



CREST Science Olympiad (CSO)
Previous Year Paper (2021-22)

Class 10

Time Allowed: 1-hour

Maximum Marks: 60

- Additional **10 minutes** will be allotted to fill up information on the OMR Sheet, before the start of the exam.
- Fill in all the mandatory fields clearly on the OMR Sheet.
- There are **2 sections** in the question paper namely the **Practical Science & Achievers' Section** consisting of **40 questions (1 mark each) & 10 questions (2 marks each)**, respectively.
- There is no negative marking. The use of a calculator is not permitted.
- There is **only ONE correct option** to a given question.
- Use **HB Pencil or Blue / Black ball point pen only** for marking the correct choice of answers on the OMR Sheet.
- Rough work is to be done in the space provided in the test booklet. Extra plain sheet may be provided by the school for the rough work.
- The OMR Sheet is to be handed over to the invigilator at the end of the exam.
- No candidate is allowed to carry any textual material, printed or written, bits of paper, any electronic device, etc. inside the examination hall.
- The use of unfair means may result in the cancellation of the exam. Any such instances may be reported at **+91-98182-94134** or **info@crestolympiads.com**

DO NOT OPEN THIS BOOKLET UNTIL ASKED TO DO SO

FILL IN THE DETAILS

Student Name: _____

Class: _____ Section: _____

Enrollment No: _____

Practical Science (Each Question is 1 Mark)

1. Fill in the blank:

White light while passing through a glass prism breaks up into light of different colours, because

_____.

- the refractive index of glass is different for different colours of light
- glass prism absorbs white light and emits lights of several colours in different directions
- of total internal reflection of white light on surfaces of the prism
- of the interference colours inside the prism

2. In the following question, an assertion and a reason are given. Choose the correct option:

Assertion (A): In a motion picture, usually 24 frames are projected every second over the whole length of the film.

Reason (R): An image formed on the retina of eye persists for about 1/15s after the removal of the stimulus.

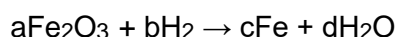
- Both (A) and (R) are true and (R) is the correct explanation of (A)
- Both (A) and (R) are true, but (R) is not the correct explanation of (A)
- (A) is true, but (R) is false
- (A) is false, but (R) is true

3. The magnetic field intensity of an electromagnet depends on which of the following parameter?

- Number of turns of the solenoid
- Nature of the core substance
- The magnitude of electric current
- The shape of the core

- I and III
- II and IV
- I, II and III
- I, II, III and IV

4. Consider the following balanced equation and identify a, b, c and d:



- a-1, b-1, c-2, d-3
- a-1, b-1, c-1, d-1
- a-1, b-3, c-2, d-3
- a-1, b-2, c-2, d-3

5. Which of the following statements is incorrect?

- Sodium and potassium are soft and silvery white metals.
- Sodium and potassium in the air get tarnished due to the formation of a layer of oxide or carbonate.
- Sodium and potassium burn in dry oxygen (excess) giving peroxides.
- Sodium and potassium are kept under kerosene to avoid contact with air and moisture.

6. Which of the following statements is/are true?

- The lattice structure of diamond and graphite are different.
- Graphite is an impure form of carbon while diamond is pure form.
- Graphite conducts electricity while diamond does not.
- Graphite has a lower density than diamond.

