NATIONAL TALENT SEARCH EXAMINATION (NTSE-2017) STAGE -1
CHANDIGARH STATE : SAT

Date: 06/11/2016

Max. Marks: 100 **SOLUTIONS** **Time allowed: 90 mins**

1. Kidneys in human beings are a part of the system of

(1) Nutrition (2) Respiration (3) Excretion (4) Transportation

Ans. ***(3)***

Sol. Human excretory system contists of pair of kindneys, ureters, urinary bladder and urethra.

2. In a neuron, conversion of electrical signal to a chemical signal occurs at/in

(1) Axon (2) Dendrite end (3) Axonal end (4) Cell body

Ans. ***(3)***

Sol. In a neuron, the conversion of electrical signal to a chemical signal occurs at/in axonal end, with the help of a neurotransmitter.

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

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

Ans. ***(2)***

Sol. The function of the thyroid gland is to take iodine, found in food and convert it into thyroid hormone ; thyroxine and triodothyronine.

4. Name the plant hormone responsible for falling of senescent leaves

(1) Gibberelin (2) Auxin (3) Cytokinin (4) Abscisic acid

Ans. ***(4)***

Sol. Plant hormone responsible for falling of senescent leaves is Abscisic acid as it act as a growth inhibitor.

5. Characters transmitted from parents to offspring are present in

(1) Cytoplasm (2) Ribosome (3) Golgi Bodies (4) Genes

Ans. ***(4)***

Sol. Gene is a segment of DNA and are also called unit of inheritance.

6. Break down of pyruvate to give carbon dioxide, water and energy takes place in

(1) Cytoplasm (2) Mitochondria (3) Chloroplast (4) Nucleus

Ans. ***(2)***

Sol. Pyruvic acid enters mitochondria, undergoes krebs cycle and ETC thus producing CO_2, water and ATP (Energy).

7. In human males, all the chromosomes are paried perfectly except one. This/these unpaired chromosome is/are

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

Ans. ***(3 & 4)***

Sol. In human males, sex chromosomes are XY which are unparied.

8. 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

(3) Washing of clothes

(4) Immersion of ashes

Ans. ***(1)***

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

9. 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-biodagradable pesticides in the food chain in increasing amount at each higher trophic level is known as biomagnification.

10. Out of the following endrocine glands which are unparied ?

(1) Ovary (2) Testes (3) Pancreas (4) Adrenal

Ans. ***(3)***

Sol. Ovary, testes and Adrenal glands are paired gland while pancreas is not paired.

11. How many pairs of spinal nerves arise from spinal cord ?

(1) 31 Pairs (2) 30 Pairs (3) 40 Pairs (4) None of these

Ans. ***(1)***

Sol. Spinal nerves are paired peripheral nerves that arise from the spinal cord. In humans there are 31 pairs.

12. What is the information source for making proteins in the nucleus of a cell ?

(1) IUCD (2) DNA (3) ER (4) ATP

Ans. ***(2)***

Sol. Information or coding for manufacture of proteins is present on DNA which is present in nucleus of the cell.

13. Asexual reproduction takes place through budding in

(1) Amoeba (2) Yeast (3) Plasmodium (4) Leishmania

Ans. ***(2)***

Sol. Amoeba, Plasmodium and leishmania reproduces by fission whereas yeast reproduces by budding.

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

(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 organs of different species having same basic structure and similar embryonic origin but different in functions.

15. An object is placed at 10 cm from a convex mirror of focal length 20cm, find the position of image ?

(1) 3.33 cm behind the mirror (2) 3.33 cm in front of the mirror

(3) 6.67 cm in front of the mirror (4) 6.67 cm behind the mirror

Ans. ***(4)***

Sol. $f = +20$ cm

$u = -10$ cm

use mirror formula :

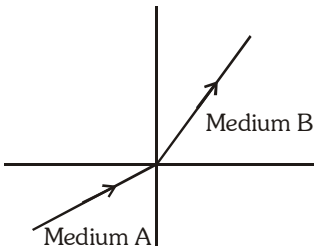
$$\frac{1}{v}+\frac{1}{u}=\frac{1}{f} \Rightarrow \frac{1}{v}=\frac{1}{f}-\frac{1}{u}$$

$$= \frac{1}{20}+\frac{1}{10}$$

$$\frac{1}{v}=\frac{3}{20}$$

$v = +\frac{20}{3}$ cm $= 6.67$ (behind the mirror as it is a convex mirror)

16. A light ray enters from medium A to medium B as shown in figure. below. The refractive index of medium B relative to A will be



(1) Greater than unity (2) Less than unity (3) Equal to unity (4) Zero

Ans. ***(1)***

Sol. Since the ray bends towards the normal in medium B, so it is optically denser with respect to medium A, so refractive index of B will be more than refractive index of A. Therefore $\frac{n_B}{n_A} > 1$ so answer is more than unity.

