

Vinaya J.

Centre For advancement Of Standards In Examinations
GRADE X PATHFINDER - 2011

Name of the Student: _____
Grade : _____ Sec: _____
No. of pages: 15

Subject : Science
Time : 0:15 Reading
2:00 Writing

Total marks: Physics – 17	Number of questions: 12
Chemistry-17	Number of questions: 12
Biology -16	Number of questions: 11
50	35

2: 15 Hrs

GENERAL INSTRUCTIONS

- All questions are compulsory.
- The questions are divided into three sections:
 1. SECTION I Questions 1 to 29 are Multiple Choice Questions. Each MCQ has four options out of which only **one** option is correct. Each correct answer earns a credit of 1 mark.
 2. SECTION II Questions 30 to 32 are Column – Matching questions. In these questions, there are 3 items in the left column (Column 1) and their answers are given in the right column (Column 2). You have to match each item in column 1 with **all** the correct options in column 2. For each item in column 1 you earn 1 mark.
 3. SECTION III Questions 33 to 35 are Numerical questions. Each correct answer earns a credit of 4 marks. All steps to derive the answers must be indicated.
 4. All calculations must be done in the space provided for that purpose.

SECTION I : MULTIPLE CHOICE QUESTIONS (1 mark each)

Mark the correct answer with a ✓ mark in the appropriate alphabet.

PART 1 Question numbers	1 -10 PHYSICS
PART 2 Question numbers	11 -20 CHEMISTRY
PART 3 Question numbers	21 -29 BIOLOGY

PART 1 (PHYSICS)

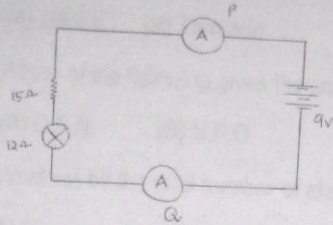
1. Convex mirrors are commonly used as rear-view mirrors in vehicles. Suppose you are sitting in a parked car, you notice a jogger approaching towards you in the side view mirror. The radius of curvature of the side view mirror is 2cm. If the jogger is running at a speed of 5m/s, how fast the image of the jogger appears to move when the jogger is 9m away from the mirror.
(A) 0.05m/s
(B) 0.1m/s
(C) 0.5m/s
(D) 0.01m/s
2. There is a water tank with water on the terrace of a building. The tank is 12m deep. A boy standing on the terrace is looking into the tank and the tank appears to be only 9m deep. This is due to one of the phenomenon of light called refraction. Then what is the speed of light in water?
(A) 2.25×10^8 m/s
(B) 3×10^8 m/s
(C) 2.25×10^7 m/s
(D) None of these
3. Magicians are doing the magical events based on some scientific facts. A magician during a show makes a convex lens with refractive index 1.47 which disappears in a trough of liquid of refractive index 1.47. What is the nature of the lens in the liquid?
(A) Convex lens
(B) Concave lens
(C) Plane glass sheet
(D) Biconvex lens

SPACE FOR ROUGH WORK

4. Hypermetropia is one of the refractive defects of human eye. What type of lens should a hypermetropic person use while looking at the sky?
- (A) Concave lens
 - (B) Convex lens
 - (C) Bifocal lens
 - (D) Prefers to remove the spectacles
5. Although Ohm's law has been found valid over a large class of materials, there do exist materials and devices used in electric circuits where the proportionality of 'V' and 'I' does not hold. Identify such a device or material from the following
- (A) Platinum
 - (B) Carbon
 - (C) Mercury
 - (D) Tungsten
6. A straight wire carrying a current of 12A is bent into a semi circular arc of radius 2cm. Then which of the following statements is true.
- (A) The straight wire has a magnetic field.
 - (B) The semicircular wire has a magnetic field.
 - (c) The straight wire has no magnetic field
 - (D) Both the wires have magnetic field.
7. A rainbow is one of the most spectacular natural phenomena exhibited by the sunlight and formed just opposite to the sun after a rain shower. There is a possibility of formation of a secondary rainbow. How many reflections and refractions are there in the secondary rainbow?
- (A) 1Reflection+1Refraction
 - (B) 1Reflection+2Refraction
 - (c) 2Reflections+2Refractions
 - (D) 2Reflections+1Refraction

SPACE FOR ROUGH WORK

8. In the circuit given below, the ammeter at position P reads 0.33A. Then what does the ammeter at position Q read?



- (A) 3A
- (B) 6A
- (C) 3.33A
- (D) 0.33A

9. The atomic masses of various elements are expressed in a unit called atomic mass unit (u). It is known that $1u = 1.6605 \times 10^{-27} \text{Kg}$. Find the energy equivalent of one atomic mass unit.

