ALLEN CAREER INSTITUTE KOTA (RAJASTHAN) Path to success

NATIONAL TALENT SEARCH EXAMINATION (NTSE-2021) STAGE -1

STATE : CHANDIGARH PAPER : SAT

Date: 13/12/2020

Max. Marks: 100 **NTSE STATE-1** Time allowed: 120 mins

1. Which of the following indicated the main objectives of French Constitution in 1791.

(1) Constitutional Monarchy

(2) Right to vote for all men above 25 years of age

(3) Declaration of Rights fo man and citizens

(4) Only men of 25 years and paid taxes were allowed to vote.

(1) All the above (2) 2, 3, 4 (3) 1, 2, 3 (4) 1, 3, 4

Ans. (4)

Sol. 1. Constitutional monarchy.

2. Declaration of Rights of man and citizens

3. Only men of 25 years & paid taxes were allowed to vote.

2. The name associated with " APRIL THESES" is

(1) Karls Marx (2) Robert Owen (3) Lenin (4) Stalin

Ans. (3)

Sol. The name associated with 'April Theses' is Lenin.

3. BUDENOVKA is_____

(1) Russian Coat (2) Russian Hat (3) Russian Tie (4) Russian Uniform

Ans. (2)

Sol. Budenovka is Russian Hat.

4. Arrange the following in the correct Chronological order of the events

(1) Pearl Harbour Attack

(2) German Invasion of Russia

(3) German Invasion of Poland

(4) Hitler pulling Germany out of League of Nations

(1) 1 2 3 4 (2) 2 3 1 4 (3) 4 3 1 2 (4) 4 3 2 1

Ans. (4)

Sol. 1. Hitler pulling Germany out of League of Nations.

2. German invasion of Poland.

3. German invasion of Russia.

4. Pearl Harbour attack.

5. Consider the following statements and choose the correct ones.

(1) British invited German expert, DIETRIECH BRANDIS for advice in saving forests.

(2) Brandis was made first Inspector General of Forests

(3) Brandis set up Indian Forest Services in 1864

(4) Brandis helped formulate the Indian Forest Act in 1869

(1) 1 2 3 4 are correct (2) only 1 3 4 are correct (3) 1 2 3 are correct (4) only 1 is correct

Ans. (3)

Sol. Option 4 is false. Brandis helped formulate the Indian Forest Act in 1865.

6. Dhangars were the pastoral community of _____

(1) Gujarat (2) Maharashtra (3) Karnatak (4) Chhattisgarh

Ans. (2)

Sol. Dhangars were the Pastoral community of Maharashtra.

7. Name the French philosopher who explained- What makes the nation?

(1) JEAN- JACQUES ROUSSEAU (2) FREDERIC SORRIEU

(3) MONTESQUIE (4) ERNST RENAN

Ans. (4)

Sol. Ernest Renan is the French philosopher who explained 'What makes the nation?'.

8. Arrange the following into correct Chronological order:

(1) Arrival of Simon Commission in India

(2) Lord Irvin announced Dominion status of India

(3) Gandhiji sent the letter stating 11 demands

(4) Poona Pack

(1) 1 2 3 4 (2) 2 3 4 1 (3) 3 4 1 2 (4) 4 1 2 3

Ans. (1)

Sol. 1. Arrival of Simon Commission in India.

2. Lord Irwin announced Dominion status of India.

3. Gandhiji sent the letter stating 11 demands.

4. Poona Pact.

9. Which of the following statements are false:-

(1) Silk route linked ASIA -EUROPE - NORTH AFRICA

(2) Silk route was route both by land and sea

(3) Budddhism travelled across silk route

(4) Precious metals -Gold & Silver flowed from Asia to Erope

(1) 1 and 4 (2) only 1 (3) only 3 (4) only 4

Ans. (4)

Sol. Statement 4 is false. Precious metals- Gold & silver flowed from Europe to Asia.

10. Europeans were attracted to Africa, why?

(1) By its Natural Beauty (2) To expand Industries

(3) by its vast land resources and mineral wealth (4) All the above

Ans. (3)

Sol. Europeans were attracted to Africa because of its vast land resources and mineral wealth.

11. _____ of Korea is among world's oldest existed book with moveable metal types printing.

(1) Diamond Sutra (2) Bible (3) Jikji (4) Ukiyo

Ans. (3)

Sol. 'Jikji' of korea is among world's oldest existed book with movable metal types printing.

12. Following statement refer to the life of Baba Ramchandra in Awadh. Choose the false statement-

(1) Peasants were led by Baba Ramchandra in Awadh (2) Baba Rama Chandra was a sanyasi

(3) He worked as indentured labourer in Assam (4) He headed Oudh Kisan Sabha with J.L. Nehru

Ans. (3)

Sol. Statement 3 is false. He worked as indentured labourer in Fiji

13. Choose the right option of peaks in descending order of their heights.

(1) Kanchenjunga (2) Dodabetta (3) Anaimudi (4) Nanda Devi

(1) 1 2 3 4 (2) 2 3 4 1 (3) 3 4 1 2 (4) 1 4 3 2

Ans. (4)

Sol. Peaks in descending order of their heights.

1. Kanchenjunga - 8598m
2. Nanda Devi - 7817m
3. Anaimudi - 2695m
4. Dodabetta - 2637m

14. River Kaveri makes the second biggest water fall in India. It is _____.

(1) Jog falls (2) Duduwa falls

(3) Shiva Samundram falls (4) Dudhsagar Falls

Ans. (3)

Sol. River Kaveri makes the second biggest waterrfall in India. It is Shiva Samundram falls.

15. MAHAWAT is the local name of _____ rainfalls in Indian Plains.

(1) Summer (2) Winter (3) Spring (4) Autumn

Ans. (2)

Sol. Mahawat is the local name of winter rainfall in Indian Plains.

16. Which of the following are the features of National Population Policy-2000

1. Imparts free and compulsory education upto 14years of age
2. Reducing infant mortality rate to below 30 per 1000 live births
3.Achieving Universal Immunisation of children
4. Promoting early marraige among girls.

