RRC Group D Previous Year Paper 19 (Held On: 10 Dec 2018 Shift 2)

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

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CBT

Q1. Which state cricket team has won the 2018 Vijay Hazare trophy?

(a) Mumbai
(b) Rajasthan
(c) Odisha
(d) Karnataka

Q2. Given is a question followed by two arguments numbered I and II. Read the question and decide which of the arguments is strong with respect to the question.

Question:

Should shifting agriculture be practiced?

Arguments:

I. No. It is not a worthy practice.

II. Yes. When compared to modern methods of farming, it is less expensive.

(a) Only argument II is strong.
(b) Only argument I is strong.
(c) Neither argument I nor II is strong.
(d) Either argument I or II is strong.

Q3. Read the give statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statements(s).

Statement:

Recent research says listening to specific types of frequencies have a positive effect on human brain and it aids in healing.

Conclusion:

I. Human brain responds to music.

II. Certain frequencies are used to heal diseases in human body.

(a) Both the conclusions follow.
(b) Neither conclusion follows.
(c) Only conclusion I follows.
(d) Only conclusion II follows.

Q4. What is the missing term in the series?

YB25, WD23, ____, SH19

(a) UG21
(b) UF21
(c) uF20
(d) UG20

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Q5. A solid metallic hemisphere with radius r is melted and cast into a solid right circular cone with the radius of the base = r. What is the ratio of their curved surface areas?

(a) 5/√2
(b) 2/√5
(c) 3/2
(d) 5/2

Q6. Four numbers, a, b, c and d, are such that their overall average is 26.5 the average of a and b is 20. The average of c and d is:

(a) 35.5
(b) 31.5
(c) 33
(d) 32.5

Q7. Recently in 2018, assembly elections took place in which of the following states?

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

Q8. Read the given statement and conclusions carefully and select which of the conclusions logically follow(s) from the statement.

Statement:

Some jaguars are cheetahs, some cheetahs are leopards. All leopards are panthers.

Conclusions:

1. All leopards are jaguars.
2. Some panthers are cheetahs.

(a) Only conclusion 2 follows
(b) Only conclusion 1 follows
(c) Either 1 or 2 follows
(d) Both 1 and 2 follows

Q9. Find the next term in the following series.

24XW23, 22VU21, _____?

(a) 20RT19
(b) 20TS19
(c) 20TR19
(d) 20ST19

Q10. Who among the following approved the procurement of 111 utility helicopters for the Indian Navy at a cost of over Rs. 21,000 crores?

(a) Defence Acquisition Council
(b) Defence Procurement Commission
(c) Defence Purchase Association
(d) Defence Dealers Association

Q11. Genetic information is carried by long chains of molecules. What are these molecules called?

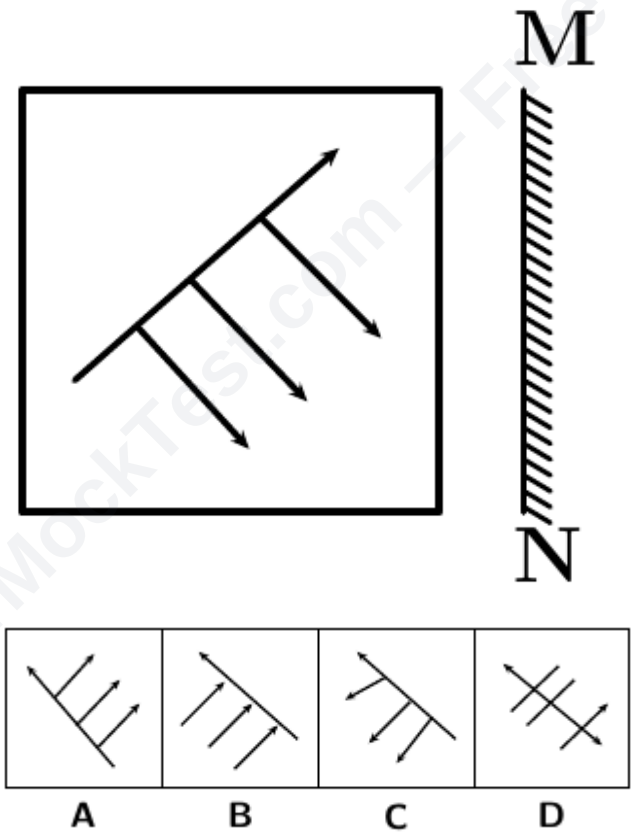
(a) Phosphates
(b) Nitrogenous Bases
(c) RNA
(d) Nucleotides

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Q12. Astronauts in space communicate with each other by radio links because _____.

