

**Date: 03/11/2019**

Max. Marks: 100

## SOLUTIONS

Time allowed: 120 mins

**101.** Unit of momentum is

- (1) meter/second                      (2) Newton x meter                      (3) kg-meter/second                      (4)  $\text{kg}^{-1}$  meter second<sup>-1</sup>

**Ans. (3)**
**Sol.** kg-meter/second

SINCE, MOMENTUM (p) = mass (m) x velocity (v)

Then, unit of 'p' = kg meter/second

**102.** Which one of the following physical quantity is constant in simple harmonic motion?

- (1) Restoring force                      (2) Kinetic energy                      (3) Potential energy                      (4) Total energy

**Ans. (4)**
**Sol.** as during simple harmonic motion there is continuous interchange of kinetic energy and potential energy, so total mechanical energy (KE + PE) is conserved.

**103.** A ray of light passes from glass ( $\mu = \frac{3}{2}$ ) to water ( $\mu = \frac{4}{3}$ ). The value of critical angle will be-

- (1)  $\sin^{-1}\left(\frac{1}{2}\right)$                       (2)  $\sin^{-1}\left(\sqrt{\frac{8}{9}}\right)$                       (3)  $\sin^{-1}\left(\frac{8}{9}\right)$                       (4)  $\sin^{-1}\left(\frac{5}{7}\right)$

**Ans. (3)**
**Sol.** As we have refractive index ( $\mu$ ) formula in terms of critical angle (c) as,

$$\mu_1 / \mu_2 = 1/\sin c$$

so, we can write

$$(3/2) / (4/3) = 1/\sin c$$

$$\sin c = 8/9$$

$$c = \sin^{-1}(8/9)$$

$$\text{here, } \mu_1 = \mu_{\text{glass}} = 3/2$$

$$\mu_2 = \mu_{\text{water}} = 4/3$$

**104.** The value of acceleration due to gravity (g) on the earth will be maximum at-

- (1) surface                      (2) poles                      (3) equator                      (4) center

**Ans. (2)**
**Sol.** since radius of earth at poles are minimum and at equator is maximum

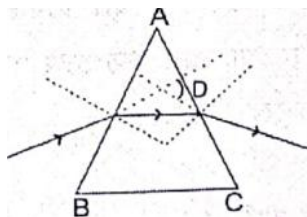
Therefore, acceleration due to gravity increases when we move from equator to poles.

**105.** Which one of the following is an example of Biomass Energy source.

- (1) Nuclear Energy                      (2) Sun Energy                      (3) Gobar Gas                      (4) Wind Energy

**Ans. (3)**
**Sol.** since gobar gas or bio gas is obtained from decomposition of biomass.

**106.** The refraction of light by a prism is shown in the following figure. Then Angle  $\angle D$  is-



- (1) Angle of prism                      (2) Angle of refraction                      (3) Angle of emergent                      (4) Angle of deviation

**Ans. (4)**

**Sol.** since angle of deviation is the angle made between incident ray and emergent ray from the prism.

**107.** The unit of power of a lens is dioptre. Then one diopter (1 diopter) is equal to-

- (1)  $100 \text{ cm}^{-1}$                       (2)  $1 \text{ meter}^{-1}$                       (3) 1 meter                      (4) 100 cm

**Ans. (2)**

**Sol.** AS S.I. UNIT OF POWER OF LENS IS dioptre (D).

FORMULA OF POWER OF LENS ( $P$ ) =  $1/\text{FOCAL LENGTH (in meters)}$

$$P = 1/f \text{ (in meters)}$$

So,

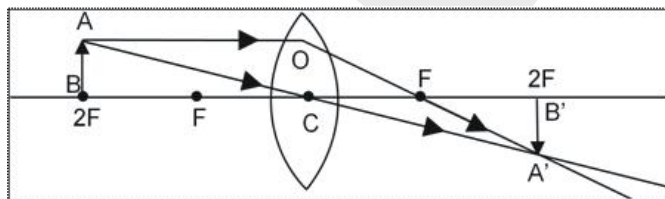
$$1 \text{ dioptre} = 1/(\text{meter}) = 1 \text{ meter}^{-1}$$

**108.** If  $F$  be the focal length of a convex lens, then the nature of image of an object placed at a

- (1) Real, inverted and same size                      (2) Virtual, erect and small  
(3) Real, erect and same size                      (4) Virtual, inverted and same size

**Ans. (1)**

**Sol.**



When the object is placed at  $2F$

When the object is placed at the centre of curvature of a lens then a ray of light  $AO$  which is parallel to the principal axis after refraction pass through the focus  $F$  along the direction  $OF$ . While the other ray  $AC$  pass through the optical centre  $C$  and goes straight without any deviation. These two refracted light rays intersect each other at point  $A'$ , on the other side of the lens at the centre of curvature  $2F$ . So, the image  $A'B'$  formed in this case is at the centre of curvature, of same size as the object, real and inverted.

**109.** The Power of a plane mirror is-

- (1) Zero (0)                      (2) +1                      (3) -1                      (4) Infinity( $\infty$ )

**Ans. (1)**

**Sol.** The power of a mirror is the reciprocal of its focal length. As the focal length of a plane mirror is infinite, its power is zero.

$$P = 1/f$$

$$P = (1/\infty) = 0$$

**110.** The resistance of a wire is  $4\Omega$ . If length of wire is made double and area of cross section is made half, then the new resistance will be-

- (1)  $1\Omega$  (ohm)                      (2)  $16\Omega$  (ohm)                      (3)  $4\Omega$  (ohm)                      (4)  $12\Omega$  (ohm)

**Ans. (2)**

**Sol.** As given in question that old resistance of a wire is = 4 ohm

Resistance = Resistivity  $\times$  length/area

When the wire is stretched to double the length, the area of cross section gets reduced to half.