17. Which of the following defects can be rectified by using cylinderical lenses ?

(1) Myopia (2) Presbyopia (3) Astigmatism (4) Hypermetropia

Ans. ***(3)***

Sol. Astigmatism can be cured by using cylindrical glasses.

18. Splitting of white light into its component is called

(1) Dispersion (2) Scattering (3) Total internal reflection (4) Spectrum

Ans. ***(1)***

Sol. Splitting of white light into its component colours is called dispersion.

19. Formation of Rainbow is due to

(1) Scattering (2) Dispersion

(3) Atmospheric refraction (4) Total internal reflection

Ans. ***(4)***

Sol. Rainbow is formed because of three events : Refraction, Dispersion total internal reflection but TIR is more appropriate.

20. Speed of light is maximum in a medium whose refractive index with respect to air is

(1) 1.33 (2) 1.5 (3) 1.2 (4) 1.67

Ans. ***(3)***

Sol. Refractive index of any medium can be given by :

$$\mu = \frac{c}{v}$$

$$\text{or } v = \frac{c}{\mu}$$

So a medium with least value of refractive index has maximum velocity of light.

21. In a hydro-Power Plant

(1) Potential energy possessed by stored water is converted into electricity

(2) Kinetic energy possessed by stored water is converted into potential energy

(3) Electricity is extracted from water

(4) Water is converted into steam to produce electricity

Ans. ***(1)***

Sol. In hydro-power plant, water is stored inside a dam so potential energy of stored water is convered into electricity.

22. Right hand Thumb Rule is used for

(1) Direction of induced current

(2) Direction of force acting on a current-carrying conductor inside the magnetic field.

(3) Direction of magnetic field due to current carrying conductor

(4) Direction of force on a moving charge inside magnetic field

Ans. (3)

Sol. Right hand thumb rule is used to find the direction of magnetic field due to current carrying conductor.

23. A positively charged particle projected towards west is deflected towards north by a magnetic field then the direction of magnetic field is

(1) Towards South (2) Forwards East (3) Downward (4) Upward

Ans. (4)

Sol. By using Fleming's left hand rule, direction of magnetic field will be upward.

24. Phenomenon of electromagnetic induction is

(1) Process of charging a body

(2) Process of generating magnetic field due to a current passing through a coil

(3) Producing induced current in a coil due to relative motion between a magnet and the coil

(4) Process of roatating a coil of an electric motor

Ans. (3)

Sol. Whenever there is change in magnetic flux through a coil an emf is induced which induces current in the coil. This is called electromagnetic induction and this happens when there is a relative motion between a magnet a coil.

25. Two electrical appliances are connected in series. If their powers are P_1 and P_2 then the power of combinations will be

(1) $P_1 + P_2$ (2) $\frac{1}{P_1} + \frac{1}{P_2}$ (3) $\frac{P_1P_2}{P_1+P_2}$ (4) None

Ans. (3)

Sol. The electrical appliance with power P_1 is of resistance R_1 and power P_2 is of resistance R_2

So $P_1 = \frac{V^2}{R_1}$ & $P_2 = \frac{V^2}{R_2}$

Equation of power $P = \frac{V^2}{R_1+R_2}$ (Equivalent resistance $= R_1 + R_2$ as the resistors are connected in series)

or $R_1 + R_2 = \frac{V^2}{P}$

Now $R_1 = \frac{V^2}{P_1}$ & $R_2 = \frac{V^2}{P_2}$

$\frac{V^2}{P_1} + \frac{V^2}{P_2} = \frac{V^2}{P}$

$\frac{1}{P} = \frac{1}{P_1} + \frac{1}{P_2}$ or $P = \frac{P_1P_2}{P_1+P_2}$

26. Which of the following is not a use of electrolysis ?

(1) Electroplating (2) Printing (3) Purification of metals (4) Photography

Ans. (2)

Sol. Only printing is not a use of electrolysis.

27. Ratio of resistivities of two materials A and B is 1 : 2, ratio of their length is 3 : 4. If the ratio of their radii is 2 : 3, find the ratio of resistance of A and B

(1) 3 : 4 (2) 4 : 3 (3) 32 : 27 (4) 27 : 32

Ans. ***(4)***

Sol. Given : $\frac{\rho_1}{\rho_2} = \frac{1}{2}, \frac{\ell_1}{\ell_2} = \frac{3}{4}, \frac{r_1}{r_2} = \frac{2}{3}$

$$\frac{R_1}{R_2} = \frac{\frac{\rho_1\ell_1}{A_1}}{\frac{\rho_2\ell_2}{A_2}} = \frac{\frac{\rho_1\ell_1}{r_1^2}}{\frac{\rho_2\ell_2}{r_2^2}} = \frac{\rho_1\ell_1}{r_1^2} \times \frac{r_2^2}{\rho_2\ell_2}$$

$$= \frac{1}{2} \times \frac{3}{4} \times \frac{9}{4} = \frac{27}{32}$$

28. Chemical reaction between quick lime and water is characterised by

(1) evolution of Hydrogen gas

(2) formation of slaked lime precipitate

(3) change in temperature of mixture

(4) change in colour of the product

Ans. ***(3)***

Sol. $\underset{\text{Quick lime}}{CaO(s)} + H_2O(\ell) \rightarrow \underbrace{Ca(OH)_2(aq)}_{\text{Slaked lime}} + \text{Heat}$

It is an exothermic reaction which completed through evolution of heat.

