pollute the environment, is cheap to setup, is reliable and far more efficient than coal fired power station.
- 40. The best place to be in during a thunder storm is ...**
- A. in an open field.
 B. under a tall tree.
 C. in a shack made of corrugated iron.
 D. in a tent.
- 41. Consider two beakers containing water at 80°C and 10°C. The water from the two beakers is now mixed together in another beaker. The temperature of the new mixture will be ...**

- A. more than 80°C.
 - B. less than 10°C.
 - C. more than 10°C but far less than 80°C.
 - D. equal to 90°C.
42. Which of the following lamps is the least energy efficient electric light source?
- A. LED lamp
 - B. CFL lamp
 - C. Incandescent lamp
 - D. CFL Tube
43. Which of the following statements related to renewable energy sources is TRUE?
- A. Renewable energy sources can be replenished.
 - B. Renewable energy sources will be depleted over time.
 - C. Renewable energy sources are bad for the environment.
 - D. Renewable energy sources can't be replaced by nature.
44. The four electric appliances shown below have their power (in Watts) indicated on them. Which one of the four appliances will use more electricity if they are all switched on for eight hours a day?

 Light bulbs 100 Watts	 Television 80 Watts
 Heater 3000 Watts	 Refrigerator 250 Watts

- A. Light bulb
 - B. Television
 - C. Heater
 - D. Fridge
45. The transfer of thermal energy by movement of particles through gases and liquids is an example of energy transfer through ...
- A. convection.
 - B. conduction.
 - C. radiation.
 - D. convention.
46. The Sun's rays increasing the temperature of a house is an example of energy transfer through ...
- A. convection.
 - B. conduction.
 - C. sublimation.
 - D. radiation.
47. A voltmeter is used to measure ...
- A. resistance.
 - B. current.
 - C. pressure.
 - D. potential difference.

Use the following phase change diagram to answer questions 48 and 49.



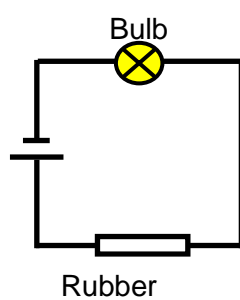
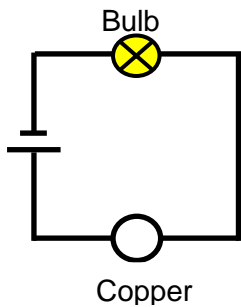
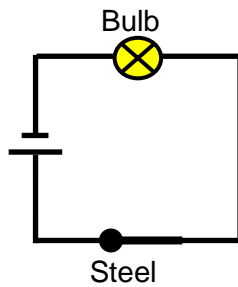
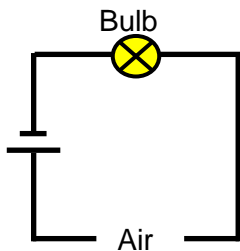
48. The diagram above shows the heating of an unknown substance. Its melting point is ...
- A. between 35°C and 70°C.
 - B. 70°C.
 - C. between 70°C and 140°C.

D. 140°C.

49. The substance is _____ while heat is added between points D and E.

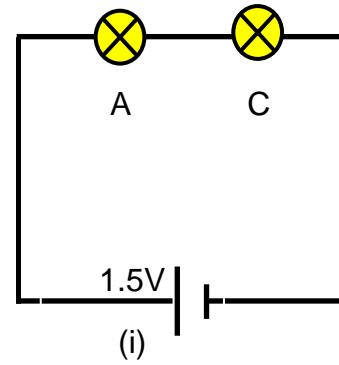
- A. sublimating
- B. freezing
- C. melting
- D. boiling

50. The following diagrams show a cell and a bulb connected by wires to various materials as indicated. Which of the bulbs will light up?

