

Date: 04.11.2018

Max. Marks: 100

SOLUTIONS

Time allowed: 120 minutes

1. A cell is having two boundaries, the outer being cell wall and the inner being plasma membrane. The inherent property of this pair moving from outside to inside is:

- (1) Semi-permeable and Permeable (2) Semi-permeable and Semi-permeable
(3) Permeable and Semi-permeable (4) Permeable and Permeable

Ans. (3)

Sol. Cell wall is fully permeable where as cell membrane is semi permeable.

2. The process of osmosis, is the movement across the cell membrane of :

- (1) Salts from a hypotonic solution to hypertonic solution
(2) Salts from a hypertonic solution to hypotonic solution
(3) Water from a hypotonic solutions to hypertonic solution
(4) Water from a hypertonic solution to hypotonic solution

Ans. (3)

Sol. Osmosis is a special type of diffusion in which water moves from a region of high solvent concentration to low solvent concentration.

3. A poorly developed zone in the center of a cell that has DNA molecule is called as:

- (1) Nucleolus of prokaryote (2) Nucleoid of prokaryote (3) Nucleus of prokaryote
(4) Nucleus of eukaryote

Ans. (2)

Sol. Prokaryotes have their genetic material in nucleoid.

4. In a practical laboratory, a student while observing the slide of tissue with the help of a microscope, found a bunch of cylindrical shaped cells having interconnections belong to the category of:

- (1) Adipose tissue (2) Heart muscle (3) Smooth muscle (4) Skeletal muscle

Ans. (2)

Sol. Cardiac (heart) muscles are cylindrical and interconnected, smooth muscles are spindle in shape where as skeletal muscles are cylindrical with no branching.

5. Pteridophyte plants can be better described as:

- (1) Non vascular, non seed producing (2) Vascular, non seed producing
(3) Vascular seed producing (4) Nonvascular seed producing

Ans. (2)

Sol. Incomplete vascular tissue appeared for the first time in pteridophytes and seeds appeared for the first time in gymnosperms.

6. If a potted plant and a dish containing potassium hydroxide are covered by a sealed container made up of glass are kept in sunlight for a week, what will happen:

- (1) Plant will grow taller (2) Leaf turn yellow due to no photosynthesis
(3) Leaf turn green due to excess photosynthesis (4) Leaf turn yellow due to no oxygen in the jar

Ans. (2)

Sol. Potassium hydroxide absorbs CO_2 . Therefore, photosynthesis will not occur due to absence of CO_2 .

7. Rings of cartilage are present in the throat
- (1) To keep the throat erect
 - (2) To produce the voice
 - (3) To prevent the air passage from infection
 - (4) To prevent air passage from collapse

Ans. (4)

Sol. Rings of cartilage are present in the throat to prevent the trachea from collapsing.

8. The process of excretion involves a sequential arrangement of following organs:

- | | | | |
|--------------------|--------------------|--------------------|----------------------|
| i. Urinary bladder | ii. Kidney | iii. Ureter | iv. Urethra |
| (1) i, iii, ii, iv | (2) ii, i, iii, iv | (3) ii, iv, iii, i | (4) ii, iii, iii, i, |

Ans. (4)

Sol. The process of excretion involves a sequential arrangement of kidney, ureter, urinary bladder and urethra.

9. The part of brain concerned with the precise voluntary muscle coordination is:

- | | | | |
|--------------|----------------|----------|-----------------------|
| (1) Cerebrum | (2) Cerebellum | (3) Pons | (4) Medulla oblongata |
|--------------|----------------|----------|-----------------------|

Ans. (2)

Sol. The part of the brain concerned with the precise voluntary muscle co-ordination is cerebellum.

10. Sex determination in humans is due to the presence of:

- (1) Presence of X-chromosome in female
- (2) Presence of only Y-chromosome in male
- (3) Formation of two types of eggs by female
- (4) Formation of two types of sperms by male

Ans. (4)

Sol. Sex determination in humans is due to the two types of chromosomes (x & y) in males.

11. The arm of humans, leg of horse, leg of a lizard and wing of birds are linked to each other because:

- (1) Structures having similar development but different functions
- (2) Structures having similar function but different development
- (3) Structures having similar development and similar functions
- (4) Structures having different development and different functions

Ans. (1)

Sol. The arm of humans, leg of horse, leg of lizard & wings of bird are homologous organs which have similar development but different functions.

12. In one experiment showing Mendelian inheritance, a tall pea plant with purple flowers was crossed with short pea plant with white flower. All the progeny in the next generation was seen to have purple flowers but half of them were short. What will be the genetic makeup of tall parent:

- | | | | |
|----------|----------|----------|----------|
| (1) TTPP | (2) TtPP | (3) TTpp | (4) TtPp |
|----------|----------|----------|----------|

Ans. (2)

Sol. If the genetic makeup of the tall parent is TtPP then only the next generation can have purple flowers to half of the offspring will be short which is not possible in all the other genetic makeup given.

13. A solid cube of silver has a mass of 84 g. What is the resistance between the opposite faces. Given that density of silver is 10.5 g/cm^3 and resistivity is $1.6 \times 10^{-4} \Omega \text{ cm}$.