(1) 1 2 3 4 (2) 1 3 4 only (3) 1 2 3 only (4) 2 3 4 only

Ans. (3)

Sol. The features of National Population Policy 2000;

1. Imparts free and compulsory education upto 14 years of age.
2. Reducing infart mortality rate to below 30 per 1000 live births.
3. Achieving Universal immunisation of children.

17. Laterite soil is very useful in growing _____.

(1) Rice, Wheat, Mustard (2) Tea, Coffee and Cashewnuts

(3) Pulses, sugarcanes and resins (4) Cotton, Maize

Ans. (2)

Sol. Laterite soil is very useful in growing tea, coffee and cashewnuts.

18. Match the Following

MULTI PURPOSE DAMS	NAME OF RIVERS
A. Rana Pratap Sagar Dam	i. Bhagirathi River -
B. Salal Project	ii. Chambal River
C. Tehri Dam	iii. Krishna River
D. Nagarjuna Sagar Dam	iv. Chenab River

(1) A- i, B-ii, C-iii, D- iv (2) A-ii, B-iv, C-i, D-iii (3) A-iii, B-i, C-ii, D-iv (4) A-iv, B-iii, C-ii, D-i

Ans. (2)

Sol. Multipurpose Dam – Name of River

a. Rana Pratap Sagar Dam – Chambal river

b. Salal Project - Chenab river

c. Tehri Dam – Bhagirathi river

d. Nagarjuna Sagar Dam – Krishna river

19. Average climatic conditions for growing sugarcane are _____.

(1) 21°C – 27°C (75cm –100cm rainfall) (2) 25°C – 30°C (25cm – 50cm rainfall)

(3) below 18°C (75cm – 100cm rainfall) (4) 21°C – 27°C(50cm – 65 cm rainfall)

Ans. (1)

Sol. Average climatic conditions for growing sugarcane are 21° C – 27°C temperature (75 cm – 100 cm rainfall).

20. The first ever cement olanLset-up in India was _____

(1) Mumbai 1904 (2) Kolkata 1944 (3) Chennai 1940 (4) Chennai 1904

Ans. (4)

Sol. The first ever cement plant in India was set up in Chennai in 1904.

21. The river associated with National Water way No.2 is

(1) Ganges (2) Sutleg (3) Kaveri (4) Brahmaputra

Ans. (4)

Sol. The river associated with National Waterway No.2 is Brahmaputra.

22. Consider the following facts and decide which of these facts would you call a democracy.

1. Elections are held regularly

2. Voters are bribed by the lea

3. Govt, arrests the leaders who protest peacefully against the wrong policie

4. Govt, works for the welfare of the people.

(1) 1, 2, 3, 4 (2) 1and 2 (3) only 1 (4) 1 and 4

Ans. (4)

Sol. In a democracy:

1. Elections are held regularly.

2. Government works for the welfare of the people.

23. Who, among the following leaders was born in Saudi Arabia and opposed Muslim separatist politics and later became first Education Minister of India

(1) Jaipal Singh (2) Abul Kalam Azad (3) G. Durgabai Deshmukh (4) Dr. Zakir Hussain

Ans. (2)

Sol. Abul kalam Azad was born in Saudi Arabia and opposed Muslim separatist politics and later became the first Education Minister of India

24. " Nyaya Yuth'' (Struggle for Justice) was a movement launched by Chaudhar Devi Lal against which ruling party in Haryana?

(1) Janata Dal (2) Congress (3) BSP (4) BJP

Ans. (2)

Sol. 'Nyaya Yudh' (Struggle for Justice) was a movement launched by Chaudhri Devi Lal against Congress party in Haryana.

25. The Constitution of Belgium has been amended four times between the years _____.

(1) 1970-1992 (2) 1970-1990 (3) 1972-1992 (4) 1970-1993

Ans. (4)

Sol. The Constitution of Belgium has been amended four times between the years 1970-1993.

26. Which country among the following countries suffered disintegration due to politcal fights on the basis of religious and ethnic identities,

(1) Yugoslavia (2) India (3) Belgium (4) Netherland

Ans. (1)

Sol. Yugoslavia suffered disintegration due to political fights on the basis of religious & ethnic identities.

27. Which of the following political parties to power in Bolivia in 2006.

(1) The Communist party (2) The Republican Party (3) The Socialist Party (4) The Conservative Party

Ans. (3)

Sol. The Socialist Party came to power in Bolivia in 2006.

28. Match the following regional political parties with their symbols-

Political party	Symbol
A. Telegu Desam Party	i. 
B. YSR Congress Party .	ii. 
C. Shromani Akali Dal	iii. 
D. The Conservative Party	iv. 

(1) A-ii, B-iii, C-iv, D-i (2) A-ii, B-iii, C-i, D-iv (3) A-I, B-i'v, C-iii, D-ii (4) A-iv, B-iii, C-ii,D-i

Ans. (1)

Sol. Political party Symbol

A. Telugu Desam Party ii 

B. YSR Congress Party iii 

C. Shiromani Akali Dal iv. 

D. The Conservative Party i. 

29. Match the following :-

A. Electricity Bill	i. Fixed Capital
B. computers	ii Human Capital
C. Labour	iil. Working Capital

(1) A-i, B-ii, C-iii (2) A-iii, B-i, C-ii (3) A-ii, B-iii, C-i (4) A-iii, B-ii, C-i

Ans. (2)

Sol. A. Electicity Bill – Working Capital

B. Computers – Fixed Capital

C. Labour – Human Capital

30. A person is considered poor if his or her income level falls below a given_____.

(1) Maximum level necessary to fulfil needs

(2) Minimum level necessary to fulfil basic needs

(3) Both 1 & 2

(4) Level Below per capita income of the country

Ans. (2)

Sol. A person is considered poor if his or her income level falls below a given minimum level necessary to fulfil basic needs.

31. Prime Minister Rozgar yojana was started

(1) 1973 (2) 1983 (3) 1993 (4) 2003

Ans. (3)

Sol. Prime Minister Rozgar Yojana was started in 1993.

32. Yellow card is issued to _____.

(1) People above Poverty Line (2) People below Poverty Line

(3) People in government Jobs (4) People in Private sector

Ans. (2)

Sol. Yellow card is issued to people below poverty line.