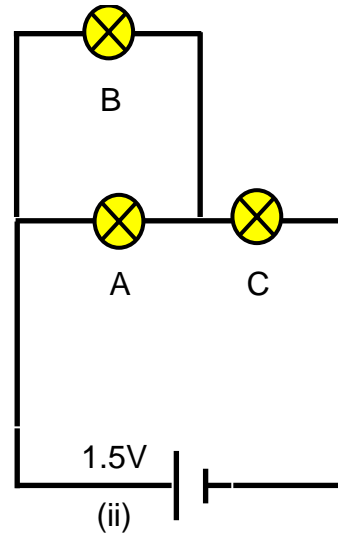


- A. Bulbs 1 and 2 only
- B. Bulbs 2 and 3 only
- C. Bulbs 3 and 4 only
- D. 1, 2 and 3 only

51. Study the two circuits, (i) and (ii). The first circuit shows two bulbs, A and C, connected in series. In circuit (ii), bulb B is connected in parallel with bulb A. How will the brightness of bulb C in circuit (ii) change if all the bulbs A, B and C have the same specification?



(i)



(ii)

- A. Increase
- B. Decrease
- C. Not change
- D. Will switch off

52. Which of the following statements is NOT correct?

- A. While water freezes its temperature does not change.
- B. While water boils its temperature increases.
- C. While water freezes its density decreases.
- D. While water boils its density decreases

53. Dry air consists of ...

- A. 78% nitrogen, 20.9% oxygen, 0.9% argon, 0.03% carbon dioxide.

- B. 78% oxygen, 20.9% nitrogen, 0.9% carbon dioxide and 0.03% argon.
- C. 78% oxygen, 20.9% carbon dioxide, 0.9% nitrogen and 0.03% argon.
- D. 78% oxygen, 20.9% nitrogen, 0.9% carbon dioxide and 0.03% argon.

54. Which of the following statements is correct regarding acid rain?

- A. Acid rain is caused by water pollution.
- B. Acid rain is caused when carbon dioxide dissolves in rain water to form carbonic acid.
- C. The main gases responsible for acid rain are sulphur oxide and nitrogen oxide.
- D. Acid rain is rain water with PH of more than 8.

55. Which kind of energy is produced when a learner beats a drum?

- A. Electrical energy
- B. Sound energy
- C. Light energy
- D. Chemical energy

56. When oil is burning, the reaction will ...

- A. release energy.
- B. absorb energy.
- C. neither absorb nor release energy.
- D. sometimes release and absorb energy depending on the oil.

57. What is formed when a neutral atom loses an electron?

- A. A gas
- B. An ion
- C. An acid
- D. A molecule

58. What percentage of an adult human body is water?

- A. 40% to 50%
- B. 57% to 63%
- C. 75%
- D. 95%

59. Which of the following waste materials must never be recycled?

- A. Garden waste
- B. Metals
- C. Medical waste
- D. Plastic

60. Which of the following is NOT a negative consequence associated with poor waste management?

- A. Pollution of water, soil and the environment in general
- B. Diseases and other health hazards
- C. Blockage of sewers and water drainage systems
- D. Soil erosion

61. The wrought iron gate shown below will rust if exposed to ...



- A. wind and heat.
- B. moisture, heat and light.
- C. oxygen and moisture.
- D. oxygen and light.

62. Which method of physical separation involves two phase changes?

- A. Using magnet
- B. Evaporation
- C. Distillation
- D. Chromatography

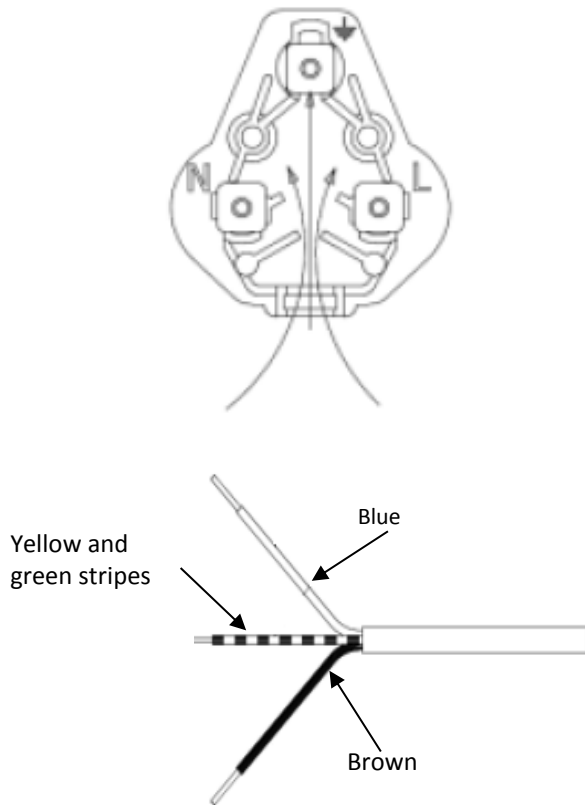
63. Which of the following statements give safety tips for using electricity?