- Only II
- I and II
- I, II and III
- I, III and IV

7. Consider the following statements and choose the correct option
- Photolysis of water involves the breakdown of water by light.
 - The specific function of light energy in the process of photosynthesis is to activate chlorophyll.
 - One of the by-product of photosynthesis is oxygen.
- Only I is correct
 - Only II is correct
 - Only III is correct
 - I, II and III are correct
8. Consider the following statements and choose the correct option:
- RNA is double-stranded.
 - RNA can be genetic or non-genetic.
 - Viruses have RNA as a genetic material.
 - In RNA, uracil is present in place of thymine.
- Only I is incorrect
 - I and III are incorrect
 - I, II and III are incorrect
 - II and III are incorrect
9. The Red Data Books published by the International Union for Conservation of Nature and Natural Resources (IUCN) contains lists of which of the following?
- Endemic plant and animal species present in the biodiversity hot spots.
 - Threatened plant and animal species
 - Protected sites for conservation of nature and natural resources in various countries.
 - None of the above
10. K^+ , Ar, Ca^{2+} and S^{2-} have:
- Same electronic configuration and atomic volume
 - Different electronic configuration but same ionisation potential
 - Same electronic configuration but different atomic volume
 - Same electronic configuration and same ionisation potential
11. The following are the ions obtained by the dissociation of different salts. Which of the following is not possible?
- Disodium potassium phosphate $\rightarrow Na^+, K^+, PO_4^{-3}$
 - Bleaching powder $\rightarrow Ca^{+2}, Cl^-, OCl^-$
 - Potash alum $\rightarrow K^+, Al^{+3}, SO_4^{-2}$
 - Sodium argentocyanide $\rightarrow Na^+, Ag^+, CN^-$
12. Arrange the following in the increasing order of relative sweetness:
- Glucose
 - Maltose
 - Fructose
 - Lactose
- ACBD
 - DBAC
 - ACDB
 - CADB
13. Lily connected a bulb to a battery through a resistor. What will happen to the brightness of the bulb, if another resistor is connected in parallel to the first resistor?
- Increases
 - Remains the same
 - Decreases
 - Increases or decreases depending upon the resistance of the filament
14. Fill in the blank:
- When 480 plants are produced in the F₂ generation of dihybrid cross made with pure breeding plants, the total number of plants with parental combinations obtained is _____.
- 300
 - 270
 - 30
 - 180

15. In the following question, an assertion and a reason are given. Choose the correct option:

Assertion: Graphite is slippery to touch.

Reason: The various layers of carbon atoms in graphite are held together by weak van der Waal's forces.

- Both Assertion and Reason are true and Reason is the correct explanation of Assertion
 - Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
 - Assertion is true, but Reason is false
 - Assertion is false, but Reason is true
16. Read the following statements and choose the correct option:
- Statement 1:** During vigorous physical exercise, lactic acid is formed inside the muscle cell because there is an excess of carbon dioxide.
- Statement 2:** Villi present on the internal wall of intestine help in the digestion of carbohydrates.
- Statement 1 is correct and statement 2 is incorrect
 - Statement 1 is incorrect and statement 2 is correct
 - Both the statements are correct
 - Both the statements are incorrect
17. Read the following clues and identify X:

Clue 1: X is embedded in the uterine wall.

Clue 2: It secretes hormones such as oestrogen.

Clue 3: It acts as a storage of glycogen.

- Zygote

- Embryo's head
- Placenta
- Eggs

18. Which of the following is employed for harnessing the potential energy of surface water stored in a reservoir?

- Thermal power plant
- Nuclear power plant
- Tidal power plant
- Hydroelectric power plant

19. Arrange the following compounds in the decreasing order of covalency of the non-metallic elements:

- PCl_5
- NCl_3
- CH_4
- SO_3
- Cl_2O_7

- EDACB
- BCADE
- ECADB
- BDACE

20. What happens when aqueous sodium carbonate (Na_2CO_3) reacts with $\text{HCl}(\text{aq})$?

- NaOH , $\text{H}_2(\text{g})$ and $\text{CO}_2(\text{g})$ is formed
- NaCl , H_2O and $\text{CO}_2(\text{g})$ is formed
- NaHCO_3 , $\text{H}_2(\text{g})$ and $\text{CO}_2(\text{g})$ is formed
- NaHCO_3 , HO_2 , (g) and $\text{CO}_2(\text{g})$ is formed

21. Which one among the following statements is correct?

- All arteries carry oxygenated blood
- All veins carry oxygenated blood
- Except the pulmonary artery, all other arteries carry oxygenated blood
- Except the pulmonary vein, all other veins carry oxygenated blood

22. Which among the following cannot be used for the preparation of the halogen acid?

- a. $2\text{KBr} + \text{H}_2\text{SO}_4 (\text{conc.}) \rightarrow \text{K}_2\text{SO}_4 + 2\text{HBr}$
- b. $2\text{NaCl} + \text{H}_2\text{SO}_4 (\text{conc.}) \rightarrow \text{NaHSO}_4 + \text{HCl}$
- c. $\text{NaHSO}_4 + \text{NaCl} (\text{conc.}) \rightarrow \text{Na}_2\text{SO}_4 + \text{HCl}$
- d. $\text{CaF}_2 + \text{H}_2\text{SO}_4 (\text{conc.}) \rightarrow \text{CaSO}_4 + 2\text{HF}$

23. Hydrogen chloride and SO_2 are the side products in the reaction of ethanol and thionyl chloride. Which of the following is the main product in this reaction?

