

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO



GRADE – 9

SCIENCE

SAMPLE PAPER

IOA SCIENCE OLYMPIAD – 2019 - 20

Test Booklet Series

Set - 0

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Roll No.:

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Student's Name:

Maximum Time: 75 Minutes

Maximum Marks: 100

INSTRUCTIONS

1. Please **DO NOT OPEN** the contest booklet until the proctor has given permission to start.
2. There are 40 questions in this paper. 2 points, 3 points will be awarded for each correct question in Foundation, and Exploration respectively. 1 point will be deducted for each incorrect answer, and no penalty for skipping a question.
3. All questions are compulsory. There is only ONE correct answer to each question.
4. No electronic devices capable of storing and displaying visual information are allowed during the exam.
5. Use of **calculator** is strictly prohibited in the exam.
6. Fill your **Name, Roll No., Grade and School Name** in the answer sheet.
7. To mark your choice of answers by darkening the circles in the Answer Sheet, use an HB Pencil or a **Blue/Black Ball Point Pen** only.
8. Shade your answer clearly as per the example is shown below:

CORRECT	INCORRECT
<input type="radio"/> A <input checked="" type="radio"/> B <input type="radio"/> C <input type="radio"/> D	<input checked="" type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input checked="" type="radio"/> D

Foundation: (2 POINTS)

1. Water is different from other substance because
 (A) It is more dense as a solid than a liquid (B) It is less dense as a solid than liquid
 (C) It is more dense as a gas than a liquid (D) It is less dense as a solid than a gas

2. Match the following:

	Column - I		Column - II
(1)	Solid to gas	(p)	Vaporization
(2)	Solid to liquid	(q)	Sublimation
(3)	Liquid to gas	(r)	Condensation
(4)	Gas to liquid	(s)	Fusion

- (A) 1 → r, 2 → s, 3 → q, 4 → p (B) 1 → s, 2 → r, 3 → q, 4 → p
 (C) 1 → r, 2 → s, 3 → p, 4 → q (D) 1 → r, 2 → q, 3 → s, 4 → p

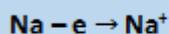
3. The diagram shows a colored gas being compressed in a gas syringe until the plunger could not be pushed any further. The experiment was repeated using the same volume of a coloured liquid. It was found that the final volume of the gas was



- (A) Much less than that of the liquid (B) Much greater than that of the liquid
 (C) Same as that of liquid (D) None of these
4. Carbon burns in oxygen to form carbon dioxide. The properties of carbon dioxide are
 (A) Similar to carbon
 (B) Similar to oxygen
 (C) Totally different from both carbon and oxygen
 (D) Much similar to both carbon and oxygen

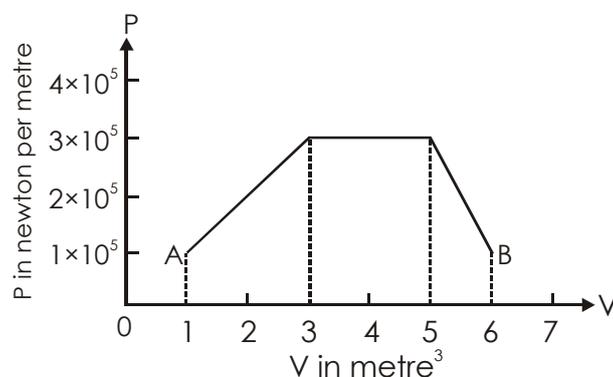
5. A motorist travelling at 10 ms^{-1} can bring his car to rest in a braking distance of 10m. In what distance could he bring the car to rest from a speed of 30 ms^{-1} using the same braking force?
 (A) 17m (B) 30m (C) 52m (D) 90m

6. The element hydrogen is able to form two different ions of formulae H^+ and H^- . Which of the following statements about these two ions is true?
 (A) The H^+ ion does not consist of any electrons
 (B) The H^+ ion has more protons than the H^- ion
 (C) The H^- ion has one more electron than the H^+ ion
 (D) The H^- ion is formed when a hydrogen atom loses one electron



