

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



GRADE-7&8

FARADAY

INTERNATIONAL SCIENCE OLYMPIAD - 2023

Test Paper

Test Booklet Series

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

Roll No.:

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Student's Name:

Maximum Time: 90 Minutes

Maximum Marks: 120

INSTRUCTIONS

- Please **DO NOT OPEN** the contest booklet until the proctor has given permission to start.
- There are 30 questions in this paper. **Easy:** 3 points for each correct answer. **Medium:** 4 points for each correct answer. **Hard:** 5 points for each correct answer. 1 point will be deducted for each incorrect answer, and no penalty for skipping a question.
- There is only ONE correct answer to each question.
- No electronic devices capable of storing and displaying visual information are allowed during the exam.
- Use of **calculator** is strictly prohibited in the exam.
- Fill your **Name, Roll No., Grade and School Name** in the answer sheet.
- 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.
- Shade your answer clearly as per the example is shown below:

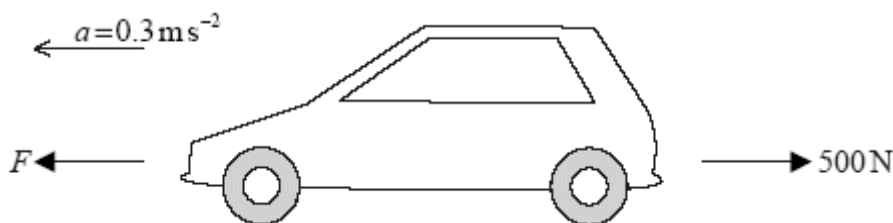
CORRECT	INCORRECT
<input type="radio"/> A <input checked="" type="radio"/> B <input type="radio"/> C <input type="radio"/> D	<input checked="" type="radio"/> A <input type="radio"/> B <input checked="" type="radio"/> C <input type="radio"/> D

Email: exam@internationalolympiadacademy.com, Website: www.internationalolympiadacademy.com,
www.mathkangaroo.in, Phone: +91-8368118421, +91-9810336335

SECTION – A (3 POINT PROBLEMS)

1. A car of mass 1000 kg accelerates on a straight, flat, horizontal road with an acceleration $a = 0.3 \text{ m s}^{-2}$.

The driving force F on the car is opposed by a resistive force of 500 N.



The net (resultant) force on the car is

- (A) 200 N (B) 300 N (C) 500 N (D) 800 N

2. A tennis ball of mass m moving horizontally with speed u strikes a vertical tennis racket. The ball bounces back with a horizontal speed v . The magnitude of the change in momentum of the ball is

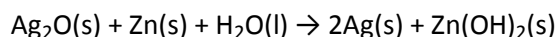
- (A) $m(u + v)$.
 (B) $m(u - v)$.
 (C) $m(v - u)$.
 (D) zero.



3. Which species could be reduced to form NO_2 ?

- (A) N_2O (B) NO_3^- (C) HNO_2 (D) NO

4. Consider the overall reaction taking place in a voltaic cell.



Here, Zinc acts as

- (A) The positive electrode and the oxidizing agent.
 (B) The positive electrode and the reducing agent.
 (C) The negative electrode and the oxidizing agent.
 (D) The negative electrode and the reducing agent.
5. A car driving at a constant speed of 20 m/s, heads straight to a mountain. The driver presses the car horn and receives an echo 2.4 seconds later. Calculate the distance between the car and the mountain when the driver pressed the horn. (Take the speed of sound in air to be 300 m/s).
- (A) 336 m (B) 384 m (C) 672 m (D) 768 m
6. A convex lens is making full image of an object. If half of the lens is covered by an opaque black paper, then
- (A) Half image is not seen
 (B) Full image is seen and of same intensity
 (C) Half image of same intensity is seen
 (D) Full image of decreased intensity is seen

7. Which is the most acidic oxide?
 (A) Cl_2O (B) Cl_2O_3 (C) Cl_2O_5 (D) Cl_2O_7
8. Which microscope helps in the study of molecular structure in solid state?
 (A) Dark field microscope (B) Phase contrast microscope
 (C) X-Ray microscope (D) Compound microscope
9. Which technique is not used for studying metabolic processes?
 (A) Autoradiography (B) Electron microscopy
 (C) Spectrophotometry (D) Chromatography
10. What is not true for H_2O ?
 (A) It has high latent heat of vaporisation (B) High adhesion and cohesion forces
 (C) High viscosity (D) High specific heat

SECTION – B (4 POINT PROBLEMS)

Based on the following statement choose the correct options in question number 11 to 14.