- (1) $0.4 \times 10^{-4} \Omega$ (2) $0.8 \times 10^{-4} \Omega$ (3) $0.4 \times 10^{-8} \Omega$ (4) $0.8 \times 10^{-8} \Omega$

Ans. (2)

Sol. $R = \rho \frac{L}{A} = \rho \frac{L^2}{V}$

$d = \frac{m}{V}$

$V = \frac{m}{d} = \frac{84 \text{ g}}{10.5 \text{ g/cm}^3} = \frac{840}{105} \text{ cm}^3 \quad V = 8 \text{ cm}^3$

side of square = 2 cm $= \frac{1.6 \times 10^{-4} \times 4}{8} \quad R = 0.8 \times 10^{-4} \Omega$

14. Farsighted people, who have lost their spectacles, can still read a book by looking through a small (3- 4 mm) hole in a sheet of a panel because

- (1) Because the fine hole produces an image of the letters at a longer distance.
 (2) Because in doing so, the distance of the object is increased.
 (3) Because in doing so, the focal length of the eye lens is effectively decreased.
 (4) Because in doing so, the focal length of the eye-lens is effectively increased.

Ans. (3)

Sol. Option (3) is correct because in doing so focal length of eye lens effectivity decreases and we know this person requires a higher power of the eye lens.

15. The equivalent resistance of network of three 2Ω resistors can not be

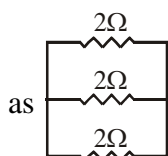
- (1) 0.67 (2) 2Ω (3) 3Ω (4) 6Ω

Ans. (2)

Sol. Case-I

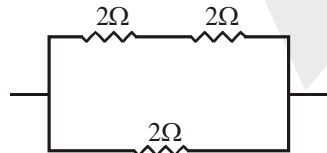


Case-II



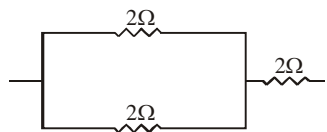
$= 0.67 \Omega$

Case-III



$R = 1.33 \Omega$

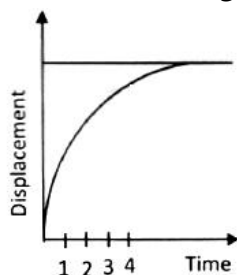
Case-IV



$R = 3 \Omega$

Solution : Net resistance can never be 2Ω . **Option (2)** is correct.

16. The displacement of body as a function of time is shown in figure. The figure indicates that



- (1) The body starts with a certain velocity, but the motion is retarded and finally the body stops.
- (2) The velocity of the body is constant throughout
- (3) The acceleration of the body is constant throughout
- (4) The body starts with a constant velocity, the body moves with another constant velocity.

Ans. (1)

Sol. The graph indicates that slope is decreasing and slope of displacement time gives velocity since velocity is decreasing, hence retarded motion and finally body comes to rest.

Option (1) is the answer

17. A bird is in a wire cage hanging from a spring balance. The reading of the balance is taken when the bird is flying about in the cage, and when the bird is at rest in the cage. The first reading will be

- (1) Much greater than the second
- (2) Greater than the second
- (3) Less than the second
- (4) Same as the second

Ans. (3)

Sol. Option (3) is correct. Because the wire cage is open and is exposed to the atmosphere so when the bird is flying inside the cage, its reading will be less in comparison to the reading when the bird is at rest inside the cage.

18. A concave mirror is placed on a table with its pole touching the table. The mirror is rotated about its principal axis in clockwise direction. The image of a person looking straight into it

- (1) Rotates in clockwise direction
- (2) Rotates in anti-clockwise direction
- (3) is inverted
- (4) does not rotate

Ans. (4)

Sol. When a concave mirror is rotated, image does not rotate.

Option (4) is the correct answer

19. A man standing in a swimming pool looks at a stone lying at the bottom. The depth of the swimming pool is h . At what distance from the surface of water is the image of the stone formed? Take μ as refractive index of water.

- (1) h
- (2) μh
- (3) $\frac{h}{\mu}$
- (4) $\frac{\mu}{h}$

Ans. (4)

Sol. **Since apparent depth of a substance put in a denser medium is h/m . Apparent depth is lesser than the actual depth.**

Thus option (4) is the correct answer

20. "Metal dishes" (Dish Antennas) are used for receiving TV signals from distant communication satellites. These 'Metal Dishes' are

- (1) Convex Reflectors
- (2) both convex and concave reflectors
- (3) Concave reflector
- (4) Convex refractors

Ans. (3)

Sol. Metal dishes used for receiving TV signals from distant communication satellites are concave reflectors.