(a) Sound waves can't travel in space
(b) Sound waves have low frequency
(c) Sound waves travel slowly in space
(d) Sound waves travel quickly in space

Q13. Choose the mirror image for the following figure:



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

Q14. Who is termed as the 'Plastic Man of India', who has found a way to reuse plastic waste and make durable roads?

(a) Rajagopalan Vasudevan
(b) Rajagopalan Muruganantham
(c) Arunachalam Muruganantham
(d) Arunachalam Vasudevan

Q15. Starting from point O facing West a man walks 4 km to reach point A. He turns right, walks 4 km and reaches point B. Then, he turns right, walks 4 km and reaches point C. He turns right, walks 3 km and reaches point D. He turns left, walks 4 km and reaches point E. Then, he turns right, walks 5 km and reaches point F. At point F, the man is facing _____ direction.

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

Q16. The kinetic energy acquired by a mass (m) in traveling distance starting from rest under the action of the constant force is directly proportional to:

(a) 1/m
(b) m°

(c) m
(d) 1/(√m)

Q17. The royal city at Fatehpur Sikri was built by Mughal Emperor _____ in honor of Sufi saint Shaikh Salim Chisti.
(a) Aurangzeb
(b) Humayun
(c) Shah Jahan
(d) Akbar

Q18. Consider the following statement and decide which of the conclusion logically follows from the statements.
Statements:
If you're a good computer programmer, then we definitely have a job for you.
Conclusions:
1. Good computer programmers are never jobless.
2. We are in need of a good computer programmer.
(a) Neither conclusion 1 nor 2 follows
(b) Only conclusion 2 follows
(c) Both conclusions 1 and 2 follow
(d) Only conclusion 1 follows

Q19. Find out the two signs that need to be switched for the equation to be equated.
5 + 6 × 3 – 4 ÷ 2 = (-1)
(a) × & +
(b) • & ÷
(c) ÷ & ×
(d) • & -

Q20. Select the option that is related to the third term in the same way as the second term is related to the first term.
Alight: Descend ? House: _____?
(a) Pound
(b) Home
(c) Hug
(d) Hen

Q21. Non-Metals are generally more electronegative due to their _____.
(a) A large number of electrons.
(b) Smaller atomic radii.
(c) Smaller atomic number.
(d) Smaller ionization energy.

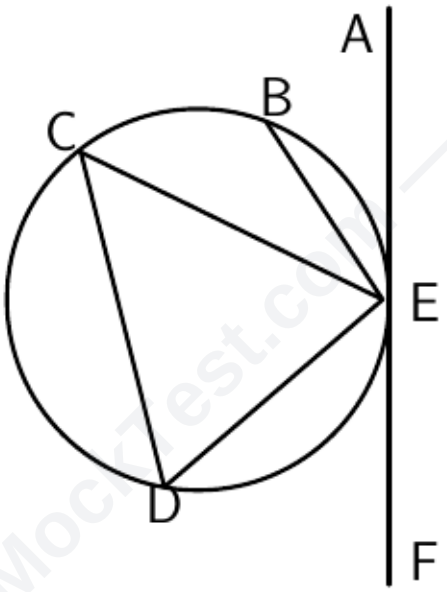
Q22. You are given a question and two statements. Identify which of the statements is/are necessary/ sufficient to answer the question.
There are 6 baskets in a supermarket that are use to load and unload commodity. All have been filled with tins of 2 different sizes and shapes. In total, how many tins have been loaded in the baskets?
Statements:
1. The shape of 6 tins is such that in one trolley, only 2 can fit.
2. The tins contain processed sauce.
(a) The statements are not sufficient
(b) Statement 1 alone is sufficient
(c) Statement 2 alone is sufficient
(d) Statement 1 and 2 together are necessary.

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Q23. Who played the lead role in the movie 'Dangal' released in 2016?

(a) Akshay Kumar
(b) Shah Rukh Khan
(c) Aamir Khan
(d) Raj Kumar Rao

Q24.