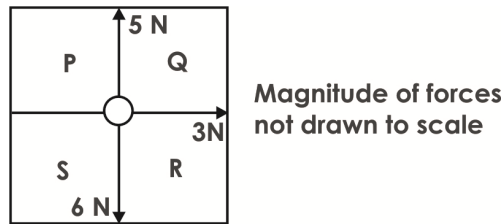
Statement: Three elements X, Y and Z, are in the same period of the periodic table. The accompanying table gives some data concerning the elements and their oxides. One of the elements forms another oxide in addition to that listed.

X	Y	Z
Appearance Oxide white solid, XO_2	Shiny black solid solid, YO	Silvery solid white yellow crystals white solid, ZO_3

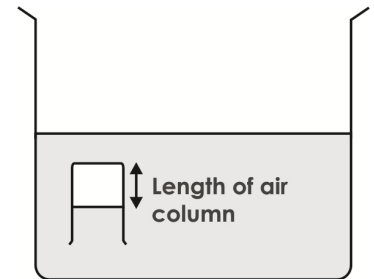
Use the letters, X, Y and Z in answering the following questions.

11. Write the letters X, Y and Z in the order in which the elements appear in the period
 (A) Y, X, Z (B) Y, Z, X (C) X, Y, Z (D) Z, X, Y
12. To which groups do the elements belong?
 (A) X is in group II, Y is in group IV, Z is in group VI
 (B) Z is in group II, X is in group IV, Y is in group VI
 (C) X is in group II, Z is in group IV, Y is in group VI
 (D) Y is in group II, X is in group IV, Z is in group VI
13. Where the formulae of the compounds which the elements would form with hydrogen
 (A) YH_2 , XH_4 , ZH_6 (B) YH_2 , XH_4 , ZH_2 (C) Y_2H , XH_4 , ZH_4 (D) YH_2 , XH_2 , ZH_6
14. Which element would be the best conductor of electricity?
 (A) Y (B) X (C) Z (D) None

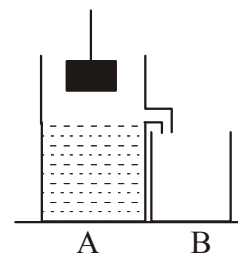
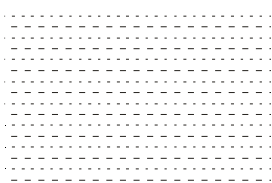
15. The diagram below shows the top view of a field separated into four sectors, P, Q, R, and S. A cart tied to three ropes is placed in the middle of the field. Three bull carts start to pull the ropes (with forces indicated in the diagram) at the same time. In which sector will the cart start to move initially?



- (A) Sector P (B) Sector Q (C) Sector R (D) Sector S
16. An empty glass is inverted and lowered 20 cm into a trough of water, a trough of oil, a trough of mercury and a trough of iodine. Given that the densities of water, oil, mercury and iodine are 1000 kg m^{-3} , 800 kg m^{-3} , 13600 kg m^{-3} and 5000 kg m^{-3} respectively, in which liquid will the length of air column in the cup be the shortest?
- (A) Water
(B) Oil
(C) Mercury
(D) Iodine



17. What is /are false regarding Astigmatism? Chose the correct option that follows:
- (i) It is a defect in the eye or in a lens.
(ii) It is caused by a deviation from spherical curvature.
(iii) It results in regular plane images as light rays are prevented from meeting at a common focus.
(iv) It can be corrected by using concave lens only.
- (A) (i) and (ii) (B) (iii) and (iv) (C) (ii) and (iii) (D) (i) and (iii)
18. A metal block of mass 100 kg and of density $D = 5000 \text{ kg/m}^3$ is submerged in water of container A which is filled to its maximum capacity as shown. What mass of water will flow into vessel B?



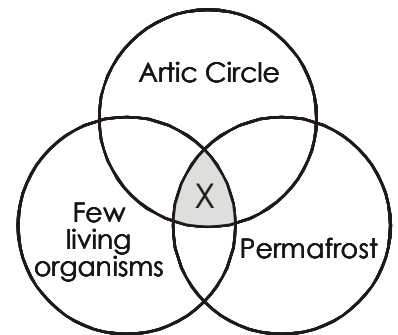
- (A) 100 kg (B) 500 kg (C) 20 kg (D) 40 kg
19. A man moves in an open field such that after moving 10 m in a straight line, he makes a sharp turn of 60° to his left. Find the total displacement of the man just after 7 such turns.
- (A) 10 m (B) 20 m (C) 70 m (D) 30 m
20. If 5 g of solute dissolve in 50 gm of water at 25°C then its solubility is
- (A) 0 kg (B) 250 g (C) 10 g (D) 100 g