- a. $\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$
- b. C_2H_6
- c. CH_5Cl
- d. $\text{C}_2\text{H}_5\text{Cl}$

24. In the following question, an assertion and a reason are given. Choose the correct option:

Assertion: Atomic size decreases as we move from left to right in a period.
Reason: In a period from left to right, the number of valence electrons in the same shell increases.

- a. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
- b. Both assertion and reason are CORRECT, but reason is NOT THE CORRECT explanation of the assertion.
- c. Both assertion and reason are INCORRECT.
- d. Assertion is CORRECT, but reason is INCORRECT.

25. Which of the following shows the correct order for ionization energy?

- a. $\text{Be} > \text{B} > \text{C} > \text{N} > \text{O}$
- b. $\text{B} < \text{Be} < \text{N} < \text{C} < \text{O}$
- c. $\text{B} < \text{Be} < \text{C} < \text{N} < \text{O}$
- d. $\text{N} > \text{O} > \text{C} > \text{Be} > \text{B}$

26. Which of the following acidic salt can react with one mole of base?

- a. NaH_2PO_3
- b. Na_2HPO_3
- c. $(\text{NH}_4)_2\text{CO}_3$
- d. CH_3COOK

27. Which of the following happens when a monochromatic ray of light travels from a medium of refractive index n_1 to a medium of refractive index n_2 ($n_2 > n_1$)?

- a. Speed increases by a factor n_2/n_1
- b. Speed decreases by a factor n_2/n_1
- c. Frequency decreases by a factor n_2/n_1
- d. Wavelength increases by a factor n_2/n_1

28. The ciliary muscles can change the focal length of the eye lens. Find the ratio of the focal length of the eye lens when it is focused on two different objects, one at a distance of 2 m and the other at a distance of 1 m. The diameter of the normal eye is 2.5 cm.

- a. 82 : 81
- b. 81 : 82
- c. 78 : 81
- d. 81 : 78

29. When Peter rotated a plane mirror through an angle of 60° , the reflected ray turned through the angle 120° . What will happen to the size of the image during this rotation?

- a. Doubled
- b. Halved
- c. Remains the same
- d. Becomes infinite

30. Two particles having charges q_1 and q_2 when kept at a certain distance, exert a force F on each other. If the distance between the two charges is reduced to half and the charge on each particle is doubled then the force exerted on each other would be:

- a. $2F$
- b. $4F$
- c. $8F$
- d. $16F$

31. In the following question, an assertion and a reason are given. Choose the correct option:

Assertion: Bending a wire increases the electrical resistance.

Reason: Resistance of wire is inversely proportional to the length of the material.

- a. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
- b. Both assertion and reason are CORRECT, but reason is NOT THE CORRECT explanation of the assertion.
- c. Both assertion and reason are INCORRECT.
- d. Assertion is CORRECT but the reason is INCORRECT.

32. Three resistors, each of resistance 7.5Ω are connected in parallel. Five resistors, each of resistance 8Ω are connected in parallel. Another three resistors, each of resistance 6Ω are in parallel. If these three parallel combinations are in series, find the effective resistance of the circuit:

- a. 2.5Ω
- b. 2Ω
- c. 6.1Ω
- d. 1.8Ω

33. In the following question, an assertion and a reason are given. Choose the correct option:

Assertion: The magnetic force experienced by moving charge will be zero if the direction of the velocity of charge is parallel to the applied magnetic field.

Reason: Force on moving charge is independent of the direction of the applied magnetic field.

- a. Both assertion and reason are CORRECT and reason is the CORRECT explanation of the assertion.
- b. Both assertion and reason are CORRECT, but reason is NOT THE CORRECT explanation of the assertion.
- c. Both assertion and reason are INCORRECT.
- d. Assertion is CORRECT, but the reason is INCORRECT.