In the figure given above, AF is a tangent to the circle at E, angle CDE = 80° and m(BC) = m(BE). What is the measure of angle BEA?

(a) 30°
(b) 45°
(c) 40°
(d) 35°

Q25. The property of metals wherein they can be beaten into thin sheets is called _____.

(a) Expansion
(b) Malleability
(c) Ductility
(d) Conduction

Q26. Mass/Volume = _____

(a) Pressure
(b) Area
(c) Density
(d) Force

Q27. _____ tissue is found beneath the skin, around the kidneys, and between the internal organs.

(a) Ligament
(b) Areolar
(c) Tendons
(d) Adipose

Q28. Who among the following is known as 'The Guardian of Public Purse"?

(a) Attorney General
(b) Comptroller & Auditor General
(c) Chief Minister
(d) Prime minister

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Q29. Read the given statement (s) a conclusions carefully. Assuming that the information in the statement (s) is true, even if they appear to be at variance with commonly known facts, select which of the conclusions logically follow(s) from the statement(s) beyond reasonable doubt.

Statements:

All crayons are pens

All pens are nibs

Conclusions:

I) All crayons are nibs

II) All nibs are crayons

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

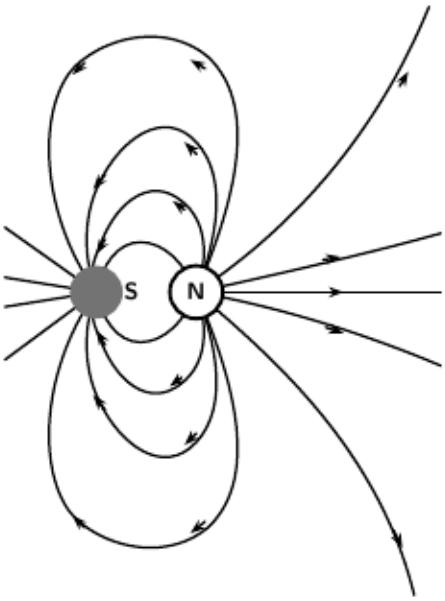
Q30. Which of the following numbers will have an even number of factors?

(a) 1600
(b) 52900
(c) 30000
(d) 36100

Q31. The SI unit of thrust is _____.

(a) Pascal
(b) Ohm
(c) Newton
(d) Joule

Q32. The diagram shows the force field produced by a current-carrying wire. Name the force field.



(a) Electrostatic field
(b) Magnetic field
(c) Electromagnetic field
(d) Static field

Q33. Ravi sold goods for Rs. 6250 and made a profit of 25% in the process. What would have been his profit percent if he has sold the same goods for Rs. 6000?

(a) 10%
(b) 15%

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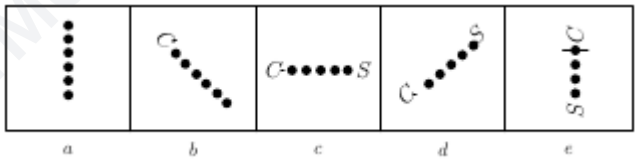
(c) 20%
(d) 5%

Q34. In ____ tissue the cells are widely spaced.
(a) Tendons
(b) Cartilage
(c) Bone
(d) Ligament

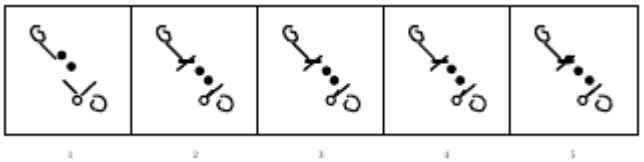
Q35. The AIADMK party is a regional political party of which state?
(a) Karnataka
(b) Telangana
(c) Tamil Nadu
(d) Andhra Pradesh

Q36. Pressure × Area = _____.
(a) Thrust
(b) Inertia
(c) Momentum
(d) Volume

Q37. Study the pattern in the following series and identify which figure from the answer figures will follow next.
Problem Figure



Answer Figures



(a) 5
(b) 2
(c) 3
(d) 1

Q38. A hollow sphere with external and internal diameters as 24 cm and 16 cm. respectively, is melted into a cylinder with a base diameter of 32 cm. The height of the cylinder is closest to:
(a) 7.33 cm
(b) 5.56 cm
(c) 5.16 cm
(d) 6.33 cm

Q39. Using the below three shapes form a valid shape and identify your shape with the below options?