SECTION – C (5 POINT PROBLEMS)

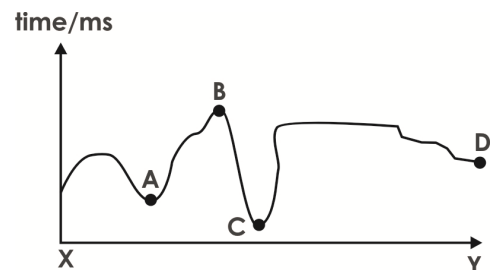
21. Twenty-five electric bulbs are connected in series across a 220 V supply. After one bulb is fused the remaining 24 are connected again in series across the same supply. The illumination will be
- (A) More with 25 bulbs than with 24 (B) More with 24 bulbs than with 25
(C) Equal in both the cases (D) In the ratio $25^2 : 24^2$
22. A girl of mass 50 kg is standing on pencil heels each of area of cross-section 1 cm^2 and an elephant of mass 5000 kg and foot area 250 cm^2 each standing on the floor. What is the difference between the pressure exerted by the girl and the elephant?
- (A) $20 \times 10^5 \text{ Pa}$ (B) $10 \times 10^4 \text{ Pa}$ (C) $25 \times 10^5 \text{ Pa}$ (D) $15 \times 10^5 \text{ Pa}$

23. Study the Venn diagram and choose suitable option for X.

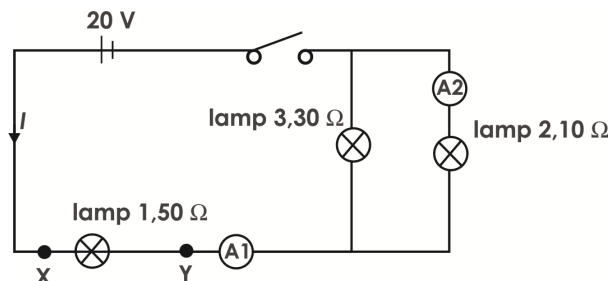
- (A) Desert biome
(B) Tundra biome
(C) Deciduous biome
(D) Boreal biome



24. Ultrasound is emitted from a ship directly downwards into the water. The diagram below shows the duration for ultrasound to return to the receiver on the ship as the ship travels from point X to point Y along the surface of the water. At which position is the water deepest?
- (A) A (B) B
(C) C (D) D



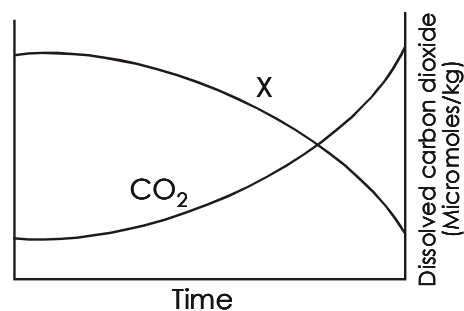
25. The circuit below is switched on and all three lamps light up. What would happen if a wire is connected across XY?



- | Lamp 1 | Lamp 2 | Lamp 3 |
|--------------|----------|----------|
| (A) Brighter | Dimmer | Dimmer |
| (B) Dimmer | Off | Off |
| (C) Off | Brighter | Brighter |
| (D) Same | Brighter | Brighter |

26. A researcher has made following statements and graph on greenhouse effect.
"Greenhouse effect is rapidly increasing because of increase in concentration of carbon dioxide".

In the given graph the increase in carbon dioxide concentration is shown. What could be X corresponding to it?



- I. Rate of photosynthesis in plants
II. pH of the oceans
III. Water level of ocean
IV. Average global temperature of earth
- (A) I and III (B) II and IV (C) Only II (D) Only IV
27. A plane mirror makes an angle of 30° with horizontal. If a vertical ray strikes the mirror, find the angle between mirror, and reflected ray
(A) 30° (B) 45° (C) 60° (D) 90°
28. The density of a gas A is twice that of a gas B at the same temperature. The molecular weight of gas B is thrice that of A. The ratio of the pressures acting on A and B will be
(A) 1:6 (B) 7:8 (C) 2:5 (D) 1:4
29. For the reaction $A + 2B \rightarrow C$, 6 mole of A and 10 mole of B will produce -
(A) 5 mole of C (B) 6 mole of C
(C) 4 mole of C (D) 16 mole of C
30. A lady's 18 carat gold wedding ring has become discoloured with some minute drops of mercury from a broken thermometer. Which of the following treatments would restore it to its original condition?
(A) Place it in hot strong nitric acid
(B) Place it in cold dilute hydrochloric acid
(C) Heat it gently in a sand – bath
(D) Heat it in chlorine