29. Process of respiration is

(1) an oxidation reaction which is endothermic

(2) a reduction reaction which is exothermic

(3) a combination reaction which is endothermic

(4) an oxidation reaction which is exothermic

Ans. ***(4)***

Sol. Respiration is a process in which combustion (oxidation) of food takes place with the evolution of heat.

$C_6H_{12}O_6 + O_2 \longrightarrow CO_2 + H_2O + \text{Heat}.$

30. The discomfort caused by indigestion due to over eating can be cured by taking

(1) vinegar (2) lemon juice

(3) baking soda (4) caustic soda

Ans. ***(3)***

Sol. Baking soda ($NaHCO_3$) is used as can antacid in case of indigestion.

31. Which of the following is treated with chlorine to obtain bleaching powder ?

(1) $CaSO_4$ (2) $Ca(OH)_2$ (3) $Mg(OH)_2$ (4) KOH

Ans. ***(2)***

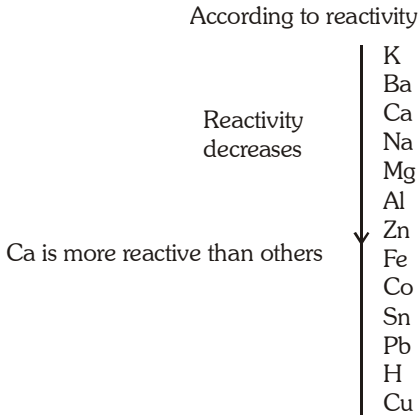
Sol. $Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2$

32. Which of the following is the most reactive metal ?

(1) aluminium (2) copper (3) tin (4) calcium

Ans. ***(4)***

Sol.



33. Which of the following pair of reactants can undergo displacement reaction under appropriate conditions ?

(1) $MgSO_4 + Fe$ (2) $ZnSO_4 + Fe$ (3) $MgSO_4 + Pb$ (4) $CuSO_4 + Fe$

Ans. ***(4)***

Sol. $CuSO_4 + Fe \longrightarrow FeSO_4 + Cu$

34. Calamine ore can be converted into ZnO by the process of.

(1) Dehydration (2) Roasting (3) Calcinations (4) Sulphonation

Ans. ***(3)***

Sol. $ZnCO_3 \longrightarrow ZnO + CO_2$

35. Which of the following always contains mercury as one of the constituent ?

(1) Stainless steel (2) Solder (3) Duralumin (4) Zinc Amalgam

Ans. ***(4)***

Sol. Amalgam is an alloy with mercury and any other metal.

36. Property of self-combination of the atoms of the same element to form long chains is known as

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

Ans. ***(4)***

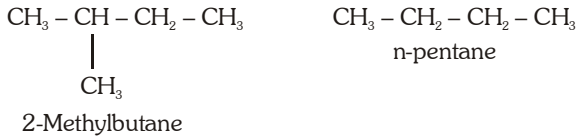
Sol. The property of forming bonds with atoms of same element to form long chains is called "catenation".

37. Hydrocarbon 2-methylbutane is an isomer of

(1) n-pentane (2) n-butane (3) propane (4) iso-butane

Ans. ***(1)***

Sol.



38. Chlorine reacts with saturated hydrocarbons at room temperature in the

(1) absence of sunlight (2) presence of sunlight

(3) absence of moisture (4) presence of H_2SO_4

Ans. ***(2)***

Sol. $C_nH_{2n+2} + Cl_2 \xrightarrow{\text{Sunlight}} C_nH_{2n+1}Cl + HCl$

39. On moving from left to right in a period of the periodic table, the atomic number of elements increases. What happens to the size of atoms of elements on moving from left to right in a period ?

(1) Increases (2) Decreases

(3) Remains the same (4) First increaeses then decreases

Ans. (2)

Sol. On moving left to right in a period atomic size decreases because number of electrons increases in same shell.

40. When a student put some copper turnings in a colourless solution, he observed that the solution gradually turned blue. The solution is most likely to be

(1) Ferrous sulphate solution (2) Magnesium nitrate solution

(3) Silver nitrate solution (4) Copper sulphate solution

Ans. (3)

Sol. $Cu + 2\,AgNO_3 \longrightarrow Cu\,(NO_3)_2 + 2Ag$

41. A narrow belt of about 8 to 16 km in width laying parallel to the slopes of the Shivalik is known as

(1) Doab (2) Bhangar (3) Bhabar (4) Terai

Ans. (3)

Sol. The rivers, after descending from the mountains deposit pebbles in a narrow belt of about 8 to 16 km in width lying parallel to the slopes of the Shiwaliks. It is known as bhabar.