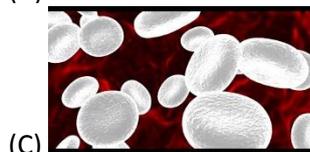
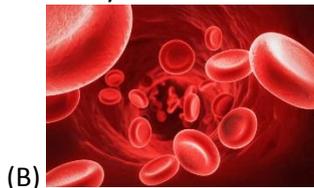
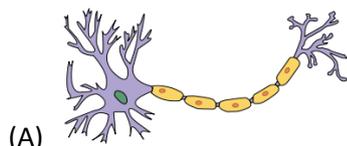
7. Which of the following statements is/are justify above chemical reaction?
 I. An ionic compound is made up of two ions one positively charged cation and another negatively charged anion
 II. The cations are usually formed by the metals which donate their electrons to the nonmetals which accept the electrons to form anions

- III. An ionic compound is made up of a metal and a nonmetal
 IV. A cation is formed by loss of electrons
 (A) I and II (B) I, II and IV (C) II and III (D) III and IV
8. An altered form of the structural protein collagen causes a condition in which bones are weak and break easily. Which of the following are components of collagen?
 (A) Amino acids (B) Fatty acids (C) Monosaccharides (D) Nucleotides
9. Atoms of inert gas elements are monoatomic while of the other elements are not. This is because
 I. The atoms of inert gas elements have stable electronic configuration, thus they can exist independently and are monoatomic in nature
 II. The atoms of all other elements are yet to have stable configuration and to achieve it, they combine with the atoms of the other elements
 (A) Both I and II (B) Only I (C) Only II (D) None of the above
10. Which of the following statement is incorrect?
 (A) An isotope of iodine is used in the treatment of Goitre
 (B) An isotope of uranium is used as a fuel in nuclear reactor
 (C) An isotope of cobalt is used in the treatment of cancer
 (D) An isotope of carbon is used in the preparation of dye
11. The change in the state of a gas from A to B is as shown in the figure below. The work done in the process is



- (A) 6×10^5 joule (B) 7×10^5 joule (C) 7×10^5 erg (D) 12×10^5 joule
12. An engineer works at a factory out of town. A car is sent for him from the factory every day that arrives at the railway station at the same time as the train he takes. One day the engineer arrived at the station one hour before his usual time, and without waiting for the car, started walking towards factory site. On his way he met the car and reached the factory 10 minutes before the usual time. How long did the engineer walk before he met the car?
 (A) 40 minutes (B) 45 minutes (C) 50 minutes (D) 55 minutes
13. A cell placed in a solution X swells up, what kind of solution is X?
 (A) Hypertonic (B) Hypotonic (C) Isotonic (D) None of the above
14. X is involved in the synthesis of protein as it has ribosomes attached to it. Y is involved in synthesis of lipids for making cell membrane. Here X and Y are
 (A) X – RER Y – SER (B) X – SER Y – ER
 (C) X – Ribosomes Y – Ribosomes (D) X – Ribosomes Y – Golgi apparatus

15. Identify the cell which can change its shape continuously.



16. Which of the following is correct regarding the function of epithelium?

- I. Epithelium lines the skin
- II. Epithelium lines the insides cavities
- III. Epithelium lines the lumen of our body

(A) I and III (B) I and II (C) II and III (D) I, II and III

17. A stone is dropped into a well. If the depth of water below the top be h and velocity of sound is v then the splash in water is heard after T sec. Then

(A) $T = \sqrt{\left(\frac{2h}{g}\right)} + \frac{h}{v}$

(B) $T = 2\sqrt{\left(\frac{2h}{g}\right)}$

(C) $T = \frac{2h}{v}$

(D) $T = \sqrt{\left(\frac{2h}{g}\right)} \times \frac{h}{v}$

18. Which of the following statements regarding aging and the muscular system is true?

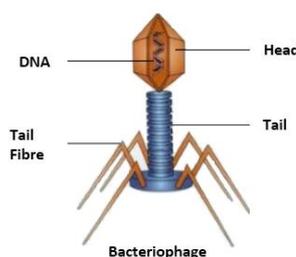
- (A) Aging is associated with decreased myoglobin production
- (B) Effects of aging can be nearly reversed
- (C) The satellite cells will differentiate into motor neurons when an individual is advanced in age
- (D) Youngsters have more adipocytes in muscle tissue than the elderly

19. Which of the following statement is correct?

- (A) All echinoderms have a mesodermal endoskeleton made of tiny calcified plates and spines
- (B) The mesodermal endoskeleton forms a rigid support contained within tissues of the organism
- (C) Some groups of Echinoderms have modified spines called pedicellariae that keep the animals free of debris
- (D) All of the above

