NATIONAL TEACHERS COUNCIL

NATIONAL LEVEL

SCIENCE OLYMPIAD

Class 9

Time Allowed: 90 Minutes   **Maximum Mark: 50**

This Test Booklet contains 12 pages. Do not open the Test Booklet until you are asked to do so.

Important instructions

1. ***The Answer Sheet is inside this Test Booklet.*** *When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue/black ball point pen.***

2. *The question paper is divided into two sections.* **Science** *(40 Questions) and* **Logical Reasoning** *(10 Questions)*

3. *All the two Sections contain Multiple Choice Questions (MCQs). Each of these questions has four options out of which only one option is correct.*

4. *Each question should be answered by **darkening** the appropriate circle (A, B, C, or D) with a **blue or black ball pen***.

5. *All questions are compulsory. There is no negative marks for wrong answer.*

6. *Answer recorded once in the answer sheet cannot be altered.*

7. *All rough works should be done only in the space provided for **rough work** in this question paper.*

8. *Calculator is not permitted in the examination hall.*

9. *Candidate should write his / her name in the space provided for the purpose.*

Candidate's Name:

Roll Number   :

……………………
Candidate's Signature

…………………...
Invigilator's Signature

SCIENCE

1 The hard covering of seeds and nuts is due to

    [A] Parenchyma   [B] Sclerenchyma

    [C] Collenchyma   [D] Aerenchyma

2 Select INCORRECT statement about lysosomes

    [A] It supplies energy   [B] It produces digestive enzymes

    [C] It helps in metamorphosis   [D] It is immune system of cell

3 AIDS is a disease caused by retrovirus, an RNA virus which bring about

    [A] Reduction in the number of helper T-cells

    [B] Reduction in the number of killer T-cells

    [C] Autoimmunity

    [D] Non production of interferons

4 Select an appropriate sequence of organisms on the basis of their appearance in the geological time scale

    [A] Starfish, lung fish, dinosaur, horse

    [B] Starfish, dinosaur, lungfish, horse

    [C] Dinosaur, starfish, lungfish, horse

    [D] Lungfish, starfish, horse, dinosaur

5 When cells of meristematic tissues become very active they possess

    [A] Dense cytoplasm, vacuoles and nucleoid

    [B] Thick cellulose walls, vacuoles and nuclei

    [C] Dense cytoplasm, thin cellulose walls and nuclei

    [D] Vacuoles and nuclei

6 Raju was suffering from severe stomach pain and the doctor diagnosed that he was suffering from peptic ulcer and treated with antibiotics. He was relieved of pain. What could be the reason for peptic ulcers?

    [A] Reduced secretion of hormones   [B] Reduced water content

    [C] Growth of Helicobacter pylori   [D] Excess secretion of enzymes

7 Mina and Hari observed an animal in their garden. Hari called it an insect While Meena said it was an earthworm. Choose from the character from the following which confirm that it is an insect.

    [A] Bilateral symmetrical body   [B] Body with jointed leg

    [C] Cylindrical body   [D] Body with little segmentation

8   Select the right combination of heart types and animals

[A]	2 chambers	Sardine fish
	3 chambers	Amphibians
	4 chambers	Reptiles

[B]	2 chambers	Sardine fish
	3 chambers	Gabriel reptiles
	4 chambers	Owl / birds

[C]	2 chambers	Gabriel reptiles
	3 chambers	Owl / birds
	4 chambers	Human

[D]	2 chambers	Birds
	3 chambers	Gabriel reptiles
	4 chambers	Sardine fish

9   *Read the following statement of assertion and statement of reason carefully and select correct option.*

Assertion: Diffusion is a passive process of membrane transport

Reason   : Osmosis is an active process of membrane transport

[A] Assertion is true and Reason is false

[B] Assertion is false and Reason is true

[C] Both Assertion and Reason are true and Reason is the correct explanation of Assertion

[D] Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

10   Choose the group that contains fungi only

[A] Euglena, Lichen   [B] Yeast, Mushroom

[C] Anabaena, Amoeba   [D] Paramecium, Mycoplasma

11   Aruna visited a Natural Gas Compressing Unit and found that the gas can be liquefied under specific conditions of temperature and pressure. While sharing her experience with friends she got confused. Help her to identify the correct set of conditions.

[A] Low temperature, low pressure   [B] High temperature, low pressure

[C] Low temperature, high pressure   [D] High temperature, high pressure

12   Which of the following is a chemical change?

I: Bubbling of oxygen gas through water.