42. The soil in the northern plain region of India consists of calcareous deposits and is locally known as

(1) Khadar (2) Black soil (3) Doab (4) Kankar

Ans. (4)

Sol. The largest part of the northern plain is formed of older alluvium. They lie above the flood plains of the rivers and present a terrace like feature. This part is known as bhangar.The soil in this region contains calcareous deposits locally known as kankar.

43. A narrow belt of high attitude (above 12000 m) where westerly wind in the troposphere flows is known as

(1) Ozone layer (2) El Nino (3) EVSO (4) Jet stream

Ans. (4)

Sol. Jet Streams are a belt of high altitude (above 12,000 m) westerly winds in the troposphere. Their speed varies from about 110 km/h in summer to about 184 km/h in winter.

44. A warm ocean current that flows past the Peruvian coast in place of cold Peruvian current is known as

(1) ENSO (2) LA NINA (3) EL Nino (4) Western Disturbance

Ans. (3)

Sol. El Nino: This is a name given to the periodic development of a warm ocean current along the coast of Peru as a temporary replacement of the cold Peruvian current.

45. Which one is the highest peak in the Eastern Ghats

(1) Nilgiri (2) Mahendragjri (3) Parasnath (4) DodaBeta

Ans. (2)

Sol. Mahendragiri (1,501 metres) is the highest peak in the Eastern Ghats.

46. Ganga plain lies between which river

(1) Yamuna and Teesta (2) Ghaggar and Teesta

(3) Yamuna and Brahmaputra (4) Teesta and Sarda

Ans. (2)

Sol. The Ganga plain extends between Ghaggar and Teesta rivers. It is spread over the states of North India, Haryana, Delhi, U.P., Bihar, partly Jharkhand and West Bengal to its East, particularly in Assam lies the Brahmaputra plain.

47. Non-metallic minerals are found in

(1) Igneous rocks (2) Metamorphic rocks (3) Sedimentary rocks (4) Mixed rocks

Ans. (3)

Sol. Non metallic minerals are found in Sedimentary Rocks.

48. Silicon used in the computer industry is obtained from

(1) Bauxite (2) Quartz (3) Cuprite (4) Magnetite

Ans. (2)

Sol. Silicon used in the Computer Industry is obtained from Quartz.

49. Which is the extreme south western port located at the entrance of lagoon with a natural harbour?

(1) Tuticorin 2) Chennai (3) Kochi (4) Karwar

Ans. (3)

Sol. Kochchi is the extreme south-western port, located at the entrance of a lagoon with a natural harbour.

50. The national water ways no. 1 is located on the river

(1) Ganga (2) Brahmaputra (3) Kaveri (4) Yamuna

Ans. (1)

Sol. The Ganga river between Allahabad and Haldia (1620 km)-N.W. No.1.

51. The larger occurrence of minerals of igneous and metamorphic rocks are called

(1) Veins (2) Loads (3) Layers (4) Beds

Ans. (2)

Sol. The smaller occurrences of minerals are called veins and the larger are called lodes.

52. "Rat-hole" mining is found in -

(1) Jharkhand (2) Nagaland (3) Meghalaya (4) Odisha

Ans. (3)

Sol. Coal mining in Jowai and Cherapunjee (Meghalaya) is done by family member in the form of a long narrow tunnel, known as 'Rat hole'.

53. In the context of France the fall of Bastille took place on

(1) 20th August 1789 (2) 14th August 1789 (3) 14th July 1789 (4) 14th August 1798

Ans. (3)

Sol. On the morning of 14 July 1789, the city of Paris was in a state of alarm. This event marked the falling of Bastille in France.

54. "The Spirit of Laws" book was written by

(1) Rousseau (2) John Locke (3) Montesquieu (4) Nelson Mandela

Ans. (3)

Sol. In The Spirit of the Laws, Montesquieu proposed a division of power within the government between the legislative, the executive and the judiciary.

55. Who led the Bolshevik group in Russia during Russian Revolution?

(1) Karl Marx (2) Friedrich Engels (3) Leon Trotsky (4) Vladimir Lenin

Ans. (4)

Sol. Vladimir Lenin led the Bolshevik revolution in Russia.

56. Which incident led to the start of World Warll ?

(1) Russian invasion of Poland (2) German invasion of Russia

(3) German invasion of Poland (4) Japans sinking of ship at Pearl Harbour

Ans. (3)

Sol. German invasion of Poland led to the start of World War II.

57. When was the first world cup cricket successfully staged

(1) 1975, (2) 1947. (3) 1974 (4) 1976

Ans. (1)

Sol. First World Cup Cricket successfully took place in 1975.

58. Why did the Indians oppose the Rowlatt Act ?

(1) It increased the taxes on land

(2) It gave the British the power to arrest and detain a person without a trial

(3) It put a ban on the congress party

(4) All of the above

Ans. (2)

Sol. Rowlatt Act was opposed by most of the Indians as it gave the British the power to arrest and detain a person for two years without trial.