Hence option (3) is the correct answer

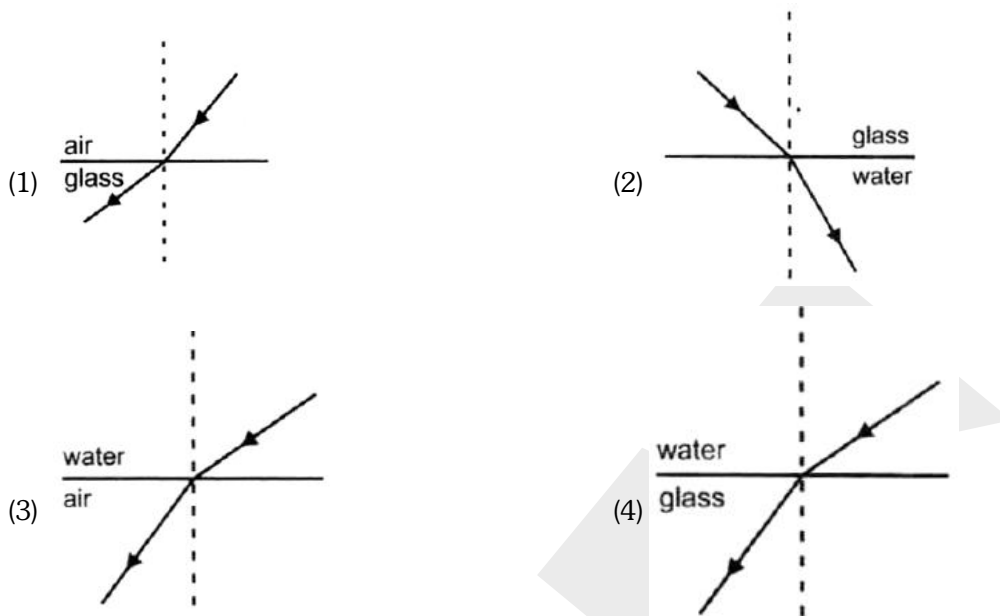
21. Linear magnification (m) Produced by a rear view mirror fitted in vehicles
 (1) Is equal to one (2) is infinity (3) Is more than one (4) Is less than one

Ans. (4)

Sol. Since a rear view mirror is a convex mirror and images formed by convex mirrors are virtual and diminished. Thus, linear magnification is always less than one

Option (4) is the correct answer

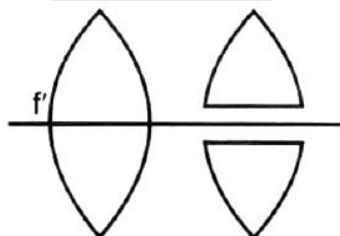
22. Which of the following ray diagrams, show the correct refraction of ray of light.



Ans. (4)

Sol. Option (4) is the correct answer as glass is denser than water.

23. If a symmetrical convex lens of focal length 'f' is cut into two parts along the principal axis as shows in the figure, the focal length of each part will be



- (1) $f/2$ (2) $f/4$ (3) f (4) ∞

Ans. (3)

Sol. When a convex lens cut into two parts along principal axis, focal length of each part does not change. Option (3) is the correct answer

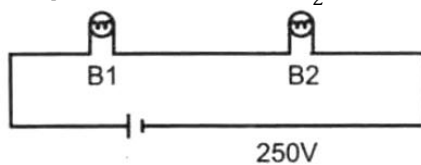
24. Which statement is true for an eye donor
 i. Eye donor can belong to any age group or gender
 ii. People who use spectacles can not donate eye
 iii. Eye must be removed within 4-6 hours after death
 iv. Eye removal process takes only 10-15 minutes

- (1) i, ii, iii (2) i, iii, iv (3) i, ii, iv (4) ii, iii, iv

Ans. (2)

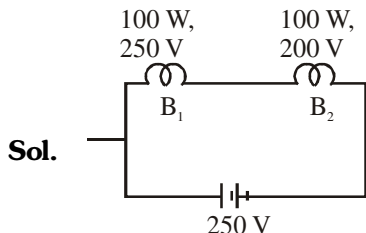
Sol. Eye removal process takes 10-15 minutes. People who used specs can donate eyes.

25. Electric bulb B_1 (100W - 250V) and electric bulb B_2 (100 W - 200V) are connected across source of 250 v as shown in figure what is the potential drop across electric bulb B_2 ?



- (1) 200 V (2) 250 V (3) 98 V (4) 48 V

Ans. (3)



$$R_1 = \text{Resistance of bulb } B_1 = \frac{(250)^2}{100} = 25 \times 25 = 625\Omega$$

$$R_2 = \text{Resistance of bulb } B_2 = \frac{(200)^2}{100} = 400\Omega$$

Voltage will get divided in the ratio

$$\begin{aligned} V_1 : V_2 &= R_1 : R_2 \\ &= 625 : 400 \\ &= 25 : 16 \end{aligned}$$

$$\text{Potential drop} = V_2 = \frac{250}{41} \times 16$$

across $B_2 = 97.56$ V

Option (3) is correct

26. A beam of alpha particles moving towards east is deflected towards south by magnetic field. The direction of magnetic field is

- (1) towards south (2) towards east (3) downward (4) upward

Ans. (4)

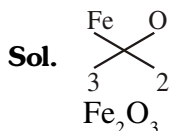
Sol. Using Fleming's left hand rule, direction of magnetic field is upwards.

Option (4) is correct.

27. What is the formula for ferric Oxide?

- (1) Fe O (2) $Fe_2 O_3$ (3) $Fe_3 O_4$ (4) $Fe_2 O$

Ans. (2)



28. In the presence of concentrated H_2SO_4 acetic acid reacts with ethyl alcohol to produce

- (1) In Aldehyde (2) Carboxylic Acid (3) Sulphur Dioxide (4) Ester

Ans. (4)

29. Which of the following is also known as laughing gas?

- (1) Methyl isocyanate (2) Sulphur Dioxide (3) Nitrous Oxide (4) Methyl phosphate

Ans. (3)

30. The ion of an element has 3 positive charge, 27 mass number and 14 neutrons. Find the number of electrons in this ion.