So

New Resistance = Resistivity  $\times$  (2 length) / (area/2)

New resistance = (Resistivity  $\times$  length/area)  $\times$  4

New resistance = Resistance  $\times$  4

So, New resistance =  $4 \times 4 = 16$  ohm

**111.** Which one of the following alternating current is supplied in our house hold circuits-

- (1) 110V and 50 Hz                      (2) 220V and 60 Hz                      (3) 110V and 60 Hz                      (4) 220V and 50 Hz

**Ans. (4)**

**Sol.** In INDIA we work on 50 Hz frequency and 220 V supply in house hold circuits.

**112.** How much time will be taken by a 100 watt bulb to consume one unit of energy-

- (1) 1 hour                      (2) 10 hour                      (3) 100 hour                      (4) 1000 hour

**Ans. (2)**

**Sol.** given, power (P) = 100 watt

and Energy (E) = 1 unit = 1 kWh = 1000 Wh

To find, time(t) = ?

energy = power  $\times$  time

$E = P \times t$

so,  $t = E/P$

$t = 1000/100 = 10$  hour

**113.** Which one of the following is not a conventional source of energy-

- (1) Coal                      (2) Petroleum                      (3) Hydro                      (4) Solar energy

**Ans. (4)**

**Sol.** as only solar energy is non conventional as well as renewable source of energy.

**114.** Which of the following element is more electro positive?

- (1) Br                      (2) F                      (3) Cl                      (4) I

**Ans. (4)**

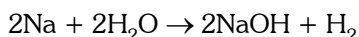
**Sol.** On moving down to the group electropositive character increases because ionization energy decreases as size of atom increases. So in halogens, iodine is the most electropositive element.

**115.** The name of metal which decomposes water in cold is:

- (1) Cu                      (2) Pt                      (3) Ag                      (4) Na

**Ans. (4)**

**Sol.** According to metal reactivity series Na is more reactive than hydrogen and Pt, Cu and Ag are less reactive than hydrogen.



**116.** On heating camphor in a porcelain dish it got mixed in air without melting. This phenomenon is known as:

- (1) Condensation                      (2) Sublimation                      (3) Suspension                      (4) Evaporation

**Ans. (2)**

**Sol.** Camphor is an example of sublime substance which upon heating gets converted from solid state into gaseous state without undergoing into liquid state.

**117.** Ethane and Sulphur monochloride on heating gives:

- (1) Chloroethane                      (2) Ethylene chloride                      (3) Mustard Gas                      (4) Ethylene glycol

**Ans. (3)**



**118.** The  $\text{H}^+$  ion concentration of a solution is  $2 \times 10^{-8} \text{ mol L}^{-1}$ . The PH value of the solution is-  
( $\log_{10} 2 = 0.3010$ )

- (1) 7.699                      (2) 7.599                      (3) 7.799                      (4) 7.899

**Ans. (1)**

**Sol.** Here  $[\text{H}^+]$  of given solution is very less so  $[\text{H}^+]$  from water has to be considered.

$$\begin{aligned} [\text{H}^+]_{\text{total}} &= [\text{H}^+]_{\text{solution}} + [\text{H}^+]_{\text{water}} \\ &= 2 \times 10^{-8} + 10^{-7} \\ &= 10^{-8} (2 + 0.1) \end{aligned}$$

$$\begin{aligned} [\text{H}^+]_{\text{total}} &= 2.01 \times 10^{-8} \\ \text{pH} &= -\log_{10} [\text{H}^+] \\ &= -\log_{10}(2.01 \times 10^{-8}) \\ &= -\log_{10} 2.01 + (-\log_{10} 10^{-8}) \\ &= -0.3010 + -(-8) \\ &= -0.3010 + 8 \end{aligned}$$

**119.** Which of the following elements exhibit variable valency?

- (1) Normal element      (2) Typical element      (3) Transitional element      (4) None of these

**Ans. (3)**

**Sol.** The transition elements have their valence electrons into different sets of orbitals i.e.  $(n-1)d$  and  $ns$ . As there is very little difference in the energies of these orbitals. Both energy levels can be used for bond formation. So, transition elements show variable valencies.

**120.** Which one is addition reaction:

- (1)  $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$       (2)  $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$   
(3)  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$       (4)  $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$

**Ans. (3)**

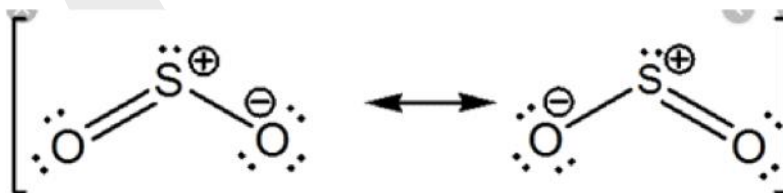
**Sol.** When two or more reactants combine together to form a product known as addition reaction.

**121.** Which compound has both covalent as well as co-ordinate bond?

- (1)  $\text{H}_2\text{S}$                       (2)  $\text{CO}_2$                       (3)  $\text{H}_2\text{O}$                       (4)  $\text{SO}_2$

**Ans. (4)**

**Sol.** Central sulphur atom is connected to one oxygen by a double bond and to the other by a co-ordinate bond due to presence of lone pair of electron on sulphur atom.



**122.** Complex salt is-

- (1) Zinc Sulphate (2) Sodium hydrogen Sulphate  
(3) Iron ammonium Sulphate (4) Tetraammine Copper (II) Sulphate

**Ans. (4)**

**Sol.** A compound composed of central metal atom having coordinate bonds and with legends around it, is known as complex salt because the structure is complex and there are cations and anions bonded to each other. Tetra amine copper sulphate is one of the examples of complex salt.

**123.** Calamine is the ore of metal:

- (1) Copper (2) Aluminium (3) Zinc (4) Iron

**Ans. (3)**

**Sol.** The formula of calamine is  $\text{ZnCO}_3$  or it is also known as zinc carbonate.

**124.** Acid used in Lead Batteries is:

- (1) HCl (2)  $\text{H}_2\text{SO}_4$  (3)  $\text{HNO}_3$  (4)  $\text{H}_2\text{CO}_3$

**Ans. (2)**

**Sol.** Sulphuric acid is used in Lead - Acid storage batteries.

**125.** Which type of ores are concentrated by Froth floatation process:

- (1) Oxide ores (2) Sulphide ores (3) Carbonate ores (4) Nitrate ores

**Ans. (2)**

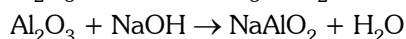
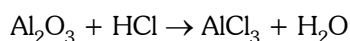
**Sol.** Only sulphide ores are concentrated by froth floatation process because pine oil selectively wets the sulphide ores and hence brings it to froth.

