JUNIOR SCIENCE TALENT SEARCH EXAM
04/2016-17 (For Class - IX)
Held on January 29, 2017

GENERAL KNOWLEDGE

(Question 1 – 50)

1. Solar Impulse – 2 is a:
   (1) Missile (2) Solar powered mobile phone
   (3) Solar powered aircraft (4) Fighter plane

1. 3

2. The company which launched 4G services for the first time
   (1) Airtel (2) Aircel
   (3) Idea (4) Vodafone

2. 1

3. What is the maximum number of over a bowler can bowl in T-20 cricket?
   (1) Six (2) Four
   (3) Two (4) Three

3. 2

4. Which of the following is the official slogan for the 2016 Rio - olympic and paralympic games?
   (1) 'A new world' (2) 'Love and save nature'
   (3) 'Inspire a generation' (4) 'Welcome home'

4. 1

5. The National Highway Authority of India (NHAI) has recently signed pact with which IIT to develop technology to construct maintenance free highways in India?
   (1) IIT – Bombay (2) IIT – Madras
   (3) IIT – Kharagpur (4) IIT – Indore

5. 3

6. The Theme song '70 Saal Azadi Yaad Karo Kurbani' for Tiranga yatra has been composed by whom?
   (1) Sonu Nigam (2) Asha Bhosle
   (3) Kesiraju Srinivas (4) Lata Mangeshkar

6. 3

7. Who has been posthumously honoured with the Ashoka Chakra on the 2016 Independence Day?
   (1) Hanamanthappa Kappad (2) Havildar Hangpan Dada
   (3) Niranjan Ek (4) Gursevak Singh

7. 1

8. What is the route of India's fastest train 'Gatiman Express'?
   (1) Delhi to Pune (2) Delhi to Agra
   (3) Kolkata to Hyderabad (4) Mumbai to Bangalore

8. 2

9. Which international airport become the first in the world to operate completely on solar energy?
(1) India Gandhi Airport (2) Rajiv Gandhi Airport
(3) Cochin Airport (4) Sardar Vallabhbhai Patel Airport

9. 3

10. Which cancer causing compound present in bread was banned by FSSAI?
(1) Potassium Bromate (2) Potassium Glucomate
(3) Potassium Sulphate (4) Sodium Bromate

10. 1

11. Under 'UJALA' programme which of the following states, become the 1st state in the country to remove VAT on LED bulbs?
(1) Madhya Pradesh (2) Uttar Pradesh
(3) Gujarat (4) Kerala

11. 2

12. Which number was approved on the single emergency number for India by the telecom commission?
(1) 100 (2) 112
(3) 101 (4) 212

12. 2

13. 'Zika Virus' first identified in:
(1) Brazil (2) Nigeria
(3) Uganda (4) Venezuela

13. 3

14. First state of India to have bank accounts for all householders of it states under the schemed 'Jan Dhan Yojana'?
(1) Chhatisgarh (2) Delhi
(3) Tamil Nadu (4) Kerala

14. 4

15. Full form of CFL is:
(1) Compact Filament Lamp (2) Compact Fluoroscent Lamp
(3) Central Fluoroscent Light (4) Central Filament Light

15. 2

16. Which state has launched the scheme 'Aapki Beti Hamari Beti'?
(1) Uttar Pradesh (2) Telengana
(3) Haryana (4) Goa

16. 3

17. In which city, Prime Minster Narender Modi flag off 'Run for Rio' on 31st July 2016?
(1) Bangalore (2) Chennai
(3) Delhi (4) Jaipur

17. 3

18. Which of the following polymers is used for making bulled proof material?
(1) Polyvinyl chloride (2) Polystyrene
(3) Polyethylene (4) Polyamide

18. 4

19. The country that will host 2018 FIFA world cup
(1) England (2) Russia
(3) Spain (4) Portugal
19. 2

20. The symbols of world wild fund is
(1) White Tiger (2) Bear
(3) Rhododendron (4) Red Panda
20. 4

21. The author of the book 'Creating Leadership' is:
(1) Kiran Bedi (2) Najeeb Jung
(3) Arvind Kejriwal (4) Anna Hajare
21. 1

22. Chicks, coorgs and Margogipse are varieties of
(1) Tea (2) Coffee
(3) Cotton (4) Wheat
22. 2

23. The chemical that is used in artificial rain
(1) Silver Iodide (2) Potassium chlorate
(3) Sodium Nitrate (4) Copper sulphate
23. 1

24. The transactions in stock markets is regulated by
(1) RBI (2) SEBI
(3) FICCI (4) Finance Ministry
24. 2

25. HTT – 40 is
(1) A Trainner Aircraft (2) A missile
(3) A mission to fight against terrorist (4) A submarine
25. 1

26. The country that has decided to quit European Union after a referendum on June 24, 2016
(1) UK (2) Turkey
(3) Spain (4) Portugal
26. 1

27. The state without Vidhan Parishad is
(1) Uttar Pradesh (2) Maharashtra
(3) Bihar (4) Rajasthan
27. 4

28. The tenure of chief minister of Jammu and Kashmir is
(1) 4 years (2) 5 years
(3) 6 years (4) 7 years
28. 3

29. Kolkata is an example of a ___ port
(1) Natural (2) Oil
(3) Riverine (4) Naval
29. 3

30. ‘PAN card’ issued by department of income tax, is not used for the purpose of
(1) Residential proof (2) Identity card
(3) Registered income tax payee proof (4) Date of birth proof
30. 1

31. In India, the Prime Minister
(1) Elected (2) Selected
(3) Nominated (4) Appointed
31. 4

32. United Nations general assembly has decided to observe 20th February every year as the
(1) World consumer Right Day (2) World Kidney Day
(3) World day of Social Justice (4) World Radio Day
32. 3

33. Indian constitutional amendment 122th is concerned with
(1) Health (2) Education
(3) Tax (4) Sport
33. 3

34. ‘Garampani’ sanctuary is located at
(1) Junagarh (Gujarat) (2) Diphu (Assam)
(3) Gangtok (Sikkim) (4) Kohima (Nagaland)
34. 2

35. Indian Ocean is
(1) S – Shaped (2) Triangular shaped
(3) Circular shaped (4) Square shaped
35. 2

36. ‘SUSU’ is
(1) Variety of fish (2) Variety of dolphin
(3) Variety of crocodile (4) Variety of tortoise
36. 2

37. Nail polish remover contains
(1) Acetone (2) Benzene
(3) Petroleum (4) Acetic Acid
37. 1

38. The evidence of use of plough has been found at
(1) Kalibangan (2) Lothal
(3) Harappa (4) Banwali
38. 1

39. India’s first underground museum will be opened at
(1) Patna (2) Ahmedabad
(3) New Delhi (4) Jaipur
39. 2

40. The World’s first hospital is on train
(1) Gatiman express (2) Jyoti express
(3) Life line express (4) Red cross express
40. 3

41. Which one among the following produces seeds but not flowers
(1) Cashew nut (2) Coffee
(3) Pine (4) Groundnut
41. 4

42. Skill development program 'Himayat' has been launched in
(1) Jammu and Kashmir (2) Maharashtra
(3) Bihar (4) Odisha
42. 1

43. Cycling track is called ___
(1) Court (2) Velodrome
(3) Field (4) Rink
43. 2

44. The major aim of devaluation of currencies to
(1) Discourage export (2) Encourage export
(3) Encourage both export and import (4) Encourage import
44. 2

45. Phylloquinone is the scientific name of
(1) Vitamin D (2) Vitamin E
(3) Vitamin K (4) Vitamin B_{12}
45. 3

46. The main pollutant in the smoke coming from cigarette is
(1) Carbone monoxide and benzene
(2) Carbon dioxide and sulphour dioxide
(3) Carbone monoxide and Hydrogen sulphide
(4) Carbon dioxide and Benzene
46. 1

47. Who addressed Mahatma Gandhi as 'one man boundary force'?
(1) Lord canning (2) Lord lytton
(3) Lord mayo (4) Lord mountbatten
47. 4

48. The electromagnetic wave used in RADAR system is
(1) Radio wave (2) Microwave
(3) Infrared wave (4) Light wave
48. 1

49. Which one of the following is not included within the meaning of 'animal' under police Act, 1861?
(1) Dog (2) Sheep
(3) Goat (4) All the above
49. 1

50. Which of the following Indian States does not border Bangladesh?
(1) Assam (2) Meghalaya
(3) Manipur (4) Tripura
50. 3

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GENERAL SCIENCE AND MATHEMATICS

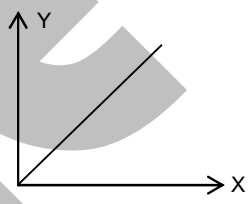
(Question 51 – 200)

51. A body is immersed into a liquid; up thrust acting on its depends on
(a) Density of liquid (b) Volume of body immersed
(c) Volume of liquid (d) Temperature of liquid
(1) a, b and c (2) b, c and d
(3) a, b and d (4) a, c and d

51. 3

Sol. Buoyancy depends on density of liquid and volume of the body immersed.