- (i) Do not use a fork or a knife or anything metal to remove toast from a toaster when it is plugged in.
- (ii) Never use water to put out an electrical fire if the mains are not switched off.
- (iii) Never use electrical appliances in damp or wet areas.

- A. (i) and (ii)
- B. (i), (ii) and (iii)

- C. (i) and (iii)
- D. (ii) and (iii)

64. The diagram below shows a three-pin plug and a 3-core electric wire. If the plug is to be connected to the electric wire, then the correct way for the connection to be done is as follows:



- A. Blue wire – neutral, brown wire – live, yellow & green wire - earth
- B. Blue wire – earth, brown wire – live, yellow & green wire- neutral
- C. Blue wire – live, brown wire – neutral, yellow and green wire – earth
- D. Connect in any order as long as all wires are connected.

65. An example of a direct current (DC) circuit is ...

- A. A torch using a 1.5 V cell.
- B. A lamp using paraffin.
- C. A 240 V fan connected to the main power supply.
- D. A fire made of wood.

66. The total resistance of a number of resistors connected in parallel is ...

- A. always GREATER than the total resistance of the same resistors connected in series.

- B. always LESS than the total resistance of the same resistors connected in series.
- C. always EQUAL to the total resistance when the same resistors are connected in series.
- D. always equal to ZERO.

67. Energy derived from coal is called?

- A. Mechanical energy
- B. Potential energy
- C. Electrical energy
- D. Kinetic energy

68. Independent Power Producers (IPPs) will provide South Africans with...

- A. cheap petrol.
- B. cheap electricity.
- C. clean energy.
- D. cheap coal.

69. Which is the best activity to help keep a home cool in the summer?

- A. Open the refrigerator often.
- B. Turn off the television, radios and computers.
- C. Open the windows during the day.
- D. Close the shades where the Sun is shining.

70. Where in a room would you find the warmest air during wintertime?

- A. Near the ceiling
- B. Near the floor
- C. In the corners
- D. By a window

71. Which one of the following is an example of a light reflector?

- A. The planet Mars
- B. Lightning
- C. Exploding fireworks
- D. Stars

72. Which of the following statements gives evidence to the fact that the Moon can be viewed as a light reflector instead of a light producer?

- A. The Moon makes its own light from energy within it.

- B. The Moon is visible because light from the Sun bounces off of it.
- C. The Moon is not visible from Earth during the new moon phase.
- D. The Moon glows from radiant energy below its surface.

73. What causes an echo?

- A. Sound waves that are absorbed by objects
- B. Sound waves that are transmitted through objects
- C. Sound waves that are reflected off objects
- D. Sound waves that completely disappear

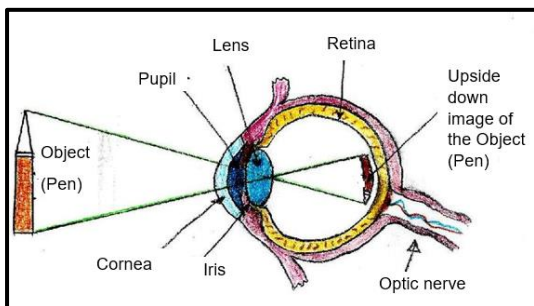
74. What would happen if you INCREASE the frequency of a sound wave?

- A. The sound would get louder.
- B. The sound would get softer.
- C. The sound would be higher in pitch.
- D. The sound would be lower in pitch.

75. What would happen if you increased the intensity of a sound?

- A. The sound would get louder.
- B. The sound would get softer.
- C. The sound would be higher.
- D. The sound would be lower.

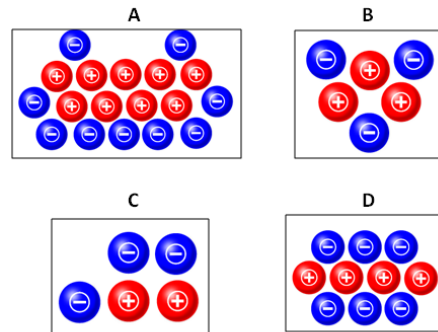
76. The figure below shows how an image of a pencil is formed on the retina of a human eye. Which of the statements that follows is correct?