33. Mr. Dhiman took a loan of Rs.20 Lakhs Mr. Dhlman took a lona of Rs. 20 Lakhs from bank to purchase a house. The annual rate of Interest on the loan is 12% per annum and loan is to be repaid in 10 years in instalments. The bank retains the papers of new house as collateral, which will be returned to Mr.Dhiman only when he repays the entire loan amount with interest. Analyse the loan information given above and choose the right option for the same.

(1) Mode of Repayment (2) Interest on Loan (3) Terms of Credit (4) Collateral

Ans. (3)

Sol. Terms of Credit - Interest rate, collateral, documentation requirement and the mode of repayment, together is called the terms of credit.

34. There are two statements marked as Assertion (A) and Reason (R). Read the statements carefully and choose the correct option. (s)

Assertion (A) :- The goods and services are produced globally.

Reason (R):- Production process is divided into small parts but it sis not spread out across the globe.

(1) Both A and R are true and R is correct explanation of A

(2) Both A and R are true and R is not the correct explanation of A.

(3) A is true and R is False

(4) A is False and R is True

Ans. (3)

Sol. Statement (R) contradicts Statement (A)

35. Which one of the following minerals belong to the category of ferrous mineral?

(1) Gold (2) Copper (3) Mangnese (4) Bauxite

Ans. (3)

Sol. Manganese is a ferrors mineral. Gold, copper and bauxite do not contain iron and hence thy eare not ferrous minerals.

36. Which one of the following groups of cities is connected by the National Highway No.7.

(1) Delhi-Amritsar (2) Delhi-Kolkata (3) Delhi-Mumbai (4) Varanasi-Kanyakumari

Ans. (4)

Sol. Varanasi – Kanyakumari is connected by the National Highway No.7

37. Name the place where the Non- cooperation Movement turned violent?

(1) Champaran (2) Kheda (3) Nagpur (4) Chauri Chaura

Ans. (4)

Sol. The Non-Cooperation Movement turned violent at Chauri – Chaura.

38. Whose name of the following is associated with Kesari?

(1) Jyotiba Phule (2) Dr. Ambedkar (3) Bal Gangadhar Tilak (4) Mahatma Gandhi

Ans. (3)

Sol. Bal Gangadhar Tilak was the founder of the newspaper named 'Kesari'

39. Who wrote the book ' Hind Swaraj'?

(1) Mahatma Gandhi (2) Jawaharlal Nehru (3) Lal Bahadur Shastri (4) Maulana Azad

Ans. (1)

Sol. Mahatma Gandhi wrote the book 'Hind Swaraj'

40. In which of the following year was Treaty of Vienna signed?

(1) 1811 (2) 1810 (3) 1815 (4) 1812

Ans. (3)

Sol. The treaty of Vienna was signed in 1815.

41. Which of the following compound is responsible for tarnishing of silver?

(1) Ag_2O (2) Ag_2CO_3 (3) Ag_2S (4) AgCN

Ans. (3)

Sol. Silver reacts with hydrogen sulphide to develop a layer of black silver sulphide (Ag_2S).

42. Vinegar on reaction wtih baking soda produces a gas which when passed through lime water turns it milky. The milkiness is due to the formation of:

(1) Calcium Oxalate (2) Calcium Carbonate (3) Calcium Hydroxide (4) Calcium Bicarbonate

Ans. (2)

Sol. $NaHCO_3$ + CH_3COOH $\longrightarrow$ $CH_3COONa + CO_2 + H_2O$

Baking soda Vinegar

CO_2 gas is released which when passed through lime water, turns it milky due to following reaction:

$Ca(OH)_2$ + CO_2 $\longrightarrow$ $CaCO_3 + CO_2 + H_2O$

Lime water (insoluble)

causes milkiness

43. Match List -I with List -II and select the correct answer by using the codes given below the list:

List-I (Name of acid)	List- II (Source)
(A) Lactic acid	(i) Tamarind
(B) Malic acid	(ii) Curd
(C) Acetic acid	(iii) Tomato
(D) Tartaric acid	(iv) Vinegar

Codes:

(A) (B) (C) (D)

(1) (i) (iv) (ii) (iii)

(2) (ii) (i) (iv) (iii)

(3) (ii) (i) (iii) (iii)

(4) (ii) (iii) (iv) (i)

Ans. (4)

Sol. Fact based

44. When a copper vessel is exposed to moist air for long time it acquires a dull green coating. This coating is a mixture of:

(1) Copper Oxide and Copper Carbonate (2) Copper Hydroxide and Copper carbonate

(3) Copper Oxide and Copper Hydroxide. (4) Copper Peroxide and Copper Carbonate

Ans. (2)

Sol. Green coating on copper is due to basic copper carbonate.

$CuCO_3 . Cu(OH)_2$ i.e. mixture of copper hydroxide and copper carbonate.

45. The Buckminster fullerene has

(1) 60 Carbon atoms (2) 58 Carbon atoms (3) 62 Carbon atoms (4) 56 Carbon atoms

Ans. (1)

Sol. Backminster Fullerene is C_{60}

46. Plaster of Paris can be prepared by heating _____ to a temperature of 100°C

(1) $CaSO_3 2H_2O$ (2) $CaCl_2.2H_2O$ (3) $CaCO_3.2H_2O$ (4) $CaSO_4.2H_2O$

Ans. (4)

Sol. $$\underset{\text{(Gypsum)}}{CaSO_4.2H_2O} \xrightarrow{100^\circ C} \underset{\text{(Plaster of paris)}}{CaSO_4\,\frac{1}{2}H_2O} + 1\frac{1}{2}H_2O$$

47. The atomic number of four elements P, Q, R and S are 6, 8, 14 and 16 respectively. Out of these elements the metalloid is :

(1) P (2) Q (3) R (4) S

Ans. (3)

Sol. P, Q, R, S are carbon, oxygen, silver and sulphur respectively. Out of these, R i.e. silicon is a metalloid.

48. Which of the following metals and nonmetals is found in the liquid state at room temperature?

(1) Gallium and Iodine (2) Gallium and Bromine (3) Mercury and Bromine (4) Mercury and Sulphur

Ans. (3)

Sol. Fact based.