52. A graph for simple pendulum is drawn in which X and Y axis are
(1) Y-time, X-temperature
(2) Y-temperature, X-time
(3) Y-length, X-time
(4) Y-(time)^2, X-length



52. 4

Sol. $T = 2\pi\sqrt{\frac{\ell}{g}}$; $T^2 = \frac{(2\pi)^2}{g}\ell$

Y = mX.

Straight line curve.

53. A cool soft drink is kept on a balance. When its cap is removed the weight
(1) increase (2) decrease
(3) first increases then decreases (4) first decrease then constant

53. 4

Sol. The vapour of the soft drink will be released.

54. A bullet is fired from a rifle the kinetic energy of the rifle in comparison to that of bullet is
(1) Greater (2) Lesser
(3) Equal (4) Can't say

54. 2

Sol. Momentum will be same, so the body with less velocity will have less kinetic energy.

55. Action and Reaction
(1) Act on same body and cancel out effect of each other.
(2) Act on different bodies and cancel out the effect of each other.
(3) Act on different bodies and do not cancel the effect of each other.
(4) Experience the effect of each other in same direction.

55. 3

Sol. Action and Reaction acts on different bodies and do not cancel the effect of each other.

56. A body falls freely under gravity when it loses potential energy u its velocity becomes v, the mass of body is
(1) $\frac{u^2}{v^2}$ (2) $\frac{2u^2}{v^2}$
(3) $\frac{2u}{v^2}$ (4) $\frac{u}{v^2}$

56. 3

Sol. $\frac{1}{2}mv^2 = u$

$m = \frac{2u}{v^2}$

57. A balloon starts rising from the ground with an acceleration of 1.25 m/s^2. After 8 second a stone is released from the balloon the stone will

(1) Cover a distance of 40 m
(2) Have a displacement of 50 m.
(3) Reach the ground in 4 sec.
(4) Begin to move down after being released.

57. 3

Sol. $S = ut + \frac{1}{2}at^2$

$-40 = 10 \times t - \frac{1}{2} \times 10 \times t^2$

t = 4 sec.

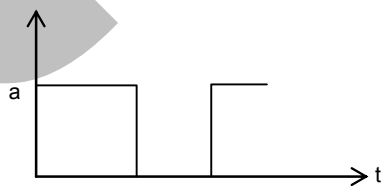
58. The work is done on the artificial satellite, when it revolves around the earth

(1) No work is done.
(2) By gravitational force of earth
(3) By gravity of sun
(4) Engine fitted in satellite.

58. 1

Sol. There is no change in kinetic energy so no work is done.

59. Figure shows the acceleration time graph of a particle. Which of the following represents the corresponding velocity-time graph



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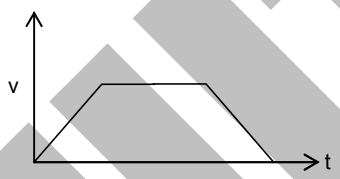

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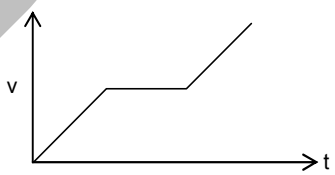

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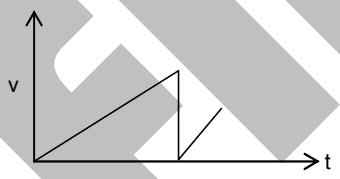

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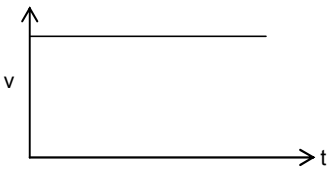


59. 2

Sol. Velocity in increasing, then constant and then again increasing.

60. A pebble is dropped into a well of depth h. The splash is heard after time t. If c be the velocity of sound then

(1) $t = \sqrt{\frac{gc}{2h}}$
(2) t = c + gh
(3) t = c – gh
(4) $t = \sqrt{\frac{2h}{g}} + \frac{h}{c}$

60. 4

Sol. Time = time of fall + time taken by sound.

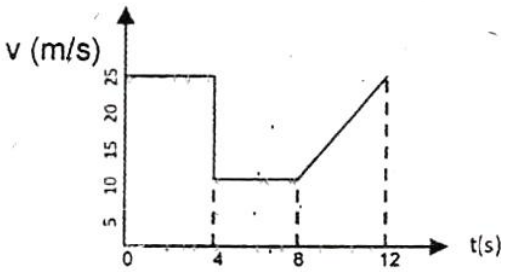
$t = \sqrt{\frac{2h}{g}} + \frac{h}{c}.$

61. Hold a stone at the end of spring balance. The pointer reads 5 kg wt. Now release the spring balance, then pointer will read
(1) More than 5 kg wt (2) Less than 5 kg wt
(3) Equal to 5 kg wt. (4) Zero

61. 4

Sol. In case of free fall no contact force is applied.

62. The v-t graph of the motion of a particle along a straight line is given. The average velocity of the particle is
(1) 12.5 m/s
(2) 15 m/s
(3) 17.5 m/s
(4) 20 m/s



62. 3

Sol. Average velocity = $\frac{100+40+70}{12}$ = 17.5 m/s

63. A silver ornament is suspected to be hollow. Its weight is 250 g and it displaces 50 cc of water. If the specific gravity of silver be 10. Find the volume of cavity.
(1) 50 cc (2) 25 cc
(3) 10 cc (4) 250 cc

63. 2

Sol. Volume of silver = $\frac{250}{10}$ = 25 cc

Volume of cavity = 50 – 25 = 25 cc.

64. A particle of mass m at rest is acted upon by a force p for a time 't'. Its kinetic energy after time t is
(1) $\frac{p^2t^2}{m}$ (2) $\frac{p^2t^2}{2m}$
(3) $\frac{p^2t^2}{3m}$ (4) $\frac{pt}{2m}$

64. 2

Sol. Acceleration = $\frac{P}{m}$

Displacement in time 't' = $\frac{1}{2}\times at^2$

$= \frac{1}{2}\times\frac{P}{m}t^2$

Kinetic energy = P × d

$= P\times\frac{1}{2}\times\frac{P}{m}t^2 = \frac{P^2t^2}{2m}$

65. The density of ice is 917 kg/m^3. What fraction of the volume of a piece of ice will be above water when floating in fresh water. Density of fresh water is 1000 kg /m^3.
(1) 0.083 (2) 0.917
(3) 0.50 (4) 0.017

65. 1

Sol. $1-\frac{x}{V}=\frac{917}{1000}$

$\frac{x}{V}=1-\frac{917}{1000}$ = 0.083

66. A bullet fired at target has its velocity decreased to 50% after penetrating 30 cm into it. Then additional thickness it will penetrate before coming to rest is
(1) 10 cm (2) 30 cm
(3) 40 cm (4) 60 cm

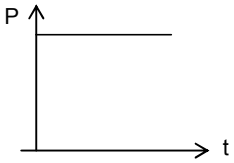
66. 1

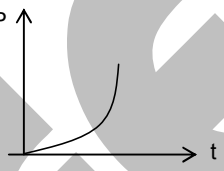
Sol. Initial kinetic energy = $\frac{1}{2}mv^2$

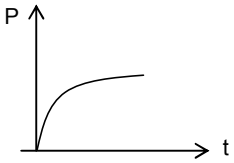
Final kinetic energy = $\frac{1}{2}m\frac{V^2}{4} = \frac{mv^2}{8}$.

