RRC Group D Previous Year Paper 22 (Held On: 18 Sept 2018 Shift 2)

RRB Group D • 2018 • 100 questions • 90 minutes • Answer key and solutions

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CBT

Q1. On a certain sum, simple interest for 5/2 years at an annual rate of 12% is Rs. 50 less than the interest on the same sum for 7/2 years at an annual rate of 10%. Find the sum.

(a) Rs. 1500
(b) Rs. 1000
(c) Rs. 1200
(d) Rs. 2000

Q2. The Ninety East Ridge is a submarine volcanic ridge located in which ocean?

(a) Pacific Ocean
(b) Atlantic Ocean
(c) Arctic Ocean
(d) Indian Ocean

Q3. _____ is the most electropositive element among the given alternatives.

(a) S
(b) Cl
(c) Mg
(d) Al

Q4. An object is released from a certain height above the ground. Just at the time it touches the ground, it will possess _____.

(a) heat energy
(b) chemical energy
(c) kinetic energy
(d) potential energy

Q5. The area of the circumcircle of a right angle triangle whose sides are 6 cm, 8 cm and 10 cm will be:

(a) 9π cm²
(b) 25π cm²
(c) 24.5π cm²
(d) 16π cm²

Q6. A milkman adds a small amount of baking soda to fresh milk:

(a) To improve taste of milk
(b) To increase the cream in the milk
(c) To prevent acidification of milk
(d) To improve the consistency of milk

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Q7. On selling a jute bag for Rs. 48, Ashmitha incurs a loss of 20%. In order to make a profit of 20% what should be the selling price of the jute bag?

(a) Rs. 56
(b) Rs. 72
(c) Rs. 52
(d) Rs. 68

Q8. The molecular mass of O2 is _____

(a) 8
(b) 16
(c) 32
(d) More than one of the above
(e) None of the above

Q9. Sadhguru Jaggi Vasudev has been awarded with Padma vibhushan award in 2017 by the government of India for his contribution towards which of the following _____.

(a) Politics
(b) Musics
(c) Spirituality
(d) Sports

Q10. If the cost of tomatoes increases by 25% per Kg and Sudha wants to spend only 15% more on the tomatoes. Calculate the percentage decrease in the quantity of tomatoes that Sudha gets.

(a) 12.5%
(b) 8%
(c) 10%
(d) 12%

Q11. Which of the following does NOT belong to this group?

A. ant
B. caterpillar
C. hamster
D. locust

(a) C
(b) B
(c) A
(d) D

Q12. Identify the founder of Paytm who was listed in TIME magazine's Most Influential People list 2017 along with Prime Minister Narendra Modi?

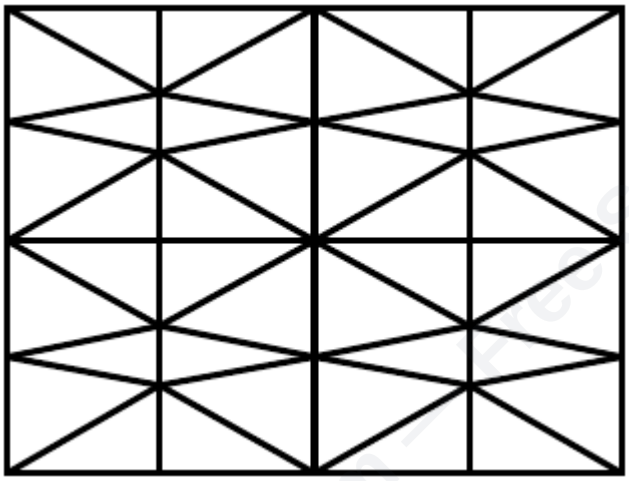
(a) Vijay Bhaskar
(b) Vijay Shekhar Sharma
(c) Vijay Malya
(d) Narendra Kumar

Q13. {8 + (2^4 + 3)} ÷ 9 = ?

(a) 3
(b) 9
(c) 4
(d) 8

Q14. How many right-angled triangles are there in the following figure?

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(a) 16
(b) 14
(c) 12
(d) 15

Q15. Given is a statement followed by two assumptions numbered I and II. Consider the statement and the following assumptions and decide which of the assumptions is/are implicit in the statement.

Statement:

Global warming, species extinction and deforestation are posing a threat to the environment.

Assumptions:

I. The more we exploit and degrade our environment, the more ecological imbalance we create, ultimately putting the very existence of human life at risk.

II. Every species is dependent on every other species for survival, directly or indirectly. Human beings are the ones who depend on maximum number of species for not only our survival but also for our development needs.

(a) Only assumption I is implicit
(b) Both assumptions I and II are implicit
(c) Neither assumption I nor II is implicit
(d) Only assumption II is implicit

Q16. By walking at 4/5 of his usual speed, Soham is 6 minutes late to office. How much time does he usually take to get to office?

(a) 16 minutes
(b) 25 minutes
(c) 24 minutes
(d) 20 minutes

Q17. There is a maximum gap of x years between two successive leap years. What is the value of x?

(a) 4
(b) 2
(c) 8
(d) 1

Q18. An object is stationary then the force is still acting on it is:

(a) Weight
(b) Momentum
(c) Acceleration
(d) Impulse

Q19. The _____ acts as a food store in plant seeds.

(a) cotyledons
(b) plumule
(c) ovule
(d) radicle

Q20. The square root of (882/1922) is:

(a) 21/31
(b) 20/31
(c) 22/31
(d) 19/31

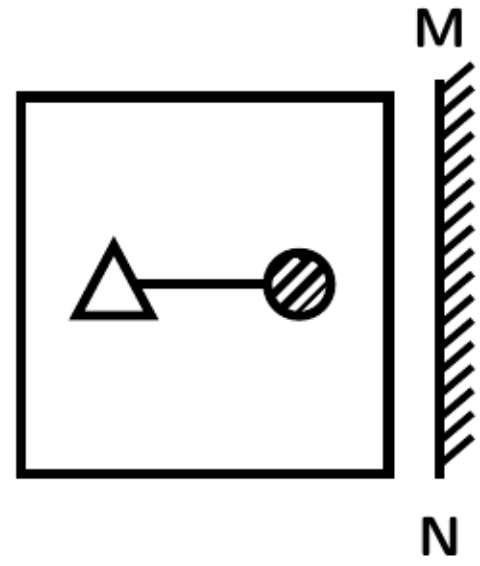
Q21. Name the athletic event in which Manpreet Kaur won a gold medal in the first leg of Asian Grand Prix Athletics Meet?

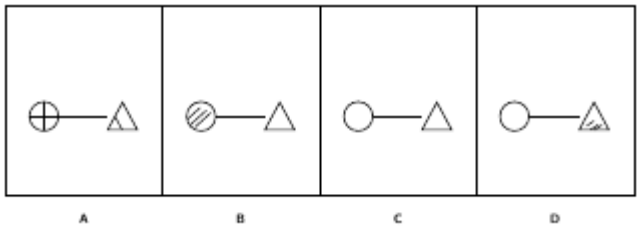
(a) Long jump
(b) High jump
(c) Shot put
(d) Discus throw

Q22. From the top of a platform 7 m high, the angle of elevation of a tower was 30°. If the tower was 47 m high, how far away from the tower was the platform positioned?

(a) 15√3 m
(b) 40 m
(c) 45√3 m
(d) 40√3 m

Q23. Choose the mirror image for the following figure when the mirror is kept at the MN line.





(a) A
(b) B
(c) D
(d) C

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Q24. Consider the given statement to be true even if it seems to be at variance with the commonly known facts and decide which of the given conclusion logically follow(s) from the statement.

Statement:

Waste management is one of our country's most important concerns these days given the fast pace of growing population and increasing wastes.

Conclusions:

I. Waste management was not a major concern of our country earlier.

II. Apart from waste management, our country might also have other major concerns these days.

(a) Only conclusion II follows.
(b) Only conclusion I follows
(c) Both conclusions I and II follow
(d) Neither conclusion I nor II follows

Q25. Find the missing term in the following series.

B-25, ?, F-9, H-4

(a) S-18
(b) D-20
(c) T-19
(d) D-16

Q26. If KIN is written as PRM, then how would you write THREAD?

(a) GSIVZW
(b) GSIVWZ
(c) GSIVYW
(d) GRIUZW

Q27. Select the most appropriate option.

1 KWh = _____

(a) 3,60,000 J
(b) 3,600 J
(c) 36,00,000 J
(d) 36,000 J

Q28. A 161.5-m-long train crosses a 758.5-m-long bridge in 46 seconds. What is the speed of the train?

(a) 80 km/h
(b) 72 km/h
(c) 75 km/h
(d) 78 km/h

Q29. What is the maximum strength of Lok Sabha?

(a) 548
(b) 545
(c) 550
(d) 552

Q30. The walls of sclerenchyma cells are thickened due to _____.

(a) Hemi-cellulose
(b) Lignin
(c) Cellulose
(d) Pectin

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Q31. Which of the following is the indigenously designed and developed long-range subsonic cruise missile of India?

(a) Nag
(b) Nirbhay
(c) Helina
(d) Pinaka

Q32. If √108 + √243 = 25.98 Find the value of √147 + √192.

(a) 25.98
(b) 26.89
(c) 27.712
(d) 24.248

Q33. What is the quantity of copper in 1 kg of alloy if the alloy contains 32% copper, 40% zinc and the rest is nickel?

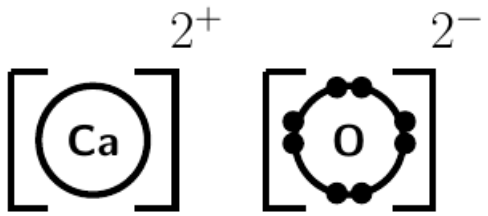
(a) 400 g
(b) 240 g
(c) 280 g
(d) 320 g

Q34. A tap can fill the tank in 25 minutes and the other can empty the tank in 50 minutes. If both the tap are opened simultaneously, then the tank will be filled in time?

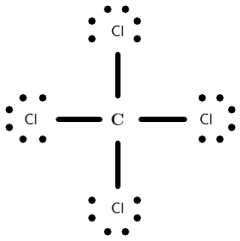
(a) 1 hour, 10 minutes
(b) 50 minutes
(c) 1 hour, 5 minutes
(d) 55 minutes

Q35. _____ is NOT a covalent molecule.

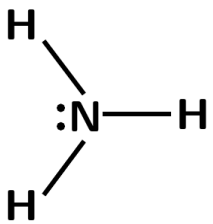
(a)



(b)

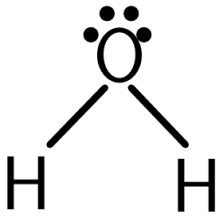


(c)



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(d)

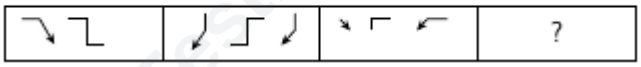


Q36. The sum of two fractions is 7/4. One of them is 5/3. What is the other fraction?

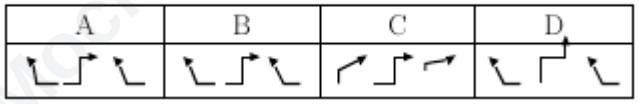
(a) 2/1
(b) 1/12
(c) 1/5
(d) 1/10

Q37. Select the option figure that will complete the series of question figures.

Problem Figures:



Answer Figures:



(a) C
(b) B
(c) A
(d) D

Q38. If today is Monday, then find the day after 61 days?

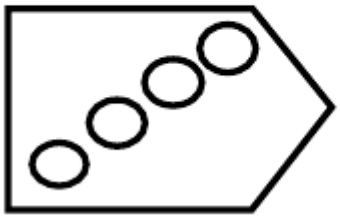
(a) Tuesday
(b) Saturday
(c) Monday
(d) Friday

Q39. Who among the following was the founder of Swatantra Party?

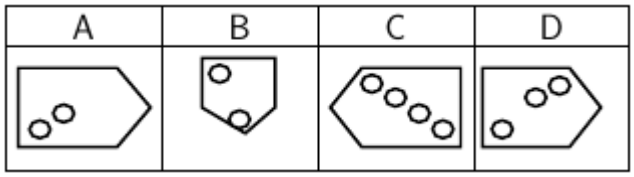
(a) Gopal Krishna Gokhale
(b) C Rajagoplachari
(c) Kamaraj
(d) Vallabhbhai patel

Q40. Which of the options bears the closest resemblance to the following figure?

Problem Figure:



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(a) B
(b) C
(c) D
(d) A

Q41. How many factors of 1296 are perfect squares?
(a) 8
(b) 9
(c) 12
(d) 10

Q42. Which organization has set up the Govardhan Eco Village in Maharashtra?
(a) RSS
(b) Isha Foundation
(c) ISKCON
(d) GaugiyaMath

Q43. Find the values of k for which $x^2 + 5kx + k^2 + 5$ is exactly divisible by x + 2 but not divisible by x + 3.
(a) Both 1 and 9
(b) 9
(c) 1
(d) Neither 1 nor 9

Q44. Which of the given elements A, B, C, D and E with atomic number 2, 3, 7, 10 and 30 respectively belong to the same period?
(a) B, C, D
(b) A, D, E
(c) B, D, E
(d) A, B, C

Q45. _____ is the commercial unit of energy.
(a) Kilowatt
(b) Watt hour
(c) Kilowatt hour
(d) Joule

Q46. If “MAP” is coded as KYN in a code language, how will “REDUCE” be written in the same code?
(a) OBARBD
(b) PCBSAC
(c) OBASBD
(d) PCBSAB

Q47. The prefix added to the name of the hydrocarbon with 4 carbon atoms is.
(a) Prop
(b) Eth
(c) Hept
(d) But

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Q48. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statements:

All mud are vessels.

