



# Young Scholars Foundation

**Prizes**

**SCIENCE**

**GRADE  
10**

<p><b>1st Rank</b> Trip to Dubai</p>  <p>+</p> <p>Gold Medal + Certificate of Excellence</p>	<p><b>2nd Rank</b> ₹ 25000</p> <p>+</p> <p>Silver Medal + Certificate of Excellence</p>	<p><b>3rd Rank</b> ₹ 10000</p> <p>+</p> <p>Bronze Medal + Certificate of Excellence</p>
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**4<sup>th</sup> TO 10<sup>th</sup>  
Rank  
Rs 1100**

+ Certificate of Excellence

**11<sup>th</sup> TO 50<sup>th</sup>  
Rank  
Wrist Watch**



+ Certificate of Excellence

## Instructions

Time : 1 hour

Maximum Marks : 100

- Maximum Time is 1 hour & You will get additional ten minutes to fill up information about yourself on the OMR Sheet, before the start of the exam.
- Write your **Name, School Code, Class, Roll No.** and **Mobile Number** clearly on the **OMR Sheet** and do not forget to sign it.
- The Question Paper comprises four sections:  
**Scientific Reasoning** (25 Questions), **General Science** (15 Questions), **Logical Reasoning** (5 Questions) and **Wise Wizard** (5 Questions). Each question carries two marks.
- All questions are compulsory. There is no negative marking. Use of calculator is not permitted.
- To mark your choice of answers by darkening the circles on the OMR Sheet, use **HB Pencil** or **Blue / Black ball point pen** only.

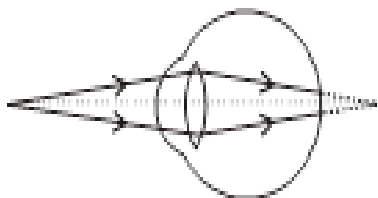
Roll No

Student Name

Father's Name

## SECTION - A (SCIENTIFIC REASONING)

- Q1. What is the magnification when the object is placed at  $2f$  from the pole of a convex mirror?
- a.  $\frac{1}{3}$                       b.  $-\frac{2}{3}$                       c.  $-1$                       d.  $-\frac{3}{2}$
- Q2. A body is moving along a circular path of radius  $r$ . The ratio of distance to displacement of the body, when it completes  $\frac{3}{4}$  th revolution, is
- a.  $\frac{2\sqrt{2}\pi}{3}$                       b.  $\frac{3\pi}{2}$                       c.  $\frac{3\pi}{2\sqrt{2}}$                       d.  $\frac{\sqrt{3}\pi}{2}$
- Q3. No force acts on the charge fired through a magnetic field, when the angle between its velocity and magnetic field is
- a.  $\pi$                       b.  $\frac{3\pi}{4}$                       c.  $\frac{\pi}{2}$                       d.  $\frac{\pi}{4}$
- Q4. A man is suffering from vision defect. According to given diagram, the defect he suffers from is



- a. Myopia                      b. Cataract                      c. Hypermetropia                      d. Astigmatism
- Q5. Work done by a body against friction always results in
- a. Increase in kinetic energy                      b. Decrease in kinetic energy  
c. Increase in potential energy                      d. Decrease in potential energy
- Q6. A long straight wire carries a current along  $Z$  axis. It is not possible to find two points in  $X$ - $Y$  plane where
- a. The magnetic fields are same  
b. The direction of magnetic fields are same  
c. The magnitude of magnetic fields are equal  
d. The field at one point is opposite to that at the other point
- Q7. A particle travels a distance of 20 m in 7<sup>th</sup> second and 24 m in 9<sup>th</sup> second. The distance travelled by the particle in 15<sup>th</sup> second will be
- a. 42 m                      b. 36 m                      c. 48m                      d. 32 m
- Q8. The weight of a person is 560 N on the surface of earth. The weight of same person at a depth  $\frac{R}{8}$  from the surface of earth would be
- a. 490 N                      b. 560 N                      c. 420 N                      d. 360 N