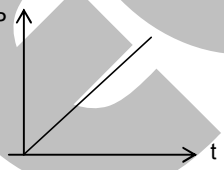
$F \times 30 = \frac{3mv^2}{8}$; $F \times x = \frac{mv^2}{8}$; x = 10 cm.

67. The motor drives a body along a straight line with a constant force. The power used by the motor varies with time t according to which graph.

(1) 

(2) 

(3) 

(4) 

67. 4

Sol. P = F × V

P = F × a × t

Since, force and acceleration are constant. Power is directly proportional to time.

68. From a bulling two balls a and B are thrown with same speed such that A thrown upward and B down ward (both vertically). If V_A and V_B are their respective speeds on reaching the ground then
(1) $V_B > V_A$ (2) $V_A > V_B$
(3) $V_A = V_B$ (4) speed depends on mass

68. 3

Sol. Final velocity will be same.

69. If a body moves in a circular path with constant speed. Then
(1) Its velocity is constant (2) Its acceleration is constant
(3) magnitude of acceleration is constant (4) None of these

69. 3

Sol. In a circular path magnitude of acceleration is constant for constant speed.

70. Two particles of masses m_1 and m_2 are moving with equal linear momenta. Compare their kinetic energies if $m_1 > m_2$.
(1) $E_1 > E_2$ (2) $E_1 = E_2$
(3) $E_1 < E_2$ (4) $\frac{E_1}{E_2} = \frac{m_1}{m_2}$

70. 3

Sol. If momentum is same greater mass will have lesser kinetic energy.

71. The velocity of sound in air is independent of change in
(1) Pressure (2) Temperature
(3) Density (4) Humidity

71. 1

Sol. Velocity of sound in air is independent of pressure.

72. Which can be zero at centre of earth
(1) Mass only (2) Weight only
(3) Both mass and weight (4) None of these

72. 2

Sol. There is no net gravitational force in the centre of earth.

73. SONAR is based on the principle of
(1) Resonance (2) Reverberation
(3) Echo (4) None of these

73. 3

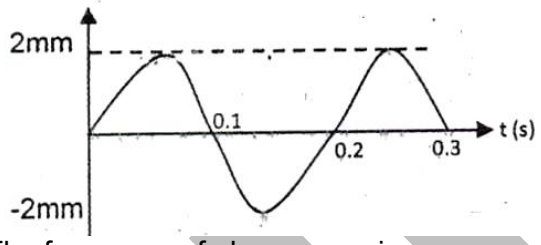
Sol. Sonar is based on the principle of echo.

74. On the surface of moon, a pendulum clock will
(1) Run slow (2) run fast
(3) Remain stationary (4) None of these

74. 1

Sol. Time period will increase if acceleration due to gravity decreases.

75.

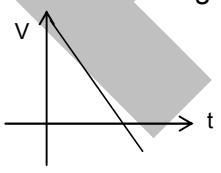


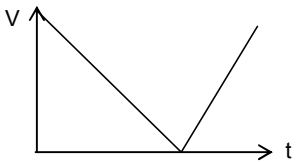
The frequency of above wave is
(1) 10 Hz (2) 5 Hz
(3) 30 Hz (4) 0.2 Hz

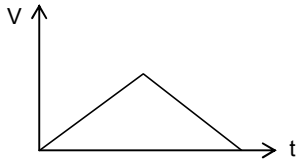
75. 2

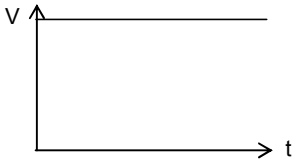
Sol. Frequency = $\frac{1}{T}=\frac{1}{0.2}$ = 5 Hz.

76. The velocity time graph of a stone thrown vertically upwards and then coming downward after a maximum height is

(1) 

(2) 

(3) 

(4) 

76. 1

Sol. Acceleration is constant and negative so the graph will be straight line and decreasing.

77. A body falling freely from rest has a velocities v after it falls through distance h. The distance it has to fall down further for its velocity to become double is
(1) h (2) 2h
(3) 3h (4) 4h

77. 3

Sol. $mgh = \frac{1}{2}mv^2$

$mgh' = \frac{1}{2}m \times (2v)^2$; $mgh' = 4 \times \frac{1}{2}mv^2$

$mgh' = 4mgh$

$h' = 4h$

$\therefore$ It should travel 3h more.

78. There is no effect of rotational motion of earth on the value of acceleration due to gravity at the

(1) Equator (2) Pole

(3) Surface (4) Exactly midpoint between equator and pole

78. 2

Sol. There is no effect of rotational motion of earth on the value of acceleration due to gravity at the pole.

79. A ball falls freely form rest. The ratio of distance travelled in first second, third and fourth second is

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

(3) 1 : 1 : 1 : 3 (4) 1 : 3 : 5 : 7

79. 4

Sol. Ratio of distance travelled in 1 sec, 2 sec, 3 sec, 4 sec is

$\frac{1}{2} \times g \times (1)^2$; $\frac{1}{2} \times g \times (2)^2$; $\frac{1}{2} \times g \times (3)^2$; $\frac{1}{2} \times g \times (4)^2$

= 1 : 4 : 9 : 16

$\therefore$ Ratio of distance travelled in first, second, third and fourth second is 1 : 3 : 5 : 7.

80. The frequency of second's pendulum is

(1) 0.5 Hz (2) 0.1 Hz

(3) 2 Hz (4) 00

80. 1

Sol. Time period of seconds pendulum is 2 sec.

Frequency = $\frac{1}{2}$ = 0.5 Hz.

81. If distance between consecutive crest and trough is L. Then the wavelength is given by

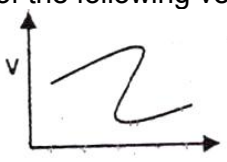
(1) $\frac{L}{2}$ (2) 2L

(3) 4L (4) L

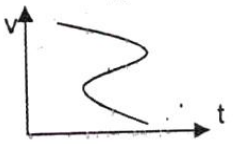
81. 2

Sol. Wavelength = 2L

82. Which of the following velocity time graph shows a realistic situation for a body in motion?

(1) 

(2) 

(3) 

(4) 

82. 2

Sol. In a particular time two velocities are not possible.

83. A car accelerates from rest at a constant rate 'α' for some time after which it decelerates at a constant rate β and comes to rest. If total time elapsed is t, then maximum velocity acquired by car will be

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

(3) $\frac{(\alpha-\beta)t}{\alpha\beta}$ (4) $\frac{\alpha\beta\, t}{\alpha+\beta}$

83. 4

Sol. $\frac{V}{\alpha}+\frac{V}{\beta}=t$

$V=\frac{\alpha\beta t}{\alpha+\beta}$

84. A particle is moving in a circle with uniform speed v. In moving from a point to another diametrically opposite point.

(1) The momentum changes by mv (2) The momentum changes by 2 mv

(3) No change in momentum (4) Kinetic energy; changes by mv^2

84. 2

Sol. Direction of velocity is opposite. So change in momentum = 2 mv.

85. If the kinetic energy of body becomes four times of its initial value, then new linear momentum will

(1) Become twice its initial value

(3) Become thrice its initial value

(3) Become four times its initial value

(4) Remain constant

85. 1

Sol. When velocity is doubled kinetic energy is made four times momentum will be twice.

86. A bomb of mass 30 kg at rest explodes into two pieces of masses 18 kg and 12 kg. The velocity of 18 kg mass is 6 ms^{-1}. The kinetic energy of the other mass is

(1) 324 J (2) 486 J

(3) 256 J (4) 527 J

86. 2

Sol. $18 \times 6 = 12 \times V$

$\Rightarrow \quad V = 9$ m/s

Kinematic energy = $\frac{1}{2}mv^2$

$= \frac{1}{2}\times 12\times(9)^2 = 486$ J.