II: Burning of wax of a candle

III: Emitting of light from an electric bulb on passing electric current

IV: Passing of carbon dioxide gas through lime water

[A] I & II   [B] III & IV

[C] II & IV   [D] I & IV

13 The scattering of α-particles by 180° in the Rutherford's experiment is due to a direct collision with

     [A] An electron in the gold foil   [B] A proton in the gold foil

     [C] A neutron in the gold foil   [D] A nucleus in the gold foil

14 Which of the following statement DO NOT match with the postulates of Bohr's mode of atom?

     (I) Electrons are revolving around the nucleus in specified paths called orbits

     (II) Each shell is associated with definite amount of energy

     (III) Electron, while revolving through a particular shell can increase or decreases its energy

     (IV) Energy of the shells decreases as their distance from nucleus increases

     [A] I & II   [B] III & IV

     [C] I & II   [D] II & IV

15 An element **X** has the same number of electrons in the first and the fourth shell as well as in the second and the third shell. What is the formula and nature of its oxide?

     [A] XO, Neutral   [B] XO_2, Acidic

     [C] XO_2, Amphoteric   [D] XO, basic

16 A test tube along with calcium carbonate in it initially weighed 30.08g. A heating experiment was performed on this test tube till calcium carbonate completely decomposed with evolution of a gas. Loss of weight during this experiment was 4.4g. What is the weight of the empty test tube in this experiment?

     [A] 20.08g   [B] 21.00g

     [C] 24.50g   [D] 2.008g

17 Dry ice is

     [A] Water in solid state   [B] Carbon dioxide in liquid state

     [C] Carbon dioxide in solid state   [D] Water in gaseous state

18 Structures of nuclei of three atoms A, B and Care given below. A has 90 protons, and 146 neutrons, B has 92 protons and 146 neutrons and C has 90 protons and 148 neutrons. Based on the above data, which of these atoms are isotopes and which are isobars?

     [A] B and C are isobars; A and B are isotopes

     [B] A and B are isotopes; A and C are isobars

     [C] A and C are isotopes; B and C are isobars

     [D] A and C are isotopes; A and B are isobars

19 The number of molecules in 35.5g of chlorine gas is

[A] 1.2044×10^{24} [B] 3.011×10^{23}

[C] 6.022×10^{23} [D] 9.033×10^{23}

20 The reaction between Potassium bromide and Barium iodide is an example of

[A] Combination reaction [B] Decomposition reaction

[C] Displacement reaction [D] Double displacement reaction

21 A compound **X** decomposes to form a compound **Y** and oxygen as shown below

$2X \longrightarrow 2Y + 3O_2$

How many moles of **X** are required to form 12 moles of oxygen?

[A] 3 moles [B] 12 moles

[C] 7 moles [D] 8 moles

22 Based on the statements given below, choose the correct option.

P: Some sugar can be added to a full glass of water without causing overflow

Q: A liquid is continuous even though space is present between the molecules

[A] P and Q are true and Q explains P

[B] P and Q are true and Q does not explains P

[C] Only P is true

[D] Only Q is true

23 Which one of the following is a pure substance?

[A] Steel [B] Ammonia

[C] Magnalium [D] Gun powder

24 Which of the following statements is correct?

[A] Compounds can be separated into constituents by physical processes

[B] The boiling points and melting points of compounds are not fixed

[C] The composition of compounds are not fixed

[D] The properties of compounds are entirely different from those of its constituents

25 A sample of an element X contains two isotopes $_8X^{16}$ and $^8X^{18}$. If the average atomic mass of the element be 16.24, the percentage of the two isotopes in this sample respectively is

[A] 88, 12 [B] 10, 90

[C] 80, 20 [D] 20, 80

26 A body is projected vertically upwards with a velocity of 96ft/s. What is the total time for which the body will remain in the air? ($g = 32ft/s^2$)

[A] 3 s [B] 6 s

[C] 9 s [D] 12 s

27 If the displacement of an object is proportional to square of time, then the object moves with

        [A] Uniform velocity   [B] Uniform acceleration

        [C] Increasing acceleration   [D] decreasing acceleration

28 Two friends of equal mass *m* are standing on a stationary wagon of mass *M* mounted on frictionless horizontal rails. Each of them can jump off the back of the wagon on to the track at a speed of *u* with respect to it. They have the choice of jumping off one by one, or both at the same time. The final speed attained by the wagon is

        [A] Larger when they jump off one by one

        [B] Larger when they jump off together

        [C] Equal in both the cases

        [D] Larger in the first case or the second case, depending on the *m/M* ratio.