- Q9. Choose the incorrect statement about hydrogen as a fuel.
- It has the highest calorific value
  - Its burning does not cause any pollution
  - It can be prepared by the electrolysis of water
  - It does not burn with explosion. So, its use is very much safe
- Q10. The main reasons for the formation of chemical bond is
- To attain minimum energy and minimum stability
  - To attain maximum energy and maximum stability
  - To attain maximum energy and minimum stability
  - To attain minimum energy and maximum stability
- Q11. The mass of 18 molecules of water is
- $5.38 \times 10^{-23}$  g
  - $5.38 \times 10^{-22}$  g
  - $2.98 \times 10^{-23}$  g
  - $5.38 \times 10^{-24}$  g
- Q12. The pair of cross linked polymers is
- Rayon and nylon
  - Teflon and rayon
  - Bakelite and melamine
  - PVC and PHB
- Q13. Consider the following statements :
- Sodium carbonate is used in glass, soap and paper industry.
  - Sodium carbonate is used to remove permanent hardness of water.
  - Chemical formula of washing soda is  $\text{NaHCO}_3$ .
- The correct statements are :
- I and III
  - II and III
  - I and II
  - I, II and III
- Q14. Which of the following compounds is formed when zinc reacts with caustic soda?
- $\text{Zn}(\text{OH})_2$
  - $\text{ZnCl}_2$
  - $\text{ZnCO}_3$
  - $\text{Na}_2\text{ZnO}_2$
- Q15. Consider the following box :
- Mg, Al, Cu, Na, Mn, Fe, Ag
- The total number of metals which react with very dilute nitric acid to give hydrogen is
- 3
  - 4
  - 5
  - 2
- Q16. Electronic configuration of an element 'E' is  $x, x^3, 2x^2 - 5$ . Position of element E in the Modern Periodic Table is
- Period = 3 Group = 3
  - Period = 3 Group = 13
  - Period = 5 Group = 13
  - Period = 3 Group = 2

Q17. All of the following are neutral salts, except

- a. Potassium nitrate
- b. Potassium sulphate
- c. Potassium acetate
- d. Potassium chloride

Q18. The process that does not involve oxidation is

- a. Alloying
- b. Rusting
- c. Combustion
- d. Rancidity

Q19. *Riccia* belongs to the division

- a. Pteridophyta
- b. Bryophyta
- c. Gymnospermae
- d. Thallophyta

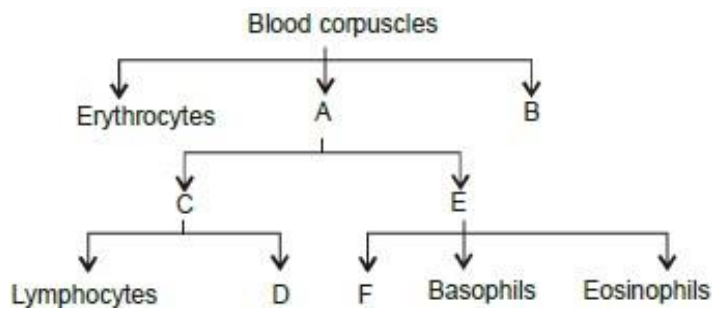
Q20. A cell becomes turgid when placed in

- a. Hypertonic solution
- b. Hypotonic solution
- c. Isotonic solution
- d. Ringer's solution

Q21. Oxygen is consumed in all of the following processes, except

- a. Respiration
- b. Photosynthesis
- c. Decay
- d. Combustion

Q22. Study the given flow chart.