34. A solution of sodium carbonate is prepared by dissolving 0.53 g in 100 ml of the solution. To this 200 ml of 0.001 M NaOH is added. What is the pH of the resulting mixture?

- a. 13
- b. 12.53
- c. 15
- d. 16.43

35. Consider the following statement:

1. A person with myopia can see distant objects distinctly but cannot see nearby objects clearly.
2. A person with hypermetropia cannot see distant objects clearly.
3. A person with presbyopia can see nearby objects without corrective glasses.

Which of the statement given above is/are not correct?

- a. 1, 2 and 3 b. 1 and 2 only
c. 2 and 3 only d. 3 only

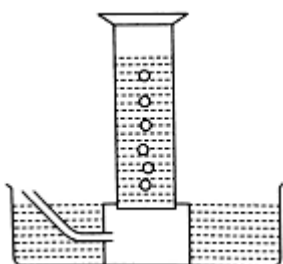
36. A myopic person has a power of -1.25 dioptre. What is the focal length and nature of his lens?

- a. 50 cm and convex lens
b. 80 cm and convex lens
c. 50 cm and concave lens
d. 80 cm and concave lens

37. Which among the following is the correct increasing order of pH found in human body?

- a. Gastric juice, saliva, blood
b. Blood, saliva, gastric juice
c. Saliva, blood, gastric juice
d. Gastric juice, blood, saliva

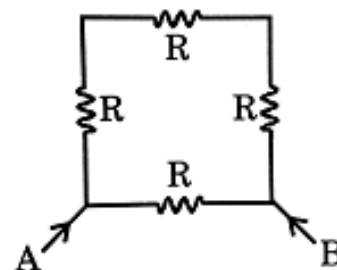
38. A reactive metal (M) is treated with $\text{H}_2\text{SO}_4(\text{dil})$. The gas is evolved and is collected over the water as shown in the figure. What conclusion can be drawn from the above experiment?



- a. The gas evolved is hydrogen.
b. The gas evolved is lighter than air.

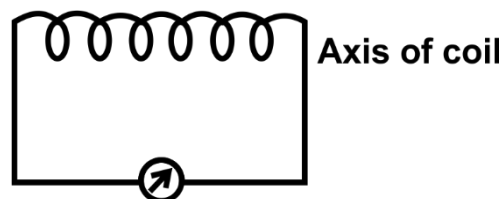
- c. The gas evolved is O_2 and is lighter than air.
d. Both (a) and (b)

39. Four equal resistances are connected as shown in figure. Find the resistance measured across AB:



- a. $3R/4$ b. $3R$
c. $4R$ d. $4/3R$

40. A student connects a coil of wire with a sensitive galvanometer as shown in figure. He will observe the deflection in the galvanometer if bar magnet is:



- a. placed near one of the faces of the coil and parallel to the axis of the coil
b. placed near one of the faces of the coil and perpendicular to the axis of the coil
c. placed inside the coil
d. moved towards or away from the coil parallel to the axis of the coil

Achiever's Section (Each Question is 2 Marks)

41. The reaction of KMnO_4 and HCl results in:

- a. Oxidation of Mn in KMnO_4 and production of Cl_2
b. Reduction of Mn in KMnO_4 and production of H_2

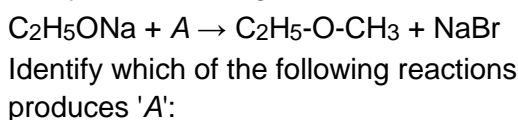
- c. Oxidation of Mn in KMnO_4 and production of H_2
d. Reduction of Mn in KMnO_4 and production of Cl_2

42. Match the following:

| Function of blood vessels | Entering/leaving blood vessels |
|---|--------------------------------|
| (i) It carries the blood from the upper part of the body. | (a) Hepatic artery |
| (ii) It carries oxygenated blood to all the parts of the body. | (b) Renal veins |
| (iii) It supplies oxygenated blood to the liver from the aorta. | (c) Pulmonary artery |
| (iv) It transports the blood from the kidney to the posterior vena cava for its purification. | (d) Superior vena cava |
| (v) It carries the deoxygenated blood from the right ventricle to the lungs for purification. | (e) Aorta |