29 A bomb of mass 9kg initially at rest explodes into two pieces of masses 3kg and 6kg. If the kinetic energy of 3kg mass is 216J, then the velocity of 6kg mass will be

        [A] $4ms^{-1}$ [B] $3ms^{-1}$

        [C] $2ms^{-1}$ [D] $6ms^{-1}$

30 The weight of an object at the centre of the earth of radius R is

        [A] Zero

        [B] Infinite

        [C] R times the weight at the surface of the earth

        [D] $1/R^2$ times the weight at the surface of the earth

31 An object moving at a constant speed in a circular path experiences a force which is

        [A] In the direction of motion

        [B] Opposite to the direction of motion

        [C] Outwards and at 45° to the direction of motion

        [D] Inwards and at right angle to the direction of motion

32 *Read the following statement of assertion and statement of reason carefully and select correct option.*

        Assertion: On a rainy day sound travels slower than on a dry day

        Reason   : When moisture is present in air the density of air increases

        [A] Assertion is true and Reason is false

        [B] Assertion is false and Reason is true

        [C] Both Assertion and Reason are true and Reason is the correct explanation of Assertion

        [D] Both Assertion and Reason are true and Reason is not the correct explanation of Assertion

33 If there is an option for soldiers to use rifles of different weights but with bullets of a fixed weight they would prefer

  [A] Light gun, because handling them is easy

  [B] Heavy guns so that they can held firmly

  [C] Heavy guns because they have less recoil

  [D] Light gun so that they can be carried easily

34 The radius of a planet A is twice that of planet B. The average density of the material of planet A is thrice that of planet B. The ratio between the values of acceleration due to gravity on the surface of planet A and that on the surface of planet B is

  [A] 2 : 3   [B] 3 : 2

  [C] 4 : 3   [D] 6 : 1

35 The variation in the kinetic energy (K. E) and the potential (P. E) of a particle moving along the x-axis are shown in the graph below. Which one of the following graphs violates the law of conservation of energy?
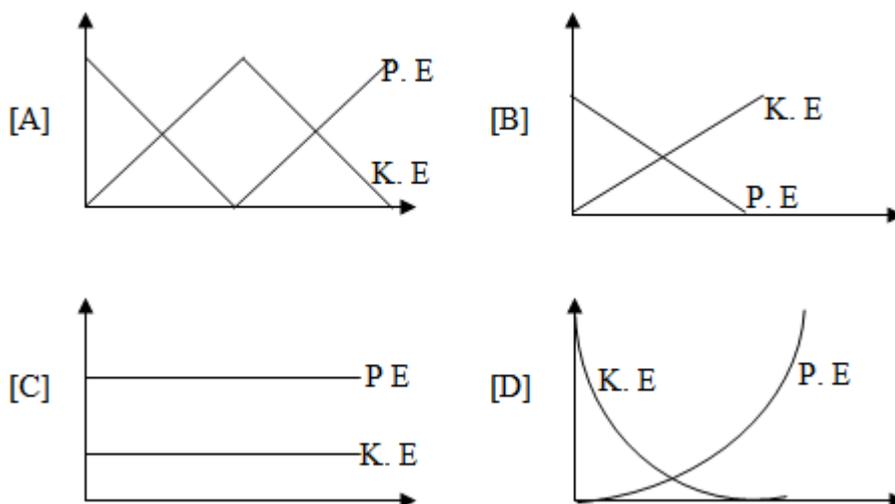
36 Albert and Sathya are participating in a $225ms^{-2}$ and an initial velocity of $1ms^{-1}$. Who will finish the racefirst? 900m race. Sathya runs the race with a constant velocity of 2m/s, while Albert runs with a constant acceleration of 1/

  [A] Albert   [B] Sathya

  [C] Both will take same time   [D] Data is insufficient

Questions 37 to 40: Read the following passage and answer the questions that follow.