59. Who said 'When France sneezes rest of Europe Catches cold'?

(1) T.S. Eliot (2) Metternich (3) Count Cavour (4) Bismarck

Ans. (2)

Sol. Metternich once remarked that "When France sneezes, the rest of Europe catches cold".

60. Who was the founder of Hoa Hao movement?

(1) Huynh Phun So (2) Liang Oichad (3) Phan Boi Chan (4) Ngyuagen Dinchien

Ans. (1)

Sol. Huynh Phu So founded the Hoa Hao movement.

61. During French colonization Thailand was known as

(1) Mekong (2) Yunnan (3) Sagon (4) Siam

Ans. (4)

Sol. Thailand was known as Siam in during French Colonisation.

62. Which of the following was the first book printed by Gutenberg?

(1) New Testament (2) Bible (3) Chap Books (4) Diamond Sutra

Ans. (2)

Sol. Bible was the book first published by Gutenberg.

63. Which one of the following was the 'city of gold'?

(1) Peru (2) Mexico (3) Spain (4) El Dorado

Ans. (4)

Sol. El Dorado was known as the "City of Gold".

64. "Godan" is a famous novel by

(1) Bhartendu Harishchandra (2) Premchand

(3) Jaishankar Prasad (4) Namvar Singh

Ans. (2)

Sol. Godan is a famous novel by Premchand.

65. Iraq became independent in 1932 from which rule

(1) French (2) U.S.A. (3) British (4) Germany

Ans. (3)

Sol. Iraq became independent from British rule in 1932.

66. Which country had faced the worst recorded famine is the world history in the year 1958 to 1960?

(1) Mexico (2) India (3) Pakistan (4) China

Ans. (4)

Sol. China had faced the worst recorded famine in the year 1958 to 1960.

67. On what charges was Nelson Mandela sentenced to life imprisonment ?

(1) For corruption charges (2) For breaking the laws

(3) For treason (4) For possessing illegal proper

Ans. (3)

Sol. Nelson Mandela was charged for Treason.

68. The number of seats reserved for Scheduled Caste (SC) in the Lok Sabha is

(1) 69 (2) 41 (3) 79 (4) 89

Ans. (3)

Sol. Seats are reserved for SCs and STs in the Lok Sabha.

69. Which body exposed to the world that prisoners at Guantanamo Bay were being tortured in ways that violated the US laws?

(1) United Nations (2) Amnesty international

(3) International Court of Justice (4) International Labour Organization

Ans. (2)

Sol. Amnesty International (an organisation working towards human rights) exposed to the world that prisoners in Guantanamo Bay were being tortured in ways that violated US laws.

70. Which of the following system of power sharing is called checks and balance ?

(1) Separation of power (2) Federal division of powers

(3) orizontal division of powers (4) Vertical division of powers

Ans. (3)

Sol. Horizontal division of powers - System of Checks and Balance.

71. Which one is the group of federal countries?

(1) India, USA, Iraq (2) USA, Switzerland and Libya

(3) USA, India, Switzerland (4) USA, India and Libya

Ans. (2)

Sol. USA, India and Switzerland are a group of fedearl countries.

72. Which party enjoys a strong hold in Tripura, Kerala and West Bengal ?

(1) CPI (2) CPI (M) (3) Trinamool Congress (4) CPI (L)

Ans. (3)

Sol. CPI(M) enjoys a strong hold in Tripura, Kerala and West Bengal.

73. Who is the chairman of the planning commission?

(1) Finance Minister (2) Chief Minister (3) President (4) Prime Minister

Ans. (4)

Sol. Prime Minister is the chairman of Planning Commission.

74. World Trade Organisation (WTO) was started at the initiative of_____.

(1) Developing Countries (2) Asian Countries (3)3 Developed Countries (4) European Countries

Ans. (3)

Sol. Developed countries started World Trade Organisation.

75. In which sectors maximum underemployment is found in India

(1) Secondary Sector (2) Primary Sector (3) Tertiary Sector (4) None of the above

Ans. ***(2)***

Sol. Primary Sector includes agriculture sector, hence it shows maximum unemployment in India.

76. In which year National Rural Employment Gurantee Act was passed?

(1) 2008 (2) 2005 (3) 1991 (4) 1995

Ans. ***(2)***

Sol. NREGA Act was passed in the year 2005

77. Gross Domestic Product (GDP) is the total value of _____produced during a particular year.

(1) All goods and services (2) All final goods and services

(3) All intermediate and final good and services (4) None of the above

Ans. ***(2)***

Sol. GDP is the total value of all final goods and services produced during a particular year.

78. Golden Revolution associated witht the production of_____.

(1) Oil seeds (2) Poultry (3) Horticulture (4) Cotton

Ans. ***(3)***

Sol. Golden Revolution is associated with the production of Oilseeds.