**126.** Which of the following is amphoteric oxide:

- (1)  $\text{Na}_2\text{O}$  (2)  $\text{SO}_2$  (3)  $\text{Al}_2\text{O}_3$  (4)  $\text{CaO}$

**Ans. (3)**

**Sol.** Aluminium Oxide is amphoteric oxide because it can react with acids as well as base.



**127.** In human body temperature control centre is-

- (1) Epithalamus (2) Hypothalamus (3) Thalamus (4) Medula oblongata

**Ans. (2)**

**Sol.** Hypothalamus

Brain is central center of our body. Its different part control different function & hypothalamus is control the body temperature.

**128.** Which factor is responsible for Green House Effect-

- (1)  $\text{H}_2\text{O}$  (2) CO (3)  $\text{SO}_2$  (4)  $\text{CO}_2$

**Ans. (4)**

**Sol.**  $\text{CO}_2$

$\text{CO}_2$  trap the UV rays & UV rays donot move out complete to the space & temperature of earth increase. This is green house effect.

**129.** Which one of the following element is essential for synthesis of Thyroxin Hormones-

- (1) Zinc (2) Iodine (3) Boron (4) Nitrogen

**Ans. (2)**

**Sol.** Iodine

Self explanatory.

**130.** Smallest unit of classification is-

- (1) Species (2) Class (3) Order (4) Kingdom

**Ans. (1)**

**Sol.** Species

Kingdom

Phylum

Class

order

family

Genus

Species → Basic & smallest unit and Taxon

TAXONOMIC Classification

**131.** Which of the following is not a part of the female reproductive system in human beings-

- (1) Ovary (2) Uterus (3) Fallopian tube (4) Vas deferens

**Ans. (4)**

**Sol.** Vas deferens

Vas deferens is part of male reproductive system. which carry sperm.

**132.** Most powerful digestive enzyme occurs in which cell organelles-

- (1) Mitochondria (2) Chloroplast (3) Golgi body (4) Lysosome

**Ans. (4)**

**Sol.** Lysosome

Lysosome is digestive body of cell & its function to digest unwanted particle of cell & dead cell organelle with help of digestive enzyme so it contain most powerful enzyme.

**133.** Causative agent of Kala azar (Black fever) is:

- (1) Virus (2) Bacteria (3) Fungi (4) protozoan

**Ans. (4)**

**Sol.** Protozoan

Kala azar or Black fever is caused by leishmania which is member of protozoa group.

**134.** Unisexual flowers occur in which of the following plants-

- (1) Mustard (2) Tomato (3) Pea (4) Watermelon

**Ans. (4)**

**Sol.** Watermelon

Tomato, mustard, Pea contain male & female reproductive parts in their flower so they are known as bisexual flower. But in watermelon contain either male or female reproductive part so it is known as unisexual flower.

**135.** Biotic components of ecosystem are-

- (1) Producers (2) Consumers (3) Decomposers (4) All of above

**Ans. (4)**

**Sol.** All of these

Producer, consumers, decomposers are living so they all are known as biotic component of ecosystem.

**136.** Which one of the following substance is changed into amino acid after digestion-

- (1) Protein (2) Carbohydrate (3) Fat (4) Nucleic acid

**Ans. (1)**

**Sol.** Protein is polymer of amino acid.

Protein  $\xrightarrow{\text{pepsin}}$  peptides  $\xrightarrow{\text{peptidase}}$  Amino acid.

**137.** Source of Penicillium antibiotic is-

- (1) Bacteria (2) Fungi (3) Virus (4) Algae

**Ans. (2)**

**Sol.** Fungi

Penicillium is obtained from Penicillium notatum which is a fungi.

**138.** Testosterone Hormone is produced in-

- (1) Leydig cell (2) Kupffer cell (3) Granulosa cell (4) None of above

**Ans. (1)**

**Sol.** Leydig cells

Leydig cells are present in side the testis & they are responsible for secretion of testosterone & This hormone is responsible for secondary sexual character in male. Testis is part of male reproductive system.

**139.** Number of sex chromosomes in human beings are-

- (1) 23 (2) 46 (3) 1 (4) 2

**Ans. (4)**

**Sol.** 2

Human contain 46 number of chromosome in which 44 are autosomal chromosome & 2 are sex chromosome which are xx in female & xy in male.

**140.** Which of the following is known as the 'suicide bag of the cell'?

- (1) Plastid (2) Mitochondria (3) Ribosome (4) Lysosome

**Ans. (4)**

**Sol.** Lysosome

because lysosome contain hydrolytic enzymes & when programming of cell is disturbed then digestive enzymes come out in cytoplasm of cell & it digest its own cell.