- (1) 13 (2) 10 (3) 14 (4) 16

Ans. (2)

Sol. Charge = +3

$$A = 27$$

$$n = 14$$

$$A = n^{\circ} + p^{+}$$

$$p^{+} = 27 - 14$$

$$p^{+} = 13$$

$$\text{In charge} \Rightarrow e^{-} = P^{+} - \text{charge}$$

$$e^{-} = 13 - 3$$

$$e^{-} = 10$$

31. Which of the following is responsible for the blackening of silver jewellery on prolonged exposure to air?

- (1) Ag_3N (2) Ag_2O (3) Ag_2S and Ag_3N (4) Ag_2S

Ans. (4)

32. A metal is strongly heated in the presence of air to form a black mass. The metal is.....

- (1) Copper (2) Potassium (3) Silver (4) Zinc

Ans. (1)

33. Which of these shows Tyndali effect?

- (1) Common Salt Solution (2) Lemon Juice (3) Milk (4) Copper Sulphate Solution

Ans. (3)

34. Which substance is chemically resistant and can hold aqua regia?

- (1) Ceramics (2) Glass (3) Plastic (4) Fibre

Ans. (2)

35. What mass of Oxygen is required to react completely with 15g of Hydrogen gas to form water?

- (1) 120g (2) 107.5g (3) 132.5g (4) 112g

Ans. (1)

Sol. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

$$4\text{g of H}_2 \text{ reacts with} = 32 \text{ g of O}_2.$$

$$1\text{g of H}_2 \text{ reacts with} = \frac{32}{4} \text{ g of O}_2.$$

$$15\text{g of H}_2 \text{ reacts with} = 8 \times 15 \text{ g of O}_2. \\ = 120 \text{ g of O}_2.$$

36. On which of the following substances will you pour Hydrochloric acid if you wish to prepare carbon dioxide gas in laboratory?

- (1) Zinc particles (2) Copper sulphate particle (3) Pieces of marbles (4) Ammonium chloride.

Ans. (3)

Sol. $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$

37. Solder is an alloy of _____

- (1) Copper and Mercury (2) Copper and lead (3) Lead and Mercury (4) Lead and Tin

Ans. (4)

47. Who was the Austrian Chancellor when Congress of Vienna (1815) was held?

- (1) Giuseppe Mazzini (2) Duke Metternich
(3) Giuseppe Garibaldi (4) Otto Von Bismarck

Ans (2)

Sol. (According to NCERT)

48. Name the two imperialist countries against, which the nationalist Vietnamese fought?

- (1) France and Britain (2) Britain and Japan
(3) Japan and France (4) France and Germany

Ans (3)

Sol. (According to NCERT)

49. Who Formed the Swaraj Party?

- (1) Jawahar lal Nehru and Mahatma Gandhi (2) Jawaharlal Nehru and Subhash Chandra Bose
(3) Jawaharlal Nehru and Motilal Nehru (4) Motilal Nehru and C.R. Dass

Ans (4)

Sol. (According to NCERT)

50. Which two new colonial powers joined European powers in the process of carving up of Africa between themselves at, Berlin in 1885?

- (1) Britain and France (2) Italy and France
(3) Belgium and Germany (4) Britain and Italy

Ans (3)

Sol. (According to NCERT)

51. What, does Proto-industrialisation mean?

- (1) The first, and early form of industrialisation (2) Industrialisation after 1800 C.E.
(3) Industrialisation after 1900 C.E. (4) Industrialisation after 2000 C.E.

Ans (1)

Sol. (According to NCERT)

52. Who among the following authored 'Godan'?

- (1) Rabindranath Tagore (2) Prem Chand
(3) Bankim Chandra (4) Srinivas Das

Ans (2)

Sol. (According to NCERT)

53. In which country women do not have the right to vote.

- (1) Estonia (2) Saudi (3) Fiji (4) Mexico

Ans (2)

Sol. (According to NCERT)

54. The name of the autobiography written by Nelson Mandela is

- (1) Robben Island (2) The long walk to Freedom
(3) Blacks (4) Apartheid

Sol. (According to NCERT)

Ans (2)

55. Who appoints the judges of the Supreme Court and the High Court.

- (1) The President
(2) The Prime Minister
(3) The Chief Justice of the Supreme Court
(4) The president on the advice of the Prime Minister and in consultation with the Chief Justice of the Supreme Court

Ans (4)

Sol. (According to NCERT)

56. Kosovo was a province of _____ before its split
(1) Vietnam (2) Zimbabwe (3) Sri Lanka (4) Yugoslavia

Sol. (According to NCERT)

Ans (4)

57. Which language was recognised as the official language after independence in Sri Lanka?
(1) Tamil (2) Hindi (3) Sinhali (4) Telgu

Sol. (According to NCERT)

Ans (3)

58. Which country does not have federal system?

- (1) Belgium (2) India
(3) Myanmar (4) The United States of America

Ans (3)

Sol. (According to NCERT)

59. The _____ legislates on residuary subjects

- (1) Union Government (2) State Government (3) Local Government (4) President

Ans. (1)

Sol.