- a. i-d, ii-e, iii-a, iv-c, v-b
 b. i-c, ii-e, iii-a, iv-b, v-d
 c. i-d, ii-e, iii-a, iv-b, v-c
 d. i-b, ii-e, iii-a, iv-d, v-c

43. Study the reaction given:



- a. Ethane with HBr
 b. Methyl alcohol with PBr₅
 c. Ethyl alcohol with PBr₃
 d. Ethane with excess of bromine in the presence of sunlight

44. Two snapdragon plants with pink flower were hybridized. The F1 plants produced red, pink, and white flowers

in the proportion of 1 red, 2 pink, and 1 white. What could be the genotype of the two plants used for hybridization? (Red flower colour-RR white-rr)

- a. rr b. Rr
 c. RR d. RRRR

45. Consider the following statements:

- If the sperm and ovum are fertilised in the uterus, then the baby born as a result is known as a test tube baby.
- The rupture of Graafian follicles to produce ovum is called capacitation.
- Tubectomy is a surgical procedure that prevents the entry of sperms into the uterus.
- The involvement of two organisms of the same species to produce a new offspring is known as asexual reproduction.

Which of the above statement(s) is/are incorrect?

- a. 1 only b. 2 only
 c. 2 and 3 only d. 1, 2, 3 and 4

46. Three elements X, Y and Z belong to the same group of the modern periodic table such that the difference in atomic weight of X and Y is equal to the difference in atomic weight of Y and Z. The sum of atomic weights of elements X and Z is 46 and that of X and Y is 30. Identify the elements X, Y and Z:

- a. X-Be, Y-Mg, Z-Ca
 b. X-B, Y-C, Z-N
 c. X-F, Y-Cl, Z-Br
 d. X-Li, Y-Na, Z-K

47. 26 g of an alloy of copper and zinc reacts with H₂SO₄ releasing 4.48 L of H₂ at STP. What is the percentage of zinc in the alloy?

- a. 10.2%
- b. 76.5%
- c. 25.5%
- d. 48.8%

48. Answer the following questions:

1. Which of the following would not change the pH of 10 cm^3 of dilute HCl when added to the acid?
2. Identify the salt whose aqueous solution has the highest pH at the same temperatures.
3. How many times a solution of pH = 2 is more acidic than a solution of pH = 6?

- a. 1 - 5 cm^3 of pure water, 2 - NaCl, 3 - 1000
- b. 1 - 20 cm^3 of pure water, 2 - $(\text{NH}_4)_2\text{SO}_4$, 3 - 400
- c. 1 - 10 cm^3 of dil. HCl, 2 - $\text{CH}_3\text{COONH}_4$, 3 - 100
- d. 1 - 20 cm^3 of the same dil. HCl, 2 - K_2CO_3 , 3 - 10,000

49. Fill in the blank:

An electric kettle has two thermal coils A and B. When current is passed through A, water in the kettle boils in 6 minutes. When current is passed through B, the same volume of water in the kettle boil in 8 minutes. If both A and B are joined in series and current is passed, water will boil in _____.

- a. 14 minutes
- b. 7 minutes
- c. 24 minutes
- d. 28 minutes

50. Concave and convex lenses are placed touching each other. The ratio of magnitudes of their powers is 2:3. The focal length of the system is 30 cm. Then the focal lengths of individual lenses are _____.

- a. -75 cm, 50 cm
- b. -15 cm, 10 cm
- c. -50 cm, 100 cm
- d. 40 cm, -200 cm

Answer Key

| | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1. a | 2. c | 3. c | 4. c | 5. c | 6. d | 7. d | 8. a | 9. b | 10. c |
| 11. d | 12. b | 13. a | 14. a | 15. a | 16. d | 17. c | 18. d | 19. a | 20. b |
| 21. c | 22. a | 23. d | 24. a | 25. d | 26. a | 27. b | 28. a | 29. c | 30. d |
| 31. c | 32. c | 33. d | 34. b | 35. a | 36. d | 37. a | 38. d | 39. a | 40. d |
| 41. d | 42. c | 43. b | 44. b | 45. d | 46. d | 47. d | 48. d | 49. a | 50. b |