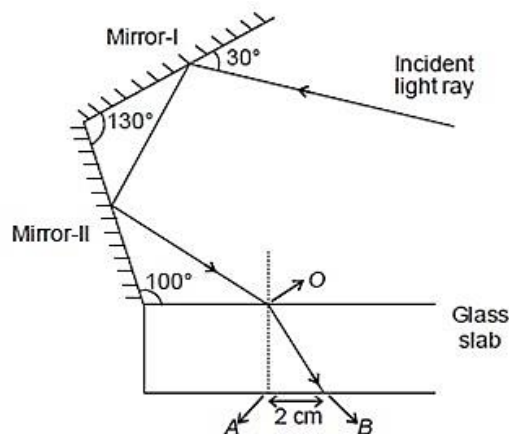
Select the incorrect statement w.r.t. the cells which are indicated as letters A-F.

- a. The number of A per microlitre of blood is called TLC
- b. The letter E is used for granulocytes and squeezing out of F through the capillary wall is called diapedesis
- c. An abnormal rise in the count of B is called polycythemia
- d. The letter C is used for agranulocytes and cell indicated as D are able to squeeze out through the capillary wall

- Q23. Read the following statements and identify which of them are true and which of them are false and select the correct option.
- (i) Branchial respiration occurs in fishes.
  - (ii) Pharynx is a common passage for the air we inhale and the food we eat.
  - (iii) In men, the vocal cords are usually shorter and thinner.
  - (iv) Breathing occurs voluntarily but the rate is controlled by the respiratory centre located in the medulla oblongata.
  - (v) Diaphragm is the characteristic of all mammals.
- (i) (ii) (iii) (iv) (v)
- a. False False True True True
  - b. True True False False True
  - c. True False True True False
  - d. False True True False True
- Q24. While walking in a garden, Mohan detected the smell of a flower. Which of the following parts firstly received the scent?
- a. Axon of sensory neuron
  - b. Dendrite of sensory neuron
  - c. Dendrite of motor neuron
  - d. Dendrite of relay neuron
- Q25. Shaman is suffering from a disorder due to which he is excreting 8 litres of urine per day. A hormone deficiency of which of the following endocrine glands is responsible for this?
- a. Pancreas
  - b. Thyroid
  - c. Pineal
  - d. Pituitary

### SECTION - B (GENERAL SCIENCE)

- Q26. A ray of light is incident on a plane mirror-I and after reflection from mirror-II, enter into glass slab as shown in the figure. If refractive index of the glass slab is 2, then what is the thickness of the glass slab?

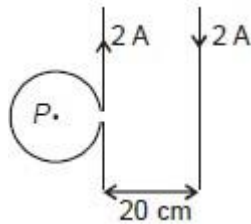


- a.  $\sqrt{30}$  cm
- b. 10 cm
- c.  $\sqrt{60}$  cm
- d.  $5\sqrt{2}$  cm

Q27. Specific resistance of conductor depends upon

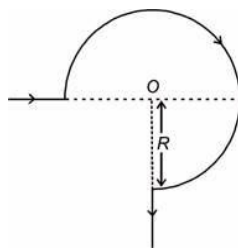
- a. Shape of conductor                      b. Length of conductor  
 c. Area of conductor                        d. Temperature of conductor

Q28. A long straight current carrying wire is placed near a long wire which is bent as shown in the figure. If radius of arc is 20 cm, then what will be the net magnetic field at point  $P$ ?



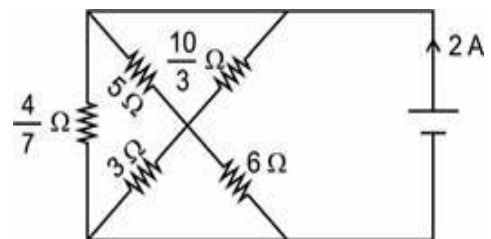
- a.  $3.15 \times 10^{-7}$  T    b.  $7.28 \times 10^{-6}$  T                      c.  $6.78 \times 10^{-6}$  T                      d.  $1.2 \times 10^{-7}$  T

Q29. The net magnetic field at the centre of a three quarter circular arc of radius  $R$  carrying a constant clockwise current  $I$ , is