20. Which of the following holds true for the organism shown in the given figure?

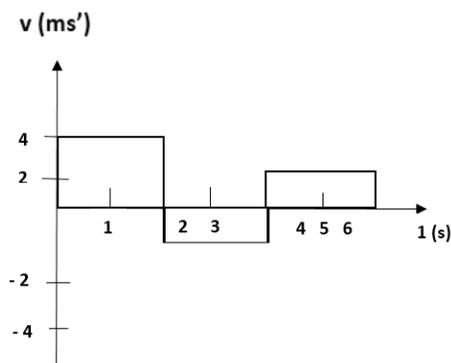
- I. It can pass through bacteria proof filter. They can be crystallized as protein molecules
- II. It is obligatory parasites
- III. Its head is made up of protein coat: inside is genetic material; either DNA or RNA
- IV. It has single stranded DNA



- (A) I, II, III and IV (B) I, II and IV (C) II, III and IV (D) I, II and III

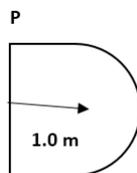
Exploration (3 POINTS)

21. The velocity-time graph of an object moving in straight line as shown in figure. The displacement travelled by object in 6 s is



- (A) 6 m (B) 10 m (C) 8 m (D) 16 m

22. An object goes from point P to Q, moving in a semicircle of radius 1.0 m in 1.0 s. The magnitude of the average velocity is:



- (A) 3.14 m/s (B) 2.0 m/s (C) 1.9 m/s (D) Zero

23. Two identical metal coins are dropped separately into two identical tubes. One of the tubes is filled with air and the other has its air pumped out with a vacuum pump. Which of the following observation(s) is/are true?

- I. Both metal coins will drop with same speed
 - II. Both metal coins will accelerate at a different rate
 - III. Both metal coins will reach the bottom of the tube at the same time
- (A) II only (B) I and II only (C) II and III only (D) None of the above

24. A skater is pushing a snowmobile across an ice rink. The skater pushed with a horizontal force of 80 N and the snowmobile experiences a force of friction of 30 N. The snowmobile has a mass of 20 kg. What is the acceleration of the snowmobile?
 (A) 4.0 m s^{-2} (B) 1.5 m s^{-2} (C) 2.5 m s^{-2} (D) 0.25 m s^{-2}
25. A body is lifted at constant speed through a distance of 15 meters above the ground in 10 s. The potential energy gained by the object is equal to
 (A) Work done on the object
 (B) Work done on the object minus kinetic energy of the object
 (C) Force acting on the object
 (D) None these
26. If two unequal masses possess the same momentum, then the kinetic energy of the heavier mass is The kinetic energy of the lighter mass.
 (A) Less (B) Equal (C) More (D) Can not say
27. Given table shows the name of animals. Classify them as acoelomates, Pseudo coelomates and coelomates.

I.	Moon jelly	II.	Human beings
III.	Earthworm	IV.	Fish tapeworm
V.	Planaria	VI.	Scorpion
VII.	Spongilla	VIII.	Ascaris
IX.	Nereis	X.	

	Acoelomates	Pseudo coelomates	Coelomates
A.	I, IV and VI	III and VIII	II, V, VI, VII and IX
B.	II, III and V	I, IV and VI	VII, VII and IX
C.	VII, VIII and IX	II, III and V	I, IV and VI
D.	II, V, VI, VII and IX	I, IV and VI	III and VIII

28. A spaceship is travelling in space in a straight line with its engine switched off. Which of the following cases would require the engine to be switched on again?
 I. Keep at a constant speed in a straight line
 II. Change direction
 III. Slow down to a stop
 (A) I only (B) II only (C) I and II only (D) II and III only
29. The figure shows overhead views of four situations in which two forces accelerate the same block across a frictionless floor. Rank the situations according to the magnitudes of the acceleration of the block, greatest first.