Thermoelectricity is the electricity generated by the application of heat to the junction of two dissimilar metals. If the ends of two dissimilar metals, say copper and iron are joined end to end so as to form a closed circuit and the junctions are kept at different temperatures, then a voltage difference will arise and an electric current will exist between the hot and the cold junctions. This arrangement of two dissimilar metals whose junctions are kept at different temperatures is called a thermocouple. The junction at a higher temperature is called hot

junction and the other, the cold junction. The voltage difference develops in a thermocouple depends on (i) the temperature difference between the junctions and (ii) the nature of metals.

The thermo-electric current increases with the temperature of the hot junction and becomes maximum for a particular temperature, called **neutral temperature.** On further heating the hot junction, the thermo-electric current decreases and reaches zero at another temperature. If the hot junction is heated further the direction of thermo-electric current reverses and this temperature of hot junction at which the thermo-electric current reverses its direction is called **temperature of inversion.** The neutral temperature is constant for a thermo-couple irrespective of the temperature of the cold junction, while the temperature of inversion is variable. The neutral temperature is the average of the temperature of cold junction and the temperature of inversion.

37 The thermo electric current is maximum when its hot junction is at

[A] 100° [B] Neutral temperature

[C] Temperature of invasion   [D] None of these

38 The cold junction of a thermo-couple is at 30^oC and its neutral temperature is 215^oC. The temperature of invasion is

[A] 245^oC [B] 400^oC

[C] 430^oC [D] 460^oC

39 How does the voltage difference of a thermo-couple change with the increase in temperature of the hot junction?

[A] Increases with the temperature of hot junction

[B] Decreases with the temperature of hot junction

[C] Remains unchanged

[D] Increases or decreases depending on the temperature of the hot junction

40 Which of the following graph is for thermo-electric current?

[A] THERMO-ELECTRIC CURRENT / TEMPERATURE

[B] THERMO-ELECTRIC CURRENT / TEMPERATURE

[C] THERMO-ELECTRIC CURRENT / TEMPERATURE

[D] THERMO-ELECTRIC CURRENT / TEMPERATURE
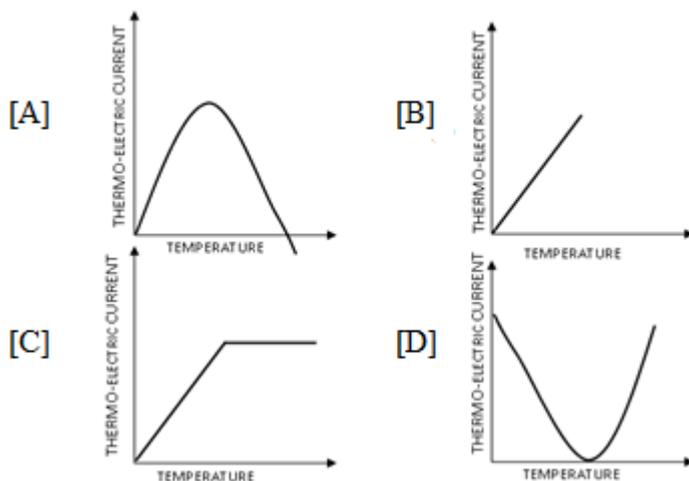
LOGICAL REASONING

41 Which number replaces the question mark (?) in the following?
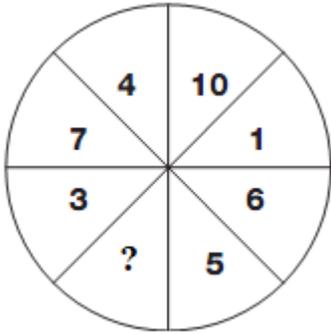
[A] 7

[B] 9

[C] 8

[D] 11

42 Look at this series: 664, 332, 340, 170, ____, 89. What number should fill the blank?

[A] 85   [B] 97

[C] 109   [D] 178

43 Pointing to Bhuvan, Meena said. "*He is the son of my father's only son*." How is Bhuvan's mother related to Meena?

[A] Mother   [B] Sister-in-law

[C] Aunt   [D] Daughter

44 *In the following question contains a small paragraph followed by a question on it. Read the paragraph carefully and answer the question given below it.*

The passage best supports the statement that motivation -

[A] Encourages an individual to give priority to personal goals over organizational goals.

[B] Is crucial for the survival of an individual and organization.

[C] Is the product of an individual's physical and mental energy.