- a.  $\frac{3\mu_0 I}{8\pi R} \otimes$     b.  $\frac{3\mu_0 I}{8R} \otimes$                       c.  $\frac{4\mu_0 I}{\sqrt{2\pi R}} \otimes$                       d.  $\frac{\mu_0 I}{2R} \otimes$

Q30. In the circuit given below, A current is drawn from battery as shown in figure. Battery has internal resistance of  $1 \Omega$  thus emf of battery is



- a. 1 V                      b. 2 V                      c. 3 V                      d. 4 V

Q31. Which of the following is/are alkali(es)?

- (a) Ferric hydroxide                      (b) Cupric hydroxide                      (c) Calcium hydroxide  
 a. Only (a)                      b. Both (b) and (c)                      c. Both (a) and (c)                      d. Only (c)

Q32. The correct arrangement of the given elements in the decreasing order of the atomic radii is

- a.  $\text{Be} > \text{Mg} > \text{Ca} > \text{Sr}$                       b.  $\text{Ca} > \text{Sr} > \text{Mg} > \text{Be}$   
 c.  $\text{Sr} > \text{Ca} > \text{Mg} > \text{Be}$                       d.  $\text{Be} > \text{Ca} > \text{Mg} > \text{Sr}$

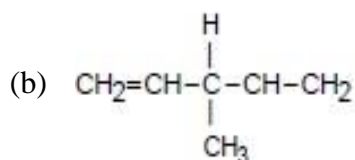
Q33. Match the following and choose the correct option.

**Column-I**

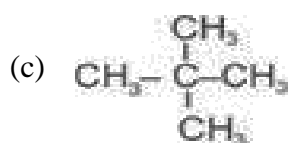
**Column-II**



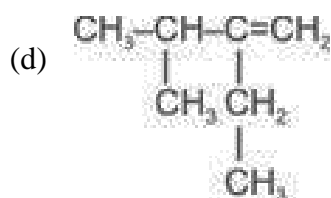
(i) 2-Ethyl-3-methylbut-1-ene



(ii) Pent-3-en-1-yne



(iii) 2,2-Dimethylpropane



(iv) 3-Methylpenta-1,4-diene

- a. (a)- (iv), ( b)- (ii), (c)- (iii), (d)-(i )  
 b. (a)- (ii), ( b)- (i), (c)- (iii), (d)- (iv )  
 c. (a)- (ii), (b)- (iv), ( c)-(i), (d)-(iii )  
 d. a)- (ii), ( b)-(iv), (c)-(iii), (d)-(i )

Q34. The common metal present in brass and bronze is

- a. Lead                      b. Zinc                      c. Tin                      d. Copper

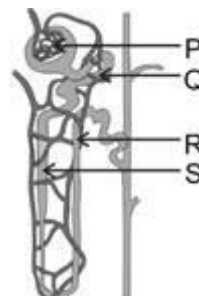
Q35. A gaseous product 'X' is released by the reaction of bleaching powder with sulphuric acid. 'X' on reacting with gaseous product released at cathode during chlor-alkali process forms a compound 'Y'. Compound 'Y' is

- a.  $\text{Na}_2\text{CO}_3$                       b.  $\text{CaCl}_2$                       c.  $\text{NaOH}$                       d.  $\text{HCl}$

Q36. Which of the following is a sexually transmitted disease caused by virus in human?

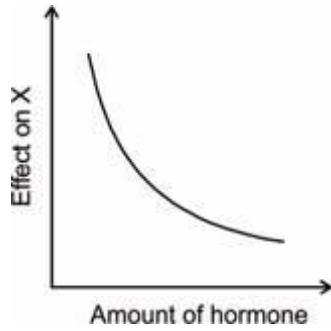
- a. Syphilis                      b. Genital herpes                      c. Gonorrhoea                      d. Chlamydia

Q37. In the given structure of nephron, identify the labelled part that is involved in the selective reabsorption of the substances and the part which is permeable to water respectively.