87. Kepler discovered

(1) Laws of motion (2) Laws of rotational motion

(3) Laws of planetary motion (4) Laws of curvilinear motion

87. 3

Sol. Kepler discovered laws of planetary motion.

88. When a body is taken form poles to equator on the earth, its weight

(1) Increases

(2) Decreases

(3) Remains the same

(4) Increases at south pole and decreases at north pole

88. 2

Sol. Acceleration due to gravity decreases from pole to equator.

89. The motion of a rocket is based on the principle of conservation of
(1) Linear momentum (2) Angular momentum
(3) Kinetic energy (4) mass

89. 1

Sol. Linear momentum conservation explains motion of rocket.

90. The quantity which does not change, when sound enters from one medium to another
(1) Wavelength (2) Speed
(3) Frequency (4) None of these

90. 3

Sol. Frequency does not change when sound enters form one medium to another.

91. _____ metal is present in vitamin B_{12}
(1) Nickle (Ni) (2) Cobalt (Co)
(3) Iron (Fe) (4) Magnesium (Mg)

91. 2

Sol. Co present in Vitamin B_{12}.

92. During roasting process zinc blends is converted into
(1) $ZnSO_4$ (2) ZnO
(3) $ZnCO_3$ (4) Zn

92. 2

Sol. $\underset{\text{Zinc blende}}{ZnS} + O_2 \longrightarrow ZnO + SO_2\,(\text{Roasting})$

93. $Al_2O_3 + 3Mg \longrightarrow 3MgO + 2Al$, in the above reaction Mg acts as
(1) reducing agent (2) oxidizing agent
(3) purification agent (4) combustion agent

93. 1

Sol. Mg acts as reducing agent.

94. Density of water is maximum at _____^oC
(1) 2 (2) 4
(3) 3 (4) 0

94. 2

Sol. Density of water is maximum at 4^oC.

95. Match the following

(a)	As – 74	(i)	Treatment of goiter
(b)	Na-24	(ii)	Cancer cure
(c)	I – 131	(iii)	Detects tumors
(d)	Co-60	(iv)	Detect blood clot

(1) a(ii), b(iv), c(iii), d(i) (2) a(iii), b(iv), c(i), d(ii)
(3) a(iii), b(i), c(iv), d(ii) (4) a(i), b(iii), c(ii), d(iv)

95. 2

Sol. As – 74 $\rightarrow$ Detects tumors
Na-24 $\rightarrow$ Detect blood clot
I – 131 $\rightarrow$ Treatment of goiter
Co-60 $\rightarrow$ Cancer cure

96. Common salt gets moistured in rainy season due to the presence of
(1) $CaCl_2$ (2) KCl
(3) $MgCl_2$ (4) $AlCl_3$

96. 1, 3

Sol. $MgCl_2$ & $CaCl_2$ is present in common salt.

97. How much grams of O_2 is required for the complete combustion of 4.0 g carbon?
(1) 10.32 g (2) 10.16 g
(3) 10.8 g (4) 10.66 g

97. 4

Sol. $\underset{12\,g}{C} + \underset{32g}{O_2} \longrightarrow CO_2$

12 g of C is required for 32 g of oxygen

4 g of C is required for $\frac{32}{12} \times 4$ = 10.66 g

98. The leakage of cooking gas(LPG) can be identified by the presence of
(1) Ethyl mercaptan (2) Ethyl methyl ether
(3) Ethanol (4) Methanol

98. 1

Sol. LPG can be identified by ethyl mercaptan.

99. Organic liquid used as nail polish remover is
(1) Ether (2) Acetone
(3) Alcohol (4) Formaline

99. 2

Sol. Acetone used in nail polish remover.

100. Deficiency diseases caused by lack of vitamin-E is
(1) hair fall (2) xerophthalmia
(3) infertility (4) blood clotting time increases

100. 3

Sol. Lack of vitamin-E causes infertility.

101. Atom bomb is based on
(1) catalytic reaction (2) nuclear fusion reaction
(3) nuclear fission reaction (4) thermonuclear reaction

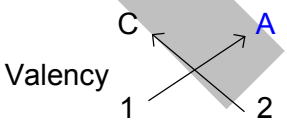
101. 3

Sol. Atom bomb is based on Nuclear fission reaction.

102. Four elements A, B, C and D have the following arrangements of electrons in their atoms
(A) 2, 8, 6 (B) 2, 8, 8
(C) 2, 8, 8, 1 (D) 2, 7
What will be formula of the compound between A and C?
(1) A_2C (2) CA
(3) CA_3 (4) C_2A

102. 4

Sol.



Compound : C_2A

103. Which polymer is used to make electrical boards and switches?
(1) Melamine (2) Glyptal
(3) Bakelite (4) PAN

103. 3

Sol. Bakelite is used to make electrical board & switches.

104. Which of the following does not react?
(1) $CuSO_4$ + Zn (2) $CuSO_4$ + Fe
(3) $CuSO_4$ + Ag (4) $CuSO_4$ + Mg

104. 3

Sol. Ag is less reactive than Cu.

105. Acid present in curd is
(1) tartaric acid (2) oxalic acid
(3) citric acid (4) lactic acid

105. 4

Sol. Lactic acid is present in curd.

106. Read the following statements carefully and identify X, Y and Z
(a) X is stored under kerosene
(b) Y catches fire on exposure and is stored in water
(c) Z reacts with water slowly
(1) Na, Mg, Cu (2) Na, P, Fe
(3) Cu, Zn, K (4) Zn, Cu, Na

106. 2

Sol. X = Na
Y = P
Z = Fe

107. Nichrome is an alloy made of
(1) Ni, Cr and Mn (2) Cr and Mg
(3) Ni and Cu (4) Ni and Cr

107. 4

Sol. Nichrome – Ni & Cr

108. What is mean by 1u?
(1) One atom of C-12 isotope (2) $1/12^{th}$ of mass of a hydrogen atom
(3) One atom of any element (4) $1/12^{th}$ of mass of a carbon atom

108. 4

Sol. 1u = $1/12^{th}$ mass of a C – atom.

109. How many oxygen atoms are present in 88.0 g CO_2?
(1) 2.4092×10^{24} (2) 1.2046×10^{24}
(3) 6.023×10^{23} (4) 1.8069×10^{24}

109. 1

Sol. In 44 g of CO_2, $2 \times N_A$ atom of O – present

In 88 g of CO_2 = $\frac{2 \times 6.022 \times 10^{23} \times 88}{44} = 2.4092 \times 10^{24}$

110. The atomic mass of oxygen is 16u and the molecular mass of ozone is 48u. What is the atomicity of ozone, if it is an allotrope of oxygen?
(1) 1 (2) 2
(3) 3 (4) 4

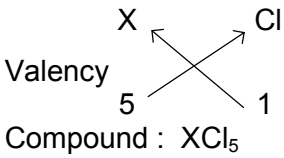
110. 3

Sol. Atomicity of ozone(O_3) = 3

111. An element X forms an oxide with formula X_2O_5. What will be the formula of its chloride?
(1) XCl_5 (2) X_2Cl_5
(3) XCl (4) X_5Cl_2

111. 1

Sol.



Compound : XCl_5

112. Which of the following solution will exhibit Tyndall effect?
(1) Salt solution (2) Sugar solution

(3) Copper sulphate solution (4) Starch solution

112. 4

Sol. Starch solution exhibit tyndall effect.

113. The boiling points of some gases found in air are given below:

Gas	Kr	Ne	N_2	O_2
B.Pt ^oC	-152	-246	-196	-183

If the liquid mixture is fractional distilled, the order of gases distilling out will be

(1) Kr, Ne, N_2, O_2 (2) Ne, N_2, O_2, Kr

(3) N_2, Ne, O_2, Kr (4) O_2, Ne. N_2, Kr

113. 2

Sol. The order of gases distilling out will be Ne, N_2, O_2, Kr.

114. Study of table given below and choose the correct statement:

Element	No. of protons	No. of neutrons	No. of electrons
U	11	12	10
V	20	20	20
W	16	18	18
X	20	19	18
Y	14	15	18
Z	10	10	10

114. 4

Sol. At. no. of Z is 10 i.e. Ne & it is a noble gas.