49. The fluorescence on the walls of discharge tube is due to-

(1) Cathode rays (2) Anode rays (3) Canal rays (4) None of the above

Ans. (1)

Sol. Fact based.

50. Isotopes of an element always have the

(1) Same number of Proton (2) Same number of the Neutron

(3) Same Charge (4) None of the above

Ans. (1)

Sol. Isotopes have some atomic number i.e. same number is protons.

51. Li is similar in behaviour to

(1) C (2) Si (3) Mg (4) Be

Ans. (3)

Sol. Due to diagnonal relationship (similar size)

52. The velocity of a reaction is defined as the

(1) increase of concentration of reactants per unit time

(2) decrease of concentration of reactants per unit time

(3) increase of concentration of products per unit time

(4) both 2 and 3

Ans. (4)

Sol. Fact based.

53. Property of self combination of the atom of the same element to form long chain is known as

(1) Protonation (2) Carbonation (3) Coronation (4) Catenation

Ans. (4)

Sol. Self linking property is called catenation.

54. When light passes from one medium to another medium, which of the following remains unchanged.

(1) Refractive index (2) Frequency (3) Wavelength (4) Velocity

Ans. (2)

Sol. When light passes from one medium to another medium, frequency remains unchanged.

55. Two waves have intensities in the ratio 1 : 9. If these waves produce interference, then ratio of maximum and minimum intensities is

(1) 3 : 1 (2) 4 : 1 (3) 9 : 1 (4) 16 : 1

Ans. (2)

Sol. $I \propto A^2,\ \therefore \frac{A_1}{A_2} = \sqrt{\frac{I_1}{I_2}} = \sqrt{\frac{1}{9}} = \frac{1}{3}$

$$\frac{(I)_{max imum}}{(I)_{min imum}} = \frac{(A_1 + A_2)^2}{(A_2 - A_2)^2} = \frac{(1+3)^2}{(1-3)^2} = \frac{16}{4} = \frac{4}{1}$$

56. The minimum wave length of the X-rays produced by electrons accelerated through a potential difference of V (Volt) is directly proportional to

(1) $\sqrt{V}$ (2) V^2 (3) $\frac{1}{\sqrt{V}}$ (4) $\frac{1}{V}$

Ans. (4)

Sol. Maximum kinetic energy gained by electron = eV

Energy of X-Ray = hC/λ

K.E. of electron is maximum, thus λ is minimum, $\therefore$ $eV = hc/\lambda_{min}$

$$\lambda_{min} \propto \frac{1}{V}$$

57. A radioactive element has half life period 1600 years. After 6,400 years, what amount will remain?

(1) $\frac{1}{2}$ (2) $\frac{1}{16}$ (3) $\frac{1}{8}$ (4) $\frac{1}{4}$

Ans. (2)

Sol. $T_{1/2}$ = 1600 yrs

T = 6400 yrs

$$n = \frac{6400}{1600} = 4$$

$$N = N_0 \times \left(\frac{1}{2}\right)^n = N_0\left(\frac{1}{2}\right)^4 = \frac{N_0}{16}$$

58. For a transistor Ic/Ie = 0.96. The current gain in common emitter configuration is

(1) 6 (2) 12 (3) 24 (4) 48

Ans. (3)

Sol. Current gain = $\frac{I_C}{I_B}$

given, $\frac{I_C}{I_E} = 0.96$ or $I_C = 0.96\ I_E$

also, $I_B = I_E - I_C$

$I_B = I_E - 0.96\ I_E$

$I_B = 0.04\ I_E$

Current gain = $\frac{I_C}{I_B} = \frac{0.96 I_E}{0.04 I_E} = 24$

59. The mean free path of molecules of a gas (radius r) is inversely proportional to:

(1) r^3 (2) r^2 (3) r (4) $r^{1/2}$

Ans. (2)

Sol. Mean free path, $\lambda = \frac{1}{\sqrt{2}\pi d^2 n}$

$d \rightarrow$ diameter of the molecule

r = radius of the molecule

$\therefore \lambda = \frac{1}{\sqrt{2}\pi(2r)^2 n}$ $\therefore \lambda \propto \frac{1}{r^2}$

60. If force (F), velocity (V) and time (T) are taken as fundamental units, then dimensions of mass are:

(1) $[FVT^1]$ (2) $[FVT^2]$ (3) $[FV^1T^1]$ (4) $[FV^{-1}T]$

Ans. (4)

Sol. F = m a

m = $\frac{F}{a} = \frac{F\ T}{V}$ {$\because$ a = Rate of change of Velocity}

$m = [FV^{-1}T]$

61. A conducting sphere of radius R is given charge Q. The electric potential and the electric field at the centre of sphere respectively are

(1) zero and $\frac{Q}{4\pi\varepsilon_0 R^2}$ (2) $\frac{Q}{4\pi\varepsilon_0 R}$ and zero (3) $\frac{Q}{4\pi\varepsilon_0 R}$ and $\frac{Q}{4\pi\varepsilon_0 R^2}$ (4) Both are zero

Ans. (2)

Sol. For a conducting sphere potential at centre = $\frac{kQ}{R} = \frac{Q}{4\pi\varepsilon_0 R}$

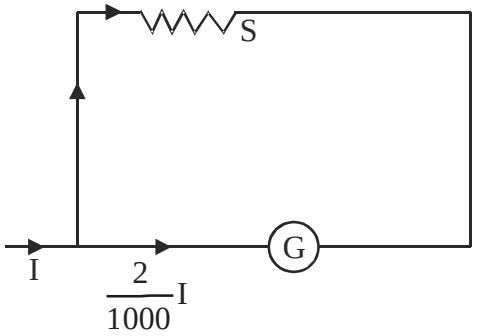
Electric field at centre = 0

62. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be:

(1) $\frac{1}{499}G$ (2) $\frac{499}{500}G$ (3) $\frac{1}{500}G$ (4) $\frac{500}{499}G$

Ans. (3)

Sol. $I-\frac{2I}{1000}=\frac{998}{1000}I$



$\because$ G & S are in parallel $V_G = V_S$

$$\frac{2I}{1000}\times G=\frac{998}{1000}S,\ S=\frac{G}{499}$$

(R_{net} = G and S are in parallel)

$$R_{net}=\frac{G\times S}{G+S}=\frac{G\times\frac{G}{499}}{G+\frac{G}{499}}=\frac{G}{500}$$

63. If the focal length of object lens is increased then magnifying power of

(1) Microscope will increase but that of tele scope will decrease

(2) Microscope and telescope both will increase

(3) Microscope and telescope both will decrease

(4) Microscope will decrease but that of telescope will increase

Ans. (4)

Sol. Magnifying power of a microscope $=m_m=\left(\frac{L}{f_0}\right)\left(\frac{D}{f_e}\right)$

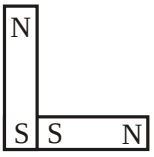
$f_0 \rightarrow$ focal lenght of objective lens.