- (A) $1.49 \times 10^{-10} \text{J}$
- (B) $14.9 \times 10^{-10} \text{J}$
- (C) $1.49 \times 10^{-11} \text{J}$
- (D) $149 \times 10^{-11} \text{J}$

10. A loop of irregular shape carrying current is located in an external magnetic field. If the wire is flexible, it changes to a circular shape. Why?

- (A) To reduce the magnetic force acting on it
- (B) To increase the magnetic force acting on it
- (C) To increase the flux linked with it
- (D) To minimize the area enclosed by it

SPACE FOR ROUGH WORK

PART 2 (CHEMISTRY)

11. Identify the indicator used by a visually impaired student?
(A) Litmus. (B) Turmeric (C) Vanilla. (D) Petunia leaves.
12. Which of the following gives the correct increasing order of the atomic radii, O, F and N?
(A) O, F, N (B) N, F, O (C) O, N, F (D) F, O, N
13. What will be the total number of electrons in an atom, if the K, L, M, N shells of the atom are full?
(A) 60 (B) 26 (C) 42 (D) 36.
14. 'A' has 9 protons, 9 electrons and 10 neutrons. 'B' has 12 protons, 12 electrons and 12 neutrons. What will be the formula of the compound formed by the elements 'A' and 'B'?
(A) BA_2 (B) AB_2 (C) B_2A_3 (D) AB_4
15. Which of the given elements A, B, C, D, E with atomic number 2, 3, 7, 10 and 30 respectively belong to the same period?
(A) A, B, C (B) B, C, D (C) A, D, E (D) B, D, E
16. What is the number of covalent bonds in Pentane?
(A) 15 (B) 12 (C) 16 (D) 17
17. Which of the following is not a hydrated salt?
(A) Blue vitriol (B) baking soda (C) washing soda (D) gypsum
18. Which of the following oxide(s) of iron would be obtained on prolonged reaction of iron with steam?
(A) FeO (B) Fe_2O_3 (C) Fe_3O_4 (D) Fe_2O_3 and Fe_3O_4
19. Which of the following hydrocarbons would be expected to have the highest boiling point
(A) CH_4 (B) C_2H_5 (C) C_6H_{14} (D) C_4H_{10}

SPACE FOR ROUGH WORK

20. What is the composition of aqua regia?

- (A) Dilute HCl and conc. HNO_3 in the ratio of 3:1 (B) Dilute HCl and dilute HNO_3 in the ratio of 3:1
(C) Conc. HCl and conc. HNO_3 in the ratio of 3:1 (D) Conc. HCl and dilute HNO_3 in the ratio of 3:1

PART 3 (BIOLOGY)

21. Which is the correct sequence for the path of oxygen through the respiratory system?

- (A) Nasal passages, bronchi, trachea, bronchioles, cells, blood, alveoli
(B) Cells, blood, alveoli, bronchioles, bronchi, trachea, nasal passages
(C) Nasal passages, blood, alveoli, bronchi, cells, trachea, bronchioles
(D) Nasal passages, trachea, bronchi, bronchioles, alveoli, blood, cells

22. During the process of respiration,

- (A) Oxygen is delivered to body cells. (B) Carbon dioxide is expelled from the body.
(C) Oxygen is used in cells to produce ATP (D) All of these.

23. Assertion- Being HIV-positive means that you have tested positive for being infected with the virus known as HIV and is different from having AIDS.

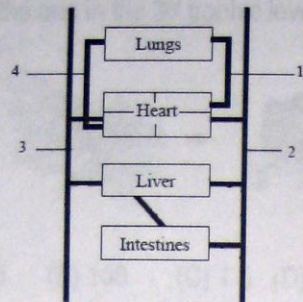
Reason – Having AIDS means that you are HIV-positive and that the progressive damage done to your immune system has weakened it to a point at which you can no longer fight off a range of infections.

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

24. Arrange the following 7 steps in the filtration of blood in order.

- A. From the Bowman's capsule, fluid flows through a U-shaped tubule.
B. Under high pressure, blood flows into capillaries that make up the glomerulus.
C. After being stored in the bladder, urine exits the body via the urethra.
D. Fluid moves from the end of the nephron's tubule to the ureter.
E. Blood enters the nephron from a branch of the renal artery.
F. Water, glucose, amino acids, and ions are reabsorbed into the blood.
G. Water, glucose, amino acids, wastes, and other substances move from glomerular capillaries into a Bowman's capsule.
(A) B,G,A,E,F,D,C (B) D,E,G,B,A,F,C (C) E,B,G,A,F,D,C (D) A,B,G,E,F,D,C