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(a)



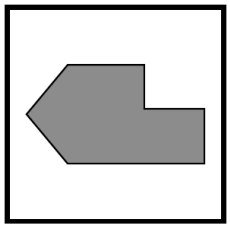
(b)



(c)



(d)



Q40. Founded in 1927, Dr. Bhimrao Ambedkar University is a non Profit public higher education institution located in the urban setting of the large city of _____.

(a) Gorakhpur
(b) Agra
(c) Lucknow
(d) Kanpur

Q41. Ratnagiri mines are found in which state?

(a) Gujarat
(b) Telangana
(c) Maharashtra
(d) Karnataka

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Q42. How many groups are there in the modern periodic table?

(a) 9
(b) 18
(c) 21
(d) 8

Q43. The two roots of a quadratic equation are given as x = 5/3 and x = -3/10. The equation can be written as:

(a) (10x - 3) (3x - 5) = 0
(b) (10x + 3) (3x - 5) = 0
(c) (10x + 3) (3x + 5) = 0
(d) (10x - 3) (3x + 5) = 0

Q44. Neela was sweeping the floor. When she was facing south-west, she moved the broom 90° along the floor to her right. In which direction is the broom facing with respect to its initial position?

(a) North-west
(b) South-west
(c) North-east
(d) South-east

Q45. Arjit's age is 3 years more than 1.5 times the age of Heera, whose age in turn is 10 years more than 2/3 the age of Deepika. If 5 times the age of Deepika is equal to 3 times the age of Arjit, what is the sum of the present ages of the trio?

(a) 99 years
(b) 95 years
(c) 100 years
(d) 97 years

Q46. Select the options that is related to the third term in the same way as the second term is related to the first term.

Bird : Nest ? Lion _____?

(a) Hive
(b) Den
(c) Igloo
(d) Convent

Q47. Preethi tells Kajol, "Your mother's father's own son is my husband." How is Preethi related to Kajol?

(a) Daughter
(b) Cousin
(c) Siter-in-law
(d) Aunt

Q48. Rs. 10000, invested at 30% rate of interest per annum, but compounded every four months, will give an amount of Rs. ____ in one year.

(a) 13270
(b) 13000
(c) 13300
(d) 13310

Q49. Which of the numbers given below is NOT divisible by 4?

(a) 89700
(b) 76166
(c) 43584
(d) 74708

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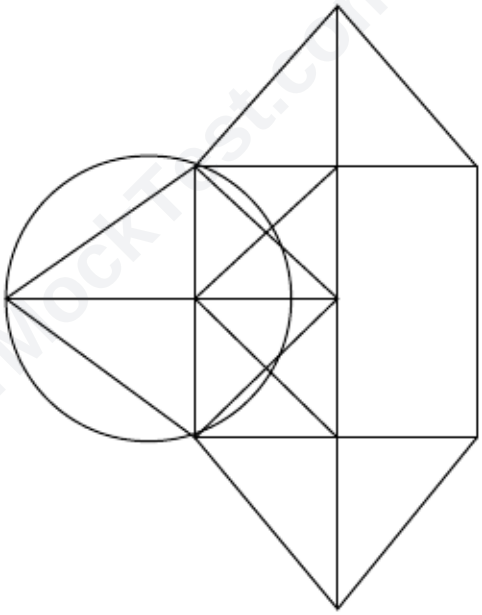
Q50. A body of mass "m" moving with velocity 4 km/h collides with a body of mass "3 m" at rest. Now the coalesced mass starts to move with a velocity of:

(a) 4 km/h
(b) 4/3 km/h
(c) 1 km/h
(d) 2 km/h

Q51. The square root of which of the numbers below will be rational?

(a) 16848
(b) 41872
(c) 49883
(d) 43264

Q52. Find the number of triangles in the given figure.



(a) 14
(b) 12
(c) 10
(d) 16

Q53. Atomic power Station is located at Rawatbhata, in the state of.

(a) Maharashtra
(b) Madhya Pradesh
(c) Rajasthan
(d) Gujarat

Q54. Which of the following numbers is a composite?

(a) 263
(b) 293
(c) 283
(d) 273

Q55. Find the next term in the following series.

48, 47, 50, 49, _____?