**141.** The Harappan Civilization was discovered in the year

- (1) 1910 (2) 1921 (3) 1935 (4) 1942

**Ans. (2)**

**Sol.** It was discovered in 1921 by Rakhal Das Banerjee

**142.** The First Literary Source is -

- (1) Rigveda (2) Samveda (3) Yajurveda (4) Atharvaveda

**Ans. (1)**

**Sol.** As per ancient history first literacy source is Rig veda

**143.** During whose reign Megasthenes visited to india?

- (1) Ashoka (2) Harsh Vardan (3) Chandragupta Maurya (4) Kumar Gupta

**Ans. (3)**

**Sol.** During the reign of Chandra Gupta Maurya Megasthenes visited India.

**144.** Which dynasty was ruling over north India at the time of Alexander's invasion ?

- (1) Nand (2) Maurya (3) Shunga (4) Kanva

**Ans. (2)**

**Sol.** Mauryan Empire was ruling over North India

**145.** The Name of Shershah in childhood was-

- (1) Hasan (2) Farid (3) Sher Khan (4) None of the above

**Ans. (2)**

**Sol.** Farid was his childhood name of Shershah Suri

- 146.** Which sultan of Delhi has also been called 'A mixture of opposites' ?  
 (1) Balban (2) Alauddin Khilji (3) Mohammad Tughalaq (4) Ibrahim Lodi  
**Ans. (3)**  
**Sol.** Mohammad Tughalaq was called as opposite of mixture because of his insensible decisions
- 147.** The Emperor was called 'Kalandar' -  
 (1) Babar (2) Humayun (3) Akbar (4) Shahjahan  
**Ans. (1)**  
**Sol.** Kalandar means honesty (Babar)
- 148.** Famous 'Peacock Throne' was taken away out of India by-  
 (1) Ahmad Shah Abdali (2) Taimur (3) Dalhousie (4) Nadir Shah  
**Ans. (4)**  
**Sol.** Nadir Shah took away Peacock Throne
- 149.** 'Subsidiary Alliance' was implemented during period of-  
 (1) Lord Cornwallis (2) Lord Wellesley (3) Sir John Shore (4) Lord Auckland  
**Ans. (2)**  
**Sol.** Lord wellesley initiated Subsidiary Alliance
- 150.** Which one of the following writings is Not related to Mahatma Gandhi-  
 (1) My Experiments with truth (2) Harijan  
 (3) Das Capital (4) Hind Swaraj  
**Ans. (3)**  
**Sol.** Das Capital was written by Karl Marx
- 151.** Name the founder of 'Gadar Party'-  
 (1) Lala Hardayal (2) Subhash Chandra Bose (3) Madam Cama (4) Madan Lal Dhingra  
**Ans. (1)**  
**Sol.** Lala Hardayal started the 'Gadar Party'
- 152.** Who among the following was not known as Moderate in the Indian National Movement?  
 (1) Bal Gangadhar Tilak (2) Dadabhai Naoroji (3) M.G.Ranade Gokhale (4) Gopal Krishna  
**Ans. (1)**  
**Sol.** Bal Gangadhar Tilak was a moderate while others were exteruist
- 153.** The Himalayan mountain range is an example of-  
 (1) Block mountain (2) Folding mountain (3) Volcanic mountain (4) Residual mountain  
**Ans. (2)**  
**Sol.** Himalayan mountain are called as Young fold moutains
- 154.** The forest of Ganga-Brahmputra-delta is known as-  
 (1) Evergreen Forest (2) Monsoon Forest (3) Sundar Ban (4) Deciduous Forest  
**Ans. (3)**  
**Sol.** Sundar Ban being the most fertile land are called as deltas where river Ganga and Brahmputra meet.
- 155.** How many districts are in Uttar Pradesh?  
 (1) 70 (2) 75 (3) 80 (4) 85  
**Ans. (2)**  
**Sol.** 75 Districts are there in UP
- 156.** In which continent the Sahara desert is situated-  
 (1) South America (2) Africa (3) Asia (4) North America  
**Ans. (2)**  
**Sol.** Sahara desert is situated in Africa



- 157.** The Blue Revolution is related with-  
 (1) Food Grain Production (2) Fish Production (3) Milk Production (4) Oil seed Production  
**Ans. (2)**  
**Sol.** Fish production is called blue rebellion
- 158.** The Oil and Natural Gas Commissions(ONGC) was set up in-  
 (1) 1956 (2) 1957 (3) 1959 (4) 1961  
**Ans. (1)**  
**Sol.** ONGC was set up in 1956
- 159.** What is the name of Mid Latitude grass land in South America?  
 (1) Prairie (2) Pampas (3) Veld (4) Steppes  
**Ans. (2)**  
**Sol.** Pampas are the name given to Mid Latitude grass land in South America
- 160.** Where Thar Desert is located?  
 (1) Pakistan (2) China (3) India (4) United State of America  
**Ans. (3)**  
**Sol.** Thar desert is located in India
- 161.** Where Gobind Sagar reservoir is situated?  
 (1) Uttar Pradesh (2) Haryana (3) Himanchal Pradesh (4) Punjab  
**Ans. (3)**  
**Sol.** Gobind Sagar reservoir is situated in Punjab
- 162.** When Tourism day is celebrated?  
 (1) 5 January (2) 10 December (3) 5 June (4) 27 September  
**Ans. (4)**  
**Sol.** 27<sup>th</sup> September is celebrated as Tourism day
- 163.** According to Census 2011 the population of U.P. is-  
 (1) 18.88 Crores (2) 19.98 Crores (3) 24.70 Crores (4) 30.00 Crores  
**Ans. (2)**  
**Sol.** The population of UP according to 2011 report was 19.98 crores
- 164.** I.M.F. was established by the recommendations of which Committee?  
 (1) Bretton woods Committee (2) Goswami Committee  
 (3) Narsingham Committee (4) None of them  
**Ans. (1)**  
**Sol.** Bretton woods Committee was recommended by International monetary fund during world war II (1944)
- 165.** In which year India devalued its currency for the first time?  
 (1) 1949 (2) 1966 (3) 1991 (4) None of them  
**Ans. (2)**  
**Sol.** The currency of India was devalued for the first time in the year 1966
- 166.** The least Population State in India is-  
 (1) Sikkim (2) Mizoram (3) Uttar Pradesh (4) Bihar  
**Ans. (1)**  
**Sol.** Sikkim is the least populated state
- 167.** Where is situated the Headquarter of World Bank?  
 (1) Texas (2) Canada (3) Washington (4) Geneva  
**Ans. (3)**  
**Sol.** World Bank is situated in Washington (USA)

- 168.** Who has first developed the theory of Rent?  
 (1) Ricardo (2) Adam Smith (3) Marshall (4) None of them  
**Ans. (1)**  
**Sol.** David Ricardo developed the theory of Rent
- 169.** Which Canal is largest in the world?  
 (1) Panama Canal (2) Ram Ganga Canal (3) Kra Canal (4) Suez Canal  
**Ans. (4)**  
**Sol.** Suez canal is the largest canal which is 193.5 km
- 170.** 'Chipko Movement' was basically against-  
 (1) Water Pollution (2) Noise Pollution (3) Soil Pollution (4) Deforestation  
**Ans. (4)**  
**Sol.** Deforestation give rise to 'Chipko Movement' against cutting of trees.
- 171.** The President's Rule in a state means that the state is ruled by-  
 (1) The President (2) The Chief Minister  
 (3) The Governor of the State (4) The Prime Minister  
**Ans. (1)**  
**Sol.** During President's rule in the state, the state is ruled by The President
- 172.** In which year "The Right to Information Act" was passed -  
 (1) 2001 (2) 2003 (3) 2005 (4) 2007  
**Ans. (3)**  
**Sol.** The Right to Information Act was passed in 2005 by central government
- 173.** The Constitution of India primarily did not include in its preamble  
 (1) Sovereign (2) Socialist (3) Democratic (4) Republic  
**Ans. (2)**  
**Sol.** Socialist was the word which was included in the 42nd Amendment Act 1976
- 174.** Article-370 was associated with-  
 (1) Uttar Pradesh (2) Nagaland (3) Jammu & Kashmir (4) Telangana  
**Ans. (3)**  
**Sol.** Article 370 is related to the state Jammu and Kashmir
- 175.** Who presided over the first meeting of the Indian Constituent Assembly?  
 (1) Sachchidanand Sinha (2) Dr. Rajendra Prasad (3) Dr. B. R. Ambedkar (4) H.V. Kamath  
**Ans. (1)**  
**Sol.** Sachchidanand Sinha presided over the 1st meeting of the Indian Constituent Assembly
- 176.** Who appoints the Chairman of Union Public Service Commission?  
 (1) President (2) Prime Minister (3) Chief Justice of India (4) Vice President  
**Ans. (1)**  
**Sol.** The President of the country appoints the chairman of union Public service commission
- 177.** Which of the following appointments is not made by the President of India?  
 (1) Speaker of the Lok Sabha (2) Chief Justice of India  
 (3) Chief of Army (4) Prime Minister  
**Ans. (1)**  
**Sol.** The Speaker of the Lok Sabha is not appointed by the President of India but he/she elected by the majority in the Lok Sabha
- 178.** The first female speaker of Lok Sabha is -  
 (1) Vijay Laxmi Pandit (2) Sucheta Kriplani (3) Tarkeshwari Sinha (4) Meira Kumar  
**Ans. (4)**  
**Sol.** Meira Kumar was the first female speaker in Lok Shabha