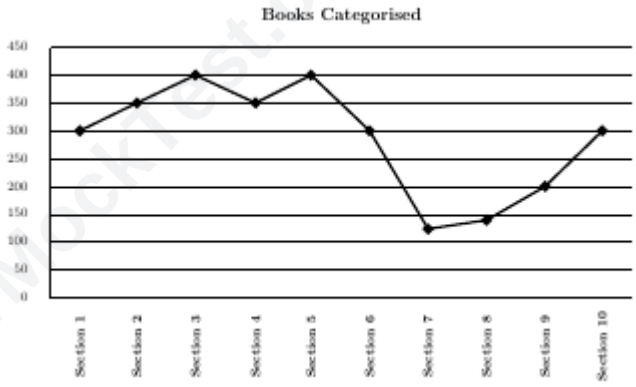
All vessels are containers.

Conclusions:

1. All containers are mud.
2. Some vessels are mud.

(a) No conclusion follows.
(b) Only conclusion 2 follows.
(c) Only conclusion 1 follows.
(d) Both conclusions follow

Q49. In a library, there are 10 different sections and the librarian categorises the books over 20 days. Which section has the least number of books?



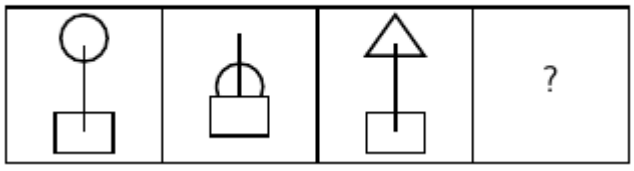
(a) Section 7
(b) Section 9
(c) Section 8
(d) Section 5

Q50. Who won the Golden Boot Award in 2018 FIFA World Cup?

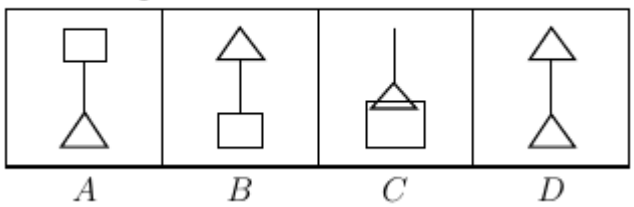
(a) Harry Kane
(b) Antoine Griezmann
(c) Gabriel Jesus
(d) Lionel Messi

Q51. Which answer figure will come next in the given problem figure series?

Problem figure:



Answer figures:



(a) B

(b) D
(c) A
(d) C

Q52. _____ is prevented by coating the conducting wire with pvc.
(a) Fusing
(b) Overloading
(c) Dripping
(d) Short-circuit

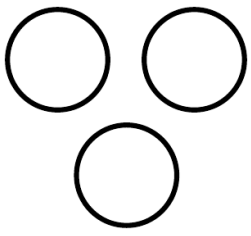
Q53. _____ contributed to the theories of inheritance of traits in living things.
(a) Gregor Mendel
(b) JBS Haldane
(c) Charles Darwin
(d) Stanley Miller

Q54. Keerthi and Malathi together can complete a task in 12 days, while Malathi can finish in 30 days. In how many days can Keerthi alone complete the task?
(a) 40 days
(b) 10 days
(c) 20 days
(d) 30 days

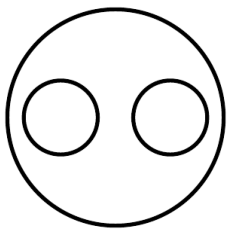
Q55. Who among the following had resigned from the post of Head Coach of Indian team in 2017?
(a) Ravi Shastri
(b) Anil Kumble
(c) Rahul Dravid
(d) Kapil Dev

Q56. Soham is 10 years younger than Paratha. Eight years ago three times the age of Soham was 4 more than twice the age of Paratha. Find Soham's present age.
(a) 28 years
(b) 30 years
(c) 32 years
(d) 33 years

Q57. Choose the most Suitable Venn diagram for the following words.
Garlic, Ginger, Chilly
(a)

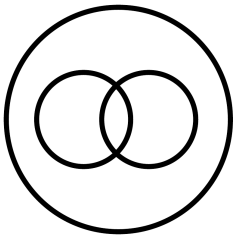


(b)

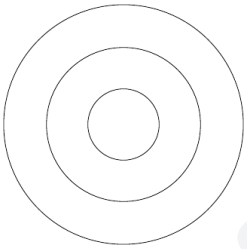


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(c)



(d)



Q58. Choose the one that does NOT belong to the group.

(a) Aluminium
(b) Silver
(c) Hydrogen
(d) Gold

Q59. _____ does not belong to the class Annelida.

(a) Nereis
(b) Earthworm
(c) Leech
(d) Ascaris

Q60. An object of mass 6 kg and having a potential energy of 480 J is placed at a height. Find the height of the object w.r.t. the ground. (g = 10 m/s)

(a) 6 m
(b) 4 m
(c) 7 m
(d) 8 m

Q61. If the radius of curvature of a concave mirror is 6.2 cm, its focal length is _____ cm.

(a) 3.1
(b) 6
(c) 2.6
(d) 12.4

Q62. A is standing facing East. B standing 750 m to the West of A. At 500 m to the right of A, there is a big pole. What is the direction of the pole with respect to B's position?

(a) North-West
(b) South-East
(c) South-West
(d) North-East

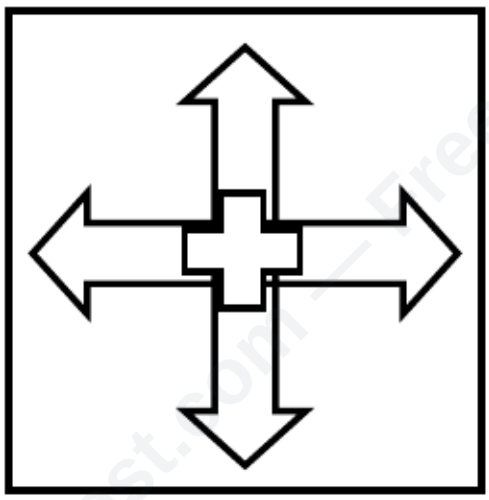
Q63. Which of the following is the ore of mercury?

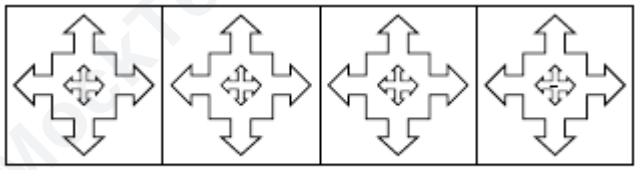
(a) Arsenic
(b) Bauxite
(c) Stibnite
(d) Cinnabar

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Q64. Which of the option figures bears the closest resemblance to the question figure?

Problem Figure





(a) C
(b) D
(c) B
(d) A

Q65. Who among the following hosts the Hindi version of “Bigg Boss-11”?

(a) Aamir Khan
(b) Salman Khan
(c) Shilpa Shetty
(d) Farhan Akhtar

Q66. Consider the given statement and decide which of the following assumption is/are implicit in the statement.

Statement: Stories are the best way to make children remember concepts in the early years of their life.

Assumptions:

I. Children like stories.

II. Stories improve children’s imagination and visualisation skills.

(a) Neither I nor II is implicit.
(b) Only II is Implicit.
(c) Only I is Implicit.
(d) Both I and II are implicit.

Q67. Read the given statement(s) and conclusions carefully and select which of the conclusion logically follow(s) from the statements(s).

Statement:

All cars are four-wheelers.

All four-wheelers are vehicles.

Conclusion:

I. All cars are vehicles.

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II. Some vehicles are four-wheelers.

(a) No conclusion follow.
(b) Only conclusion 2 follows.
(c) Only conclusion 1 follows.
(d) All the conclusions follow.

Q68. The former RBI governor Raghuram Rajan authored the book _____.

(a) Emergency-Indian Democracy's Darkest Hour
(b) The Unseen Indira Gandhi
(c) The Ministry of Utmost Happiness
(d) I Do What I Do

Q69. In which state is the Pagladia Dam located?

(a) Nagaland
(b) Meghalaya
(c) West Bengal
(d) Assam

Q70. √0.00069169 = ?

(a) 0.00243
(b) 0.000243
(c) 0.0263
(d) 0.243

Q71. If A and B are (-2, -2) and (2, -4) respectively, find the coordinates of P(x, y) such that AP = 3/7 AB and P lies on the line segment AB.

(a) -2/7, 20/7
(b) 2/7, -20/7
(c) -2/7, -20/7
(d) 2/7, 20/7

Q72. The electronic configuration of an element belonging to period 2 and showing strong catenation property is:

(a) 2, 8, 2
(b) 2, 6
(c) 2, 4
(d) 2, 8, 4

Q73. The gravitational force of attraction between a satellite and the earth gives rise to _____.

(a) tension
(b) planar force
(c) centripetal force
(d) centrifugal force

Q74. Read the given question and decide which of the following statements is/are sufficient to answer the question.

What is the age of Sriram?

Statements:

1. Sriram is 32 years elder to Shyam.
2. Shyam is 2 years old now.

(a) Either 1 or 2 is sufficient.
(b) Only 2 is sufficient
(c) Only 1 is sufficient
(d) Both 1 and 2 are sufficient

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Q75. In which of the following activities is work said to be done?

(a) Khushi is pushing a wall of a house but fails to do so
(b) Harsh is reading a book
(c) Pinki is walking on a inclined road with a book on her head
(d) Shruti is sitting on a chair

Q76. Vella is a farmer he owns few acres of land. Last month he had a good harvest which gave him a 90% profit (which was around Rs. 90,000) on his initial investment. Approximately how much money he needs to invest each season?

(a) Rs. 1,00,000
(b) Rs. 3,00,000
(c) Rs. 1,50,000
(d) Rs. 6,00,000

Q77. What is the next term in this series:

12A6Z, 24C4X, 36E2V, _____,

(a) 48F0T
(b) 48G0T
(c) 48F9T
(d) 48F9S

Q78. Who among the following has been named the “British Indian of the year”?

(a) Ishwar Gupta
(b) Ishwar Kumar
(c) Ishwar Sharma
(d) Ishwar Verma

Q79. Who launched India’s largest ‘train the trainers’ programme recently?

(a) Sachin Tendulkar
(b) Pullela Gopichand
(c) Prakash Padukone
(d) Kapil Dev

Q80. The wickets taken by a bowler in 12 cricket matches are as follows:

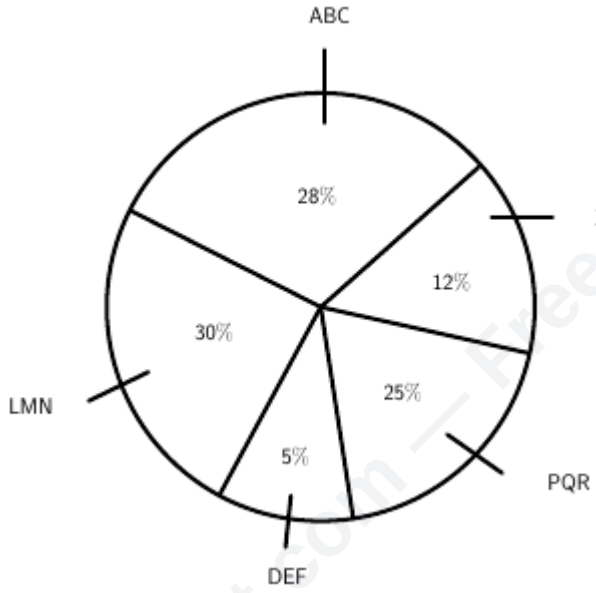
2, 6, 4, 3, 5, 0, 3, 2, 1, 3, 2, 3

Find the mode of the data.

(a) 4
(b) 1
(c) 3
(d) 2

Q81. The given pie chart shows information about the mobile phone manufacturing companies in India. The total number mobile phone units manufactured is 12,40,000.

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Which company produces the least number of mobile phones?

(a) ABC
(b) PQR
(c) DEF
(d) XYZ

Q82. We can control the urge to urinate as____.

(a) the muscular bladder is under nervous control
(b) bladder does not fill up easily
(c) sphincter muscle is present between bladder and urethra
(d) bladder is filled with less water

Q83. In which Indian state has The Union Government sanctioned RS. 98.35 Cr for the development of a Heritage Circuit?

(a) Shimla
(b) Nagaland
(c) Tripura
(d) Assam

Q84. Which organization has been honoured with the NABARD 2018 award?

(a) Repco Micro Finance
(b) HDFC Mutual Fund
(c) ICICI Prudential
(d) Shriram Mutual Funds

Q85. Find the next letter-pair in the following series.

DO, EP, FQ, GR, ?

(a) HS
(b) ST
(c) HV
(d) SH

Q86. What is the initiative of FSSAI that will enable collection and conversion of used cooking oil to biodiesel?

(a) RENO
(b) RUCO
(c) RUSA
(d) RAMA

Q87. The millions period consist of the places _____.

(a) M, TM, HM
(b) O,T, M
(c) M,TH
(d) TTh, HTh, M

Q88. Sarang is facing West. He turns 135^0 clockwise and then 45^0anticlockwise. In which direction he is facing how?

(a) West
(b) South
(c) North
(d) East

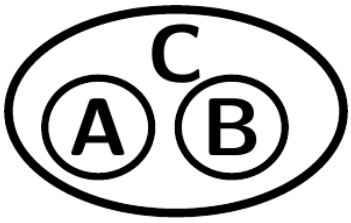
Q89. An electric bulb having voltage 240 V and current 0.6 A has a power of _____.