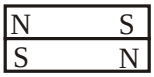
$m_m \propto \frac{1}{f_0}$, thus if f_0 increases, m_m decreases.

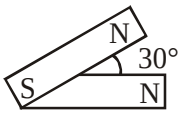
Magnifying power of a telescope $=m_t=\frac{f_0}{f_e}$

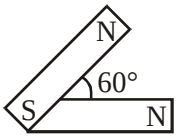
$m_t \propto f_0$, thus if f_0 increases, m_t increases.

64. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment ? M, Which configuration has the highest net magnetic dipole moment?

(1) 

(2) 

(3) 

(4) 

Ans. (3)

Sol. (1) $M_{net} = \sqrt{m^2 + m^2 + 2mm\cos 90°} = \sqrt{2}m$

(2) M_{net} = m – m = 0

(3) $M_{net} = \sqrt{m^2 + m^2 + 2mm\cos 30°} = m\sqrt{2+\sqrt{3}}$

(4) $M_{net} = \sqrt{m^2 + m^2 + 2mm\cos 30°} = \sqrt{3}m$

In (3) θ is least so M_{net} is maximum.

65. For a satellite, escape velocity is 11 kms^{-1}. If the satellite is launched at an angle of 60° with vertical, the escape velocity will

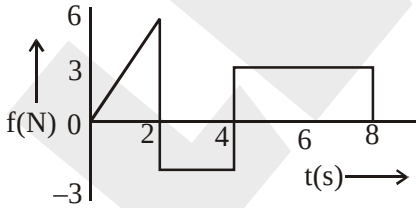
(1) 11 kms^{-1} (2) $11\sqrt{3}$ kms^{-1} (3) $\frac{11}{\sqrt{3}}$ kms^{-1} (4) 33 kms^{-1}

Ans. (1)

Sol. Escape velocity do not depend on the angle at which body is launched.

∴ Escape vel will remain same.

66. The force F acting on a particle of mass m is indicated by force - time graph shown below:



The change in momentum of the particle over the time interval from zero to 8s is:

(1) 24 Ns (2) 20 Ns (3) 12 Ns (4) 6 Ns

Ans. (3)

Sol. Area under F-t curve will give change in momentum.

∴ According to the graph in question = Area = 12 N-s.

67. Read the following statement and select the correct option

(A) Wind pollinated flowers need to produce more amount of pollen grains

(B) Seeds from cross pollinated flowers produce weaker and less healthy plants.

(1) A is false, B is true (2) A is true, B is false (3) Both A and B are true (4) Neither A nor B is true

Ans. (2)

Sol. Statement A is true

Wind pollinated flowers need to produce more amount of pollen grains to make sure that at least some pollen grains reach the stigma of other flowers and successful pollination takes place as many pollen grains are wasted.

Statement B is false.

When flowers are cross-pollinated, their seeds germinate into strong, healthy plants.

68. Which of the following is not controlled by medulla

(1) Blood pressure (2) Salivation (3) Body posture (4) Vomitting

Ans. (3)

Sol. Blood pressure, Salivation, Vomiting are controlled by Medulla.

69. Among the statements given below select the ones that correctly describe the concept of sustainable development.

i. Planned growth with minimum damage to environment.

ii. Growth irrespective of the extent of damage to the environment.

iii. Stopping all developmental work to conserve environment.

iv. Growth that is acceptable to all the stakeholders.

(1) (i) and(iv) (2) (ii) and(iii) (3) (ii)and(iv) (4) (iii) only

Ans. (1)

Sol. Sustainable development refers to planned growth with minimum damage to the environment while keeping the future of coming generation in mind.

70. Which one of the following is a definition of ecosystem.

(1) Different communities of plants, animals and microbes together with their environment.

(2) Different communities of plants and microbes and their environment.

(3) A community of organisms interacting with one another.

(4) An association of seven plants and animals

Ans. (1)

Sol. Ecosystem is a community of living organsims in junction with the non-living components and their environment, interacting as a system.

71. The correct pathway of blood circulation is

(1) Auricles $\rightarrow$ ventricles $\rightarrow$ Arteries $\rightarrow$ veins

(2) Ventricles $\rightarrow$ Auricles $\rightarrow$ Veins $\rightarrow$ Arteries

(3) Ventricles $\rightarrow$ Veins $\rightarrow$ Arteries $\rightarrow$ Auricles

(4) Veins $\rightarrow$ Ventricles $\rightarrow$ Arteries $\rightarrow$ Auricles

Ans. (1)

Sol. Auricles $\rightarrow$ Ventricles $\rightarrow$ Arteries $\rightarrow$ Veins

72. Choose the event that'does not occur in photosynthesis.

(1) Absorption of light by chlorophyll

(2) Reduction of carbon dioxide to carbohydrates

(3) Oxidation of carbon to carbondioxide

(4) Conversion of light energy to chemical energy

Ans. (3)

Sol. Option 1, 2, 4 are correct

73. Which one of the following statement Is true?

(1) In human, there are two pairs of sex chromosomes.

(2) A child who inherits an X-chromosome from father, will be a boy.

(3) A child who inherits a Y-chromosome from father, will be a girl.

(4) A child who inherits an X-chromosome from father, will be a girl.

Ans. (4)

Sol. A child will be a girl ' if she inherits one X-choromosome from mother and one X-chromosome from father

74. The accumulation of non-biodegradable substances in a food chain in increasing amount at each higher trophic level is known as.