**179.** The state in which Panchayati Raj was introduced first-

- (1) Uttar Pradesh                      (2) Bihar                      (3) Rajasthan                      (4) Gujarat

**Ans. (3)**

**Sol.** Rajasthan was the first state in which Panchayati Raj was introduced in 2nd Oct. 1959

**180.** Who was the first Muslim President in India?

- (1) Fakhruddin Ali Ahmed    (2) Dr. Zakir Hussain                      (3) Salman Khursheid                      (4) Dr. Abdul Kalam Azad

**Ans. (2)**

**Sol.** Dr. Zakir Hussain was first Muslim president of India.

**181.** Which of the following statement is true?

(1)  $\left(\frac{1}{2}\right)^{\frac{1}{2}} = \left(\frac{1}{3}\right)^{\frac{1}{3}}$

(2)  $\left(\frac{1}{2}\right)^{\frac{1}{2}} < \left(\frac{1}{3}\right)^{\frac{1}{3}}$

(3)  $\left(\frac{1}{2}\right)^{\frac{1}{2}} > \left(\frac{1}{3}\right)^{\frac{1}{3}}$

(4)  $\left(\frac{1}{2}\right)^{\frac{1}{2}}$  and  $\left(\frac{1}{3}\right)^{\frac{1}{3}}$  are rational numbers

**Ans. (3)**

**Sol.**  $\left(\frac{1}{2}\right)^{\frac{1}{2}} = \left(\frac{1}{2}\right)^{\frac{3}{6}} = \left(\frac{1}{8}\right)^{\frac{1}{6}}$  and  $\left(\frac{1}{3}\right)^{\frac{1}{3}} = \left(\frac{1}{3}\right)^{\frac{2}{6}} = \left(\frac{1}{9}\right)^{\frac{1}{6}}$

$\therefore \frac{1}{8} > \frac{1}{9}$

$\therefore \left(\frac{1}{8}\right)^{\frac{1}{6}} > \left(\frac{1}{9}\right)^{\frac{1}{6}}$

$\Rightarrow \left(\frac{1}{2}\right)^{\frac{1}{2}} > \left(\frac{1}{3}\right)^{\frac{1}{3}}$

**182.** The mean of 15 observations written in some order is 50. If the mean of first eight observations and last eight observations are 48 and 53 respectively then the eighth observation is:

- (1) 35                      (2) 80                      (3) 72                      (4) 58

**Ans. (4)**

**Sol.** Mean of 15 observations = 50

Mean of first eight observations = 48

Mean of last eight observations = 53

$\therefore$  Sum of 15 observations =  $15 \times 50 = 750$

Sum of first eight observations =  $8 \times 48 = 384$

Sum of last eight observation =  $8 \times 53 = 424$

$\therefore$  8th observation =  $384 + 424 - 750$   
 $= 808 - 750$   
 $= 58$

**183.** The point on the y-axis, which is equidistant from points A(6,5) and B(-4,3) is:

- (1) (9, 0) (2) (0, 9) (3) (0, 4) (4) (0, 3)

**Ans. (2)**

**Sol.** Let the coordinates of required point be P(0, y).

Given PA = PB where A(6, 5), B(-4, 3)

$$\therefore \sqrt{(0-6)^2 + (y-5)^2} = \sqrt{(0+4)^2 + (y-3)^2}$$

$$\sqrt{36 + y^2 - 10y + 25} = \sqrt{16 + y^2 - 6y + 9}$$

$$\sqrt{y^2 - 10y + 61} = \sqrt{y^2 - 6y + 25}$$

$$y^2 - 10y + 61 = y^2 - 6y + 25$$

$$-10y + 6y = 25 - 61$$

$$-4y = -36$$

$$y = 9$$

$\therefore$  Coordinates of point P is (0, 9).

**184.** If  $(\sec \theta - \tan \theta) = k$ , where  $k \neq 0$  then the value of  $(\sec \theta + \tan \theta)$  is

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

**Ans. (4)**

**Sol.** Given  $\sec \theta - \tan \theta = k$

$$\therefore \sec^2 \theta - \tan^2 \theta = 1$$

$$\Rightarrow (\sec \theta - \tan \theta)(\sec \theta + \tan \theta) = 1$$

$$\Rightarrow k(\sec \theta + \tan \theta) = 1$$

$$\Rightarrow \sec \theta + \tan \theta = \frac{1}{k}$$

**185.** The value of k for which the system of linear equation  $x + 2y = 5$  and  $3x + ky = 15$  has no solution, is:

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

**Ans. (Bonus)**

**Sol.** System of linear equations  $x + 2y = 5$  and  $3x + ky = 15$  has no solution.

$\therefore$  By using condition of no solution:

$$\Rightarrow \frac{1}{3} = \frac{2}{k} \neq \frac{-5}{-15} \quad \left( \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \right)$$

$$\Rightarrow \frac{1}{3} = \frac{2}{k} \neq \frac{1}{3}$$

$$\Rightarrow \frac{1}{3} = \frac{2}{k} \quad \text{or} \quad \frac{2}{k} \neq \frac{1}{3}$$

$$\Rightarrow k = 6 \quad \text{or} \quad k \neq 6$$

hence contradiction.

$\therefore$  None of the options is correct.