(a) 14.4 W
(b) 40 W
(c) 144 W
(d) 400 W

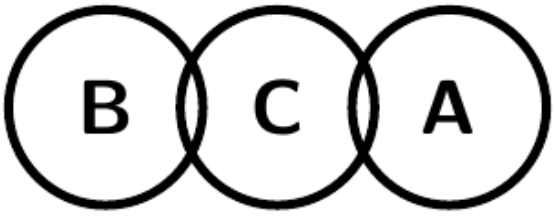
Q90. Which of the following Venn diagrams correctly represents the relationship between:

A) Mobile
B) Laptop
C) Electronics

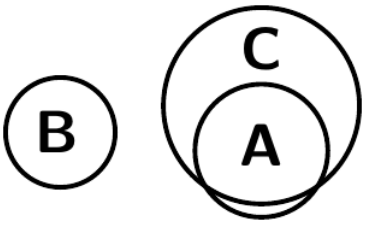
(a)



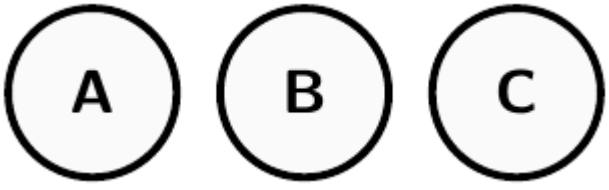
(b)



(c)



(d)



Q91. Sita bought a certain number of pens at 8 for Rs. 7 and sold them 6 for Rs. 5. The gain or loss percentage is:

(a) 100/21% loss
(b) No profit no loss
(c) 99/21% loss
(d) 100/21% profit

Q92. Clouds looking white in colour are due to the phenomenon of _____.

(a) Reflection of light
(b) Scattering of light
(c) Refraction of light
(d) Radiation

Q93. An inlet pipe and an outlet pipe are taking to fill and drain a cistern, respectively, for an hour each at a time, starting with the inlet pipe when the cistern is empty. It takes the inlet pipe 15 hours to fully fill the empty cistern, whereas the outlet pipe can drain the filled cistern completely in 21 hours. How many hours will it take for the cistern to be full?

(a) 105
(b) 52.5
(c) 100
(d) 99

Q94. Which assumptions are implied from the below statement?

"Trees can communicate and share nutrients with other trees in a forest" says a scientist.

Assumptions:

I. Plants share extra nutrients with other plants.

II. Underneath the earth everything is connected.

(a) Only I is implicit.
(b) Only II is implicit.
(c) Neither I nor II is implicit.
(d) Both I and II are implicit.

Q95. What is the greatest four-digit number that is exactly divisible by 49?

(a) 9994
(b) 9992
(c) 9996
(d) 9998

Q96. Bifocal lenses are used by people suffering from ____.

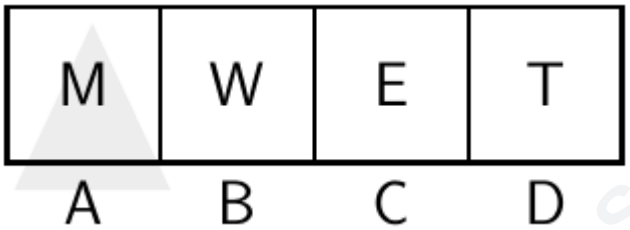
(a) Hypermetropia but not Myopia
(b) Myopia or Hypermetropia
(c) Myopia but not Hypermetropia
(d) Myopia and Hypermetropia

Q97. In which year Goa was captured by Portuguese?

(a) 1515
(b) 1516
(c) 1510
(d) 1512

Q98. Find the odd one out.

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(a) B
(b) C
(c) D
(d) A

Q99. Joy points out to a picture and says. “This is my mother’s sister’s husband” How is the person in the picture related to Joy?

(a) Brother
(b) Paternal Uncle
(c) Maternal Uncle
(d) Son

Q100. Who among the following has been honoured with the Global Diversity Award 2017 by the British Parliament House?

(a) Aamir Khan
(b) Ranbir Kapoor
(c) Akshay Kumar
(d) Salman Khan

ANSWER KEY

1	b	2	d	3	c	4	c	5	b	6	c	7	b	8	c	9	c	10	b
11	a	12	b	13	a	14	a	15	b	16	c	17	c	18	a	19	a	20	a
21	c	22	d	23	b	24	c	25	d	26	a	27	c	28	b	29	d	30	b
31	b	32	a	33	d	34	b	35	a	36	b	37	a	38	b	39	b	40	b
41	b	42	c	43	b	44	a	45	c	46	b	47	d	48	b	49	a	50	a
51	d	52	d	53	a	54	c	55	b	56	c	57	a	58	c	59	d	60	d
61	a	62	b	63	d	64	b	65	b	66	d	67	d	68	d	69	d	70	c
71	c	72	c	73	c	74	d	75	c	76	a	77	b	78	c	79	b	80	c
81	c	82	a	83	d	84	a	85	a	86	b	87	a	88	c	89	c	90	a
91	a	92	b	93	d	94	a	95	c	96	d	97	c	98	c	99	c	100	d

SOLUTIONS

Q1. Answer: (b) Rs. 1000

Shortcut Trick
Calculate the effective interest percentage for both scenarios.
Interest 1 = 12% × 2.5 years = 30%
Interest 2 = 10% × 3.5 years = 35%
Difference in interest percentage = 35% − 30% = 5%
Since 5% corresponds to Rs. 50, then 100% (Sum) = (50 ÷ 5) × 100 = Rs. 1000.
Therefore The correct answer is Rs. 1000.
Alternate Method

Given: Rate1 = 12%, Time1 = 5/2 = 2.5 years; Rate2 = 10%, Time2 = 7/2 = 3.5 years; Difference = Rs. 50.

Formula Used: Simple Interest (SI) = (Principal × Rate × Time) ÷ 100

=> Let the Sum (Principal) be P.

=> SI1 = (P × 12 × 2.5) ÷ 100 = 30P ÷ 100 = 0.30P

=> SI2 = (P × 10 × 3.5) ÷ 100 = 35P ÷ 100 = 0.35P

=> According to the question: SI2 − SI1 = 50

=> 0.35P − 0.30P = 50

=> 0.05P = 50

=> P = 50 ÷ 0.05

=> P = 5000 ÷ 5 = 1000

Therefore The correct answer is Rs. 1000.

Additional Information

Simple Interest Concept

Simple Interest is calculated only on the Principal amount. The interest remains constant for every year if the rate and principal are unchanged.

Relationship with Rate and Time

Interest is directly proportional to both Rate and Time. If the Rate increases by R% or Time increases by T years, the interest increases linearly.

Amount Formula

Total Amount (A) = Principal (P) + Simple Interest (SI). In terms of percentage, Amount % = 100% + (R × T)%.

Q2. Answer: (d) Indian Ocean

• The Indian Ocean is one of the world's main oceanic divisions with around 20 percent of the water on the earth.

• This ocean has most active spreading ridges of the mid-ocean ridge network worldwide.

• The Ninety East Ridge is a common Indian Ocean hotspot.

• The Ninety East Ridge is a single-dimensional structure situated on Indian Ocean floor.

• This ridge extends from the Bay of Bengal to the Southeast Indian Ridge, 5000 km long and 200 m high.

• This landform is named the 'Ninety East Ridge' because it is located near the spot where the Eastern Hemisphere main parallel crosses along the 90th meridian.

• This is one of the Indian Ocean's significant relief features, as it separates the Indian Ocean into the West and East Indian Oceans.

• This was created about 43.2 million years ago by the northward movement of the Indo-Australian Plate.

• Indian ocean is the 3rd largest ocean in the world.

• Java trench, also known as Sunda trench is located in the northeastern Indian ocean.

• Pacific Ocean’s shape is roughly triangular with its apex in the north at the Bering Strait.

Q3. Answer: (c) Mg

• Among the given elements, Mg is most electropositive. Metals are electropositive. Mg is followed by Aluminium.

• Caesium (Cs) is the most electropositive of the stable elements having atomic no 55.

• Atoms which tend to donate electrons are called Electropositive atoms, and the atom converts into a positive ion (M+) upon donating electrons.

• The general valency of electropositive elements is 1, 2, 3.

• The atoms which have 1, 2, 3 electrons in their valence shell will lose their electrons to attain a stable electronic configuration.

• Some examples of electropositive elements are Sodium, Magnesium, Aluminium, these 3 elements will lose electrons to attain the configuration of Noble gas Neon.

• The electronegativity of Aluminium is 1.61 in the Pauling scale and electronegativity of Magnesium is 1.31, also in the Pauling scale. Hence If electronegativity is large, then electro positivity is less. Hence Magnesium has higher electropositivity.

Q4. Answer: (c) kinetic energy

• An object is released from a certain height above the ground. Just at the time it touches the ground, it will possess kinetic energy.

• When the body falls from height potential energy decreases but kinetic energy increases but overall energy remains constant.

• Energy:

• An object having the capability to do work is said to possess energy. The object which does the work loses energy and the object

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on which the work is done gains energy.

• Its unit is Joule.

○ Energy = Kinetic energy+Potential energy

○ According to the law of conservation of energy, energy always remains constant.

• Kinetic energy:

• The energy of an object due to its motion is called kinetic energy.

• The kinetic energy of a moving body is given by the formula:

• K.E. = 1/2MV². Hence, kinetic energy is directly proportional to the square of velocity.

• Potential energy:

• The energy of an object due to its position is the potential energy.

• P.E = mgh

• So when height is increasing, P.E will increase (on moving a body against gravitational force) and when height is decreasing, P.E will decrease (on free fall of an object).

Q5. Answer: (b) 25π cm²

Shortcut Trick

For a right-angled triangle, the circumradius (R) is always half of the hypotenuse.

Given sides: 6 cm, 8 cm, 10 cm. Hypotenuse = 10 cm.

R = 10 ÷ 2 = 5 cm.

Area = $\pi R^2 = \pi \times 5^2 = 25\pi$ cm².

Therefore The correct answer is 25π cm².

Alternate Method

Given: Sides of triangle = 6 cm, 8 cm, 10 cm.

Formula Used: Circumradius (R) of a right triangle = Hypotenuse ÷ 2; Area of circle = πr^2

=> First, verify the triangle is right-angled: $6^2 + 8^2 = 36 + 64 = 100 = 10^2$.

=> In a right-angled triangle, the hypotenuse is the diameter of the circumcircle.

=> Diameter = 10 cm

=> Radius (R) = 10 ÷ 2 = 5 cm

=> Area of circumcircle = $\pi \times (5)^2$

=> Area = 25π cm²

Therefore The correct answer is 25π cm².

Additional Information

Circumradius of Right Triangle

The circumcenter of a right triangle lies at the midpoint of the hypotenuse, hence R = Hypotenuse ÷ 2.

Inradius of Right Triangle

The inradius (r) of a right triangle is calculated as r = (Base + Perpendicular − Hypotenuse) ÷ 2.

Area of Triangle

For a right triangle, Area = 1/2 × Base × Height. Also, Area = r × s, where s is the semi-perimeter.

Q6. Answer: (c) To prevent acidification of milk

• A milkman adds a small amount of baking soda to fresh milk to prevent acidification of milk.

• By adding a small amount of baking soda, the milkman shifts the pH of the fresh milk from 6 to slightly alkaline so that he can keep it for a longer time as the milk in alkaline condition, does not set curd easily.

• This milk becomes slightly basic because of the addition of baking soda, since acids formed in this milk are neutralized due to bacterial behavior.

• Therefore, it takes longer time for this milk to set as curd.

• Sodium Bicarbonate is the chemical name of Baking Soda.

• The other name for Sodium Bicarbonate is Sodium Hydrogen Carbonate.

• It is popularly called cooking soda.

• The chemical formula of Baking Soda is NaHCO3.

Q7. Answer: (b) Rs. 72

Shortcut Trick

Let the Cost Price (CP) of the jute bag be 100%.

Selling Price (SP1) at a 20% loss = 100% − 20% = 80%.

Target Selling Price (SP2) for a 20% profit = 100% + 20% = 120%.

Given that the value of 80% = Rs. 48.

Therefore, the value of 120% = (48 ÷ 80) × 120 = Rs. 72.

Therefore The correct answer is Rs. 72.

Alternate Method

Given:

Selling Price (SP1) at a loss = Rs. 48

Loss Percentage = 20%

Formula Used:

Cost Price (CP) = [SP × 100] ÷ (100 − Loss %)

Selling Price (SP) = [CP × (100 + Profit %)] ÷ 100

Calculations:

First, find the Cost Price (CP):

=> CP = (48 × 100) ÷ (100 − 20)

=> CP = (48 × 100) ÷ 80

=> CP = Rs. 60

Now, calculate the new Selling Price (SP2) for a 20% profit:

=> SP2 = [60 × (100 + 20)] ÷ 100

=> SP2 = (60 × 120) ÷ 100

=> SP2 = Rs. 72

Therefore The correct answer is Rs. 72.

Additional Information

Cost Price & Selling Price

Cost Price (CP) is the base value at which goods are bought. Selling Price (SP) is the final amount received after a sale. Profit occurs when SP is greater than CP, and Loss happens when SP is less than CP.

Marked Price & Discount

Marked Price (MP) is the list price attached to the article. A discount is always provided on the Marked Price. Formula: SP = MP × (100 − Discount%) ÷ 100.

Successive Percentage Change

When two successive changes of x% and y% are applied on a base value, the net percentage change is given directly by the effective formula: Net Change = x + y + (x × y) ÷ 100.

Q8. Answer: (c) 32

• The molecular mass of atmospheric oxygen is 32 units.

• Atmospheric oxygen is present in the form of molecule with chemical formula

.

• As there are two atoms of oxygen we double the mass of a single oxygen atom 16 x 2 = 32 units.