60. Which one of the following regional parties is associated with West Bengal?

- (1) Lok Jan Shakti Party (2) Janata Dal
(3) Forward Bloc (4) Democratic Front

Ans (3)

Sol. (According to NCERT)

61. Which of the following statement is true

- (1) El Niño is a Greek word meaning the child
(2) Presence of the El Niño leads to decrease in Sea-surface temperatures
(3) El Niño is a name given to the periodic development of warm ocean current along the coast of Peru
(4) ITCZ is a broad trough of high pressure in equatorial latitudes

Ans (3)

Sol. (According to NCERT)

62. Maldives Islands are situated to the _____ of Lakshadweep Islands

- (1) south (2) North (3) East (4) West

Ans (1)

Sol. (According to NCERT)

63. Which of the following is not a nuclear power station.

- (1) Kaiga (2) Narora (3) Korba (4) Kakrapar

Ans (3)

Sol. (According to NCERT)

64. What causes rainfall on the coastal areas of Tamil Nadu in the beginning of winters

- (1) South West monsoon (2) Temperate cyclones
(3) North East monsoon (4) Local Air circulation

Ans (3)

Sol. (According to NCERT)

65. Which of the following two extreme locations are connecting the east-west corridor

- (1) Mumbai and Nagpur (2) Ahmedabad and Kolkata
(3) Silchar and Port Blair (4) Nagpur and Siliguri

Sol. (According to NCERT)

Ans (3)

66. Match list 2 (River) and list 2 (Dam) and select the correct answer using the code given below

List 1 (River)

- A. Narmada
- B. Kaveri
- C. Bhagirathi
- D. Mahanadi

List 2 (River)

- i. Hirakund
- ii. Indira Sagar Dam
- iii. Mettur
- iv. Tehri

(1) A (i) B (iii) C (iv) D(ii)

(3) A (ii) B (iii) C (iv) D(i)

(2) A (iv) B (iii) C (ii) D(i)

(4) A (iv) B (ii) C (i) D(iii)

Ans (3)

Sol. (According to NCERT)

67. The Red soil develop a reddish colour due to

- (1) Deforestation and over grazing
- (2) The presence of Potash and magnesium
- (3) Diffusion of iron in Crystalline and metamorphic rocks
- (4) Formation from the lave flows

Ans (3)

Sol. (According to NCERT)

68. The longitudinal extent of India is.

- (1) 69°7'E to 97° 25'E
- (2) 68°7' E to 98°25'E
- (3) 68°7'E to 97°25'E
- (4) 68°7' to 99°25' E

Ans (3)

Sol. (According to NCERT)

69. The_____ is a longitudinal position of a place where the local time 12 Noon when it is 7:30 pm at Greenwich.

- (1) 113.5° W
- (2) 112.5° E
- (3) 112.5° W
- (4) 113.5° E

Ans (3)

Sol. (According to NCERT)

70. Nokrek Bio Reserve is situated in _____ state of India.

- (1) Assam
- (2) West Bengal
- (3) Meghalaya
- (4) Sikkim

Ans (3)

Sol. (According to NCERT)

71. Boundaries of which of the states does not touch Myanmar?

- (1) Mizoram
- (2) Meghalaya
- (3) Manipur
- (4) Nagaiand

Ans (3)

Sol. (According to NCERT)

72. Arrange these hills from west to east

- A. Khasi
 - B. Garo
 - C. Naga
 - D. Jaintia
- (1) C, A, B, D (2) D, B, A, C (3) A, B, C, D (4) B, A, D, C

Ans (4)

Sol. (According to NCERT)

73. National consumer day is celebrated

- (1) 24th March
- (2) 24th December
- (3) 24th September
- (4) 24th November

Sol. (According to NCERT)

Ans (2)

74. Money in hand is an example of _____
(1) Human capital (2) Fixed capital (3) Working capital (4) Physical capital

Ans (3)

Sol. (According to NCERT)

75. Non market activity is _____
(1) Selling the product near by temple
(2) Selling the products through the regulated market
(3) Producing for self consumption
(4) State of unemployment

Ans (3)

Sol. (According to NCERT)

76. Calculate the female literacy rate from the given data

Gender	Total Person	Literate Person
Males	1200	1050
Females	580	360
Total	1780	1410

(1) 62.0% (2) 28.6% (3) 25.8% (4) 20.22%

Ans (1)

Sol. (According to NCERT)

77. The Quality of Education in a country does not depend upon
(1) Aiteracy Rate (2) Growth Rate (3) Health Status (4) Acquisition of skills by people

Ans (2)

Sol. (According to NCERT)

78. Which one of the following agency issue one rupee currency note in India
(1) Reserve bank of India (2) Ministry of Finance (3) Commerce Ministry (4) Commercial Bank

Ans (2)

Sol. (According to NCERT)

79. In which year the first five year plan started
(1)1947 (2) 1951 (3) 1948 (4) 1950

Ans (2)

Sol. (According to NCERT)

80. Removing barriers or restriction set by the government is called
(1) liberalization (2) Investment (3) Favorable trade (3) Free trade

Ans (1)

Sol. (According to NCERT)

81. Solve.

$$\sqrt{\frac{1+\sin A}{1-\sin A}} + \sqrt{\frac{1-\sin A}{1+\sin A}} = ?$$

- (1) $\cos 2A$ (2) $2 \sec A$ (3) $2 \tan A$ (4) $2 \sin A$

Ans. (2)

Sol.
$$\sqrt{\frac{1+\sin A}{1-\sin A}} + \sqrt{\frac{1-\sin A}{1+\sin A}} = \sqrt{\frac{(1+\sin A)(1+\sin A)}{(1-\sin A)(1-\sin A)}} + \sqrt{\frac{(1-\sin A)(1-\sin A)}{(1+\sin A)(1-\sin A)}}$$

$$= \frac{1+\sin A}{\cos A} + \frac{1-\sin A}{\cos A} = \frac{2}{\cos A} = 2 \sec A.$$