- 186.** If  $x = 1$  is a common root of the equations  $ax^2 + ax + 3 = 0$  and  $x^2 + x + b = 0$  then the value of  $ab$  is:  
 (1) 3 (2) 3.5 (3) 6 (4) -3

**Ans. (1)**

**Sol.** Given,  $x = 1$  is a common root of the equations  $ax^2 + ax + 3 = 0$  and  $x^2 + x + b = 0$

$$\therefore ax^2 + ax + 3 = 0$$

$$a(1)^2 + a(1) + 3 = 0$$

$$a + a + 3 = 0$$

$$2a + 3 = 0$$

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

$$\text{and } x^2 + x + b = 0$$

$$1^2 + 1 + b = 0$$

$$1 + 1 + b = 0$$

$$2 + b = 0$$

$$b = -2$$

$$\therefore ab = \left(\frac{-3}{2}\right)(-2) = 3$$

- 187.** If points  $(a, 0)$ ,  $(0, b)$  and  $(1, 1)$  are collinear, then the value of  $(1/a + 1/b)$  is:

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

**Ans. (1)**

**Sol.** Given, The points  $(a, 0)$ ,  $(0, b)$  and  $(1, 1)$  are collinear.

$\therefore$  Area of triangle formed by these points = 0

$$\frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)| = 0$$

$$\Rightarrow \frac{1}{2} |a(b - 1) + 0(1 - 0) + 1(0 - b)| = 0$$

$$\Rightarrow ab - a + 0 - b = 0$$

$$\Rightarrow ab = a + b$$

$$\Rightarrow \frac{ab}{ab} = \frac{a + b}{ab}$$

$$\Rightarrow 1 = \frac{a}{ab} + \frac{b}{ab}$$

$$\Rightarrow \frac{1}{a} + \frac{1}{b} = 1$$

**188.** If the centroid of the triangle formed by points (a,b), (b,c) and (c,a) is at the origin, then  $a^3+b^3+c^3$  is equal to:

- (1) abc (2) 0 (3) a+b+c (4) 3abc

**Ans. (4)**

**Sol.** Given ; Coordinates of vertices of triangle are

A(a, b), B(b, c) and C(c, a)

∴ Coordinates of centroid  $G\left(\frac{a+b+c}{3}, \frac{b+c+a}{3}\right)$

since centroid is at the origin

Therefore,  $\left(\frac{a+b+c}{3}, \frac{b+c+a}{3}\right) = (0, 0)$

$$\therefore \frac{a+b+c}{3} = 0$$

$$\Rightarrow a + b + c = 0$$

$$\Rightarrow a + b = -c$$

$$\Rightarrow (a + b)^3 = (-c)^3$$

$$\Rightarrow a^3 + b^3 + 3ab(a + b) = -c^3$$

$$\Rightarrow a^3 + b^3 + 3ab(-c) = -c^3$$

$$\Rightarrow a^3 + b^3 - 3abc = -c^3$$

$$\Rightarrow a^3 + b^3 + c^3 = 3abc$$

**189.** The distance between the points  $(\cos \theta, \sin \theta)$  and  $(\sin \theta, -\cos \theta)$  is:

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

**Ans. (2)**

**Sol.** Given, Coordinates of points  $(\cos \theta, \sin \theta)$  and  $(\sin \theta, -\cos \theta)$

By using the distance formula;

$$\begin{aligned} \text{Distance between the given points} &= \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \\ &= \sqrt{(\cos \theta - \sin \theta)^2 + (\sin \theta - (-\cos \theta))^2} \\ &= \sqrt{(\cos \theta - \sin \theta)^2 + (\sin \theta + \cos \theta)^2} \\ &= \sqrt{\cos^2 \theta + \sin^2 \theta - 2\cos \theta \sin \theta + \sin^2 \theta + \cos^2 \theta + 2\sin \theta \cos \theta} \\ &= \sqrt{2(\cos^2 \theta + \sin^2 \theta)} \\ &= \sqrt{2 \times 1} \quad (\because \sin^2 \theta + \cos^2 \theta = 1) \\ &= \sqrt{2} \end{aligned}$$

**190.** If 35% of income of A is equal to 25% of income of B then the ratio of incomes of A and B is:

(1) 4 : 3

(2) 5 : 7

(3) 7 : 5

(4) 4 : 3

**Ans. (2)**

**Sol.** 35% of income of A = 25% of income of B

$$\Rightarrow \frac{35}{100} \times A = \frac{25}{100} \times B$$

$$\Rightarrow \frac{A}{B} = \frac{25}{35}$$

$$\Rightarrow A : B = 25 : 35$$

$$\Rightarrow A : B = 5 : 7$$

**191.** If the ratio of volumes of two cubes is 27:64 then the ratio of their surface area is:

(1) 3 : 4

(2) 4 : 3

(3) 9 : 16

(4) 16 : 9

**Ans. (3)**

**Sol.** Given, Ratio of volumes of two cubes = 27 : 64

$\therefore$  Ratio of volumes = (Ratio of sides of two cubes)<sup>3</sup>

$$27 : 64 = (\text{Ratio of sides of two cubes})^3$$

$\therefore$  Ratio of sides of two cubes = 3 : 4

Now, Ratio of surface area = (Ratio of sides)<sup>2</sup>

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

$$= \frac{9}{16}$$

$$= 9 : 16$$

**192.** If the base of a triangle is decreases by 30% and its height is increased by 25% then the percentage decrease in area of triangle is:

(1) 20%

(2) 15%

(3) 22.5%

(4) 12.5%

**Ans. (4)**

**Sol.** Let the base and height of triangle are b and h respectively.

$$\text{Original Area} = \frac{1}{2}bh$$

Now, base is decreased by 30% and height is increased by 25%

$$\therefore \text{New Area} = \frac{1}{2} \left( b - \frac{30}{100}b \right) \left( h + \frac{25}{100}h \right)$$

$$= \frac{1}{2} \left( \frac{70}{100}b \right) \left( \frac{125}{100}h \right)$$

$$= \frac{1}{2} \times \frac{7}{10} \times \frac{5}{4}bh$$

$$= \frac{7}{16}bh$$

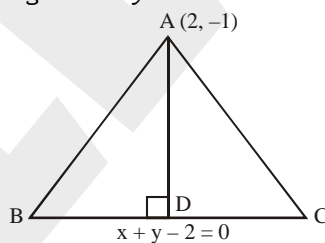
$$\begin{aligned}
 \% \text{ Change} &= \frac{\text{change in area}}{\text{original area}} \times 100 \\
 &= \frac{\frac{1}{2}bh - \frac{7}{16}bh}{\frac{1}{2}bh} \times 100 \\
 &= \frac{\frac{1}{2} - \frac{7}{16}}{\frac{1}{2}} \times 100 \\
 &= \frac{\frac{8-7}{2}}{\frac{1}{2}} \times 100 \\
 &= \frac{16}{1} \times 100 \\
 &= \frac{1}{2} \times 100 \\
 &= 12.5\%
 \end{aligned}$$