• Molecular Mass:

• Molecular mass is the sum of atomic masses of the elements present in a molecule.

• It is obtained by multiplying the atomic mass of each element by the number of its atoms and adding them together.

Q9. Answer: (c) Spirituality

• On 13th April 2017, Sadhguru was conferred the “Padma Vibhushan” by the Government of India, the highest amongst the annual civilian awards, accorded for exceptional and distinguished service in Spirituality.

• Jaggi Vasudev founded Isha Foundation in Coimbatore in 1994.

• The Foundation’s focus ever since has been ‘yoga for all’, delivering yoga programmes to not just India but the United States, United Kingdom, Malaysia, China, Lebanon and other countries.

• The United Nations has recognised the Foundation by granting it special consultative status with the intergovernmental organisation’s Economic and Social Council.

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• Seven people were conferred with Padma Vibhushan in 2017.

Name	Field	State
Shri K J Yesudas	Art-Music	Kerala
Sadhguru Jaggi Vasudev	Spiritualism	Tamil Nadu
Shri Sharad Pawar	Public Affairs	Maharashtra
Shri Murli Manohar Joshi	Public Affairs	Uttar Pradesh
Prof. Udipi Ramachandra Rao	Science & Engineering	Karnataka
Late Shri Sunder Lal Patwa (Posthumous)	Public Affairs	Madhya Pradesh
Late Shri PA Sangma (Posthumous)	Public Affairs	Meghalaya

Q10. Answer: (b) 8%

Shortcut Trick

Let initial Expenditure be 100.

New Price factor = 125 (due to 25% increase).

New Expenditure factor = 115 (due to 15% increase).

Percentage decrease in Quantity = [(125 − 115) ÷ 125] × 100 = (10 ÷ 125) × 100 = 8%.

Therefore The correct answer is 8%.

Alternate Method

Given: Increase in Price = 25%, Increase in Expenditure = 15%.

Formula Used: Expenditure = Price × Quantity

=> Let Initial Price = 100 and Initial Quantity = 100.

=> Initial Expenditure = 100 × 100 = 10,000.

=> New Price = 100 + 25% of 100 = 125.

=> New Expenditure = 10,000 + 15% of 10,000 = 11,500.

=> New Quantity = 11,500 ÷ 125 = 92.

=> Decrease in Quantity = 100 − 92 = 8.

=> Percentage Decrease = (8 ÷ 100) × 100 = 8%.

Therefore The correct answer is 8%.

Additional Information

Price and Consumption Relationship

If Expenditure remains constant, Price is inversely proportional to Consumption. If Price increases by r%, Consumption must decrease by [r/(100+r)] × 100%.

Successive Percentage Change

Net Change = a + b + (a × b)/100, where 'a' and 'b' are percentage changes in factors. Here, Price change % + Quantity change % + (P% × Q%)/100 = Expenditure change %.

Base Change Concept

When calculating percentage decrease, the denominator is always the New Increased Value (the higher base) to find how much to reduce to reach the target.

Q11. Answer: (a) C

All options except ‘hamster’ belongs to the class insecta, while ‘hamster’ belongs to the class mammalia.

Term	Explanation
ant	Ants are eusocial insects of the family Formicidae and, along with the related wasps and bees, belong to the order Hymenoptera
caterpillar	Caterpillars are the larval stage of members of the order Lepidoptera
hamster	Hamsters are rodents (order Rodentia) belonging to the subfamily Cricetinae.

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locust	Locusts are a collection of certain species of short-horned grasshoppers in the family Acrididae that have a swarming phase.

Hence, 'hamster' is the odd one out.

Q12. Answer: (b) Vijay Shekhar Sharma

• Vijay Shekhar Sharma is an Indian business billionaire.
• He is the founder of mobile payment service Paytm.
• In 2017, Sharma was listed by Forbes as the youngest billionaire in India with a net worth of $2.1 billion.
• In 2017, he was on the list of Time Magazine's 100 Most Influential People.
• Paytm is India's largest leading payment gateway that offers comprehensive payment services for customers and merchants.
• Paytm had launched its payments bank in India in May 2017.

Q13. Answer: (a) 3

{8 + (2^4 + 3)} ÷ 9
=> {8 + (16 + 3)} ÷ 9
=> (8 + 19) ÷ 9
=> 27 ÷ 9
=> 3

Q14. Answer: (a) 16

The right-angled triangles in the figure are shown below:
Hence, the figures has a total of 16 right-angled triangles.

Q15. Answer: (b) Both assumptions I and II are implicit

(Implicit - suggested though not directly expressed)
Global warming, species extinction and deforestation are some of the factors behind environment degradation. The statement says that these are posing a threat to the environment.
Since humans are a part of the environment, it is safe to assume that these factors put human life at risk.
Thus, assumption I is implicit.
The statement says that species extinction is a threat to the environment. Thus, it implies that this affects every living being in a harmful sense.
Therefore, we can assume that living beings are interdependent on each other for their survival.
Hence, both assumptions I and II are implicit.

Q16. Answer: (c) 24 minutes

Shortcut Trick
When distance is constant, Speed is inversely proportional to Time.
Speed ratio = 5 : 4 → Time ratio = 4 : 5
Difference in time ratio = 5 − 4 = 1 unit
1 unit = 6 minutes (Given late time)
Usual time = 4 units = 4 × 6 = 24 minutes
Therefore The correct answer is 24 min.
Alternate Method
Given:
New speed = 4/5 of Usual speed
Late time = 6 minutes
Formula Used:
Time = Distance ÷ Speed
Calculations:
=> Let usual speed be s and usual time be t.
=> New speed = 4s/5
=> New time = t + 6
=> Since Distance = Speed × Time is constant:

=> s × t = (4s/5) × (t + 6)

=> t = 4/5(t + 6)

=> 5t = 4t + 24

=> t = 24

Therefore The correct answer is 24 min.

Additional Information

Inverse Proportionality Rule

If speed changes by factor a/b, time changes by factor b/a, provided distance remains constant.

Average Speed

For a journey with two equal distances covered at speeds x and y, Average Speed = 2xy/(x+y).

Relative Speed

Same direction: Relative Speed = S1 − S2 | Opposite direction: Relative Speed = S1 + S2.

Q17. Answer: (c) 8

Every 4^(th) year (which is a multiple of 4) is a leap year except for century years.

A century year is a leap year only if it is divisible by 400.

Therefore, 1700, 1900 etc. are not leap years.

Thus, 1696 is a leap year. But the next leap year would be 1704.

Thus, the minimum gap between two successive leap years is 4 and the maximum gap is 8.

Hence, '8' is the correct answer.

Note: A century year is a year that is divisible by 100.

Q18. Answer: (a) Weight

The Correct Answer is Option 1 i.e Weight.

• An object is stationary then the force is still acting on it is Weight.

• Weight is just another word for the force of gravity Fg.

• Weight is a force that acts at all times on all objects near Earth.

• Momentum: It is defined as the quantity of motion of the body.

• Acceleration is the rate of change of velocity.

Q19. Answer: (a) cotyledons

• The cotyledons act as a food store in plant seeds.

• Ovules after fertilisation, develop into seeds.

• A seed is made up of a seed coat and an embryo.

• The embryo is made up of a radicle, an embryonal axis and one (as in wheat, maize) or two cotyledons (as in gram and pea).

• Cotyledons are often fleshy and full of reserve food materials.

• Cotyledons are the first leaves that appear from a germinating seed and are often referred to as seed leaves.

• They serve as the food storage structure within the seed, providing essential nutrients and energy for the young plant during the early stages of germination and growth until it can produce its own food through photosynthesis.

• The other options- plumule, ovule, and radicle have different roles in plant development:

• the plumule develops into the shoot system,

• the ovule becomes a seed post-fertilization

• the radicle develops into the root.

• At the two ends of the embryonal axis are present the radicle and the plumule.

• In some seeds such as castor the endosperm formed as a result of double fertilisation, is a food storing tissue.

• In plants such as bean, gram and pea, the endosperm is not present in mature seeds and such seeds are called non-endospermous.

Q20. Answer: (a) 21/31

√(882/1922)

=> √[(2 × 441)/(2 × 961)]

=> √[$(21)^2$/$(31)^2$]

The square root of 882/1922 = √ (21^2)/(31^2) = 21/31

Q21. Answer: (c) Shot put

• Indian shot putter Manpreet Kaur bagged the gold medal in the first leg of the Asian Grand Prix Athletics Meet, in Jinhua, China.

• Kaur broke her own 2015 national record.

• Her best throw was of 18.86m in the season-opening international event for the Indians, which was nearly one metre more than her earlier national record of 17.96m, which she had set in the year 2015.

• The shot, a metal ball (7.26kg/16lb for men, 4kg/8.8lb for women), is put – not thrown – with one hand. The aim is to put it as far as possible from a seven-foot diameter (2.135m) circle that has a curved 10-centimetre high toe-board at the front.

• In order for the put to be measured, the shot must not drop below the line of the athlete's shoulders at any stage of the put and must land inside a designated 35-degree sector.

• The athlete must not touch the top of the toe-board during their put or leave the circle before the ball has landed, and then only from the rear half of the circle.

• Athletes will commonly throw four or six times per competition. In the event of a tie, the winner will be the athlete with the next-best effort.

• The men's shot put has been part of every modern Olympics since 1896, but women putters had to wait until 1948 before they could compete at the Games.

Q22. Answer: (d) 40√3 m

Shortcut Trick

Height difference between tower and platform = 47 − 7 = 40 m.

In a 30°−60°−90° triangle, the side opposite to 30° is h and the side opposite to 60° is h√3.

Here, the vertical height h is 40 m, so the horizontal distance is 40√3 m.

Therefore The correct answer is 40√3 m.

Alternate Method

Given:

Height of platform (h_p) = 7 m

Height of tower (h_t) = 47 m

Angle of elevation (θ) = 30°

Formula Used:

tan θ = Perpendicular ÷ Base

Calculations:

=> Let the distance between the platform and the tower be d.

=> The height of the tower above the platform level = 47 − 7 = 40 m.

=> tan 30° = 40 ÷ d

=> 1 ÷ √3 = 40 ÷ d

=> d = 40 × √3

=> d = 40√3 m

Therefore The correct answer is 40√3 m.

Additional Information

Angle of Elevation and Depression

The angle of elevation is the angle between the horizontal line and the line of sight when looking up. The angle of depression is the angle when looking down.

Standard Trigonometric Ratios

For height and distance, tan 30° = 1/√3, tan 45° = 1, and tan 60° = √3 are the most frequently used values.

Right-Angled Triangle Property

In a triangle with angles 30°, 60°, 90°, the sides are in the ratio 1 : √3 : 2 respectively.

Q23. Answer: (b) B

The mirror image for the following figure when the mirror is kept at the MN is shown below:

Hence, figure 'B' is the correct answer.

Q24. Answer: (c) Both conclusions I and II follow

• The use of the term "these days" indicates that waste management has become a major problem recently.

• The use of the term "one of our" indicates that there could be other major concerns in our country too.

Hence, both conclusions I and II follow

Note: The official question had a discrepancy. So, we have rephrased the question.

Q25. Answer: (d) D-16

The logic is:

First, let us split the letters and numbers.

B, ?, F, H

As we move one step ahead in the series, we see that each letter is moving two steps forward.

25, ?, 9, 4

The numbers form a series of squares of the numbers 2 to 5 in the descending order.

Hence, 'D-16' is the correct answer.

Q26. Answer: (a) GSIVZW

The logic is:

Letters are coded by their reverse letter.

K	I	N
P	R	M

Similarly,

T	H	R	E	A	D
G	S	I	V	Z	W

Hence, 'GSIVZW' is the correct answer.

Q27. Answer: (c) 36,00,000 J

• Kilowatt-hour (kWh) and joules (J) are units of energy.
• 1 Kilowatt Hour = 3.6 x 10^6 Joules.
• 1 Joule is equal to 1 watt per 1 second
• Hence 1 kWh is equal to 1 x 1000 x 60 x 60 => 3600000 J
• It can also be written as 3.6 x 106 Joules.
• Hence 1kWH is equal to 3.6 x 106 Joules.

Q28. Answer: (b) 72 km/h

Shortcut Trick

Total Distance = 161.5 + 758.5 = 920 m

Speed (m/s) = 920 ÷ 46 = 20 m/s

Speed (km/h) = 20 × (18/5) = 72 km/h

Therefore The correct answer is 72 km/h.

Alternate Method

Given:

Length of Train (L1) = 161.5 m

Length of Bridge (L2) = 758.5 m

Time taken (T) = 46 seconds

Formula Used:

Speed = Total Distance ÷ Total Time

To convert m/s to km/h, multiply by 18/5.

Calculations:

=> Total Distance = L1 + L2

=> Total Distance = 161.5 + 758.5 = 920 m

=> Speed in m/s = 920 ÷ 46 = 20 m/s

=> Speed in km/h = 20 × (18/5)

=> Speed in km/h = 4 × 18 = 72 km/h

Therefore The correct answer is 72 km/h.

Additional Information

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Unit Conversion

1 m/s = 18/5 km/h and 1 km/h = 5/18 m/s. This is derived from (1000m / 3600s).

Relative Speed (Same Direction)

When two objects move in the same direction, relative speed = S1 − S2.

Relative Speed (Opposite Direction)

When two objects move in opposite directions, relative speed = S1 + S2.

Q29. Answer: (d) 552

The correct answer is 552.

• Note: This is the official paper answer key of RRC Group D Previous Paper 22 (Held On: 18 Sept 2018 Shift 2).

• But now it has been changed after the 104 amendments.

Key Points

• The maximum strength of the House envisaged by the Constitution is now 552.