82.
$$\frac{1}{2(3x+4y)} + \frac{12}{7(4x-3y)} = \frac{1}{2}$$

$$\frac{7}{(3x+4y)} + \frac{4}{(4x-3y)} = 2$$

Find the values of x and y

if $3x+4y \neq 0, 4x-3y \neq 0$

- (1) $x = \frac{444}{25}, y = \frac{16}{25}$ (2) $x = 0, y = 1$ (3) $x = \frac{16}{25}, y = \frac{256}{25}$ (4) $x = 2, y = 2$

Ans. (BONUS)

Sol. Let $\frac{1}{3x+4y} = a$ & $\frac{1}{4x-3y} = b$

$$\therefore \frac{a}{2} + \frac{12}{7}b = \frac{1}{2}$$

$$7a + 4b = 2$$

$$\dots(1) \Rightarrow 7a + 24b = 7$$

$$\dots(2) \Rightarrow 7a + 4b = 2, \text{ on solving we get}$$

$$20b = 5$$

$$b = \frac{1}{4}$$

put in (2), we get

$$7a + 1 = 2 \Rightarrow a = \frac{1}{7}$$

$$\Rightarrow 3x + 4y = 7 \Rightarrow$$

$$\& 4x - 3y = 4$$

$$9x + 12 = 21$$

$$16x - 12y = 16$$

$$25x = 37$$

$$x = \frac{37}{25}$$

$$\Rightarrow 4\left(\frac{37}{25}\right) - 3y = 4$$

$$\Rightarrow 3y = \Rightarrow \frac{148}{25} - 4 = \frac{48}{25}, \text{ on solving we get}$$

$$y = \frac{16}{25}$$

So, no option is matching for given values of x and y.

83. A gardener wants to grow some plants in a garden. If 4 plants are grown extra in each row, the number of rows will reduce by 2. If 4 plants are grown less in each row, the number of rows increases by 4. Find the total number of plants grown.

- (1) 90 (2) 100 (3) 108 (4) 96

Ans. (4)

Sol. Let no of rows be 'r' and plants per row be 'x' per row

Now, if rows reduced $\rightarrow r - 2$ and plants increased to $x + 4$

And if rows increased to $\rightarrow r + 4$ and plants decreased to $x - 4$, total no. of plants will remain same, so

$$(r - 2)(r + 4) = (r + 4)(x - 4) = x.r$$

$$xr + 4r - 2x - 8 = rx - 4r + 4x - 16 = xr$$

$$\Rightarrow 4x - 4r = 16$$

$$\Rightarrow x - r = 4 \quad \dots(i)$$

$$\text{Also } \Rightarrow 2x - 4r = -8$$

$$\Rightarrow x - 2r = -4 \quad \dots(ii)$$

Subtract (ii) from (i) $\Rightarrow r = 8$

$$\Rightarrow x = 12$$

\therefore total plants = 96

84. The sum of all sides of a cube is 9 cm. The volume of the cube is _____

- (1) $\frac{3}{4} \text{ cm}^3$ (2) $\frac{81}{108} \text{ cm}^3$ (3) $\frac{27}{64} \text{ cm}^3$ (4) $\frac{27}{32} \text{ cm}^3$

Ans. (3)

Sol. $12a = 9$

$$a = \frac{3}{4}$$

$$V = \left(\frac{3}{4}\right)^3 = \frac{27}{64}$$

85. If $x : y = 3 : 5$ and $x : z = 5 : 7$, then what is $(y - z)(y + z)$ equal to?

- (1) $2/23$ (2) $27/46$ (3) $18/46$ (4) $15/46$

Ans. (1)

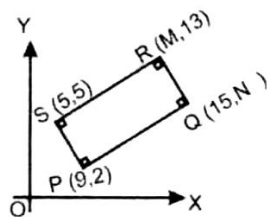
Sol. Let $x = 3a, y = 5a$

$x : z = 3a : z = 5 : 7$

$$\frac{3a}{z} = \frac{5}{7}, z = \frac{21a}{5}$$

$$\frac{y-z}{y+z} = \frac{5a - \frac{21a}{5}}{5a + \frac{21a}{5}} = \frac{4}{46} = \frac{2}{23}$$

86. Find the value of $m - n$ in the rectangles PQRS.

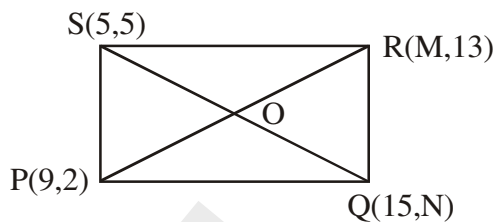


- (1) 4 (2) -2 (3) -1 (4) 1

Ans. (4)

Sol. Mid points of $SQ = \left(10, \frac{5+N}{2}\right)$

Mid points of $PR = \left(\frac{M+9}{2}, \frac{15}{2}\right)$



$$10 = \frac{M+9}{2} \qquad \frac{5+N}{2} = \frac{15}{2}, N = 10$$

$$M = 11$$

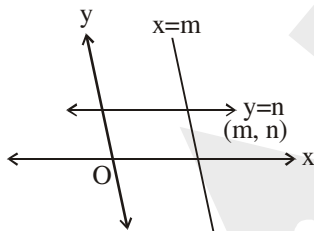
$$M - N = 11 - 10 = 1$$

87. A pair of equation $x = m$ and $y = n$ graphically represent lines which are _____.

- (1) Intersecting at (n,m) (2) coincident
 (3) parallel (4) intersecting at (m,n)

Ans. (4)

Sol.