115. An ionic compound of element M and chlorine has the formula MCl_3. the molar mass of MCl_3 is 118.5 u. What is the molar mass of the oxide of element M?

(1) 28 (2) 44

(3) 72 (4) 99

115. 3

Sol. $MCl_3 = 118.54$

$M + 3(35.5) = 118.5$

$M = 12$

Valency of M is 3, so the formula of its oxide is $M_2O_3 = 12 \times 2 + 16 \times 3 = 72$.

116. The freezing and boiling points of a substance P are -220^oC and -185^oC respectively. At which of the following range of temperature will P exist as a liquid?

(1) Between -175^oC and -210^oC (2) Between -190^oC and -225^oC

(3) Between -200^oC and -160^oC (4) Between -195^oC and -215^oC

116. 4

Sol. Between -195^oC and -215^oC

117. Ice floats on surface of water because

(1) it is heavier than water (2) the density of both ice and water is the same

(3) ice is lighter than water (4) none of these

117. 3

Sol. Ice is lighter than water because of its cage like structure.

118. Which of the following process require heating?

(1) Fusion (2) Condensation

(3) Vapourisation (4) Solidification

118. 1

Sol. Fusion requires heat.

119. Which of the following is not a characteristic of evaporation?

(1) Rate of evaporation increases with increase in surface area

(2) Rate of evaporation increases with increase in temperature

(3) Evaporation of liquid is accompanied by decrease in temperature

(4) Rate of evaporation increase with increase in humidity of air

119. 4

Sol. Rate of evaporation decreases with increase in humidity of air.

120. What are the main scales of measuring the temperature?
(1) Joules scale, Fahrenheit scale and Kelvin scale
(2) S.I scale, Kelvin scale and Celsius scale
(3) Celsius scale, Fahrenheit scale and Kelvin scale
(4) Joules scale, Kilojoules scale and Celsius scale

120. 3

Sol. Main scales of measuring the temperature are Celsius scale, Fahrenheit scale and Kelvin scale.

121. There are 15 electrons and 16 neutrons present in an element X. Which of the following correctly represents X?
(1) $^{31}_{15}X$ (2) $^{31}_{16}X$
(3) $^{16}_{15}X$ (4) $^{15}_{16}X$

121. 1

Sol. Element = $^{31}_{15}X$

122. Simple distillation can be used to separate
(1) a mixture of benzene (b.pt 80°C) and toluene(b.pt 110°C)
(2) a mixture of benzene (b.pt 35°C) and toluene(b.pt 110°C)
(3) a mixture of ethanol (b.pt 78°C) and propnone(b.pt 50°C)
(4) all the above

122. 4

Sol. Distillation is used for the separation of components of a mixture containing two miscible liquid which boil without decomposition & have sufficient difference (30 – 50 K) in their boiling point.

123. The constituents of a heterogeneous mixture are X, Y and Z. If the mixture containing X and Y is taken, X can be separated form Y by using magnetic separation. If the mixture containing Y and Z is taken, the two can be separated by using evaporation method. The different states of X, Y and Z are as follows:
(1) Solid, Solid, Liquid (2) Solid, Liquid, Solid
(3) All are liquids (4) All are solids

123. 1

Sol. X = Solid
Y = Solid
Z = Liquid

124. Manvi put naphthalene balls in the box of woolen clothes. After a few months, when she opened the box, she noticed that there were no naphthalene balls but the box had its smell. What happened to the naphthalene balls?
(1) It changed to liquid and then evaporated
(2) It directly changed to vapours
(3) It dissolved in the moisture absorbed from the clothes
(4) The moths present in the box/clothes ate it

124. 2

Sol. The process of changing a solid directly to vapor called sublimation.

125. The correct order of increasing number of protons is represented by
(1) K, I, Cl, Br, Ar (2) K, Cl, Br, I, Ar
(3) Cl, Ar, K, Br, I (4) Ar, K, Cl, Br, I

125. 3

Sol. $_{17}Cl$, $_{18}Ar$, $_{19}K$, $_{35}Br$, $_{53}I$

126. 3.42 g sucrose[$C_{12}H_{22}O_{11}$] is mixed with 18 g water in a beaker. The number of oxygen atoms present in solution is
[Molar mass sucrose = 342 g mol^{-1}]
(1) 6.68×10^{23} (2) 6.09×10^{23}
(3) 6.022×10^{21} (4) 6.022×10^{24}

126. 1

Sol. Oxygen atom is 3.42 g $C_{12}H_{22}O_{11}$ = $\frac{3.42}{342} \times 11 = 0.11$ mol

Oxygen atoms in 18 g H_2O = $\frac{18}{18}$ = 1 mol

Total oxygen atoms = 0.1 + 1 = 1.11 mol
= $1.11 \times 6.022 \times 10^{23} = 6.68 \times 10^{23}$

127. How many electrons are present in M shell of an element with atomic number 20?
(1) 5 (2) 8
(3) 12 (4) 18

127. 2

Sol. Element with At. no 20 is Ca
E.C of Ca = 2, 8, 8, 2
K L M N
M=Shell contains 8 electrons

128. Which one of the following pairs of compounds illustrate the law of multiple proportions?
(1) H_2O, Na_2O (2) MgO, Na_2O
(3) CO_2, SO_2 (4) $SnCl_2$, $SnCl_4$

128. 4

Sol. $SnCl_2$ & $SnCl_4$ illustrate the law of multiple proportions.

129. The functional groups present in amino acids are
(1) -NH_2, -COOH (2) -NH_2, -O-H
(3) -COOH, -OH (4) -COOH, -COOR

129. 1

Sol. -NH_2 & -COOH group present in amino acid.

130. Valency of potassium(K) [Atomic number (z) = 19] is:
(1) 3 (2) 2
(3) 1 (4) 4

130. 3

Sol. $_{19}K$ = 2, 8, 8, 1
Valency of K = 1

131. The sugar presents in DNA is:
(1) Ribose (2) Maltose
(3) Glucose (4) De-oxyribose

131. 4

Sol. De – oxyribose is the sugar present in DNA.

132. The girth of the stem increases due to:
(1) Cambium (2) Xylem
(3) Phloem (4) Cortex

132. 1

Sol. Cambium is a layer of actively dividing cells between xylem and phloem tissues which is responsible for increasing the girth of the stem.

133. On maturation, green tomatoes turn red, because:
(1) New chloroplasts are made
(2) Chromoplasts are changed into chloroplast
(3) Chloroplasts are disintegrated and get converted into chromoplast
(4) Leucoplasts are formed

133. 3

Sol. On maturation, green tomatoes turn red, because chloroplasts are disintegrated and get converted into chromoplast.

134. The basic unit of classification of organisms is:
(1) Order (2) Family
(3) Species (4) Class

134. 3

Sol. Species is the basic unit of classification of organisms.

135. Mitochondria are found:
(1) In all cells (2) Only in plant cells
(3) Only in animal cells (4) In all eukaryotic cells

135. 4

Sol. Mitochondria are found in all eukaryotic cells.

136. 'Foot and mouth' disease in cattle is caused by
(1) Bacteria (2) Virus
(3) Protozoa (4) Fungi

136. 2

Sol. Foot and mouth disease in cattle is a severe, highly contagious viral disease.

137. Lysosomes are produced by
(1) Mitochondria (2) Endoplasmic reticulum
(3) Golgi apparatus (4) Leucoplast

137. 3

Sol. Lysosomes are manufactured and budded into the cytoplasm by the Golgi apparatus with enzymes inside – enzymes are made in Rough Endoplasmic Reticulum.

138. Which one of the following is not a connective tissue?
(1) Bone (2) Cartilage
(3) Blood (4) Muscles

138. 4

Sol. Muscles is not a connective tissue. It is muscular tissue.

139. Which light range is most effective in photosynthesis?
(1) Red (2) Blue
(3) Green (4) Violet

139. 4

Sol. Violet is most effective in photosynthesis as chloropyhyll absorbs maximum light in violet region.