79. What was the aim of Antyoday programme

(1) upliftment of schedule tribe people (2) upliftment of women

(3) helping the poorest of poor (4) children welfare

Ans. ***(3)***

Sol. Antyodaya Program was launched with the aim of helping the poorest of the poor.

80. _____is an example of indirect taxes is

(1) Corporate Tax (2) Income Tax (3) Estate Tax (4) Entertainment Tax

Ans. ***(4)***

Sol. Entertainment Tax is an example of indirect taxes.

81. If $(-1)^n + (-1)^{4n} = 0$, then n is

(1) any positive (2) any negative

(3) any odd natural number (4) any even natural number

Ans. ***(3)***

Sol. $(-1)^n + (-1)^{4n} = 0$

n should be odd natural number.

$(-1)^n$ will be negative and $(-1)^{4n}$ will be positive.

82. If α and β be the zeroes of the polynomial $ax^2 + bx + c$, then the value of $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}}$ is

(1) b (2) $\frac{-b}{\sqrt{ac}}$ (3) $\frac{-b}{ac}$ (4) $\frac{1}{ac}$

Ans. ***(2)***

Sol. $ax^2 + bx + c$

$\alpha + \beta = -\frac{b}{a}$

$\alpha\beta = \frac{c}{a}$

$\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} \Rightarrow \frac{\alpha+\beta}{\sqrt{\alpha\beta}} = \frac{-b/a}{\sqrt{c/a}} = \frac{-b}{\sqrt{ac}}$

83. If -4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, find the value of k,

(1) $\frac{3}{4}$ (2) $\frac{7}{4}$ (3) $\frac{2}{9}$ (4) $\frac{9}{4}$

Ans. ***(4)***

Sol. $x^2 + px - 4 = 0$

$(-4)^2 - 4p - 4 = 0$

$16 - 4p - 4 = 0$

$4p = 12$

$p = 13$

$x^2 + px + k = 0$

equal roots

$\therefore \quad p^2 - 4k = 0$

$\therefore \quad k = \frac{3^2}{4} = \frac{9}{4}$

84. The value of $\sqrt{6+\sqrt{6+\sqrt{6+.....}}}$ is

(1) 4 (2) 3 (3) –4 (4) 3.5

Ans. ***(2)***

Sol. $y = \sqrt{6+y}$

$y^2 = 6 + y$

$y^2 - y - 6 = 0$

$y^2 - 3y + 2y - 6 = 0$

$(y - 3)(y + 2) = 0$

$\therefore \quad y = 3, -2$

85. In an A.P. , sum of first n terms is $\frac{3n^2}{2} + \frac{5n}{2}$. Find its 25^{th} term.

(1) 100 (2) 25 (3) 75 (4) 76

Ans. ***(4)***

Sol. $S_n = \frac{3n^2}{2} + \frac{5n}{2}$

$S_{25} = \frac{3(25)^2}{2} + \frac{5(25)}{2}$

$S_{24} = \frac{3(24)^2}{2} + \frac{5(24)}{2}$

$a_{25} = S_{25} - S_{24}$

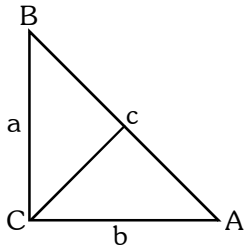
$= 76$

86. ABC is a right angle triangle, right angled at C. If p is the length of the perpendicular from C to AB, AB = c and BC = a and AC = b, then

(1) $\frac{1}{a^2}=\frac{1}{b^2}-\frac{1}{p^2}$ (2) $\frac{1}{p^2}=\frac{1}{a^2}-\frac{1}{b^2}$ (3) $\frac{1}{b^2}=\frac{1}{p^2}-\frac{1}{a^2}$ (4) $\frac{1}{a^2}=\frac{1}{a^2}-\frac{1}{b^2}$

Ans. ***(3) or (4)***

Sol.



$\frac{1}{2}ab = \frac{1}{2}pc$

$\frac{1}{p}=\frac{c}{ab}$

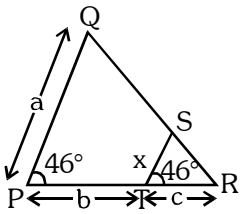
on squaring

$\frac{1}{p^2}=\frac{c^2}{a^2b^2}=\frac{a^2+b^2}{a^2b^2}$

$\frac{1}{p^2}=\frac{1}{b^2}+\frac{1}{a^2}$

$\Rightarrow \frac{1}{b^2}=\frac{1}{p^2}-\frac{1}{a^2}$

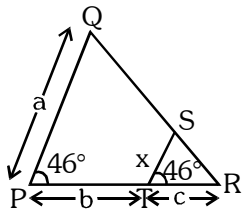
87. In a given figure, x in term of a, b and c is



(1) $x=\frac{ac}{a+c}$ (2) $x=\frac{ab}{b+c}$ (3) $x=\frac{ac}{b+c}$ (4) $x=\frac{bc}{a+c}$

Ans. ***(3)***

Sol.