- a. P and S                      b. R and Q  
 c. Q and S                      d. Q and R

Q38. Study the given graph carefully where 'X' is a/an parameter/activity in our body.



Select the correct option w.r.t. the hormones and 'X' for which the above given graph is incorrect.

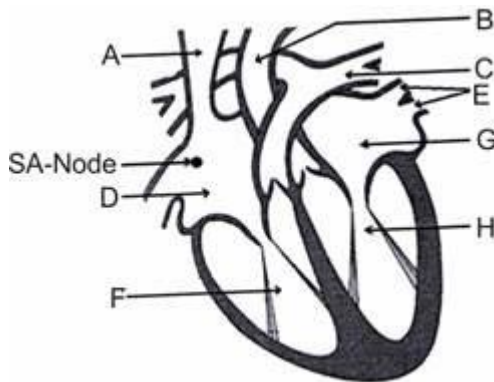
	Hormone	X
(1)	Adrenaline	Blood flow to skin
(2)	Parathyroid hormone	Blood calcium level
(3)	Insulin	Blood glucose level
(4)	Prolactin inhibitory hormone	Secretion of prolactin

- a. (1)                      b (2)                      c. (3)                      d. (4)

Q39. In which of the following organisms sex is not determined genetically?

- a. Birds                      b. Fishes                      c. Lizards                      d. Humans

Q40. Carefully observe the below given sectional view of heart and choose the correct option regarding the flow of deoxygenated blood.



- a. E → F → G → B    b. C → F → D → A    c. A → D → F → C    d. B → G → F → E



## SECTION - C (LOGICAL REASONING)

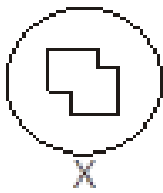
Q41. Read the given pattern carefully and answer the following question.

Seven friends A, B, C, D, E, F and G are sitting in a queue such that all are facing towards north. G is sitting adjacent to E and F. D is sitting fourth to the right of C, who is sitting adjacent to A and E. No one is sitting in the left of A.

Who is sitting at the 2<sup>nd</sup> position from the left end of the queue?

- a. B                      b. D                      c. C                      d. E

Q42. In which of the following option, figure X is embedded?



- a.      b.      c.      d.

Q43. In this question set of two figures X and Y showing a sequence of folding of a piece of paper. Figure Z shows the manner in which the folded paper has been cut. Choose a figure from the options which would most closely resemble the unfolded form of figure (Z).



- a.      b.      c.      d.

Q44. A is father-in-law of E. M is daughter of P, who is daughter of F. C is son of E, who is father of M. Now on the basis of given information answer the following question.

How is F related to E?

- a. Mother                      b. Sister                      c. Mother-in-law                      d. Daughter

Q45. Direction : Read the given pattern carefully and answer the following question.

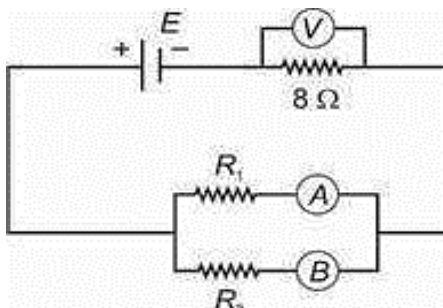
♠ a o 9 @ ♦ e # d i 8 1 2 % 5 ♣ r t k 2 3 ! w 1 6 3 & @ d g + j i ♥

The 12<sup>th</sup> term to the left of 28<sup>th</sup> term from the left end is

- a. 5                      b. r                      c. ♣                      d. t

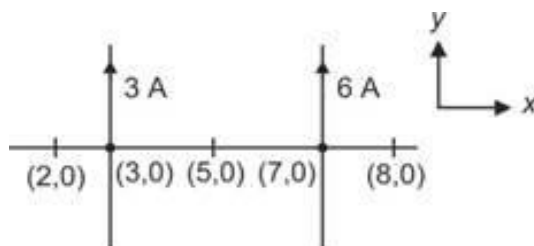
### SECTION - D (WISE WIZARD)

- Q46. Two ideal ammeters  $A$ ,  $B$  and a voltmeter of a infinite resistance are connected in an electrical circuit as shown below.