• Article 81 of the Constitution of India 1949 has specified the maximum strength of Members of Parliament in the Lok Sabha to be 552.

• Out of the maximum permitted strength, not more than 530 members are to be chosen by direct election from territorial constituencies in the Indian states,

• Not more than 20 members are to represent the union territories, chosen in such manner as Parliament of India may by law provide.

• Lok Sabha is the lower house, while Rajya Sabha is the upper house of the Parliament.

• Article 80 of the Indian Constitution lays down the maximum strength of Rajya Sabha as 250, out of which 12 members are nominated by the President and 238 are representatives of the States and of the two Union Territories.

• The Vice President of India will act as Ex-Officio Chairman of Rajya Sabha.

Important Points

• 104th Amendment Act, 2020 -

• Extended the deadline for the cessation of seats for SCs and STs in the Lok Sabha and states assemblies from Seventy years to Eighty.

• Removed the reserved seats for the Anglo-Indian community in the Lok Sabha and state assemblies.

• The maximum strength of the House envisaged by the Constitution is now 550.

Q30. Answer: (b) Lignin

The correct answer is option 2, i.e. Lignin.

Key Points

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

• The husk of a coconut - It is made of sclerenchymatous tissue.

• The cells of this tissue are dead.

• They are long and narrow as the walls are thickened due to lignin.

• Often these walls are so thick that there is no internal space inside the cell.

• This tissue is present in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.

• It provides strength to the plant parts.

• Cells specializing in one function are often grouped together in the body.

• This means that a particular function is carried out by a cluster of cells at a definite place in the body.

• This cluster of cells, called a tissue, is arranged and designed so as to give the highest possible efficiency of function.

• Blood, phloem and muscle are all examples of tissues.

Q31. Answer: (b) Nirbhay

The correct answer is option 2 i.e. Nirbhay

• Nirbhay is the indigenously designed and developed long-range subsonic cruise missile of India.

Missiles	Type	Range
Nag	Anti Tank Missile	4 km
Helina	Anti Tank Missile	7 to 8 km
Pinaka	multiple rocket launcher	40 km for Mark-I and 65 km for mark-II

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Nirbhay	Subsonic Cruise Missile	1,000 to 1,500 km

• Anti Tank guided missile: It is a medium or long-range missile whose primary purpose is to destroy tanks and other armoured vehicles.

• NOTE:-

• BrahMos, the world's fastest cruise missile is developed jointly by India & Russia and named after two rivers, the Brahmaputra of India and the Moskva of Russia.

Q32. Answer: (a) 25.98

=> √108 + √243 = 25.98

=> √(36 × 3) + √(81 × 3) = 25.98

=> 6√3 + 9√3 = 25.98

=> 15√3 = 25.98

=> 7√3 + 8√3 = 25.98

=> √(49 × 3) + √(64 × 3) = 25.98

=> √147 + √192 = 25.98

Q33. Answer: (d) 320 g

Shortcut Trick

Total alloy weight = 1 kg = 1000 g

Copper percentage = 32%

Quantity of Copper = 32% of 1000 g = 32 × 10 = 320 g

Therefore The correct answer is 320 g.

Alternate Method

Given:

Total weight of alloy = 1 kg

Percentage of Copper = 32%

Percentage of Zinc = 40%

Percentage of Nickel = 100% − (32% + 40%) = 28%

Formula Used:

Quantity = (Percentage / 100) × Total Value

Calculations:

=> Total weight in grams = 1 × 1000 = 1000 g

=> Quantity of Copper = (32 / 100) × 1000

=> Quantity of Copper = 32 × 10

=> Quantity of Copper = 320 g

Therefore The correct answer is 320 g.

Additional Information

Unit Conversion

Always convert units to the desired final form; here 1 kg = 1000 g.

Percentage to Fraction

To simplify calculations, remember common fractions like 32% = 32/100 = 8/25.

Base Change in Percentage

The value of a percentage depends directly on the base value it is applied to (Quantity = Base × %).

Q34. Answer: (b) 50 minutes

Shortcut Trick

Net filling time = (a × b) ÷ (b − a)

Given filling time (a) = 25 minutes and emptying time (b) = 50 minutes.

Required time = (25 × 50) ÷ (50 − 25) = 1250 ÷ 25 = 50 minutes.

Therefore The correct answer is 50 min.

Alternate Method

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Tap Type	Time (min)	Total Capacity (LCM)	Efficiency
Filling Tap	25	50 units	+2
Emptying Tap	50	−1	

Given: Filling time = 25 min, Emptying time = 50 min.

Formula: Total Time = Total Capacity ÷ Combined Efficiency

=> Total Capacity = LCM of 25 and 50 = 50 units.

=> Efficiency of Filling Tap = 50 ÷ 25 = +2 units/min.

=> Efficiency of Emptying Tap = 50 ÷ 50 = −1 units/min.

=> Combined Efficiency = 2 − 1 = 1 unit/min.

=> Time taken to fill the tank = 50 ÷ 1 = 50 minutes.

Therefore The correct answer is 50 min.

Additional Information

Negative Work Concept

In Pipes and Cisterns, an emptying pipe (outlet) performs negative work. Its efficiency is subtracted from the efficiency of the filling pipe.

Combined Rate Formula

If pipe A fills in 'x' hours and pipe B empties in 'y' hours (where y > x), the net rate of filling is (1/x − 1/y) per hour.

Q35. Answer: (a) [figure]

The correct answer is option 1, i.e.

• Here CaO is not forming covalent bonds because Calcium is donating its two valence electrons permanently while Oxygen is receiving the two electrons from the Calcium atom, this type of bonding is known as ionic bond.

• Ionic bond, also called the electrovalent bond, is a type of linkage formed from the electrostatic attraction between oppositely charged ions in a chemical compound.

• Such a bond forms when the valence (outermost) electrons of one atom are transferred permanently to another atom.

• The atom that loses the electrons becomes a positively charged ion (cation), while the one that gains them becomes a negatively charged ion (anion).

Additional Information

• Covalent Bond:

• When two atoms share one electron pair they are said to be joined by a single covalent bond.

• In many compounds, we have multiple bonds between atoms. The formation of multiple bonds envisages the sharing of more than one electron pair between two atoms.

• If two atoms share two pairs of electrons, the covalent bond between them is called a double bond.

• For example, in the carbon dioxide molecule, we have two double bonds between the carbon and oxygen atoms. Similarly in the ethene molecule, the two carbon atoms are joined by a double bond.

• When combining atoms share three electron pairs as in the case of two nitrogen atoms in the N2 molecule and the two carbon atoms in the ethyne molecule, a triple bond is formed.

Q36. Answer: (b) 1/12

Given:

Sum of two fractions = 7/4

1st fraction = 5/3

Formula:

Sum = 1st fraction + 2nd fraction

Calculation:

The other fraction = 7/4 - 5/3 = (7 × 3 - 5 × 4)/12 = (21 - 20)/12 = 1/12

Q37. Answer: (a) C

The Z shaped figure flips horizontally in alternate steps.

Therefore, options 3 and 4 are eliminated.

The arrows are rotating in the clockwise direction in each step.

There is no change in the direction of arrows in B. Therefore, option 2 is eliminated.

Hence, figure C is the correct answer.

Q38. Answer: (b) Saturday

Today is Monday.

Every day repeats after 7 days, hence Monday will repeat after every 7 days.

Therefore To find the day after 61 days

Therefore 61 days ÷ 7 = 8 weeks 5 odd days.

So, the 5^(th) day after Monday is Saturday.

Hence, 'Saturday' is the correct answer.

Q39. Answer: (b) C Rajagoplachari

The correct answer is option 2 i.e. C Rajagopalachari

• C. Rajagopalachari (1878-1972) was a freedom fighter, politician, an associate of Gandhi and the final governor general of India.

• Rajagopalachari parted ways with the Congress in 1957 after being disillusioned by the path it was taking.

• He founded the Swatantra Party in 1959, which favoured classical liberal principles and free enterprise.

• In this speech made in April 1973, he highlighted the purpose and the need of the party at the time.

• The Swatantra Party stands for the protection of the individual citizen against the increasing trespasses of the State.

• The Swatantra Party is founded on the claim that individual citizens should be free to hold their property and carry on their professions freely and through binding mutual agreements among themselves and that the State should assist and encourage in every possible way the individual in this freedom, but not seek to replace him.

• The Swatantra party believes that going over to the enemy is not defence, but surrender.

• Gopal Krishna Gokhale founded the Servants of India Society in 1905.

• Its objective was to unite and train Indians of different religions and ethnicities in welfare work.

• K. Kamaraj was born humble and poor in a backward area of Tamil Nadu on July 15, 1903.

• He became Chief Minister of Madras in 1954.

• Indian Government gave Bharat Ratna to K. Kamaraj for Public Affairs in the year of 1976 after his death.

• Vallabhbhai Jhaverbhai Patel was born in Nadiad, Gujarat.

• When India attained Independence he became the Deputy Prime Minister and was responsible for the Home, States and the Information and Broadcasting portfolios.

Q40. Answer: (b) C

The given figure is a pentagon with 4 small circles inside it.

Answer figure 'C' has the same shape of pentagon as in question figure and has four small circles inside it.

Hence, figure 'C' is the correct answer.

Q41. Answer: (b) 9

Shortcut Trick

Prime factorization of 1296 = 2^4 × 3^4.

For a factor to be a perfect square, the powers of prime factors must be even.

Available even powers for 2: {2^0, 2², 2^4} → 3 options.

Available even powers for 3: {3^0, 3², 3^4} → 3 options.

Total perfect square factors = 3 × 3 = 9.

Therefore The correct answer is 9.

Alternate Method

Given: Number = 1296

Formula Used: If N = a^p × b^q, number of perfect square factors = (1 + floor(p/2)) × (1 + floor(q/2))

=> Prime factorization of 1296:

=> 1296 = 2 × 648 = 2² × 324 = 2³ × 162 = 2^4 × 81

=> 1296 = 2^4 × 3^4

=> Number of even powers of 2 (0, 2, 4) = 3

=> Number of even powers of 3 (0, 2, 4) = 3

=> Total perfect square factors = 3 × 3 = 9

=> The factors are: 1, 4, 16, 9, 36, 144, 81, 324, 1296

Therefore The correct answer is 9.

Additional Information

Total Number of Factors

If N = a^p × b^q, total factors = (p + 1)(q + 1).

Perfect Cube Factors

For perfect cubes, powers must be multiples of 3. Number of factors = (1 + floor(p/3)) × (1 + floor(q/3)).

Sum of Factors

Sum = [(a^(p+1) − 1)/(a − 1)] × [(b^(q+1) − 1)/(b − 1)].

Q42. Answer: (c) ISKCON

The correct answer is option 3, i.e. ISKCON

• Expanded over 100 acres of area, Govardhan Ecovillage is a project of the International Society for Krishna Consciousness (ISKCON). The project is owned and managed by ISKCON Wada.

• Govardhan Ecovillage is a place that houses several eco-friendly initiatives. Govardhan Ecovillage is implementing several rural development initiatives in many villages nearby with the help of Sri Chaitanya Seva Trust.

• The United Nations awards Govardhan Ecovillage for sustainable development and World Tourism.

Q43. Answer: (b) 9

Shortcut Trick

For divisibility by (x + 2), substitute x = −2 in the polynomial: $(-2)^2 + 5k(-2) + k^2 + 5 = 0$.

=> $4 - 10k + k^2 + 5 = 0$ => $k^2 - 10k + 9 = 0$ => $(k - 1)(k - 9) = 0$ => k = 1 or 9.

Check x = −3: If k = 1, $(-3)^2 + 5(1)(-3) + 1^2 + 5 = 9 - 15 + 1 + 5 = 0$ (Divisible, so k = 1 is excluded).

If k = 9, $(-3)^2 + 5(9)(-3) + 9^2 + 5 = 9 - 135 + 81 + 5 = -40 \neq 0$ (Not divisible, so k = 9 is correct).

Therefore The correct answer is 9.

Alternate Method

Given: $f(x) = x^2 + 5kx + k^2 + 5$ is divisible by (x + 2) but not (x + 3).

Formula Used: Remainder Theorem states if f(x) is divisible by (x − a), then f(a) = 0.

=> Step 1: $f(-2) = (-2)^2 + 5k(-2) + k^2 + 5 = 0$

=> $4 - 10k + k^2 + 5 = 0$

=> $k^2 - 10k + 9 = 0$

=> $(k - 9)(k - 1) = 0$ => k = 9 or k = 1

=> Step 2: Condition $f(-3) \neq 0$

=> $f(-3) = (-3)^2 + 5k(-3) + k^2 + 5 = 9 - 15k + k^2 + 5 = k^2 - 15k + 14$

=> For k = 1: $(1)^2 - 15(1) + 14 = 1 - 15 + 14 = 0$ (Fails condition)

=> For k = 9: $(9)^2 - 15(9) + 14 = 81 - 135 + 14 = -40 \neq 0$ (Satisfies condition)

Therefore The correct answer is 9.

Additional Information

Factor Theorem

A polynomial f(x) has a factor (x − a) if and only if f(a) = 0.

Quadratic Roots

For a quadratic equation $ax^2 + bx + c = 0$, the sum of roots is −b/a and product of roots is c/a.

Divisibility Rule

If f(x) is exactly divisible by g(x), the remainder obtained upon division must be zero.

Q44. Answer: (a) B, C, D

The correct answer is option 1, i.e. B, C, D

• We know that elements are grouped into a period depending on the valence shell that is being filled.