$\frac{x}{a}=\frac{c}{b+c}$ (by similarity)

$\therefore \quad x=\frac{ac}{b+c}$

88. Two dice are thrown simultaneously. Find the probability of getting the sum a prime number.

(1) $\frac{12}{5}$ (2) $\frac{12}{15}$ (3) $\frac{5}{12}$ (4) 1

Ans. (3)

Sol. $2 \rightarrow (1, 1)$

$3 \rightarrow (1,2), (2, 1)$

$5 \rightarrow (1, 4)\ (2, 3), (3, 2), (4, 1)$

$7 \rightarrow (1, 6), (2, 5), (3, 4), (4, 3)\ (5, 2), (6, 1)$

$11 \rightarrow (5,6), (6, 5)$

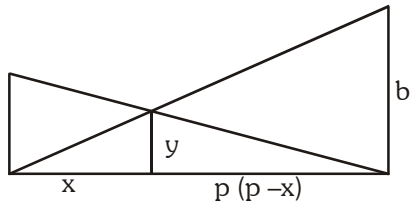
$$\frac{15}{36} = \frac{5}{12}$$

89. Two poles of height a meters and b meters are p meters apart. Height of the point of intersection of the lines joining the top of each pole to the foot of the opposite poles is given by

(1) $\frac{ab}{a+b}$ (2) $\frac{a+b}{ab}$ (3) $\frac{ab}{a-b}$ (4) $\frac{a-b}{ab}$

Ans. (1)

Sol.



$$\frac{y}{a} = \frac{p-x}{p} \qquad ...(1)$$

$$\frac{y}{b} = \frac{x}{p} \qquad ...(2)$$

from (1) & (2)

$$p - x + x = py\left(\frac{1}{a}+\frac{1}{b}\right)$$

$$\therefore\ y = \frac{ab}{a+b}$$

90. If $\tan\theta = \frac{x\sin\phi}{1-x\cos\phi}$ and $\tan\phi = \frac{y\sin\theta}{1-y\cos\theta}$ then find $\frac{x}{y}$.

(1) $\frac{\sin\phi}{\sin\theta}$ (2) $\frac{\sin\theta}{\sin\phi}$ (3) $\frac{\sin\theta}{1-\cos\theta}$ (4) $\frac{\sin\theta}{1-\cos\phi}$

Ans. ***(2)***

Sol. $\tan\theta = \dfrac{x\sin\phi}{1 - x\cos\phi}$ ...(1)

$\tan\phi = \dfrac{y\sin\theta}{1 - y\cos\theta}$ ...(2)

$\dfrac{x}{y} = ?$

from (1)

$x = \dfrac{\tan\theta}{(\sin\phi + \tan\theta\cos\phi)}$

$y = \dfrac{\tan\phi}{(\sin\theta + \tan\phi\cos\theta)}$

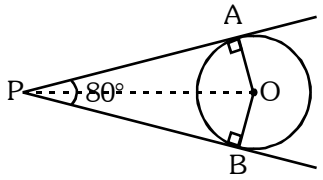
$\therefore \quad \dfrac{x}{y} = \dfrac{\sin\theta}{\sin\phi}$

91. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then $\angle POA$ is equal to

(1) 50° (2) 60° (3) 70° (4) 80°

Ans. ***(1)***

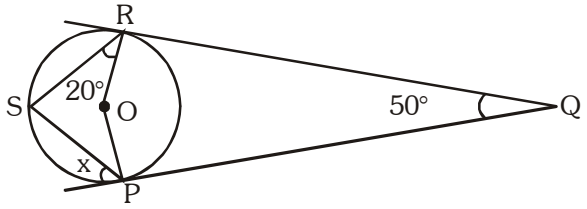
Sol.



$\angle AOB = 360° - (90° + 90° + 80°) = 100°$

$\therefore \quad \angle POA = 50°$

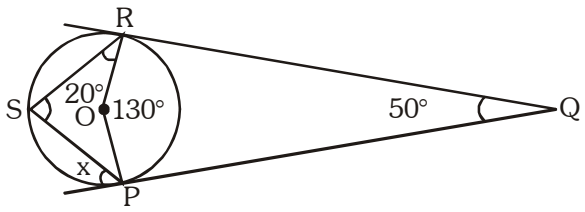
92. In the diagram, PQ and QR are tangents to the circle with centre O, at P and R respectively. Find the value of x.



(1) 25 (2) 35 (3) 45 (4) 55

Ans. ***(3)***

Sol.