- (A) 1, 4, 3, 2 (B) 1, 3, 4, 2 (C) 1, 2, 4, 3 (D) 1, 4, 2, 3

30. In given figure, two astronauts are floating in space far away from any planets or stars. What is the direction of the gravitational force that they experience, if any?
- (A) Toward each other, because there is a gravitational force between them
(B) Away from each other because they are pulled by distant planets and stars
(C) They experience a gravitational force, but its direction cannot be determined
(D) They do not experience a gravitational force because there is no large object nearby
31. Two children are at the opposite ends of an iron pipe. One strikes at end of the pipe with a stone. Find the ratio of time taken by sound waves in air and in iron rod reaching to the other child. (Given velocity of sound in air and iron are 332 m s^{-1} and $5,130 \text{ m s}^{-1}$ respectively.)
- (A) 15.40:1 (B) 15.45:1 (C) 3.45:1 (D) 3.15:1
32. A geostationary satellite is orbiting the earth at a height of $6R$ above the surface of the earth, R being the radius of the earth. What will be time period of another satellite at a height $2.5R$ from the surface of the earth?
- (A) $3\sqrt{2}$ hour (B) 8 hour (C) $6\sqrt{2}$ hour (D) 10 hour
33. Three different stones are being lifted from the ground level to different heights on different planets as given below.
- Case 1:** A 250 g stone is lifted up to 10 m on the Earth
Case 2: A 6 kg stone lifted up to 2 m on the Moon
Case 3: A 1 kg stone is lifted up to 1 m on the Jupiter
- Given that the accelerations due to gravity on the Earth, the Moon and the Jupiter are 10 m s^{-2} , 2 m s^{-2} and 25 m s^{-2} respectively, which of the following statements is true?
- (A) More energy is required for case 2 than case 1
(B) More energy is required for case 1 than case 3
(C) Case 1 and case 2 require the same amount of energy
(D) Case 1 and case 3 require the same amount of energy
34. Read the following statements made on health and disease.
- I. An individual free from diseases need not be a healthy person
II. This is because health is a state of physical, mental as well as social well beings
- Which of the following option is correct for the above statements?
- (A) Statement I is correct and II is incorrect
(B) Statement I is correct and II is correct explanation of the statement I
(C) Statement I is incorrect and statement II is correct
(D) Both statements I and II are wrong
35. ATP molecules in cells undergo a process called hydrolysis. The equation below represents this process.
- $$\text{ATP} + \text{H}_2\text{O} \rightarrow \text{ADP} + \text{P}_i$$
- What always happens within cells as a result of ATP hydrolysis?
- (A) Water is produced. (B) Chemical energy is released.
(C) Phosphorus atoms are used up. (D) Carbohydrate building blocks are formed

36. Match the following and choose correct option for it.

I	II
A. Malaria	I. Bacteria
B. Kala-azar	II. Plasmodium
C. Cholera	III. Leishmania
D. AIDS	IV. Virus

(A) A – III, B – II, C – I, D – IV

(B) A – II, B – IV, C – III, D – I

(C) A – II, B – III, C – I, D – IV

(D) A – I, B – II, C – III, D – IV

37. Which of the following correctly represents the macronutrients supplied by soil?

(A) Carbon, oxygen, nitrogen, phosphorus, copper and chlorine

(B) Carbon, oxygen, hydrogen, calcium, Sulphur and zinc

(C) Nitrogen, phosphorus, potassium, calcium, magnesium and sulphur

(D) Iron, manganese, boron, zinc, copper, molybdenum and chlorine

38. "Organic farming works in harmony with nature rather than against it". Which of the following statements is/are justify this line?

I. Continuous use of fertilizers can destroy soil quality and fertility because the organic matter in the soil is not replenished and micro-organisms in the soil are harmed by the fertilizers used

II. In organic farming, manure is used to enrich the soil with nutrients and organic matter

III. Manure is prepared from biological waste material that helps in protecting the soil from excessive use of fertilizers

(A) I and III

(B) I and II

(C) I, II and III

(D) None of the above

39. The gases released from fossil fuels, which cause acid rain are

(A) Oxygen and carbon dioxide

(B) Oxygen and nitrogen

(C) Nitrogen and Sulphur oxides

(D) Carbon dioxide and sulphur

40. Which of the following statement shows the harmful effect of the exhaust that comes out from the petrol refineries?

I. Increase of exhausts from petrol refineries will make the raindrops less alkaline

II. The exhausts from the petroleum refineries are rich in oxides of Sulphur which causes air pollution

III. The oxides of Sulphur on combining with water droplets form acidic compounds making the raindrops more acidic

(A) I and II

(B) II and III

(C) I, II and III

(D) Only III