- A. The pencil is the source of light, the air between the pen and the eye is transparent, the cornea is transparent, the lens is transparent and the retina is opaque.
- B. The pencil reflects light, the air between the pencil and the eye is transparent, the cornea is transparent, the lens is transparent and the retina is opaque.

- C. The pencil, the cornea and the retina are opaque materials.
- D. The pencil refracts light and the lens reflects light.

77. Consider the four charged objects in the figures below and choose the correct answer.



- A. The total charge on object A is the same as the total charge on object D.
- B. The total charge on object A is greater than the total charge on object D.
- C. Object C will be repelled by object D.
- D. Object B is negatively charged.

78. A soil sample contains living and non-living materials. Which material is organic?

- A. Sand particles
- B. Decomposing leaves
- C. Small pebbles
- D. Water droplets

79. What is the name of the star situated in the centre of our Solar System?

- A. The Sun.
- B. The Moon
- C. The Earth
- D. The Milky Way

80. What is the diameter of the Sun?

- A. About 1 000 000 km
- B. About 1,392 684 km
- C. About 1 000 km
- D. About 10 000 000 km

81. What percentage of the Solar System's mass is contained by the Sun?
- A. 10%
B. 55%
C. 80%
D. 99.8%
82. How long ago was the Sun born?
- A. Roughly 1 million years ago
B. Roughly 1 billion years ago
C. Roughly 3 million ago
D. Roughly 4.6 billion years ago
83. What is the distance between the Sun and Earth?
- A. 149 600 000 km
B. 12 300 km
C. 500 000 km
D. 1 000 000 km
84. The Sun is made up of ...
- A. fire.
B. 71% hydrogen, 26.5% helium and 2.5% other elements.
C. 80% hydrogen and 20% oxygen
D. 71% helium and 29% oxygen
85. How long does the Sun's rays take to reach Earth?
- A. 24 hours
B. 24 days
C. 8 days
D. 8 minutes.
86. Which planet in our Solar System is nearest to the Sun?
- A. Venus
B. Mercury
C. Saturn
D. Pluto
87. Which planet is known as the Morning Star and the Evening Star?
- A. Earth
B. Mars
C. Venus
D. Mercury
88. The diameter of Mercury is ...
- A. more than that of the Earth.
B. more than that of Mars.
C. about 5 000 km.
D. about 1 000 000km.
89. Which is the largest planet in our solar system?
- A. Jupiter
B. Saturn
C. Neptune
D. Mars
90. The planet with the most moons in the Solar System is ...
- A. Jupiter.
B. Earth.
C. Venus.
D. Mercury.
91. Which of the following is the hottest planet in the Solar System?
- A. Earth
B. Neptune
C. Saturn
D. Venus.
92. How long does it take the Moon to orbit around the Earth?
- A. 365 days
B. 24 hours
C. 27 days.
D. 30 days
93. When was the first man made object sent into space?
- A. 1942
B. 2000
C. 1960
D. 1994
94. What is responsible for high and low tides?
- A. The large amount of water in the sea
B. The wind blowing over the ocean

- C. The Sun and Moon's gravity
- D. The ships in the sea

95. Most of the Earth's atmosphere is situated within _____ of the Earth's surface

- A. 1000m
- B. 11km
- C. 100km
- D. 25 km

96. Who was the first woman to reach space?

- A. Valentina Trovoski
- B. Valentina Tereshkova
- C. Maria Seranova
- D. Johannah Perreli

97. Who was the first person to set foot on the Moon?

- A. Mark Shuttleworth
- B. Neil Armstrong
- C. Paul Adams
- D. John Kennedy

98. When does a lunar eclipse occur?

- A. When the Earth is between the Sun and the Moon
- B. When the Sun is between the Earth and the Moon
- C. When the Sun has set
- D. When it is full moon

99. In what year was the planet Pluto classified as a dwarf planet?

- A. In 2001
- B. in 2006
- C. in 1999
- D. in 2010

100. Which one of the following statements best explains why the Sun appears to rise in the morning and set in the evening?

- A. The Earth rotates on its own axis.
- B. The Sun rotates on its own axis.
- C. The Sun revolves around the Earth.
- D. The Earth revolves around the Sun.