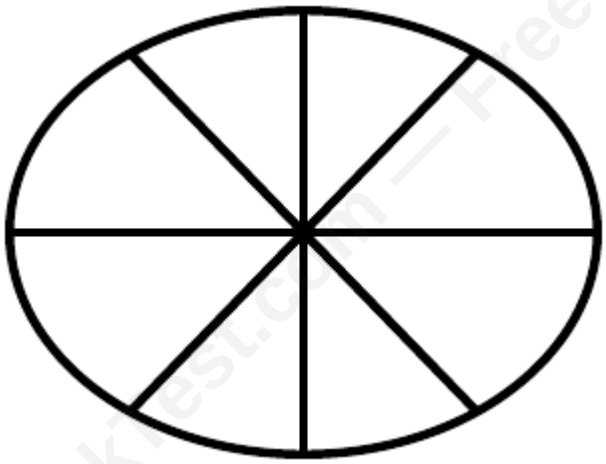
(a) 52
(b) 58
(c) 60
(d) 57

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Q56. As of February 2018, the Chairman of Central Board of Film Certification is _____.

(a) Sujit Sircar
(b) Prasoon Joshi
(c) Swaand Kirkire
(d) PahalaJ Nihalani

Q57. How many sectors are present in the below figure?



(a) 64
(b) 40
(c) 48
(d) 56

Q58. Oxides of non-metals are usually _____.

(a) Acidic
(b) Neutral
(c) Less reactive
(d) Basic

Q59. _____ describes pollination by the agency of ants.

(a) Emasculation
(b) Ficus Religious
(c) Dirmecophily
(d) Myrmecophily

Q60. Barkha Dutt is known for her role as which of the following?

(a) Politician
(b) Doctor
(c) Journalist
(d) Actor

Q61. The process of releasing an egg from the ovary is called _____.

(a) Fertilization
(b) Reproduction
(c) Gestation
(d) Ovulation

Q62. The arithmetic mean of four distinct numbers is 90. If the greatest of the four numbers is 120, what is the maximum possible value of the range of the set of four numbers?

(a) 115
(b) 117
(c) 116

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(d) 118

Q63. 105 × 2 ÷ (3 × 5) - 6 = ?

(a) -70
(b) 5
(c) 8
(d) 35

Q64. Mohan's mother was four times as old as Mohan ten years ago. After 10 years, she will be twice as old as Mohan. How old is Mohan today?

(a) 20 years
(b) 15 years
(c) 22 years
(d) 32 years

Q65. A cube of a 9 cm edge is immersed completely in a rectangular vessel containing water. If the base of the vessel is 12 cm × 15 cm then find the rise in the level of water when the cube is immersed.

(a) 4.55 cm
(b) 6.05 cm
(c) 6.55 cm
(d) 4.05 cm

Q66. 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B

If the letters in the position 8, 12, 13 and 15 from the left are picked to form a meaningful word, then the third letter of the word would be:

(a) P
(b) O
(c) E
(d) M

Q67. The median of the first 25 whole numbers is:

(a) 10
(b) 12.5
(c) 15
(d) 12

Q68. Which of the following is NOT a difference between lenses and mirrors?

(a) Light reflects from a mirror. The light goes through and is refracted by a lens.
(b) A Concave mirror converges light to a focal point. For lenses, light converges to a point for a convex lens.
(c) A convex mirror converges light, as does a concave lens.
(d) Lenses have two focal points, one on either side of the lens.

Q69. 75% of the students passed in an examination. If 2 more students had passed the examination, 80% would have been successful. How many students are there in the class?

(a) 40
(b) 30
(c) 50
(d) 32

Q70. The Mission Olympic Cell (MOC) of the Union Ministry of Sports and youth affairs included the Men's _____ team of India in the Target Olympic Podium scheme.

(a) Hockey
(b) Shooting
(c) Football
(d) Badminton

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Q71. What change will occur to the pH of a solution if its Hydrogen ion concentration is increased?

(a) The pH will decrease
(b) The pH will first increase and after some time, decrease
(c) The pH will remain the same
(d) The pH will increase

Q72. The square root of 19881 is:

(a) 149
(b) 129
(c) 141
(d) 131

Q73. The least reactive elements of the periodic table are:

(a) Transition elements
(b) Inner transition elements
(c) Alkali metals
(d) Noble gases

Q74. Newton's second law of motion _____

(a) It is also called a law of conservation of energy
(b) Is also called as law of inertia
(c) Describes the relationship between the forces on two interacting objects
(d) Explains about change in momentum

Q75. What is the HCF of 132 and 176?