140. The metal which is a constituent of chlorophyll is:
(1) Iron (2) Copper
(3) Magnesium (4) Zinc

140. 3

Sol. In chlorophyll, central ion is Magnesium.

141. Closed Blood vascular system occur in
(1) Earthworm (2) Housefly
(3) Cockroach (4) Prawn

141. 1

Sol. In Earthworm (Phylum Annelida) closed blood vascular system is present.

142. Amoeba acquires its food through:
(1) Plasmolysis (2) Endocytosis
(3) Exosmosis (4) Cytokinesis

142. 2

Sol. Amoeba acquires its food through Endocytosis.

143. The tissue which makes the plant hard and stiff is:
(1) Parenchyma (2) Sclerenchyma
(3) Collenchyma (4) Arenchyma

143. 2

Sol. Sclerenchyma is the tissue which makes the plant hard and stiff.

144. The organisms which depend on decaying organic matter for their food, are called:
(1) Photosynthetic (2) Parasitic
(3) Saprophytes (4) Sanguivores

144. 3

Sol. Saprophytes are organisms which depend on decaying organic matter for their food.

145. Marsilea is a
(1) Monocot (2) Bryophyte
(3) Pteridophyte (4) Dicot

145. 3

Sol. Marsilea is a pteridophyte.

146. The enzyme which requires acidic medium for its activity is
(1) Trypsin (2) Pepsin
(3) Amylase (4) Chymotrypsin

146. 2

Sol. The acidic medium is required in stomach because it is essential for the activation of pepsin enzyme for the digestion of proteins.

147. Vertebral column develops from
(1) Ectoderm (2) Endoderm
(3) Mesoderm (4) Notochord

147. 3

Sol. Vertebral column arise from mesoderm.

148. The two hosts of tapeworm are
(1) Man and Sheep (2) Goat and Snail
(3) Pig and Man (4) Pig and Snail

148. 3

Sol. Pig and man are two hosts of Tapeworm.

149. The gland which is not associated with Digestive System is:
(1) Pancreas (2) Adrenal gland
(3) Liver (4) Salivary gland

149. 2

Sol. Adrenal gland is not associated with digestive system.

150 The pitcher of pitcher plant is modified
(1) Lamina (2) Leaf base
(3) Whole leaf (4) Leaf Apex

150. 1

Sol. Lamina is modified into pitcher like structure called leaf pitcher in pitcher plant.

151. Which one of the following disease can be controlled by antibacterial medicine?
(1) Dengue (2) AIDS
(3) Typhoid (4) Malaria

151. 3

Sol. Typhoid is a bacterial disease which can be controlled by antibacterial medicines.

152. Which one of the following groups will not come under cryptogams?
(1) Thallophyta (2) Bryophyta
(3) Pteridophyta (4) Gymnosperm

152. 4

Sol. Cryptogams includes Thallophyta, Bryophyta, Pteridophyta, so Gymnosperm is a phanerograms.

153. The vector of sleeping sickness is:
(1) Culex (2) Aedes
(3) Tse tse fly (4) Female anopheles

153. 3

Sol. The vector of sleeping sickness is Tse tse fly.

154. 'Ball and Socket' joint is found in/between
(1) Upper arm and shoulder (2) Knee
(3) Elbow (4) Skull and vertebral column

154. 1

Sol. 'Ball and Socket' joint is found in between upper arm and shoulder.

155. In the following, which is not a cold blooded animal?
(1) Snake (2) Lizard
(3) Rat (4) Turtle

155. 3

Sol. Rat is not a cold blooded animal.

156. Oxides of nitrogen and sulphur dissolve in rain water, form
(1) Basic rain (2) Acid rain
(3) Pure rain (4) Water gas

156. 2

Sol. Oxides of nitrogen and sulphur dissolves in rain water and form acid rain.

157. 'World Environment Day' is celebrated
(1) 4^{th} June (2) 5^{th} June
(3) 4^{th} July (4) 5^{th} July

157. 2

Sol. 'World Environment Day' is celebrated on 5^{th} June.

158. A micronutrient is:
(1) Manganese (2) Nitrogen
(3) Phosphorus (4) Potassium

158. 1

Sol. Manganese is a micronutrient.

159. An Italian honey bee variety is:
(1) Apis mellifera (2) Apis dorsata
(3) Apis indica (4) Apis italiana

159. 1

Sol. Apis mellifera is an Italian honey bee variety.

160. A kind of waste disposal system of the cell is:
(1) Chromosome (2) Ribosome
(3) Mitochondria (4) Lysosome
160. 4
Sol. Lysosome is a kind of waste disposal system of the cell.

161. Special structures in the roots of legumes with nitrogen fixing bacteria are called:
(1) Root nodules (2) Root patches
(3) Corolloid root (4) Adventitious roots
161. 1
Sol. Special structures in the root of legumes with nitrogen fixing bacteria are called root nodules.

162. Muscles causing movement of food in stomach is:
(1) Striated (2) Unstriated
(3) Specialised (4) Cardiac
162. 2
Sol. Unstriated or smooth muscle cause movement of food in stomach.

163. Which of the following is without Nucleus at maturity?
(1) Sieve cell (2) Companion cell
(3) Cortical cell (4) Palisade cell
163. 1
Sol. The nucleus of each sieve cell degeneraters at maturity.

164. Multiple fission is found in:
(1) Euglena (2) Plasmodium
(3) Hydra (4) Paramoecium
164. 2
Sol. Multiple fission is found in plasmodium.

165. The edible roots occurs in:
(1) Wheat (2) Sugarcane
(3) Potato (4) Sweet potato
165. 4
Sol. The edible roots occur in sweet potato.

166. Which one of the following does not have DNA?
(1) Nucleus (2) Mitochondria
(3) Chloroplast (4) Ribosome
166. 4
Sol. Ribosomes does not have DNA.

167. Blue green algae are included in group
(1) Monera (2) Protista
(3) Plantae (4) Fungi
167. 1
Sol. Blue green algae are included in group monera.

168. Which one of the following is a free living helminth?
(1) Liver fluke (2) Tapeworm
(3) Blood fluke (4) Planaria
168. 4
Sol. Planaria belongs to the class Turbellarians which are exclusively free living.

169. Organisms in which exoskeleton is made of chitin are found in phylum
(1) Arthropoda (2) Mollusca
(3) Echinodermata (4) Porifera
169. 1

Sol. Organisms in which exoskeleton is made up of chitin are found in phylum arthropoda.

170. Pearls are obtained from:
(1) Pila (2) Sepia
(3) Loligo (4) Pinctada

170. 4

Sol. Pearls are obtained form pinctada.

171. If $abc = 1$, then the value of $\left(1+a+\frac{1}{b}\right)^{-1}+\left(1+b+\frac{1}{c}\right)^{-1}+\left(1+c+\frac{1}{a}\right)^{-1}$

(1) 2 (2) 1
(3) 4 (4) 8

171. 2

Sol. $abc = 1$

$$\left(1+a+\frac{1}{b}\right)^{-1}+\left(1+b+\frac{1}{c}\right)^{-1}+\left(1+c+\frac{1}{a}\right)^{-1}$$

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

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

$$=1$$

172. The value of $\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+.....+\frac{1}{\sqrt{9}+\sqrt{8}}$ is

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

172. 3

Sol. $\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+.....+\frac{1}{\sqrt{9}+\sqrt{8}}$

$$=-1+\sqrt{2}-\sqrt{2}+\sqrt{3}-\sqrt{3}.....-\sqrt{8}+\sqrt{9}$$

$$=\sqrt{9}-1$$

= 2

173. If $\sqrt{13-a\sqrt{10}}=\sqrt{8}+\sqrt{5}$, then

(1) –4 (2) 4
(3) 2 (4) –2

173. 1

Sol. $\sqrt{13-a\sqrt{10}}=\sqrt{8}+\sqrt{5}$

$13-a\sqrt{10}=13+2\sqrt{40}$

$a\sqrt{10}=-4\sqrt{10}$

$a=-4$

174. If is given that $\Delta ABC \cong \Delta FDE$ and $AB = 5$ cm, $\angle B = 40^\circ$ and $\angle A = 80^\circ$. Then which of the following is true:

(1) $DF = 5$ cm, $\angle F = 60^\circ$ (2) $DF = 5$ cm, $\angle E = 60^\circ$
(3) $DE = 5$ cm, $\angle E = 60^\circ$ (4) $DE = 5$ cm, $\angle D = 40^\circ$

174. 2

Sol. By congruency, DF = 5 cm, $\angle E = 60^\circ$

175. If $\frac{a^3+3ab^2}{3a^2b+b^3}=\frac{x^3+3xy^2}{3x^2y+y^3}$, then

(1) $ax=by$ (2) $xy=ab$

(3) $ay=bx$ (4) $ax=b$

175. 3

Sol. $\frac{a^3+3ab^2}{3a^2b+b^3}=\frac{x^3+3xy^2}{3x^2y+y^3}$

Using componendo and dividendo on both sides,

$\frac{(a+b)^3}{(a-b)^3}=\frac{(x+y)^3}{(x-y)^3}$

$\Rightarrow \frac{a+b}{a-b}=\frac{x+y}{x-y}$

Using componendo dividendo again,

$\Rightarrow \frac{2a}{2b}=\frac{2x}{2y}$

$\Rightarrow ay=bx$

176. How much pure alcohol should be added to 400 ml of a 15% solution to make its strength 32%?

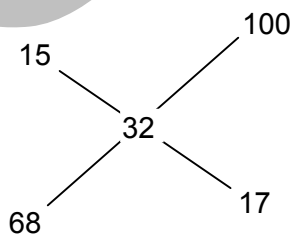
(1) 80 ml (2) 90 ml

(3) 95 ml (4) 100 ml

176. 4

Sol. $\therefore$ Ratio = 4 : 1

$\Rightarrow$ To 400 ml of 15% solution, 100 ml of pure alcohol must be mixed.



177. Simplified form of $\frac{2^{n+4}-2\left(2^n\right)}{2\left(2^{n+3}\right)}$ is:

(1) $\frac{1}{8}$ (2) $\frac{5}{8}$

(3) $\frac{7}{8}$ (4) $\frac{9}{8}$

177. 3

Sol. $\frac{2^n\left(2^4-2\right)}{2^n\left(2.2^3\right)}$

$=\frac{14}{16}$

$=\frac{7}{8}$

178. If $a^x = c^q = b$ and $c^y = a^z = d$, then

(1) $xy = qz$ (2) $\frac{x}{y} = \frac{q}{z}$

(3) $x + y = q + z$ (4) $x - y = q - z$

178. 1

Sol. $a^x = c^q = b,\ c^y = a^z = d$

$a^x = c^q$

$\Rightarrow a^x = \left(a^{\frac{z}{y}}\right)^q$

$\Rightarrow a^x = a^{\frac{zq}{y}}$

$\Rightarrow x = \frac{zq}{y}$

$\Rightarrow xy = zq$

179. If $a + b + c = 0$, then the value of $a^2(b + c) + b^2(c + a) + c^2(a + b)$ is

(1) abc (2) 3abc

(3) –3abc (4) 0

179. 3

Sol. $a^2(b + c) + b^2(c + a) + c^2(a + b)$

$= a^2(-a) + b^2(-b) + c^2(-c)$

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

$= -3abc$

180. A boy running at a speed of p km/hr to covers a distance of 1 km. But due to slippery ground, his speed is reduced by q km/h. If he takes 'r' hours to cover the same distance, then

(1) $\frac{1}{r} = \frac{pq}{p + q}$ (2) $\frac{1}{r} = p + q$

(3) $\frac{1}{r} = p - q$ (4) $r = p - q$

180. 3

Sol. $\frac{1}{r} =$ Resultant speed = p – q

181. If $2^{2x-1} + 4^x = 2^{x-\frac{1}{2}} + 2^{x+\frac{1}{2}}$, then x is

(1) $\frac{1}{2}$ (2) $\frac{2}{3}$

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

181. 1

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

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

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

$2^x = \sqrt{2}$

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

182. The price of an article was increased by p%. Later the new price was decreased by p%. If the last price was Re. 1, the original price was:

(1) $\frac{1-p^2}{200}$ (2) $\frac{\sqrt{1-p^2}}{100}$

(3) $1-\frac{p^2}{10000-p^2}$ (4) $\frac{10000}{10000-p^2}$

182. 4

Sol. Let price be x.

$x\left(1+\frac{p}{100}\right)\left(1-\frac{p}{100}\right)=1$

$x = \frac{10000}{10000-p^2}$

183. If $x^2-8x-1=0$, then $x^2+\frac{1}{x^2}$ is equal to

(1) $66+4\sqrt{3}$ (2) 66

(3) 32 (4) 64

183. 2

Sol. $x^2-8x-1=0$

$\Rightarrow x-\frac{1}{x}=8$

$\Rightarrow x^2+\frac{1}{x^2}=66$

184. The surface area of a sphere and a cube are equal. Then the volume are in ratio:

(1) $6:\sqrt{\pi}$ (2) $\sqrt{6}:\sqrt{\pi}$

(3) $6:\pi$ (4) $\sqrt{6}:\pi$

184. 2

Sol. $4\pi r^2 = 6a^2$

$\frac{r^2}{a^2}=\frac{6}{4\pi}$

$\frac{r}{a}=\frac{\sqrt{3}}{\sqrt{2\pi}}$

$\frac{V_S}{V_C}=\frac{4\pi r^3}{3a^3}=\frac{4\pi}{3}\times\frac{6}{4\pi}\times\frac{\sqrt{3}}{\sqrt{2\pi}}$

$=\frac{\sqrt{6}}{\sqrt{\pi}}$

185. If $\frac{m}{n}=\frac{4}{3}$ and $\frac{r}{t}=\frac{9}{14}$, then value of $\frac{3mr-nt}{4nt-7mr}$ is

(1) $-5\frac{1}{2}$ (2) $\frac{-11}{14}$

(3) $-1\frac{1}{4}$ (4) $\frac{11}{14}$

185. 2

Sol. $\dfrac{3mr-nt}{4nt-7mr}$

$=\dfrac{3(4x)(9y)-(3x)(14y)}{4(3x)(14y)-7(4x)(9y)}$

$=\dfrac{108-42}{168-252}$

$=\dfrac{66}{-84}$

$=\dfrac{-11}{14}$

186. A man buys some pens at the rate of Rs. 10 for 3 and twice these pens at the rate of Rs. 13 for 4. He sells all of them at Rs. 59 a dozen. His profit percent is:

(A) 16.67 (B) 50

(C) 33.33 (D) 59

186. 2

Sol. CP of a dozen pens $=4\times\dfrac{10}{3}+8\times\dfrac{13}{4}=\dfrac{40}{3}+\dfrac{104}{4}=\dfrac{118}{3}$

SP of a dozen pens = 59

$\therefore$ Profit = $59-\dfrac{118}{3}=\dfrac{59}{3}$

$\therefore$ Profit % = 50%

187. A shopkeeper sells 10 kg of sugar at Rs. 150. A customer asks for 15% discount and the shopkeeper agrees to his demand, but instead of 1 kg. he gives only 960 gm. The approximate effective discount that the customer gets is:

(1) 5.5% (2) 11.46%

(3) 12.64% (4) 10.5%

187. 2

Sol. MP $=\dfrac{150}{10}=$ Rs.15 / kg.