[D] Is the external force which induces an individual to contribute his efforts

45 Find out from amongst the four alternatives as to how the pattern would appear when the transparent sheet is folded at the dotted line.
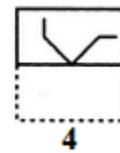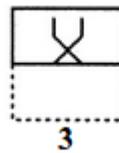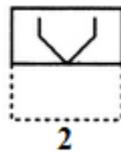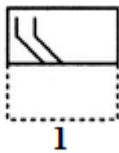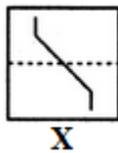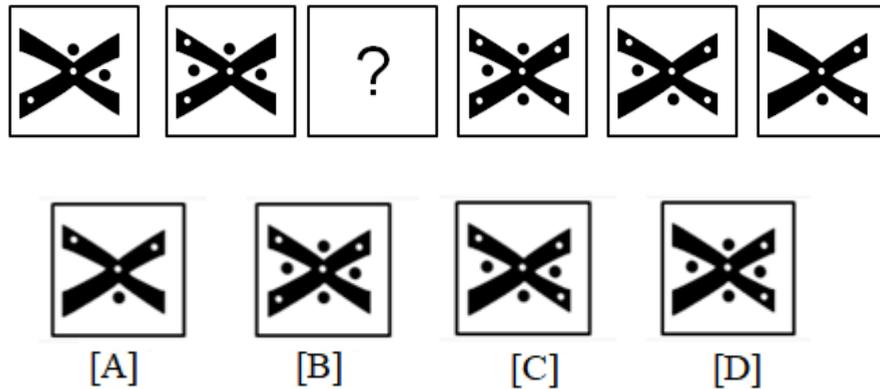

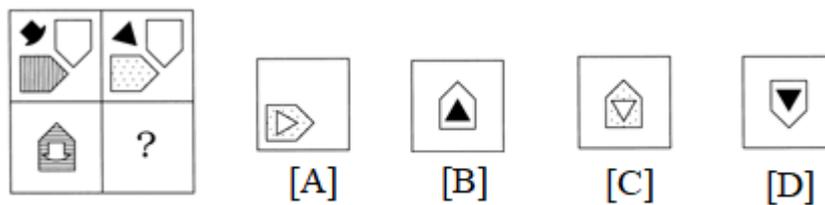[A] 1   [B] 2

[C] 3   [D] 4

46 Which picture cube does this shape make?

[A]

[B]

[C]

[D]
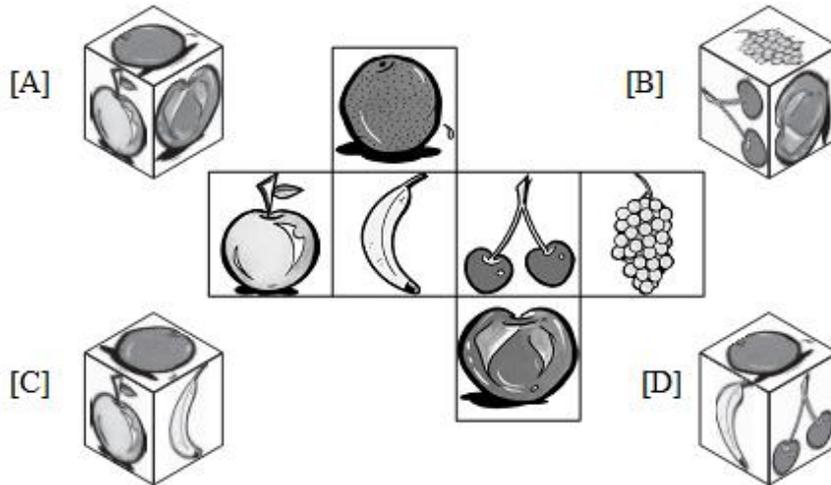
47 Choose the image that completes the pattern

?

[A]   [B]   [C]   [D]

48 Replace the question mark.

?

[A]   [B]   [C]   [D]

49 Which number replaces the question mark (?) in the following?

6		1
L	P	D
2		4

5		1
J	M	C
2		3

[A] 3

[B] 5

[C] 7

[D] 1

4		4
L	T	H
3		2

3		2
O	U	F
5		?

50 Find out the alternative figure which contains figure (X) as its part.
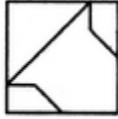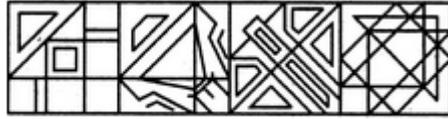
[A] 1

[B] 2

[C] 3

[D] 4

SPACE FOR ROUGH WORK