Element	Electron configuration
A (2)	2
B (3)	2, 1
C (7)	2, 5
D (10)	2, 8
E (30)	2, 8, 8, 2, 10

• So, for A, the first shell is being filled so it belongs to the first period.
• For B,C,D, the second shell is being filled, so they belong to the second period.
• For E, the fourth shell is being filled, so it belongs to the fourth period.
• So, the elements B,C,D belong to the same period.

Q45. Answer: (c) Kilowatt hour

The correct answer is option 3, i.e. Kilowatt hour
• The Commercial unit of Energy is Kilowatt-hour also called "UNIT".
• As the Power consumption in commercial cases is very high hence we can not measure Energy in joules.
• For commercial purposes, we measure Energy in Kilowatt-hour.
• 1 Kilowatt-hour is defined as the energy consumed by a device of power 1 KW in 1 hour.
• 1 Kilowatt-hour = 3600000 J.
• Unit of work is Joule.
• Unit of Power is Watt.

Q46. Answer: (b) PCBSAC

Similarly,
Hence, 'PCBSAC' is the correct answer.

Q47. Answer: (d) But

The correct option is 4, i.e. But
• The prefix added to the name of the hydrocarbon with 4 carbon atoms is But.

Prefix	Number of Carbon atoms
Meth-	1
Eth-	2
Prop-	3
But-	4
Pent-	5
Hex-	6
Hept-	7
Oct-	8
Non-	9
Dec-	10

• The suffix or ending of the name of a hydrocarbon depends on the nature of the chemical bonds between the carbon atoms.
• Hydrocarbon is an organic compound consisting entirely of hydrogen and carbon.
• Alkanes, alkenes and alkynes are the types of hydrocarbons.
• The name of the hydrocarbon and their characteristic is given below:
• The suffix or ending of the name of a hydrocarbon depends on the nature of the chemical bonds between the carbon atoms.

Hydrocarbon	Characteristic
Alkane	Carbon Carbon single bond
Alkene	Carbon Carbon double bond
Alkyne	Carbon Carbon triple bond

Q48. Answer: (b) Only conclusion 2 follows.

The least possible Venn diagram is:
1. All containers are mud. → False (It is possible but not definite)
2. Some vessels are mud. → True (All mud are vessels)

Hence, only conclusion 2 follows.

Q49. Answer: (a) Section 7

Number of books in -

Section 7 = In between 100 and 150

Section 9 = 200

Section 8 = In between 100 and 150

Section 5 = 400

But, In section 8, the number of books is near to 150 which is not the case in section 7.

Hence, Section 7 has the least number of books

Q50. Answer: (a) Harry Kane

The correct answer is option 1, i.e. Harry Kane

• England's Harry Kane finished as the leading goalscorer at the 2018 FIFA World Cup to win the Adidas Golden Boot Award.

• Harry Kane scored England's first goal of the World Cup.

• Kane was awarded the Golden Boot for scoring six goals in the tournament.

• He became the second English player to ever win the World Cup Golden Boot, after Gary Lineker in 1986.

• The Adidas Golden Boot accolade is coveted by every top striker on the planet, but only the highest scorers at the FIFA World Cup finals are awarded it.

• Belgium's Thibaut Courtois was awarded the Golden Glove award for being the best goalkeeper of the tournament.

• Spain were awarded the 'Fair Play' award.

• France won the 2018 FIFA World Cup.

Q51. Answer: (d) C

Given:

Let us observe the pattern of 1^(st) and 2^(nd) figure.

In 2^(nd) figure, the circle shifts in such a way that it intersects with both the straight line and rectangle.

Similarly,

In comparison to 3rd figure, the 4th figure will have triangle intersecting with both the straight line and rectangle.

Figure ‘C’ fulfills the above condition.

Hence, figure ‘C’ is the correct answer.

Q52. Answer: (d) Short-circuit

The correct answer is option 4, i.e. Short-circuit

• Short-circuit is prevented by coating the conducting wire with pvc.

• PVC is an insulating substance. It does not allow electric current to pass through it.

• Polyvinyl chloride, also known as poly, commonly abbreviated PVC, is the world's third-most widely produced synthetic plastic polymer, after polyethylene and polypropylene.

• PVC comes in two basic forms: rigid and flexible.

• PVC is an example of thermoplastics.

• Thermosetting plastic is a type of plastic that melts on heating and solidifies on cooling.

• Sometimes, the live and neutral wires come in direct contact due to defective or damaged wiring.

• When this happens, the resistance of the circuit becomes almost zero and a very large current flows through it. This is known as Short Circuit.

• A short circuit means negligible resistance connection between two conductors supplying electric current.

• Fuse is used to prevent the circuit whenever there is an unusual increase in the current.

• The fuse wire breaks due to excess heat generated due to excess current that protects home appliances from short circuiting or overloading.

Q53. Answer: (a) Gregor Mendel

The correct answer is option 1 i.e. Gregor Mendel

Gregor Mendel contributed to the theories of inheritance of traits in living things.

• The most obvious outcome of the reproductive process still remains the generation of individuals of similar design.

• The rules of heredity determine the process by which traits and characteristics are reliably inherited.

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• The rules for inheritance of such traits in human beings are related to the fact that both the father and the mother contribute practically equal amounts of genetic material to the child.

• This means that each trait can be influenced by both paternal and maternal DNA.

• Thus, for each trait, there will be two versions in each child.

• Gregor Mendel was the first to explain the way in which traits are passed from one generation to the next-and sometimes skip generations.

• Mandel did his experiment with pea plant breeding and he developed three principles of inheritance that described the transmission of genetic traits before anyone knew genes existed.

Additional Information

Three principles are: Laws of Dependence, Laws of Segregation and Laws of Independent Assortment.

• Afterwards, his experiment greatly expanded the understanding of genetic inheritance and led to the development of new experimental methods.

• In sexually reproducing organisms inheritance is easily experimented and described as was the case of Mendel's experiments on the inheritance of characters.

• Since in asexual reproduction gamete formation and their fusion does not occur, the laws of inheritance here doesn't hold good here as they are in the case of sexually reproducing organisms only.

• Gregor Mendel is also known as the “Father of Genetics”.

Q54. Answer: (c) 20 days

Shortcut Trick

Product / Difference method for Keerthi alone:

Days = (Keerthi + Malathi) × Malathi ÷ (Malathi − Keerthi + Malathi)

Days = (12 × 30) ÷ (30 − 12) = 360 ÷ 18 = 20 days.

Therefore The correct answer is 20 days.

Alternate Method

Given: Time taken by Keerthi and Malathi together = 12 days. Time taken by Malathi alone = 30 days.

Formula Used: Total Work = LCM of individual days; Efficiency = Total Work ÷ Time.

Person	Days	Total Work	Efficiency
Keerthi + Malathi	12	60	5
Malathi	30	2	

=> Efficiency of Keerthi = (Efficiency of Keerthi + Malathi) − (Efficiency of Malathi)

=> Efficiency of Keerthi = 5 − 2 = 3 units/day

=> Time taken by Keerthi alone = Total Work ÷ Efficiency of Keerthi

=> Time taken = 60 ÷ 3 = 20 days.

Therefore The correct answer is 20 days.

Additional Information

One Day Work Concept

If a person completes a task in 'n' days, then their one day work is 1/n. Total work is usually considered as 1 unit.

Combined Work Formula

If A and B work together, their combined time is (A × B) ÷ (A + B). To find one person's time from the total, use (Total × Known) ÷ (Known − Total).

Work and Wages

Wages are always distributed in the ratio of the Efficiency of the workers (or work done) and not the ratio of days taken.

Q55. Answer: (b) Anil Kumble

The correct answer is option 2 i.e. Anil Kumble

• Anil Kumble had resigned from the post of Head Coach of Indian team in 2017 after a successful one-year term.

• Kumble had been appointed coach in June 2016 for a one-year term by the Cricket Advisory Committee (CAC) and was instantly successful.

• Under him, India won Test series against West Indies, New Zealand, England, Bangladesh and Australia.

• India registered 12 Test wins out of 17 matches during Kumble's tenure.

• Kumble was replaced by Ravi Shastri as India coach.

• Ravi Shastri is the current Head Coach of Indian team. (April 2020)

Q56. Answer: (c) 32 years

Let the age of Soham be 'a' years.

So, age of Paratha will be 'a + 10' years.

According to question:

3 (a – 8) = 2 [(a +10) – 8] + 4

=> 3a – 24 = 2 (a + 2) + 4

=> 3a – 24 = 2a + 4 + 4

=> 3a – 2a = 8 + 24

=> a = 32

So, Soham's present age is 32 years.

Hence, '32' is the correct answer.

Q57. Answer: (a) [figure]

The most Suitable Venn diagram for the words Garlic, Ginger and Chilly is shown below:

All these words belong to three different groups and have no common relation in between them.

Hence, option 1 is the correct answer.

Q58. Answer: (c) Hydrogen

All options except 'Hydrogen' are metals, while H*ydrogen* is an intermediate element it shows the properties of both metals and non-metal.

Hence, 'Hydrogen' is the odd one out.

Q59. Answer: (d) Ascaris

The correct answer is option 4 i.e. Ascaris

• Ascaris does not belong to the class Annelida.

• Ascaris are the cylindrical shape worm that belongs to the Phylum Aschelminthes.

• Phlyum Aschelminthes comprises of Round worm that are unisexual and lack circulatory and respiratory systems.

• Annelida are bilaterally symmetrical with an organ-system level of body organisation.

• Phylum Annelida is the category of worms and includes any and every worm like earthworm, ragworm, leeches, Nereis etc.

• These worms are invertebrates and have different segments in one body.

• Kingdom Animalia is divided into sub-groups which is known as Phylum. There are 11 phyla in the kingdom Animalia.

• Phylum Arthropoda is the largest phylum in the animal kingdom.

• This phylum includes spiders, lobsters, termites, millipedes, insects, and crabs, etc.

Q60. Answer: (d) 8 m

The correct answer is option 4 i.e. 8 m

• Potential energy: It is the energy possessed by a body by virtue of its position.

• P.E of object = mgh

• Given, m = 6 kg, P.E. = 480 J, g = 10 m/s

• 480 J = 6 kg × 10 m/s × h

• h = 480/(6 × 10) = 480/60

• h = 8 m

Q61. Answer: (a) 3.1

The correct answer is option 1 i.e. 3.1

• The focal length is the distance between the centre of the lens or mirror and the focal point (where parallel rays of light meet or appear to meet) of the lens or mirror.

• The distance between the centre of the lens or mirror to the vertex which is located on the local optical axis is called the Radius of Curvature.

• The focal length is half of the radius of curvature.

• Focal Length (f) = R/2, Where R = radius of curvature

• f = 6.2/2 = 3.1

• f = 3.1

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• Therefore, the focal length of the concave mirror is 3.1 cm.

Q62. Answer: (b) South-East

So, the big pole is to the South-East of B.

Hence, 'South-East' is the correct answer.

Q63. Answer: (d) Cinnabar

The correct answer is Cinnabar.

Key Points

• Cinnabar is an ore of Mercury (Hg).

• Cinnabar is an ore of Mercury (Hg) with chemical formula HgS.

• Cinnabar is a source of brilliant red pigment, called Vermilion.

• It consists of mercury sulphide and is bright scarlet to brick red in color.

• It occurs as a vein-filling mineral in alkaline hot springs and volcanic activities.

• It resembles quartz in its symmetry.

• Mercury is the only metal which is liquid at room temperature.

• Atomic number of mercury is 80.

• Minamata disease due to mercury poisoning.

• Bauxite is the primary ore of aluminum.

• Arsenic (As) is the metalloid.

• Stibnite is an ore of Antimony with chemical formula Sb_2S_3.

Q64. Answer: (b) D

The option figure that bears the closest resemblance to the question figure is shown below:

The answer figure D is like mirror image of the question. Also, it is the only figure among the answer figures that have triangles in it, similar to that of question figure.

Hence, figure D is the correct answer.

Q65. Answer: (b) Salman Khan

The correct answer is option 2 i.e. Salman Khan

• Salman Khan was the host of the Hindi version of "Bigg Boss-11" for the eighth time.

• Born on December 27, 1965 Salman Khan is the son of the legendary writer Salim Khan.

• In 2007, he launched Being Human - Salman Khan Foundation. This charitable organization aids the underprivileged in areas such as education and health-care.

• Bigg Boss 11 is the eleventh season of Indian reality TV series Bigg Boss, which aired on Colors TV.

• The grand finale of the show took place on 14 January 2018 and Shilpa Shinde was announced as the winner while Hina Khan as Runner-up.

Q66. Answer: (d) Both I and II are implicit.

(Implicit - suggested though not directly expressed)

As 'stories are the best way to make children remember concepts', and only when someone likes something, it can be used in a good way.

Therefore, assumption I is implicit.

According to the statement, stories are used such that children remember concepts in the early years of their life - a stage when we need to improve children's imagination and visualisation skills.

Therefore, assumption II is implicit.

Hence, both I and II are implicit.

Q67. Answer: (d) All the conclusions follow.

The least possible Venn diagram is:

I. All cars are vehicles. → True (as visible in the figure)

II. Some vehicles are four-wheelers. → True (All four-wheelers are vehicles)

So, both the conclusion follows.

Hence, all the conclusions follow.

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Q68. Answer: (d) I Do What I Do

The correct answer is option 4 i.e. I Do What I Do

• The former RBI governor Raghuram Rajan authored the book I Do What I Do.

• “I Do What I Do" is a collection of former RBI Governor, Raghuraman Rajan's speeches and articles.

• Raghuram G. Rajan is the Katherine Dusak Miller Distinguished Service Professor of Finance at the Booth School of Business at the University of Chicago.

• He was Governor of the Reserve Bank of India between 2013 and 2016, and is the bestselling author of I Do What I Do and Fault Lines, and the co-author of Saving Capitalism from the Capitalists.