(a) 33
(b) 66
(c) 44
(d) 22

Q76. Shamim had to travel 420 km in 8 hours. If he travelled at an average speed of 60 km/h and took two breaks in between. The shorter break being one-third the duration of the longer, how many minutes was the long break for?

(a) 45
(b) 30
(c) 40
(d) 35

Q77. An athlete in the Olympic Games covers a distance of 100 m in 10s. His kinetic energy can be estimated to be in the range of:

(a) 200 J – 500 J
(b) 200000 J – 500000 J
(c) 20000 J – 50000 J
(d) 2000 J – 5000 J

Q78. A sum of money when invested for a year at the rate of 10% interest per annum compounded half-yearly becomes Rs. 44,100 at maturity. The sum invested was _____.

(a) Rs. 40000
(b) Rs. 40500
(c) Rs. 39800
(d) Rs. 40250

Q79. Three out of the four options given below are related in a particular way. Choose the option that is different or odd from the others.

(a) Jhelum
(b) Betwa

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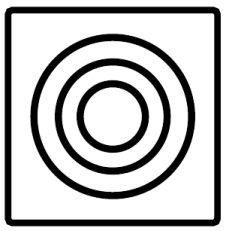
(c) Chambal
(d) Yamuna

Q80. The _____ has created National Highways Investment Promotion Cell (NHIPC) for attracting domestic and foreign investment for highways projects.
(a) NTPC
(b) SAIL
(c) TRAI
(d) NHAI

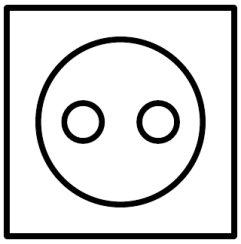
Q81. Read the statement and decide which of the conclusions logically follows from the statement.
Statement:
This cup is filled with tea.
Conclusions:
I. The tea is too hot.
II. The tea is sweet
(a) Neither conclusion I nor II follows
(b) Only conclusion I follows
(c) Both conclusions I and II follow
(d) Only conclusion II follows

Q82. Sravanthi is Varun's maternal grandmother. How is varun's only sister's mother related to Saravanthi?
(a) Daughter
(b) Sister-in-law
(c) Aunt
(d) Sister

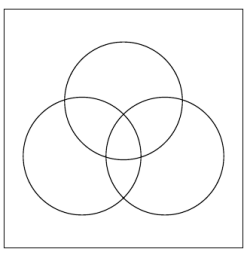
Q83. Which of the following Venn diagrams best illustrates the relation between the three given classes?
Professor, Student, Player
(a)



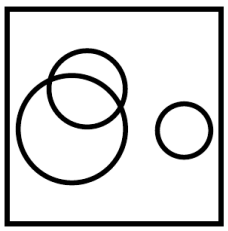
(b)



(c)



(d)



Q84. Shesh Anand Madhukar is a _____ writer who was honored with the Sahitya Academy Bhasha Samman Award in January 2018.

(a) Maithili
(b) Kannada
(c) Magahi
(d) Sanskrit

Q85. Select the option that is related to the third term in the same way as the second term is related to the first term.

STEPS : SPETS ? CLOCK: ____?

(a) KCOCL
(b) KCLOC
(c) KOCLC
(d) KCOLC

Q86. Find odd one out.

(a) VI
(b) 7
(c) IX
(d) VII

Q87. Sarthak can fill a sandpit with sand in 36 days while Vivan takes 90 days to fill it. Ali can take the entire sand of a filled sand-pit out in 60 days. If all three starts working when the pit is empty, in how many days will the sandpit be full again?

(a) 45
(b) 54
(c) 48
(d) 50

Q88. The Godavari, Krishna, Kaveri, and Vaigai are _____ flowing rivers.

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

Q89. The sum of a rational and an irrational number is a/an _____.

(a) Rational number
(b) Natural number
(c) Irrational number
(d) Complex number

Q90. Consider the following question and decide which of the statements is sufficient to answer the question.