**193.** The equation of the base of an equilateral triangle is  $x+y-2=0$ . If one of its vertex is  $(2,-1)$  then area of triangle is:

- (1)  $\frac{1}{2\sqrt{3}}$  sq. unit      (2)  $\frac{\sqrt{3}}{12}$  sq. unit      (3)  $\frac{2}{3}$  sq. unit      (4)  $\frac{3\sqrt{3}}{4}$  sq. unit

**Ans. (1)**

**Sol.** Equation of the base of an equilateral triangle is  $x + y - 2 = 0$



Construct perpendicular AD from vertex A to meet BC at D.

$\therefore AD \perp BC$

$\therefore$  product of slopes  $(m_1 m_2) = -1$  ....(1)

Let Slope of AD =  $m_1$  and Slope of BC =  $m_2$

$$x + y - 2 = 0$$

$$y = -x + 2$$

On comparing with  $y = mx + c$

Slope of line BC =  $-1$

$$\therefore m_1 (-1) = -1$$

$$m_1 = 1$$



Let coordinates of D be  $(x_1, y_1)$

$$\therefore \text{Slope of AD} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\Rightarrow 1 = \frac{-1 - y_1}{2 - x_1}$$

$$\Rightarrow 2 - x_1 = -1 - y_1$$

$$\Rightarrow x_1 - y_1 = 3 \quad \dots(2)$$

$\therefore$  D lies on line  $x + y - 2 = 0$

$$\therefore x_1 + y_1 - 2 = 0 \quad \dots(3)$$

From Equation (2) & (3);

$$x_1 = \frac{5}{2}, y_1 = \frac{-1}{2}$$

$\therefore$  By distance formula,

$$AD = \sqrt{\left(2 - \frac{5}{2}\right)^2 + \left(-1 + \frac{1}{2}\right)^2}$$

$$= \sqrt{\left(-\frac{1}{2}\right)^2 + \left(-\frac{1}{2}\right)^2}$$

$$= \sqrt{\frac{1}{4} + \frac{1}{4}}$$

$$= \sqrt{\frac{1}{2}}$$

$$= \frac{1}{\sqrt{2}}$$

$$\text{Height of equilateral triangle} = \frac{\sqrt{3}}{2} \times \text{side}$$

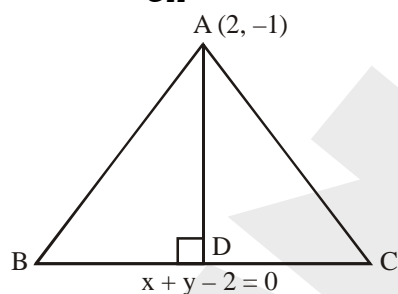
$$\frac{1}{\sqrt{2}} = \frac{\sqrt{3}}{2} \times \text{side}$$

$$\therefore \text{side} = \frac{1}{\sqrt{2}} \times \frac{2}{\sqrt{3}}$$

$$= \frac{\sqrt{2}}{\sqrt{3}}$$

$$\begin{aligned}
 \therefore \text{Area of equilateral triangle} &= \frac{\sqrt{3}}{4} \times (\text{side})^2 \\
 &= \frac{\sqrt{3}}{4} \times \left( \frac{\sqrt{2}}{\sqrt{3}} \right)^2 \\
 &= \frac{\sqrt{3}}{4} \times \frac{2}{3} \\
 &= \frac{1}{2\sqrt{3}} \text{ sq. unit}
 \end{aligned}$$

**OR**



Length of perpendicular from point  $(x_1, y_1)$  to  $ax + by + c = 0$  is  $\left| \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$

$$\begin{aligned}
 \therefore \text{Length of perpendicular AD from A to BC} &= \left| \frac{2 + (-1) - 2}{\sqrt{1^2 + 1^2}} \right| \\
 &= \left| \frac{-1}{\sqrt{2}} \right| \\
 &= \frac{1}{\sqrt{2}}
 \end{aligned}$$

$$\text{Height of equilateral triangle} = \frac{\sqrt{3}}{2} \times \text{side}$$

$$\frac{1}{\sqrt{2}} = \frac{\sqrt{3}}{2} \times \text{side}$$

$$\therefore \text{side} = \frac{1}{\sqrt{2}} \times \frac{2}{\sqrt{3}}$$

$$= \frac{\sqrt{2}}{\sqrt{3}}$$

$$\begin{aligned}
 \therefore \text{Area of equilateral triangle} &= \frac{\sqrt{3}}{4} \times (\text{side})^2 \\
 &= \frac{\sqrt{3}}{4} \times \left( \frac{\sqrt{2}}{\sqrt{3}} \right)^2 \\
 &= \frac{\sqrt{3}}{4} \times \frac{2}{3} \\
 &= \frac{1}{2\sqrt{3}} \text{ sq. unit}
 \end{aligned}$$

**194.** The lengths of chords AB and AC of a circle are 6cm and 8cm respectively. If  $\angle BAC = 90^\circ$  then the radius of the circle is :

(1) 2.5 cm

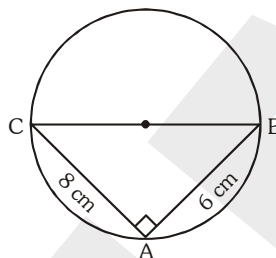
(2) 3 cm

(3) 4 cm

(4) 5 cm

**Ans. (4)**

**Sol.**



In  $\triangle ABC$

$$AB^2 + AC^2 = BC^2 \text{ (Pythagoras Theorem)}$$

$$6^2 + 8^2 = BC^2$$

$$10^2 = BC^2$$

$$10 \text{ cm} = BC$$

$$BC = 10 \text{ cm}$$

It is given that  $\angle BAC = 90^\circ$

$\therefore BC$  is diameter of circle. ( $\because$  Angle in semicircle is  $90^\circ$ )