88. If $x = 1 + \cos A$, $y = \operatorname{cosec}^2 A$, $z = 1 - \cos A$, then the value of $(xy)z$ is _____

- (1) $\operatorname{Cosec} A$ (2) 1 (3) $1 - \operatorname{Cosec}^2 A$ (4) $\operatorname{Cos}^2 A$

Ans. (2)

Sol. $x = 1 + \cos A$, $y = \operatorname{cosec}^2 A$, $z = 1 - \cos A$

$$x.z = 1 - \cos^2 A = \sin^2 A = \frac{1}{y}$$

$$\therefore xy = \frac{1}{z} \Rightarrow xyz = 1$$

89. The mode of the given series is 36. Find the value of K.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	7	6	K	16	12	8	10

(1) 10

(2) 15

(3) 20

(4) 30

Ans. (1)

$$\text{Mode} = l + h \left\{ \frac{fm - f_1}{2fm - f_1 - f_2} \right\}$$

Modal class = 30 - 40

$$36 = 30 + 10 \left\{ \frac{16 - k}{32 - k - 12} \right\}$$

$$\frac{6}{10} = \frac{16 - k}{20 - k} \Rightarrow \frac{3}{5} = \frac{16 - k}{20 - k}$$

$$\Rightarrow 60 - 3k = 80 - 5k$$

$$2k = 20 \Rightarrow k = 10$$

90. If $x + y + z = 0$ and $x \neq 0, y \neq 0, z \neq 0$, then find the value of $\frac{x^2}{yz} + \frac{y^2}{xz} + \frac{z^2}{xy}$

(1) 0

(2) 1

(3) 2

(4) 3

Ans. (BONUS)

Sol. Answer coming only if we take 2 as z.

$$x + y + z = 0$$

$$\frac{x^2}{yz} + \frac{y^2}{xz} + \frac{z^2}{xy} = \frac{x^3 + y^3 + z^3}{xyz} = \frac{3xyz}{xyz} = 3$$

91. What will be the area of the largest triangle that can be inscribed in a semicircle of radius $\frac{r}{16}$

(1) $16r^2$

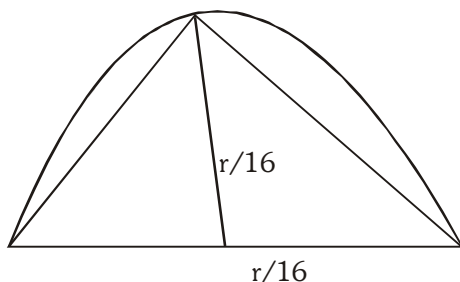
(2) $\frac{r^2}{64}$

(3) $\frac{r^2}{32}$

(4) $\frac{r^2}{256}$

Ans. (4)

$$\text{Sol. Area} = \frac{1}{2} \times \frac{2r}{16} \times \frac{r}{16} = \left(\frac{r}{16} \right)^2 = \frac{r^2}{256}$$



92. From a face of a cubical wooden block, a hemispherical depression is cut out in such a way that the diameter of hemisphere is half the edge of the cube. What will be the surface area of remaining solid?

(1) $\frac{l^2(l^2 + 4)}{2}$

(2) $64 l^2$

(3) $\frac{1}{4} l^2 (\pi + 24)$

(4) $\frac{1}{16} l^2 (\pi + 96)$

Ans. **Bonus**, l is mentioned in options but not given in the question statement.

Sol. If we take l as edge of cube then solution will be

Required surface area

= Area of 5 faces of cube + Region I + Area of hemisphere.

$$= 5 \times (4r)^2 + [(4r)^2 - \pi r^2] + 2\pi(r)^2$$

$$= 80r^2 + 16r^2 - \pi r^2 + 2\pi r^2$$

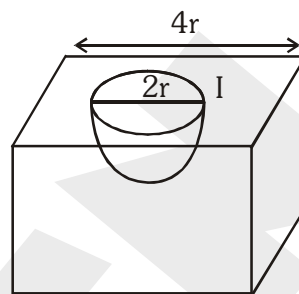
$$= 96r^2 + \pi r^2$$

let $l = 4r$, $r = l/4$

$$= 96 \times \frac{l}{16} + \pi \times \frac{l^2}{16}$$

$$= \frac{l^2}{4} \left[24 + \frac{\pi}{4} \right]$$

$$= \frac{l^2}{4} [\pi + 96]$$



Sol.