$\angle S = \dfrac{130°}{2} = 65°$

$\angle SPO + 65 + 20 + (360 - 130) = 360$

$\therefore \quad \angle SPO = 45°$

$x + \angle SPO = 90°$

$\therefore \quad x = 45°$

93. If h be the height and α the Semi-vertical angle of a right circular cone, then its volume is given by

(1) $\frac{1}{3}\pi h^3 \tan^2\alpha$ (2) $\frac{1}{3}\pi h^2 \tan^2\alpha$ (3) $\frac{1}{3}\pi h^2 \tan^3\alpha$ (4) $\frac{1}{3}\pi h^3 \tan^3\alpha$

Ans. ***(1)***

Sol. $\tan\alpha = \frac{r}{h}$

$r = h\tan\alpha$

volume $= \frac{1}{3}\pi . h^2 \tan^2\alpha . h$

$= \frac{1}{3}\pi h^3 \tan^2\alpha$

94. If the mean of x and 1/x is M, the mean of x^3 and $1/x^3$ is

(1) $\frac{M^3 - 3}{2}$ (2) $M(4M^2 - 3)$ (3) M^3 (4) $M^3 + 3$

Ans. ***(2)***

Sol. $x + \frac{1}{x} = 2M$

$x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 8M^3$

$x^3 + \frac{1}{x^3} + 6M = 8M^3$

$\frac{x^3 + \frac{1}{x^3}}{2} = \frac{8M^3 - 6M}{2} = 4M^3 - 3M = M(4M^2 - 3)$

95. If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + + b\sec\theta$ prove that the value of $x^2 - y^2$ will be,

(1) $a^2 - b^2$ (2) $a^2 + b^2$ (3) $a^2 + 1$ (4) $a^2 - 1$

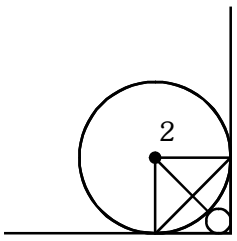
Ans. ***(1)***

Sol. $x = a\sec\theta + b\tan\theta$, $y = a\tan\theta + b\sec\theta$

$x^2 - y^2 = (a^2\sec^2\theta + b^2\tan^2\theta + 2ab\sec\theta.\tan\theta) - (a^2\tan^2\theta + b^2\sec^2\theta + 2ab\sec\theta.\tan\theta)$

$= a^2 - b^2$

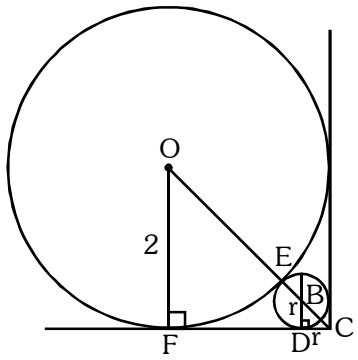
96. A circle with radius 2 unit is placed against a right angle. Another smaller circle is also placed as shown in figure. What is the radius of the smaller circle?



(1) $3 - 2\sqrt{2}$ (2) $4 - 2\sqrt{2}$ (3) $7 - 4\sqrt{2}$ (4) $6 - 4\sqrt{2}$

Ans. ***(4)***

Sol.



$\angle BCD = 45°$

$\therefore$ $BC = r\sqrt{2}$,

$\therefore$ $FC = 2$

$\therefore$ $OC = 2\sqrt{2}$

$2 + r + r\sqrt{2} = 2\sqrt{2}$

$$r = \frac{2\sqrt{2}-2}{1+\sqrt{2}} = 2(3-2\sqrt{2}) = 6-4\sqrt{2}$$

$= 6 - 4\sqrt{2}$

97. Sum of n terms of the series $\sqrt{2}+\sqrt{8}+\sqrt{18}+\sqrt{32}+.....$ is

(1) $\frac{n(n+1)}{2}$ (2) $2n(n+1)$ (3) $\frac{n(n+1)}{\sqrt{2}}$ (4) 1

Ans. ***(3)***

Sol. $\sqrt{2}+2\sqrt{2}+3\sqrt{2}+.....$

$$S_n = \frac{n}{2}[2\sqrt{2} + (n-1)\sqrt{2}] = \frac{n(n+1)}{\sqrt{2}}$$

$$= \frac{n}{2}[n\sqrt{2} + \sqrt{2}]$$

$$= \frac{n(n+1)}{\sqrt{2}}$$

98. Sum of first n odd natural numbers is

(1) n^2 (2) $n + 1$ (3) $2n + 1$ (4) n

Ans. ***(1)***

Sol. $1 + 3 + 5 + ...$

$$S_n = \frac{n}{2}[2 + (n-1)\times 2]$$

$= (n) = n^2$

99. If x = 1 is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then ab =

(1) 3 (2) 3.5 (3) 6 (4) –3

Ans. ***(1)***

Sol. $a + a + 3 = 0$

$$a = -\frac{3}{2}$$

$1 + 1 + b = 0$

$b = -2$

$\therefore \quad a \cdot b = 3$

100. The value of K if the linear equations $x + 2y = 3$ and $5x + ky + 7 = 0$ has unique solution is

(1) $K \neq 1$ (2) $K \neq 10$ (3) $K \neq 15$ (4) $K \neq 5$

Ans. ***(2)***

Sol. $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

$$\frac{1}{5} \neq \frac{2}{k} \Rightarrow k \neq 10$$