(1) Accumulation (2) Biomagnification (3) Pollution (4) Eutrophication

Ans. (2)

Sol. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as biomagnification

75. By adding diluted saliva in starch solution, the starch solution stops giving iodine test. This proves-

(1) Starch becomes non reactive in the presence of saliva

(3) Saliva has enzyme which degrades starch into sugars.

(3) Starch was hydrolysed by water before adding saliva

(4) None of these

Ans. (2)

Sol. Saliava contains an enzyme salivary amylase which hydrolyzes starch into glucose.

76. Iodine is necessary for the synthesis of which hormone?

(1) Auxin (2) Thyroxin (3) Adrenaline (4) Insulin

Ans. (2)

Sol. Iodine is necessary for the synthesis of Thyroxine hormone.

77. In human males, all the chromosomes are paired perfectly except one. This unpaired chromosome is

(1) Large chromosome (2) Small chromosome (3) Y-chromosome (4) X-chromosome

Ans. (3,4)

Sol. In human males, all the chromosomes are paired perfectly except one. These unpaired chromosomes are : Y chromosome and X chromosome.

78. The main cause of abundant coliform bacteria in the river Ganga is

(1) Disposal of unburnt corpses into water

(2) Discharge of effluents from electroplating industries

(c) Washing of clothes

(4) Immersion of ashes

Ans. (1)

Sol. Coliform bacteria mainly come from human excreta. They can also be persent in unburnt corpses

79. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as

(1) Eutrophication (2) Pollution (3) Biomagnification (4) Accumulation

Ans. (3)

Sol. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as biomagnification.

80. Which of the following is an example of homologous organs?

(1) Our arm and a dog's foreleg (2) Our teeth and an elephant's tusk

(3) Potato and runners of grass (4) All of the above

Ans. (4)

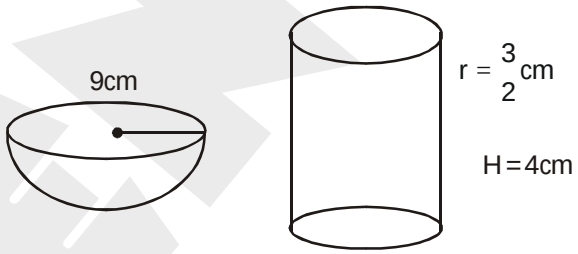
Sol. Homologous organs are the traits inherited by two different organisms from common ancestory.

81. A hemispherical bowl of internal radius 9cm is fully of liquid. The liquid is to be filled into the cylinderical shaped small bottle each of diameter 3cm and height 4cm. How many bottles are needed to empty the bowl.

(1) 52 (2) 54 (3) 53 (4) 51

Ans. (2)

Sol. $\text{No. of bottles} = \dfrac{\text{volume of liquid in hemisphere}}{\text{volume of liquid in cylinder}}$



$$= \frac{\frac{2}{3}\pi(9)^3}{\pi\left(\frac{3}{2}\right)^2 \times 4}$$

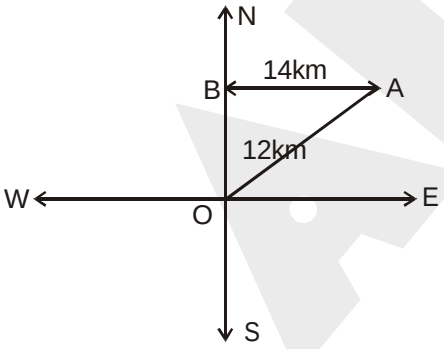
$$= \frac{2}{3} \times \frac{9 \times 9 \times 9}{\frac{9}{4} \times 4} = 54$$

82. A ship sails 12 km due north of a port and then sails 14 km due east. How far is the ship from port ?

(1) 15.4 (2) 16.4 (3) 18.4 (4) 17.4

Ans. (3)

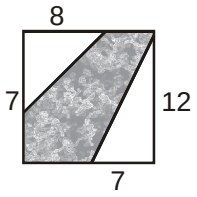
Sol.



$OA = \sqrt{OB^2 + BA^2} = \sqrt{14^2 + 12^2}$

$= \sqrt{196 + 144} = \sqrt{340} = 18.4\text{km}$

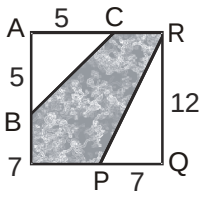
83. The area of shaded portion in the given figure,



(1) 77 sq. units (2) 74 sq. units (3) 72 sq. units (4) 89.5 sq. units

Ans. (Bonus)

Sol. If it was given square, then



Area of square = 144

$ar(ABC) = \frac{1}{2} \times 5 \times 5 = 12.5$

$ar(PQR) = \frac{1}{2} \times 7 \times 12 = 42$

$\therefore$ area of shaded portion

= 144 – 54.5

= 89.5 sq.units

84. The p^{th} term of an A.P. is q and the q^{th} term is p, find the r^{th} term

(1) p + q + r (2) p + q – r (3) p – q + r (4) p – q – r

Ans. (2)

Sol. $a + (p - 1)d = q$ ...(i)

$a + (q - 1)d = p$ ...(ii)

(i) and (ii) $\Rightarrow$

$(p - q)d = q - p$

$d = -1$

Put in (i)

$a + (p - 1)(-1) = q$

$a = q + p - 1$

$a_r = a + (r - 1)d$

$= (q + p - 1) + (r - 1)(-1)$

$= q + p - 1 - r + 1$

$= q + p - r$

85. If the angle of elevation of a cloud from a point 'h' meter above a lake is 'α' and the angle of depression of its reflection in the lake is 'β', find the distance of the cloud from the point of observation.