If the ratio of the current flowing through ammeters is  $I_A : I_B = 4 : 3$  and voltmeter reads 40 V, then the value of  $R_1$  and  $R_2$  will be respectively.

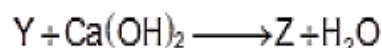
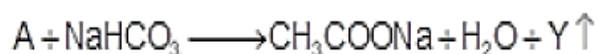
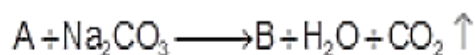
- a. 28  $\Omega$ , 21  $\Omega$  if  $E = 100$  V                      b. 28  $\Omega$ , 21  $\Omega$  if  $E = 150$  V  
 c. 21  $\Omega$ , 28  $\Omega$  if  $E = 150$  V                      d. 21  $\Omega$ , 28  $\Omega$  if  $E = 100$  V
- Q47. Two long straight current carrying wires of current 3A and 4A are placed at the  $x$ -axis is shown below.



The magnitude of net magnetic field at point (5,0) is

[Take  $\mu_0 = 4\pi \times 10^{-7}$  Tm/A and dimensions are in metre]

- a.  $2 \times 10^{-7}$  T                      b.  $3 \times 10^{-7}$  T                      c.  $4 \times 10^{-7}$  T                      d.  $5 \times 10^{-7}$  T
- Q48. Consider the following,



Compounds 'Z' and 'A' respectively are

- a. CaO,  $\text{CH}_3\text{COOH}$                       b. CaO,  $\text{CH}_3\text{CH}_2\text{OH}$   
 c.  $\text{CaCO}_3$ ,  $\text{CH}_3\text{COOH}$                       d.  $\text{CaCO}_3$ ,  $\text{CH}_3\text{CH}_2\text{OH}$

Q49. P- It represents the two alternative forms of a gene.

Q - It is the total number of genes present in the haploid set of chromosomes.

R – The type of sex determination found in grass hoppers.

S- It is the change in gene frequency which occurs by chance in a small population.

Select the option which correctly identifies P–S.

	P	Q	R	S
(1)	Allele	Genome	Protenor type	Genetic drift
(2)	Factor	Genome	XX-XO type	Gene flow
(3)	Factor	Heterosome	ZW-ZZ type	Gene pool
(4)	Allele	Autosome	Lygaeus type	Genetic drift

a. (1)

b. (2)

c. (3)

d.(4)

Q50. Refer the given dichotomous key and select the correct option for P, Q, R and S

(I) (a) It is a peptide hormone - Go to (II)

(b) It is a steroid hormone - Go to (IV)

(II) (a) It is produced from pancreas - Go to (III)(a)

(b) It is produced from posterior pituitary - Go to (III) (b)

(III) (a) It stimulates glucose production by liver - **P**

(b) It promotes water reabsorption by the kidneys - **Q**

(IV) (a) It is secreted from adrenal gland Go to (V) (a)

(b) It is secreted from gonads - Go to (V)(b)

(V) (a) It stimulates gluconeogenesis - **R**

(b) It regulates activity in female reproductive tissues – **S**

	P	Q	R	S
(1)	Glucagon	Vasopressin	Cortisol	Estrogen
(2)	Thyroxine	Vasopressin	Corticotropin	Aldosterone
(3)	Insulin	Glucagon	Progesterone	Epinephrine
(4)	Cortisol	Corticotropin	Adrenaline	Progesterone

a. (1)

b. (2)

c. (3)

d (4)

**Space for rough work**

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