SP = Rs. 12.75/ 960 gm

= Rs. 13.28/kg

Discount = Rs. 1.72

$\therefore$ Discount % = 11.46%

188. The sum of the coefficients of x^2 and x in the product of $(x-3)(x+7)(x-4)$ is

(1) 0 (2) 37

(3) 84 (4) –37

188. 4

Sol. $(x-3)(x+7)(x-4)$

Coefficient of $x^2=-(3-7+4)=0$

Coefficient of $x=-21-28+12=-49+12=-37$

$\therefore$ Sum = –37

189. If $\sqrt{3}=1.732$, $\sqrt{2}=1.414$, then the value of $\dfrac{4}{3\sqrt{3}-2\sqrt{2}}+\dfrac{3}{3\sqrt{3}+2\sqrt{2}}$ is

(1) 2.036 (2) 2.063

(3) 2.603 (4) 2.306

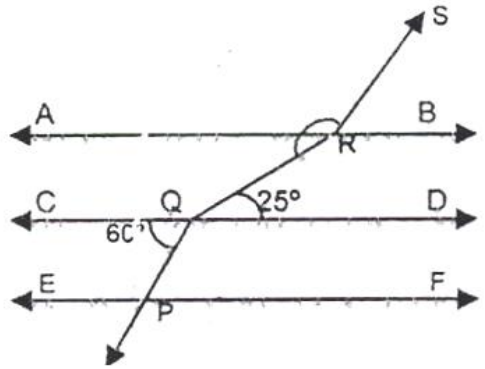
189. 2

Sol. $\dfrac{4}{3\sqrt{3}-2\sqrt{2}}+\dfrac{3}{3\sqrt{3}+2\sqrt{2}}$

$$= \frac{12\sqrt{3} + 8\sqrt{2} + 9\sqrt{3} - 6\sqrt{2}}{27 - 8}$$
$$= \frac{21\sqrt{3} + 2\sqrt{2}}{19}$$
$$= \frac{36.372 + 2.828}{19}$$
$$= 2.063$$

190. In the given figure, $AB \parallel CD \parallel EF$. $PQ \parallel RS, \angle RQD = 25^\circ, \angle CQP = 60^\circ$, then $\angle QRS$ is equal to

(1) 135°
(2) 110°
(3) 145°
(4) 95°



190. 3

Sol. $\angle QRS = \angle SRA + \angle QRA$
$= 120 + 25$
$= 145^\circ$

191. The cost price of a desk and a chair is Rs. 371. If the desk costs 12% more than the chair, then cost price of the desk is

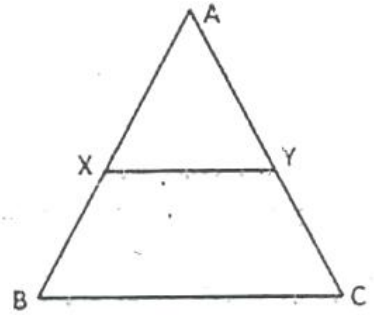
(1) Rs. 175
(2) Rs. 196
(3) Rs. 180
(4) Rs. 200

191. 2

Sol. Let the CP of chair be Rs. x
$\therefore x + 1.12x = 371$
$\Rightarrow x = 175$
$\Rightarrow$ CP of desk = Rs. 196

192. In figure, X and Y are mid points of AB and AC respectively and BC = 6 cm, AB = 5.4 cm, AC = 5 cm. Perimeter of trapezium XYCB is

(1) 16.4 c
(2) 14 cm
(3) 14.2 c
(4) 13.4 cm



192. 3

Sol. $\frac{AX}{AB} = \frac{AY}{AC} = \frac{XY}{BC} = \frac{1}{2}$
$\Rightarrow AX = 2.7, AY = 2.5, XY = 3$
$\Rightarrow BX = 2.7, CY = 2.5, XY = 3$
$\Rightarrow$ Perimeter of $XYBC = 2.7 + 2.5 + 3 + 6 = 14.2$

193. A heptagon has 4 equal angles each of 132^o and remaining three angles are also equal. The measure of one of the three equal angles is

(1) 132^o (2) 124^o

(3) 142^o (4) 123^o

193. 2

Sol. $180(n-2) = 4(132) + 3x$

Since n = 7

$180 \times 5 = 528 + 3x$

$x = 124^o$

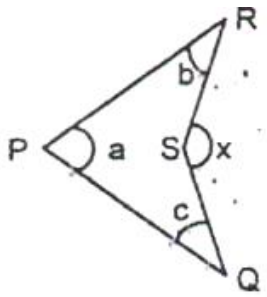
194. In the given figure, the value of x is

(1) $a + b - c$

(2) $a - b + c$

(3) $a + b + c$

(4) $a - b - c$

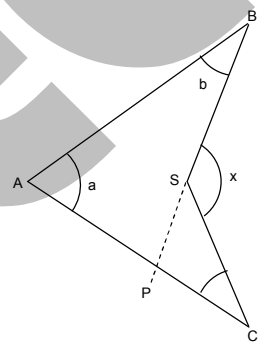


194. 3

Sol. Extended BS to meet AC at P.

$\angle SPC = a + b$ (by exterior angle theorem)

$\angle BSC = x = a + b + c$ (by exterior angle theorem)



195. The value of $\sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}}$ is

(1) 20 (2) 14

(3) 6 (4) 4

195. 4

Sol. $x = \sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}}$

$x^3 = 20 + 14\sqrt{2} + 20 - 14\sqrt{2} + 6x$

$x^3 - 6x = 40$

$x^3 - 6x - 40 = 0$

Clearly, x = 4

196. If $ax + by = 3, bx - ay = 4, x^2 + y^2 = 1$ then the value of $a^2 + b^2$ is

(1) 25 (2) –25

(3) 16 (4) –16

196. 1

Sol. $ax + by = 3$

$bx - ay = 4$

Squaring both the equations and adding, we get $(a^2 + b^2)(x^2 + y^2) = 25$

$\Rightarrow a^2 + b^2 = 25$

197. If $x+\frac{1}{x}=5$, then the value of $\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$ is

(1) $\frac{41}{23}$ (2) $\frac{43}{23}$

(3) $\frac{47}{21}$ (4) $\frac{45}{21}$

197. 2

Sol. $x+\frac{1}{x}=5 \Rightarrow x^2+\frac{1}{x^2}=23$

$$\frac{x^4+3x^3+5x^2+3x+1}{x^4+1}$$

$$=\frac{x^2+\frac{1}{x^2}+3\left(x+\frac{1}{x}\right)+5}{x^2+\frac{1}{x^2}}$$

$$=\frac{23+15+5}{23}=\frac{43}{23}$$

198. If $x=\frac{2\sqrt{6}}{\sqrt{3}+\sqrt{2}}$, then the value of $\frac{x+\sqrt{2}}{x-\sqrt{2}}+\frac{x+\sqrt{3}}{x-\sqrt{3}}$ is

(1) 0 (2) 1

(3) 2 (4) $\sqrt{6}$

198. 3

Sol. $x=\frac{2\sqrt{6}}{\sqrt{3}+\sqrt{2}}$

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

By componendo – dividendo,

$\frac{x+\sqrt{2}}{x-\sqrt{2}}=\frac{3\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$

Again, $\frac{x}{\sqrt{3}}=\frac{2\sqrt{2}}{\sqrt{3}+\sqrt{2}}$

By componendo – dividendo

$\frac{x+\sqrt{3}}{x-\sqrt{3}}-\frac{3\sqrt{2}+\sqrt{3}}{\sqrt{2}-\sqrt{3}}$

$\therefore$ given expression $=\frac{2\sqrt{3}-2\sqrt{2}}{\sqrt{3}-\sqrt{2}}=2$

199. The area of a circular ring enclosed between two concentric circles is 286 cm^2. If the difference between their radii is 7 cm, then the radii of these circles are

(1) 12 cm and 5 cm (2) 9 cm and 2 cm

(3) 11 cm and 4 cm (4) 10 cm and 3 cm

199. 4

Sol. $\pi\left(R^2-r^2\right)=286$

$\Rightarrow R^2-r^2=286\times\frac{7}{22}$

$\Rightarrow R^2-r^2=91$

$R-r=7$

$\therefore R + r = 13$

$\Rightarrow r = 3cm, R = 10$ cm

200. If $x = (27)^{1/3}$ and $y = (28)^{1/3}$, then the value of $x + y - \frac{1}{x^2 + xy + y^2}$ is

(1) 1 (2) 3

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

200. 3

Sol. $x = (27)^{\frac{1}{3}}, y = (28)^{\frac{1}{3}}$

$$x + y - \frac{1}{x^2 + xy + y^2}$$

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

$$= x + y - \frac{x - y}{x^3 - y^3}$$

$$= x + y + \frac{x - y}{1}$$

$$= x + y + x - y$$

$$= 2x$$

$$= 2 \times 3 = 6$$