(1) $\frac{2h \sec\alpha}{\tan\beta - \tan\alpha}$ (2) $\frac{2h}{\tan\beta - \tan\alpha}$ (3) $\frac{2h \sec\alpha}{\tan\beta + \tan\alpha}$ (4) $\frac{2h}{\tan\beta + \tan\alpha}$

Ans. (1)

Sol. Let AB = x

AF = CE = h

CB = H – h, $\cos\alpha = \frac{AC}{AB}$

$\Rightarrow AB = AC\sec\alpha$ ...(i)

$\tan\alpha = \frac{H-h}{AC}$ ...(ii)

In ΔADC

$\tan\beta = \frac{h+H}{AC}$ ...(iii)

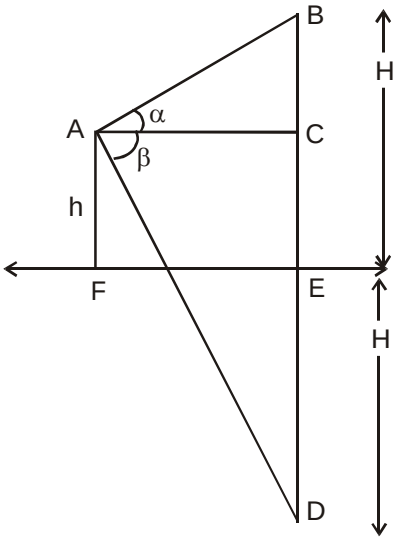
From (ii) and (iii)

$\tan\beta - \tan\alpha = \frac{h+H-H+h}{AC} = \frac{2h}{AC}$

$\Rightarrow AC = \frac{2h}{\tan\beta - \tan\alpha}$ ...(iv)

From (i) and (iv)

$AB = \frac{2h\sec\alpha}{\tan\beta - \tan\alpha}$



86. Shilpa sells apples to her customer at the cost price itself but uses a weight of 800g instead of 1kg weight. Find the profit percentage.

(1) 30% (2) 35% (3) 25% (4) 20%

Ans. (3)

Sol. $\text{Profit} = \frac{200}{800}\times 100\% = 25\%$

87. If a natural number 'α' is divided by 7, the remainder is 5. If a natural number 'β' is divided by 7, the remainder is 3. The remainder is 'r' if $\alpha + \beta$ is divided by 7. Find the value of $\frac{3r+5}{4}$

(1) 2 (2) 7 (3) 8 (4) 11

Ans. (1)

Sol. $\alpha = 7x + 5$

$\beta = 7y + 3$

$\alpha + \beta = 7(x + y) + 8$

$= 7(x + y) + 7 + 1$

If $\alpha + \beta$ is divided by 7 then remainder is 1

$\therefore r = 1$

$\frac{3r+5}{4} = \frac{3+5}{4} = 2$

88. Ruhan's salary in 2019 is Rs. 1,77,100. His salary from 2016 has risen annually by 10,15 and 40 percent respectively to reach 2019 salary figures. What was his salary in 2016.

(1) Rs. 1,00,000 (2) Rs. 1,20,000 (3) Rs. 1,15,000 (4) 95,000

Ans. (1)

Sol. Let salary in 2016 = ₹x

Salary in 2017 = $x(1+10\%) = \frac{110}{100}x$

Salary in 2018 $= \frac{110}{100}x(1+15\%) = \frac{110}{100}\times\frac{115}{100}x$

Salary in 2019 $= \frac{110}{100}\times\frac{115}{100}x(1+40\%)$

$= \frac{110}{100}\times\frac{115}{100}\times\frac{140}{100}x$

ATQ

$\Rightarrow \frac{110}{100}\times\frac{115}{100}\times\frac{140}{100}x = 1,77,100$

$\Rightarrow x = 100,000$

89. A railway engine is travelling along a circular railway track of radius 1500 metres with as speed of 66 km/hr. Find the angle turned by the engine in 10 seconds.

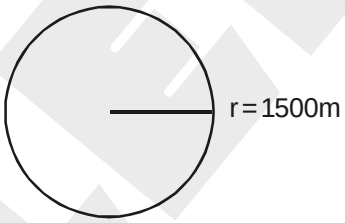
(1) 5° (2) 6° (3) 7° (4) 8°

Ans. (3)

Sol. Speed = 66kh/hr

$= 66\times\frac{5}{18}$ m / sec

$= \frac{11\times5}{3}$ m / sec



Distance covered in 10 second

$= \frac{11\times5}{3}\times10 = \frac{550}{3}$ m

= length of arc ...(i)

and length of arc = $\frac{2\pi r.\theta}{360}$

$= \frac{2\pi\times1500\times\theta}{360}$ ...(ii)

From (i) and (ii)

$2\times\frac{22}{7}\times\frac{1.500}{360}\times\theta = \frac{550}{3}$

$\theta = \frac{550}{3}\times\frac{7}{2\times2\times2}\times\frac{360}{1500} = 7^0$

90. If x men can do a work in 8 days and (x+4) can do the work in 6 days then x is equal to

(1) 10 (2) 6 (3) 12 (4) 24

Ans. (3)

Sol. Total work = $x \times 8 = (x + 4) \times 6 \Rightarrow 8x = 6x + 24$

$x = 12$

91. If If $x^2 + y^2 + z^2 = r^2$ where $x = r\cos\alpha\cos\beta$, $y = r\cos\alpha\sin\beta$, then z has one of the following values

(1) $r\cos\alpha$ (2) $r\tan\alpha\cos\beta$ (3) $r\tan\alpha\tan\beta$ (4) $r\sin\alpha$

Ans. (4)

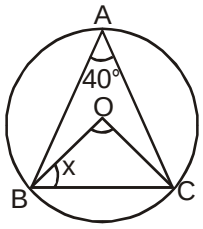
Sol. $r^2\cos^2\alpha \cdot \cos^2\beta + r^2\cos^2\alpha \sin^2\beta + z^2 = r^2$

$r^2\cos^2\alpha + z^2 = r^2$

$z^2 = r^2 \cdot \sin^2\alpha$

$\Rightarrow z = r.\sin\alpha$

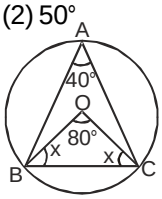
92. Find the value of 'x' from the given figure in which O is the centre of circle.



(1) 40° (2) 50° (3) 80° (4) 90°

Ans. (2)

Sol. In ΔOBC



$2x + 80 = 180$

$\Rightarrow x = 50°$

93. Radha's grandfather was 8 times older to her 16 years ago. He would be 3 times of her age 8 years from now. Eight years ago, what was the ratio of Radha's age to that of her grand father?