Therefore radius is 5 cm

**195.** If  $\cos 43^\circ = \frac{x}{\sqrt{x^2 + y^2}}$ , then the value of  $\tan 47^\circ$  is:

(1)  $\frac{y}{x}$

(2)  $\frac{y}{\sqrt{x^2 + y^2}}$

(3)  $\frac{x}{y}$

(4)  $\frac{x}{\sqrt{x^2 + y^2}}$

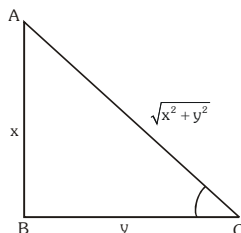
**Ans. (3)**

**Sol.**  $\cos 43^\circ = \frac{x}{\sqrt{x^2 + y^2}}$

$\sin 47^\circ = \sin (90 - 43^\circ)$

$\sin 47^\circ = \cos 43^\circ \quad [\because \sin(90 - \theta) = \cos \theta]$

$\sin 47^\circ = \frac{x}{\sqrt{x^2 + y^2}}$



In  $\triangle ABC$   $\angle C = 47^\circ$

$AB = x$  and  $AC = \sqrt{x^2 + y^2}$

$\therefore BC = y$  (by Pythagoras Theorem)

$\Rightarrow \tan 47^\circ = \tan C = \frac{AB}{BC}$

$\tan 47^\circ = \frac{x}{y}$

**196.** If the quadratic equations  $2x^2 + 4x + (a + 5) = 0$  have equal roots and  $(a + 4)x^2 + ax - 3b = 0$  have distinct real roots then which of the following is true:

- (1)  $a = -3, b < \frac{3}{4}$       (2)  $a = 3, b > \frac{3}{4}$       (3)  $a = -3, b > \frac{3}{4}$       (4)  $a = 3, b < \frac{3}{4}$

**Ans. (3)**

**Sol.** Equation  $2x^2 + 4x + (a + 5) = 0$  have equal roots

$\therefore B^2 - 4AC = 0$

$4^2 - 4(2)(a + 5) = 0$

$16 - 8(a + 5) = 0$

$8(2 - a - 5) = 0$

$8(-3 - a) = 0$

$-3 - a = 0$

$a = -3$

Equation  $(a + 4)x^2 + ax - 3b = 0$  have real and distinct roots

$B^2 - 4AC > 0$

$a^2 - 4 \times (a + 4) \times (-3b) > 0$

$a^2 + 12(a + 4)b > 0$

$(-3)^2 + 12(-3 + 4)b > 0$

$$9 + 12b > 0$$

$$b > \frac{-9}{12}$$

$$b > \frac{-3}{4}$$

$$a = -3 \text{ and } b > \frac{-3}{4}$$

Out of the given options, most appropriate option is option (3)

**197.** The value of  $\tan 1^\circ \tan 2^\circ \dots \tan 89^\circ$  is:

(1) 0

(2) 1

(3)  $\frac{1}{\sqrt{3}}$

(4) not defined

**Ans. (2)**

**Sol.**  $\tan(90 - \theta) = \cot \theta$

$$\Rightarrow \tan 89^\circ = \tan(90 - 1)^\circ$$

$$\tan 89^\circ = \cot 1^\circ$$

$$\Rightarrow \tan 88^\circ = \tan(90 - 2)^\circ$$

$$\tan 88^\circ = \cot 2^\circ$$

$$\tan 1^\circ \tan 2^\circ \dots \tan 44^\circ \tan 45^\circ \tan 46^\circ \dots \tan 88^\circ \tan 89^\circ$$

$$= \tan 1^\circ \tan 2^\circ \dots \tan 44^\circ \tan 45^\circ \cot 44^\circ \dots \cot 2^\circ \cot 1^\circ$$

$$= \tan 1^\circ \tan 2^\circ \dots \tan 44^\circ \times 1 \times \frac{1}{\tan 44^\circ} \times \dots \times \frac{1}{\tan 2^\circ} \times \frac{1}{\tan 1^\circ}$$

$$= 1$$

**198.** The digit at the unit place in  $(3157)^{2020}$  is:

(1) 1

(2) 3

(3) 7

(4) 9

**Ans. (1)**

**Sol.** Unit place digit is depend on powers of unit digit

$$= \text{unit digit of } (3157)^{2020}$$

$$= \text{unit digit of } 7^{2020}$$

$$= \text{unit digit of } 7^{4 \times 505}$$

$$= \text{unit digit of } (7^4)^{505}$$

(Cyclicity of 7 is 4)

$$= \text{unit digit of } (2401)^{505}$$

$$= \text{unit digit of } (1)^{505}$$

$\therefore$  Unit place digit is 1

**199.** A metallic cuboid of dimension 9 cm  $\times$  11 cm  $\times$  12 cm is melted and recasted into spherical balls of diameter 0.3 cm. The number of balls will be:

(1) 84000

(2) 10500

(3) 78000

(4) 86000

**Ans. (1)**

**Sol.** Number of balls =  $\frac{\text{volume of cuboid}}{\text{volume of sphere}}$

$$= \frac{9 \times 11 \times 12}{\frac{4}{3} \times \frac{22}{7} \times \frac{3}{20} \times \frac{3}{20} \times \frac{3}{20}}$$

$$= \frac{9 \times 11 \times 12 \times 7 \times 8000}{4 \times 22 \times 9}$$

$$= 12 \times 7 \times 1000$$

Number of balls = 84000

**200.** The length of tangent drawn from a point Q to a circle is 24 cm and distance from Q from the centre of circle is 25 cm. The radius of circle is:

(1) 7 cm

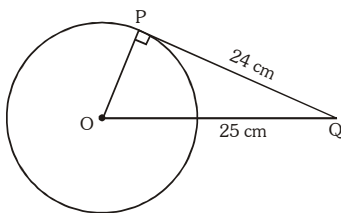
(2) 12 cm

(3) 15 cm

(4) 24.5 cm

**Ans. (1)**

**Sol.**



In  $\triangle OPQ$  ; PQ is tangent

$$\therefore \angle OPQ = 90^\circ$$

$$OQ^2 = PQ^2 + OP^2$$

$$25^2 = 24^2 + r^2$$

$$625 - 576 = r^2$$

$$49 = r^2$$

$$r = 7 \text{ cm}$$