Q69. Answer: (d) Assam

The correct answer is option 4 i.e. Assam

• Pagladia Dam is located in Assam.

• It is a multipurpose project constructed over Pagladiya River, a tributary of Brahmaputra, in Nalbari District of Assam.

• The Pagladiya River has been responsible for recurrent floods in the north bank of the Brahmaputra.

• Benefits from Pagladiya dam include flood moderation in 40,000 ha area, irrigation benefits to 54,000 ha, and incidental power generation by a plant of 3 MW capacity.

• The project cost has been estimated at Rs. 541 crore.

• Important Dam of Assam:

• Subansiri Lower Dam(Subansiri River)

• Karbi Langpi Dam(Borpani River)

● Know about Assam:

○ Capital: Dispur

○ No. of districts: 33

○ Formed on: 26 January 1950

○ Chief Minister: Sarbananda Sonowal (21 Feb 2020)

○ Governor of Assam: Jagdish Mukhi (21 Feb 2020)

○ State Animal: One-horned rhinoceros

○ State Bird: White-winged wood duck

○ State Flower: Kopou phul (Foxtail Orchid)

○ State Tree: Hollong

○ Languages: Assamese, Bodo, Bengali

Major Rivers	**Subansiri, Lohit (Tellu), Dihang/Siang, Kopili, Dhaleswari, Barak, Dhaleswari, Kameng, Brahmaputra, Kameng**
Major Regional Festivals	Bihu, Ambubachi, Elephant festival, Brahmaputra beach festival, Majuli, Baishagu, Baikho, Me-Dum-Mi-Phi
World Heritage Sites	• Kaziranga National Park on the bank of the Brahmaputra - Manas Wildlife Sanctuary near the border with Bhutan
National Parks	• Dibru-Saikhowa National Park - Kaziranga National Park - Manas National Park - Nameri National Park - Rajiv Gandhi Orang National Park

Q70. Answer: (c) 0.0263

√0.00069169

√(69169 × 10^8)

As we know,

√69169 = 263

√(263 × 263 × 10^4× 104)

=> √(0.0263)²

=> 0.0263

Q71. Answer: (c) -2/7, -20/7

Shortcut Trick

Since AP = 3/7 AB, the point P divides the line segment AB internally in the ratio 3 : 4.

Using the section formula for x-coordinate: x = (3 × 2 + 4 × (−2)) ÷ (3 + 4) = −2/7.

Using the section formula for y-coordinate: y = (3 × (−4) + 4 × (−2)) ÷ (3 + 4) = −20/7.

Thus, the coordinates of P are (−2/7, −20/7).

Therefore The correct answer is (−2/7, −20/7).

Alternate Method

Given:

Coordinates of A = (−2, −2)

Coordinates of B = (2, −4)

AP = 3/7 AB

Formula Used:

Section Formula: If a point P(x, y) divides the line segment joining A(x1, y1) and B(x2, y2) internally in the ratio m : n, then:

P(x, y) = ((m × x2 + n × x1) ÷ (m + n), (m × y2 + n × y1) ÷ (m + n))

Calculations:

Since P lies on the line segment AB:

=> AP + PB = AB

=> PB = AB − AP

=> PB = AB − 3/7 AB

=> PB = 4/7 AB

=> AP : PB = (3/7 AB) : (4/7 AB) = 3 : 4

Therefore, the ratio m : n = 3 : 4

Here, x1 = −2, y1 = −2 and x2 = 2, y2 = −4

For x-coordinate of P:

=> x = (3 × 2 + 4 × (−2)) ÷ (3 + 4)

=> x = (6 − 8) ÷ 7

=> x = −2/7

For y-coordinate of P:

=> y = (3 × (−4) + 4 × (−2)) ÷ (3 + 4)

=> y = (−12 − 8) ÷ 7

=> y = −20/7

Therefore, the coordinates of P(x, y) are (−2/7, −20/7).

Option Analysis:

=> Option 1: −2/7, 20/7 is incorrect because the y-coordinate must be negative (−20/7) as both y-coordinates of A and B are negative.

=> Option 2: 2/7, −20/7 is incorrect because the x-coordinate must be negative (−2/7).

=> Option 4: 2/7, 20/7 is incorrect because both coordinates must be negative.

Therefore The correct answer is (−2/7, −20/7).

Additional Information

Section Formula (External Division)

If a point P(x, y) divides the line segment joining A(x1, y1) and B(x2, y2) externally in the ratio m : n, then P(x, y) = ((m × x2 − n × x1) ÷ (m − n), (m × y2 − n × y1) ÷ (m − n)).

Midpoint Formula

When a point P divides the line segment AB in the ratio 1 : 1 (i.e., P is the midpoint), the coordinates are given by P(x, y) = ((x1 + x2) ÷ 2, (y1 + y2) ÷ 2).

Centroid of a Triangle

The centroid G of a triangle with vertices (x1, y1), (x2, y2), and (x3, y3) is given by G(x, y) = ((x1 + x2 + x3) ÷ 3, (y1 + y2 + y3) ÷ 3).

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Q72. Answer: (c) 2, 4

The correct answer is option 3 i.e. 2, 4.

Key Points

• Only carbon will show catenation property.

• The capability of atoms forming a long chain by bonding with each other is called catenation.

• It is the linkage of atoms of the same element to form long chains.

• The catenation process predominantly in carbon and it forms covalent bonds with other carbon atoms to form larger chains and structures.

• Carbon shows allotropy due to catenation, which is linking atoms of the same element with one another to form long chains.

• There are various allotropes of carbon that exist in nature including diamond, graphene, fullerenes, C60, C70, amorphous carbon, Q carbon, lonsdaleite, and carbon nanotubes.

• The property of an element that exists in more than one physical form is called allotropy and the forms are termed as allotropes.

• The electronic configuration of carbon= (2, 4). Therefore, the Valency of carbon is 4.

• A carbon atom has four electrons in its outermost valence shell.

• So, it needs four more electrons to complete the octet configuration.

Q73. Answer: (c) centripetal force

The correct answer is option 3 i.e. centripetal force

• The gravitational force of attraction between a satellite and the earth gives rise to centripetal force.

• Earth satellites are objects which revolve around the earth.

• Their motion is very similar to the motion of planets around the Sun and hence Kepler's laws of planetary motion are equally applicable to them.

• In particular, their orbits around the earth are circular or elliptic.

• The artificial satellites orbiting the Earth remain in their orbits and do not fall down due to the attraction of the Earth (gravity) which provides the necessary centripetal acceleration.

• We will consider a satellite in a circular orbit of a distance (R + h) from the centre of the earth, where R = radius of the earth.

• If m is the mass of the satellite and V its speed, the centripetal force required for this orbit is:

• F(centripetal force) = fracmV²R + h, directed towards the centre.

• This centripetal force is provided by the gravitational force, which is:

• F(gravitational force) = GmM/(R + h), where M is the mass of the earth.

• Centripetal force:

• A force that acts on a body moving in a circular path and is directed towards the centre around which the body is moving.

• This force is applied to the object from outside and for this reason, the centripetal force is an external force.

• It always acts towards the centre(so we do not assume that it is an internal force) but it is an external force.

Q74. Answer: (d) Both 1 and 2 are sufficient

Shortcut Trick

Statement 1: Sriram = Shyam + 32 (Two unknowns, one equation → Insufficient).

Statement 2: Shyam = 2 years (No information about Sriram → Insufficient).

Combining 1 & 2: Sriram = 2 + 32 = 34 years.

Since a unique value is obtained only by using both statements, they are together sufficient.

Therefore The correct answer is Both 1 and 2 are sufficient.

Alternate Method

Given:

From Statement 1: Sriram is 32 years elder to Shyam.

From Statement 2: Shyam is currently 2 years old.

Calculations:

=> Let the age of Shyam be S_y and Sriram be S_r.

=> From Statement 1: S_r = S_y + 32

=> From Statement 2: S_y = 2

=> Substituting the value of S_y in the first equation:

=> S_r = 2 + 32

=> S_r = 34 years

=> To find the specific age of Sriram, data from both statements is required.

Therefore The correct answer is Both 1 and 2 are sufficient.

Additional Information

Data Sufficiency Principles

A question is solvable if the number of independent equations equals the number of variables. Here, Sriram and Shyam are 2 variables requiring 2 distinct pieces of information.

Relative Age Constant

The difference between the ages of two persons always remains constant regardless of the number of years passed or future time.

Sufficiency Cases

1. Only 1: S1 alone gives a unique answer. 2. Either: Both S1 and S2 give answers independently. 3. Both: Only the combination works.

Q75. Answer: (c) Pinki is walking on a inclined road with a book on her head

The correct answer is Pinki is walking on a inclinded road with a book on her head

• Work:

• Work done on an object is defined as the magnitude of the force multiplied by the distance moved by the object in the direction of the applied force.

• The unit of work is the joule (1 Joule = 1 Newton-meter).

• Work done on an object by a force would be zero if the displacement of the object is zero.

• It is the dot product of force and displacement.

• It is a Scalar quantity.

• W = F.s cosθ.

• Distance:

• The length of the actual path covered by a moving object in a given time.

• It is a scalar quantity.

• It is always positive.

• The unit of distance is a meter (m).

• Displacement:

• It is the shortest distance covered by a body in a definite direction.

• It is a vector quantity.

• It can be positive, Negative, or Zero.

• The unit of displacement is a meter(m).

• In this question, we can see that work done would be zero in all the above options except option 3.

• In this case, when Pinki is carrying a book on his head, the gravitational force acts on his head and presses her head to make some displacement.

Q76. Answer: (a) Rs. 1,00,000

Shortcut Trick

Profit % = 90% → Profit Value = Rs. 90,000

Investment (100%) = (90,000 ÷ 90) × 100

Investment = 1,000 × 100 = Rs. 1,00,000

Therefore The correct answer is Rs. 1,00,000.

Alternate Method

Given: Profit percentage = 90%, Profit amount = Rs. 90,000.

Formula: Profit = (Profit % ÷ 100) × Investment

=> Let the initial investment be X.

=> 90% of X = 90,000

=> (90 ÷ 100) × X = 90,000

=> X = (90,000 × 100) ÷ 90

=> X = 1,000 × 100

=> X = 1,00,000

Therefore The correct answer is Rs. 1,00,000.

Additional Information

Profit and Loss Basics

Profit is the difference between Selling Price and Cost Price (Investment). Profit % = (Profit ÷ Investment) × 100.

Total Revenue

Total Revenue = Investment + Profit. In this case, Vella's total return would be Rs. 1,00,000 + Rs. 90,000 = Rs. 1,90,000.

Percentage Change

To find the original value when a percentage of it is known: Original Value = (Given Value ÷ Percentage) × 100.

Q77. Answer: (b) 48G0T

The logic is:

Hence, '48G0T' is the correct answer.

Q78. Answer: (c) Ishwar Sharma

The correct answer is option 3 i.e. Ishwar Sharma

• An eight-year-old Indian-origin schoolboy who is the under-11 UK national yoga champion has been named the 'British Indian of the Year' for his achievements in the field.

• Ishwar Sharma has won a string of titles in both individual and artistic yoga, most recently a gold medal representing Great Britain at the World Student Games 2018 in Winnipeg, Canada, in June 2018.

• He was named British Indian of the Year in the Young Achiever category at the sixth annual awards ceremony held in Birmingham.

• The family is originally from Mysore, home to world-renowned yoga gurus, and travels to the region annually.

Q79. Answer: (b) Pullela Gopichand

The correct answer is option 2 i.e. Pullela Gopichand

• Former All-England champion and celebrated badminton coach Pullela Gopichand initiated the country's largest 'train the trainers' programme, inducting 1500 Physical Education (PE) teachers from across Gujarat for advanced training.

• The programme aimed to develop the skills of PE teachers so that they can impart the right techniques to children aspiring to make it big at sports.

• This was the largest skill development programme at the grassroots level.

• It will impact over 45,000 children every year and change the Physical Literacy and Sports knowledge in schools in Gujarat.

• Pullela Gopichand, (born November 16, 1973, Nagandla, India), Indian badminton player who in 2001 became the second Indian to win the prestigious All England men's singles badminton championship.

• In 2008 he opened a badminton academy in Hyderabad.

Q80. Answer: (c) 3

Shortcut Trick

Mode is the value that appears most frequently in the data set.

Frequency of 2 → 3 times

Frequency of 3 → 4 times (Highest)

Frequency of others → 1 time each (0, 1, 4, 5, 6)

Therefore The correct answer is 3.

Alternate Method

Given: Wickets taken = 2, 6, 4, 3, 5, 0, 3, 2, 1, 3, 2, 3

Formula Used: Mode = Value with the maximum frequency.

=> Arrange in ascending order: 0, 1, 2, 2, 2, 3, 3, 3, 3, 4, 5, 6

=> Count of 0 = 1

=> Count of 1 = 1

=> Count of 2 = 3

=> Count of 3 = 4

=> Count of 4 = 1

=> Count of 5 = 1

=> Count of 6 = 1

=> Since 3 repeats the most (4 times), it is the mode.

Therefore The correct answer is 3.

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Additional Information

Empirical Formula

The relationship between Mean, Median, and Mode is: Mode = 3 × Median − 2 × Mean.

Types of Mode

A data set can be Unimodal (one mode), Bimodal (two modes), or Multimodal (more than two modes).

Median Calculation

For even number of terms (n), Median = [(n/2)^(th) term + (n/2 + 1)^(th) term] ÷ 2 after sorting.

Q81. Answer: (c) DEF

Company DEF produces the least number of mobile phones.

Number of mobile phones produced by DEF = 1240000 × 5/100 = 62000

Q82. Answer: (a) the muscular bladder is under nervous control

The correct answer is option 1 i.e. the muscular bladder is under nervous control

• We can control the urge to urinate as the muscular bladder is under nervous control.