(1) 1 : 2 (2) 3 : 8 (3) 11 : 53 (4) 1 : 5

Ans. (3)

Sol. <u>16 years ago:</u>

Let Radha's age = x yrs

Age of Radha's grandfather = 8x yrs

<u>Present age:</u>

Radha's age = x + 16

Age of Radha's grandfather = 8x + 16

<u>Eight years from now:</u>

Age of Radha = (x + 24) yrs

Age of grandfather = (8x + 24)yrs

ATQ

$8x + 24 = 3(x + 24)$

$5x = 24 \times 2$

$x = \frac{48}{5}\text{yrs} = 9.6$

<u>Eight years ago:</u>

Age of Radha $= -x + 8 = 9.6 + 8 = 17.6$

Age of grandfather $= 8x + 8 = 8 \times 10.6$

Required ratio $= \frac{17.6}{8 \times 10.6} = \frac{22}{106} = \frac{11}{53}$

94. One liters of water weights 1 kg. How many cubic millimeters of water weights 0.1 gms ?

(1) 100 (2) 1 (3) 10 (4) 0.1

Ans. (1)

Sol. Volume of 1000gm = 1 lt = $1000cm^3 = 10^6 m.m^3$

Volume of 1 gm = $10^3 m.m^3$

Volume of $\therefore$ 0.1 gm = $10^2 m.m^3 = 100 m.m^3$

95. The probability the card drawn from a pack of 52 cards will be diamond or a queen is

(1) $\frac{2}{13}$ (2) $\frac{4}{13}$ (3) $\frac{1}{13}$ (4) $\frac{1}{52}$

Ans. (2)

Sol. P(D or Q) = P(D) + P(Q) – P(D & Q)

$= \frac{13}{52} + \frac{4}{52} - \frac{1}{52}$

$= \frac{16}{52} = \frac{4}{13}$

96. If $x = y^a$, $y = z^b$, $z = x^c$ then find the value of abc.

(1) 0 (2) 1 (3) 2 (4) 3

Ans. (2)

Sol. $x = y^a$, $y = z^b$

$\therefore x = z^{ab}$ and $z = x^c$

$\Rightarrow x^1 = x^{abc}$

$\Rightarrow$ abc = 1

97. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$, $\beta^2 = 5\beta - 3$ then equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ is

(1) $3x^2 - 19x + 3 = 0$ (2) $3x^2 + 19x + 3 = 0$ (3) $3x^2 - 18x + 3 = 0$ (4) $3x^2 + 18x + 3 = 0$

Ans. (1)

Sol. $x^2 - 5x + 3 = 0$ it has two roots α and β because it is given that

$\therefore \alpha^2 - 5\alpha + 3 = 0$ and $\beta^2 - 5\beta + 3 = 0$

$\alpha + \beta = 5$, $\alpha\beta = 3$

$$\text{Sum} = \frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{\alpha^2 + \beta^2}{\alpha\beta}$$

$$= \frac{(\alpha+\beta)^2 - 2\alpha\beta}{\alpha\beta}$$

$$\text{Sum} = \frac{25-6}{3} = \frac{19}{3}$$

$$\text{Product} = \frac{\alpha}{\beta} \times \frac{\beta}{\alpha} = 1$$

$k(x^2 - sx + p)$

$$= k\left(x^2 - \frac{19}{3}x + 1\right)$$

Let $k = 3$

$\therefore$ required equation $= 3x^2 - 19x + 3$

98. If $x = b + c$, $y = c + a$, $z = a + b$ then

Find the value of $\frac{x^2 + y^2 + z^2 - yz - zx - xy}{a^2 + b^2 + c^2 - bc - ca - ab}$

(1) 0 (2) 1 (3) 2 (4) –1

Ans. (2)

Sol. $\frac{2x^2 + 2y^2 + 2z^2 - 2yz - 2zx - 2xy}{2a^2 + 2b^2 + 2c^2 - 2bc - 2ca - 2ab}$

$$= \frac{(x-y)^2 + (y-z)^2 + (z-x)^2}{(b-a)^2 + (c-b)^2 + (a-c)^2}$$

$$= \frac{(b-a)^2 + (c-b)^2 + (a-c)^2}{(b-a)^2 + (c-b)^2 + (a-c)^2} = 1$$

99. If $\tan\theta + \sin\theta = a$ and $\tan\theta - \sin\theta = b$, what is the value $\left(a^2 - b^2\right) \div \sqrt{ab}$

(1) –3 (2) –4 (3) 3 (4) 4

Ans. (4)

Sol. $\tan\theta + \sin\theta = a$

$\tan\theta - \sin\theta = b$

$a^2 - b^2 = (\tan\theta + \sin\theta)^2 - (\tan\theta - \sin\theta)^2$

$= 2\tan\theta \times 2\sin\theta$ ...(i)

$\sqrt{ab} = \sqrt{\tan^2\theta - \sin^2\theta}$

$= \sqrt{\sin^2\theta(\sec^2\theta - 1)}$

$= \sin\theta \cdot \tan\theta$ ...(ii)

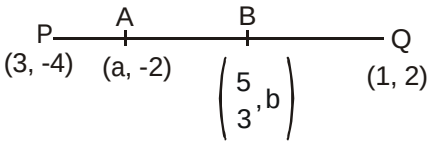
$\left(a^2 - b^2\right) \div \sqrt{ab} = 4$

100. The line segment joining the points (3,4) and (1, 2) is trisected at the points A & B. If the cordinate of A and B are (a, –2) & $\left(\frac{5}{3}, b\right)$ respectively. Find the values of a and b.

(1) $a = 0, b = \frac{7}{3}$ (2) $a = \frac{7}{3}, b = 0$ (3) a = 7, b = 3 (4) a = 3, b = 7

Ans. (Bonus)

Sol. If it was given (3, –4) then



PA : AQ = 1 : 2

Co-ordinates of A $= \left(\frac{1+6}{3}, \frac{2-8}{3}\right) = \left(\frac{7}{3}, -2\right)$

$\therefore a = \frac{7}{3}$

Mid points of AQ = $\left(\frac{a+1}{2}, 0\right) = \left(\frac{5}{3}, b\right) = \frac{a+1}{2} = \frac{5}{3}, b = 0$