The diagram shows a plan of part of the blood circulation. Identify the blood vessels labeled in the order 1 to 4



- (A) Pulmonary artery, Venacava, Aorta, Pulmonary vein
 (B) Pulmonary Vein, Venacava, Aorta, Pulmonary artery
 (C) Pulmonary artery, Aorta, Venacava, Pulmonary Vein
 (D) Pulmonary Vein, Aorta, Venacava, Pulmonary artery
26. Which of the following functions will not be affected in a person with a damaged fore brain?
- (A) Perception and recognition of auditory stimuli, memory, and speech
 (B) Body's autonomic functions like heart rate.
 (C) Regulation of reasoning, problem solving and judgement
 (D) Motor control and memory
27. Regarding the functions of the placenta, which of the following statements is true?
- (A) The placenta nourishes the fetus by establishing a dialysis pattern for exchange between the maternal and fetal circulations.
 (B) The placental barrier is very thin and freely permeable to glucose and amino acids.
 (C) The PO₂ of the blood of the umbilical vein is the same as that in the maternal arterial blood.
 (D) The estrogens secreted by the placenta tend to inhibit uterine excitability during pregnancy.

Given below is a food relationship operating in a terrestrial ecosystem. If 15000 units of energy is trapped by the producer, what amount of energy will be available to the organism in the 4th trophic level when it eats the one in the 3rd trophic level?



- (A) 0.15 (B) 150 (C) 1.5 (D) 15

29. Which of the following is not true regarding ovulation?

- (A) It is the process of gamete formation in women
 (B) Is the name given to the release of ova from the ovaries
 (C) It is an important stage of menstrual cycle
 (D) It begins at puberty and usually ends after menarche

SECTION II : COLUMN – MATCHING QUESTIONS

Question number 30 PHYSICS

Question number 31 CHEMISTRY

Question number 32 BIOLOGY

Match each item in column 1 with all the correct options in column 2. Mark the correct answer by writing the alphabets in the boxes provided against each question.

30. PHYSICS

Column 1	Column 2	Answers
1. Resistance	a. watt/Amp ²	1. Resistance
2. Voltage	b. eV	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3. Energy	c. kgm ² /s ²	2. voltage
	d. Volt/Amp	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	e. Joule/coulomb	3. energy
		<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

31. **CHEMISTRY**

Column 1	Column 2	Answers			
1. Na	a. Semiconductor b. forms basic oxide c. electrolytic reduction d. Belong to second period.	1. Na	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. B		2. B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Be		3. Be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
				<input type="checkbox"/>	<input type="checkbox"/>

32. **BIOLOGY**

Column 1	Column 2	Answers			
1. Stroma	a. Stack of thylakoid membranes b. Fluid filled space in the chloroplast c. Convert light energy to chemical energy d. Contain complex network of stacked sacs e. Possess double membrane envelope.	1. Stroma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Granum		2. Granum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Chloroplast		3. Chloroplast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CHEMISTRY

34. Compound "X" is a gaseous hydrocarbon. It decolourises Bromine water. It forms mono chloro addition product "Y" with gaseous HCl. The molecular weight of "Y" is 64.5. Identify compounds "X" and "Y". write the chemical reactions involved.

SPACE FOR ROUGH WORK

BIOLOGY

35. a. In *Drosophila*, vestigial wings and ebony colour are due to two separate recessive genes. The dominant alleles are normal (long) wings and normal (gray) body colour. What type of offspring would you expect from a cross between heterozygous normal ebony female and a vestigial ebony male? Show the genotype and phenotype in the form of a cross
- b. The ability to roll the tongue is dominant over the inability to do so in humans. If a pure breeding tongue-roller has children with a heterozygous tongue-roller, what will their children's phenotypes be? (Show the cross)

SECTION III : NUMERICAL QUESTIONS

Question number 33 PHYSICS

Question number 34 CHEMISTRY

Question number 35 BIOLOGY

Solve the problems in the space provided for that purpose after each question. All steps to derive the answers must be indicated.

PHYSICS

33. A. An object 4cm in size is placed 25cm in front of a concave mirror of focal length 15cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? Find the nature and the size of the image?
- B. Ahmed tried to find the potential drop across a resistor of resistance 2Ω by using a voltmeter, ammeter and a battery of emf 6V and internal resistance 0.6Ω in the Physics lab. He made the connections as shown in the figure given below. One of his friends pointed out some defects of the circuit that he made. Write any three suggestions made by his friend. Ahmed also wants to repeat the experiment to increase the accuracy of the experiment. How the circuit can be modified to satisfy all the requirements. Write a set of reading that Ahmed obtained while doing the experiment