93. Rahim sells apples to his customers at the cost price itself but uses a weight of 800g instead of 1 kg weight. Find his profit %

(1) 25%

(2) 20%

(3) 15%

(4) 30%

Ans. (2)

Sol. Profit = Price of 200gm = 200x

CP = 800x

$$\therefore \text{Profit}(\%) = \frac{\text{Profit}}{\text{CP}} \times 100\%$$

$$= \frac{200x}{800x} \times 100\%$$

$$= 25\%$$

94. If $x + \frac{1}{x} = 5$, then find the value of $x^9 + \frac{1}{x^9}$

(1) 1330690

(2) 1310330

(3) 1330670

(4) 1310370

Ans. (3)

Sol. $x + \frac{1}{x} = 5$

$$x^2 + \frac{1}{x^2} = 25 - 2$$

$$x^2 + \frac{1}{x^2} = 23$$

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

$$= 125 - 15 = 110$$

$$x^6 + \frac{1}{x^6} = (110)^2 - 2 = 12100 - 2 = 12098$$

$$\left(x^6 + \frac{1}{x^6}\right)\left(x^3 + \frac{1}{x^3}\right) = x^9 + x^3 + \frac{1}{x^3} + \frac{1}{x^9}$$

$$(12098)(110) = 110 + \left(x^9 + \frac{1}{x^9}\right) = 1330670$$

95. If a natural number 'a' is divided by 7, the remainder is 5. If a natural number 'b' is divided by 7, the remainder is

3. The remainder is 'r' if a + b is divided by 7. Find the value of $\frac{3r+5}{4}$

(1) 7

(2) 2

(3) 8

(4) 11

Ans. (2)

Sol. $a = 7k_1 + 5$

$$b = 7k_2 + 3$$

$$a + b = 7(k_1 + k_2) + 8$$

$$= 7(k_1 + k_2) + 7 + 1$$

$$= 7(k_1 + k_2 + 1) + 1$$

$$\therefore r = 1$$

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

96. Rajat's salary in 2017 is Rs. 1,77,100. His salary from 2014 has risen annually by 10, 15 and 40 per cent respectively to reach 2017 salary figures. What was his salary in 2014?

(1) Rs. 95,000

(2) Rs. 1,15,000

(3) Rs. 1,20,000

(4) Rs. 1,00,000

Ans. (4)

Sol. Let his salary be Rs. x in 2014

$$\text{Salary in 2015} = x \times \frac{110}{100}$$

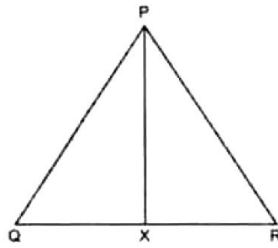
$$\text{Salary in 2016} = x \times \frac{110}{100} \times \frac{115}{100}$$

$$\text{Salary in 2017} = x \times \frac{110}{100} \times \frac{115}{100} \times \frac{140}{100}$$

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

$$\therefore = \frac{1,77,100 \times 1000}{11 \times 23 \times 7} = 1,00,000$$

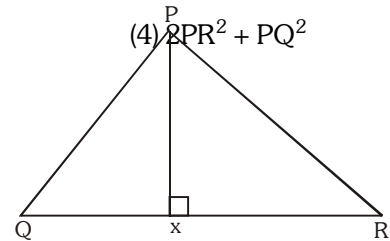
97. In ΔPQR , $PX \perp QR$. Find the value of $PQ^2 + QR^2 - 2QR \cdot QX$



- (1) PR^2 (2) $2PQ^2$ (3) $QR \cdot QX^2$

Ans. (1)

Sol. $PQ^2 + QR^2 - 2QR \cdot QX$
 $= PQ^2 + (QX + XR)^2 - 2QR \cdot QX$
 $= PQ^2 + QX^2 + XR^2 + 2QX \cdot XR - 2(QX + XR)QX$
 $= PQ^2 + QX^2 + XR^2 + 2QX \cdot XR - 2QX^2 - 2XR \cdot QX$
 $= PQ^2 - QX^2 + XR^2$
 $= PX^2 + XR^2 = PR^2$ (Using pythagoras)



98. The Points $P(0,4)$, $Q(-3,1)$, $R(0,-2)$ and $S(3,1)$ are the vertices of a

- (1) Parallelogram (2) Square (3) Kite (4) Rhombus

Ans. (2)

Sol. Mid point of $SQ = (0, 1)$
 Mid point of $RP = (0, 1)$

$$PS = \sqrt{3^2 + 3^2} = 3\sqrt{2}$$

$$PQ = \sqrt{3^2 + 3^2} = 3\sqrt{2}$$

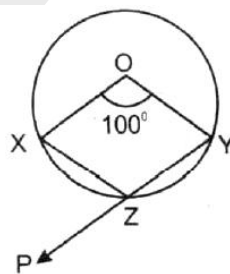
$$PR = \sqrt{6^2} = 6$$

$$SQ = \sqrt{6^2} = 6$$

$\therefore PQRS$ is a square



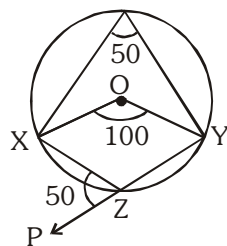
99. O is the centre of a circle and $\angle XOY = 100^\circ$. Find the measure of $\angle XZP$



- (1) 50° (2) 100° (3) 150° (4) 80°

(1)

Sol.



100. In trapezium PQRS, $PQ \parallel RS$ and $PQ = 2RS$. If PR and QS intersect at point O, what will be the ratio of areas of ΔPOQ and ΔROS ?

(1) 1 : 1

(2) 2 : 1

(3) 4 : 1

(4) 1 : 2

(3)

Sol. $\Delta POQ \sim \Delta ROS$

$$\frac{\text{ar}(\Delta POQ)}{\text{ar}(\Delta ROS)} = \left(\frac{PQ}{RS}\right)^2$$

$$= \left(\frac{2x}{x}\right)^2 = \frac{4}{1}$$