• Urine formed by the nephrons is ultimately carried to the urinary bladder where it is stored till a voluntary signal is given by the central nervous system (CNS).

• This signal is initiated by the stretching of the urinary bladder as it gets filled with urine. In response, the stretch receptors on the walls of the bladder send signals to the CNS.

• The CNS passes on motor messages to initiate the contraction of smooth muscles of the bladder and simultaneous relaxation of the urethral sphincter causing the release of urine.

• The process of release of urine is called micturition and the neural mechanisms causing it is called the micturition reflex.

• An adult human excretes, on an average, 1 to 1.5 litres of urine per day.

• The urine formed is a light yellow coloured watery fluid which is slightly acidic (pH-6.0) and has a characteristic odour.

• On an average, 25-30 gm of urea is excreted out per day.

Q83. Answer: (d) Assam

The correct answer is option 4 i.e. Assam

• Union Ministry of Tourism has sanctioned Rs 98.35 crore for a Heritage Circuit in Assam under the Swadesh Darshan scheme.

• This amount has been sanctioned for development of the Tezpur, Majuli and Sivasagar circuit under the Swadesh Darshan scheme.

• The first instalment of Rs 19.67 crore against the sanctioned amount was released by the Centre on March 31, 2017.

• The scheme also includes development of a composite tourist infrastructure in Majuli comprising a centre near Kamalabari ghat, log huts, watch towers, cafeteria, elevated walkway, solar illumination, landscaping, etc.

Q84. Answer: (a) Repco Micro Finance

The correct answer is option 1 i.e. Repco Micro Finance

• Repco Micro Finance Ltd, a non-banking finance company promoted by Repco Bank, received Nabard 2018 award for its service to self-help group (SHG) linkage in Tamil Nadu for the fiscal year 2017-18.

• Since its inception, the NBFC has disbursed loans amounting to Rs. 2,500 crore to over 10 lakh beneficiaries through 50,000 SHGs.

• Headquarters: Chennai

• Managing Director: Mrs. R.S. Isabella

Q85. Answer: (a) HS

The logic is:

Hence, ‘HS’ is the correct answer.

Q86. Answer: (b) RUCO

The correct answer is option 2 i.e. RUCO.

Key Points

• The country’s apex food regulator, the Food Safety and Standards Authority of India (FSSAI) in association with the Biodiesel Association of India (BDAI) has launched the ‘RUCO’ project, short for repurpose used cooking oil.

• RUCO is a project that plans to convert vegetable oils, animal fats or restaurant grease that has already been used in cooking into biodiesel for running diesel vehicles, or indeed any equipment that uses diesel.

• Recycling is increasingly being carried out to produce vegetable oil-based fuel in countries such as the UK and the US. India,

too, is keen to join this club.

Q87. Answer: (a) M, TM, HM

The Correct Answer is Option 1 i.e M, TM, HM.

• Million Period consists of places: Million, Hundred Millions, Thousand Millions.

• The ones period consists of the digits in the hundreds, tens, and ones places.

Billions	**Millions**	**Thousands**	**Ones**								
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
10^{11}	10^(10)	10^9	10^8	10^7	10^6	10^5	10^4	10^3	10^2	10^1	10^0
9	8	6	5	2	6	0	4	1	3	7	5

Q88. Answer: (c) North

Sarang is facing West.

He turns 135^0 clockwise and then 45^0 anticlockwise.

As he moves 135^0 clockwise and then 45^0 anticlockwise, net angular movement done by him = (135^0 – 45^0) = 90^0 clockwise.

So, 90^0 clockwise movement from west direction is shown below:

So, now he is facing north.

Hence, Sarang is facing North.

Q89. Answer: (c) 144 W

The correct answer is option 3 i.e. 144 W

CONCEPT:

• Power (P):

• The rate of doing work is called power and it is also known as the rate of consumption of energy.

• The SI unit of power is "watt".

• 1 Watt = 1 Joule/second.

Electric Power: The rate at which electrical energy is dissipated into other forms of energy is called electrical power i.e.,

• $P = W/t = VI = I^2R = (V^2)/R$

Where V = Potential difference, R = Resistance and I = current.

• Electric Current(I):

• It is defined as the net amount of electric charge(q) flowing through a cross-section of a conductor in an electric circuit per unit of time(t).

• S.I unit of electric current is Ampere(A).

• Voltage:

• An electromotive force or potential difference expressed in volts.

• Its unit is Volt, denoted as "V".

Calculation:

Given - Potential difference (V) = 240 V and current (I) = 0.6 A

• Electric power can be written as,

=> P = V I

=> P = 240 × 0.6 = 144 W

Q90. Answer: (a) [figure]

The Venn diagrams that correctly represents the relationship between:

A) Mobile

B) Laptop

C) Electronics

Is shown below:

All mobile and laptop are electronic devices.

Hence, option 1 is the correct answer.

Q91. Answer: (a) 100/21% loss

Shortcut Trick

Equate the number of pens to find the profit or loss easily.

LCM of 8 and 6 is 24.

CP of 24 pens (8 × 3) = 7 × 3 = Rs. 21.

SP of 24 pens (6 × 4) = 5 × 4 = Rs. 20.

Since CP > SP, there is a loss of 21 − 20 = Re. 1.

Loss% = (1 ÷ 21) × 100 = 100/21%.

Therefore The correct answer is 100/21% loss.

Alternate Method

Given → Cost Price (CP) of 8 pens = Rs. 7, Selling Price (SP) of 6 pens = Rs. 5.

Formulas: Loss = CP − SP | Loss% = (Loss ÷ CP) × 100

=> CP of 1 pen = 7 ÷ 8 = Rs. 0.875

=> SP of 1 pen = 5 ÷ 6 = Rs. 0.8333...

=> Loss = (7/8) − (5/6)

=> Loss = (21 − 20) ÷ 24 = 1/24

=> Loss% = [(1/24) ÷ (7/8)] × 100

=> Loss% = (1/24) × (8/7) × 100 = (1/21) × 100 = 100/21%

Therefore The correct answer is 100/21% loss.

Additional Information

Cross-Multiplication Method

For types 'a' items at Rs 'b' and 'c' items at Rs 'd', Loss/Gain% = [(ad − bc) ÷ bc] × 100. If negative, it is a loss.

Consistency in Quantity

Always compare prices for the same quantity of goods to determine the profit or loss status correctly.

Q92. Answer: (b) Scattering of light

The correct answer is option 2 i.e. Scattering of light

• Clouds are white because light from the Sun is white.

• As light passes through a cloud, it interacts with the water droplets, which are much bigger than the atmospheric particles that exist in the sky.

• When sunlight reaches an atmospheric particle in the sky, blue light is scattered away more strongly than other colours, giving the impression that the sky is blue.

• But in a cloud, sunlight is scattered by much larger water droplets.

• These scatter all colours almost equally meaning that the sunlight continues to remain white and so make the clouds appear white against the background of the blue sky.

• Light entering the Earth's atmosphere gets scattered by coming in contact with atmospheric particles.

• This phenomenon is called the scattering of light.

Q93. Answer: (d) 99

Shortcut Trick

Net work in 2 hours (1 cycle) = 7 − 5 = 2 units.

Target work before last filling step = 105 − 7 = 98 units.

Number of cycles to reach 98 units = 98 ÷ 2 = 49 cycles.

Time for 49 cycles = 49 × 2 = 98 hours.

Remaining work = 105 − 98 = 7 units, filled by inlet in 1 hour.

Total time = 98 + 1 = 99 hours.

Therefore The correct answer is 99 hours.

Alternate Method

Pipe Type	Time (Hours)	Total Work (LCM)	Efficiency
Inlet Pipe	15	105	+7

Outlet Pipe	21	−5	

=> Total capacity of the cistern = LCM(15, 21) = 105 units.

=> Efficiency of Inlet pipe = 105 ÷ 15 = +7 units/hr.

=> Efficiency of Outlet pipe = 105 ÷ 21 = −5 units/hr.

=> Work done in 1^(st) hour (Inlet) = 7 units.

=> Work done in 2^(nd) hour (Outlet) = −5 units.

=> Net work in 1 cycle (2 hours) = 7 − 5 = 2 units.

=> To avoid overfilling/draining logic, subtract inlet efficiency from total: 105 − 7 = 98 units.

=> Number of 2-hour cycles needed = 98 ÷ 2 = 49 cycles.

=> Time for 49 cycles = 49 × 2 = 98 hours.

=> Remaining work after 98 hours = 105 − (49 × 2) = 105 − 98 = 7 units.

=> In the 99^(th) hour, the Inlet pipe will fill the remaining 7 units.

=> Total time = 98 + 1 = 99 hours.

Therefore The correct answer is 99 hours.

Additional Information

Alternate Pipe Working

When pipes work alternately, calculate the net work for one full cycle (sum of individual times) before applying the total work limit.

The Last Step Rule

In problems involving filling and draining, always subtract the positive efficiency from the total work to find the point where the next filling step completes the task.

Negative Efficiency

Outlet pipes or leaks are always represented with a negative sign in efficiency calculations (Net Efficiency = Efficiency_(In) − Efficiency_(Out)).

Q94. Answer: (a) Only I is implicit.

(Implicit - suggested though not directly expressed)

Trees are a type of plant. Therefore, it is safe to assume that plants share extra nutrients with other plants.

Thus, assumption I is implicit.

From the statement, we get ideas related to plants only and nothing else.

Therefore, assumption II is not implicit.

Hence, only I is implicit.

Q95. Answer: (c) 9996

Shortcut Trick

The greatest four-digit number is 9999.

Divide 9999 by 49 → 9999 ÷ 49 = 204 with a remainder of 3.

Subtract the remainder from the greatest number: 9999 − 3 = 9996.

Therefore The correct answer is 9996.

Alternate Method

Given:

Greatest 4-digit number = 9999

Divisor = 49

Calculations:

=> 9999 = 49 × 204 + 3

=> Here, Quotient = 204 and Remainder = 3

=> Required number = 9999 − 3

=> Required number = 9996

Therefore The correct answer is 9996.

Additional Information

Divisibility Rule of 49

To check if a number is divisible by 49, multiply the last digit by 5 and add it to the rest of the number. Repeat if necessary until you reach a multiple of 49.

Division Algorithm

Dividend = (Divisor × Quotient) + Remainder. For exact divisibility, the remainder must be zero.

Smallest n-digit number divisible by x

Smallest n-digit number + (x − remainder). This ensures the result stays within or moves into the n-digit range correctly.

Q96. Answer: (d) Myopia and Hypermetropia

The correct answer is Myopia and Hypermetropia.

Key Points

• The bifocal lens can be used for the correction of Presbyopia (a person suffering from both myopia and hypermetropia).

• In bifocal lenses, the upper portion contains the concave lens, while the lower part contains the convex lens.

• The upper part is a concave lens and corrects near-sightedness while the lower part is a convex lens which corrects the farsightedness.

Defects of Vision	Details	Corrections
Myopia or Near-sightedness	The eye can see nearby objects clearly but the distant objects appear indistinct.	Concave Lens
Hypermetropia or Farsightedness	Human eye can see Distant objects clearly but cannot see nearby Objects distinctly.	Convex Lens
Presbyopia	People suffer from near-sightedness as well as farsightedness.	bifocal lenses

Q97. Answer: (c) 1510

The correct answer is 1510.

Key Points

• In 1509, Afonso de Albuquerque became the governor of Portuguese.

• He was the actual founder of Portuguese.

• In 1510, he attacked Adil Shah of Bijapur and captured Goa.

• In 1515, Albuquerque died in India.

• After this victory over the Muslims, the Hindu rulers accepted the Portuguese presence in India.

• Albuquerque planned to use Goa as a naval base against the Muslims, divert the spice trade to it, and use it to supply Persian horses to the Hindu princes.

• In 1498, Vasco da Gama was the first Portuguese to penetrate India.

• He was welcomed by the Zamorin of Calicut.

• Portuguese established their first factory in Cochin (now called Kochi) in Kerala.

• Francisco de Almeida was the first Viceroy of the Portuguese state and its headquarters was Cochin.

• The 'Instrument of Surrender' which ended the Portuguese rule in India was signed on 19th December 1961.

• This ended 450 years of Portuguese in India.

• The movement to end the Portuguese rule was called the Goa Liberation Movement.

Q98. Answer: (c) D

The logic is:

All options except ‘T’ are made of a minimum of four straight lines, while ‘T’ is made of a minimum of two straight lines.

Hence, figure D is the odd one out.

Figure	Letters	Minimum no. of lines required
A	M	4
B	W	4
C	E	4
D	T	2

Mistake Points

• In such questions, we apply only image-based logic because this is an image based classification question.

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Q99. Answer: (c) Maternal Uncle

The family tree diagram is shown below:

The person in the picture is the maternal uncle of Joy.

Hence, ‘maternal uncle’ is the correct answer.

Q100. Answer: (d) Salman Khan

The correct answer is option 4 i.e. Salman Khan

• Bollywood superstar Salman Khan has been honoured with the Global Diversity Award 2017 in the British Parliament House.

• The actor was honoured for his contribution to the Indian film industry as an actor, producer, television personality, singer and philanthropist.

• Besides his Indian cinema success, Salman is a well- known philanthropist and his NGO Being Human has done life changing work supporting the underprivileged in India.

• Previous recipients of the award include Bollywood megastar Amitabh Bachchan, actor Aishwarya Rai, Chinese action icon Jackie Chan, Bangladesh Prime Minister Sheikh Hasina, American Civil Rights leader Jesse Jackson and Formula One driver Lewis Hamilton.

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