Find the value of z,

Statements:

1. $z^2 = 36 + a$

2. $a = x^2$ and $x = 8$

(a) Either 1 or 2 is sufficient

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(b) Both 1 and 2 are sufficient
(c) Only 1 is sufficient
(d) Only 2 is sufficient

Q91. Which of the following statements is not true?
(a) Bacteria present in the mouth produce acids by the degradation of sugar and food particles remaining in the mouth
(b) When the pH of the mouth is higher than 5.5, then tooth decay starts.
(c) Tooth enamel made of calcium phosphate is the hardest substance in the body.
(d) Using toothpaste, which are generally basic, helps neutralize excess acid and prevent tooth decay.

Q92. A and B can complete a task in 70 days, B and C can complete it in 52.5 days while C and A can do the same task together in 42 days. How many days will each of A, B and C take to complete the task individually?
(a) 105, 210 and 70
(b) 56, 84 and 168
(c) 70, 210 and 105
(d) 84, 168 and 56

Q93. Which of the following is NOT an equation of motion?
(a) $s = ut + 1/2at^3$
(b) $v = u + at$
(c) $s = ut + 1/2at^2$
(d) $v^2 = u^2 + 2as$

Q94. Which children's movie features the famous song, "The Bare Necessities"?
(a) The Jungle Book
(b) Rockford
(c) Stanley's Tiffin Box
(d) The BFG

Q95. Consider the following question and decide which of the statements is sufficient to answer the question.
The simple interest on a sum of money is Rs. 100. What is the sum?
Statements:
I. The interest rate is 20% per annum.
II. The sum earned simple interest in 5 years.
(a) Both statements I and II are sufficient
(b) Only statement I is sufficient
(c) Only statement II is sufficient
(d) Either statement I or II is sufficient

Q96. Which of the following statements is correct?
(a) Two or more resistors are said to be connected in series if different current flows through them
(b) Two or more resistors are said to be connected in series if the same current flows through them.
(c) Two or more resistors are said to be connected in parallel if the same current flows through them.
(d) Two or more resistors are said to be connected in parallel if different current flows through them.

Q97. The atomic number of the atom that becomes stable by gaining 3 electrons in 5^(th) shell is:
(a) 57
(b) 51
(c) 55
(d) 59

Q98. Find the odd one out.
(a) Quadratic Equation
(b) Cubic Equation
(c) Linear Equation

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(d) Real Numbers

Q99. Which of the following cup/tournament is NOT associated with cricket?

(a) Irani trophy
(b) Ranji trophy
(c) Begum Hazratmahal trophy
(d) Vijay Hazare trophy

Q100. Raja Ravi Verma was a painter and sculptor from the state of _____.

(a) Uttar Pradesh
(b) Kerala
(c) Tamil Nadu
(d) Assam

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Mumbai

• Mumbai team was the winner of Vijay Hazare trophy 2018-19.
• It was the 3^(rd) title of the Mumbai team, in which the Mumbai team beat the Delhi team.
• Vijay Hazare Trophy is also known as Ranji one day trophy which was started in 2002-03 as a limited over cricket domestic cricket competition, in which the state team is involving from the Ranji trophy plates.
• The name of this trophy is after the name of the famous International Indian cricketer Vijay Hazare.
• In 2019, Karnataka won the Vijay Hazare trophy by defeating Tamil Nadu.

Q2. Answer: (a) Only argument II is strong.

Shifting agriculture has many benefits.

It helps to ensure weed control, pest control, sustainability etc. It is also effective in reducing the rate of environmental degradation.

Thus, the argument that this agricultural practice is unworthy is incorrect.

Therefore, argument 1 is not strong.

In shifting agriculture, an area of land is cleared off its vegetation by burning them and cultivated for a period of time and then abandoned. Thus, that abandoned land then gets ample time to restore its fertility naturally.

This method saves a wide range of resources and provides nutrients because a small area is usually cleared and the burned vegetation offers many nutrients eventually saving the costs involved in improving the fertility of the land.

Therefore, this method is considered less expensive compared to modern methods of farming.

The economic nature of shift farming is reason enough for it to be preferred over the conventional methods.

Thus, argument 2 is strong.

Hence, only argument 2 is strong.

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Q3. Answer: (d) Only conclusion II follows.

The statement only talks about specific types of frequencies.

• Though music is a type of frequency, we cannot be certain that this is the type mentioned in the statement.

• Therefore, the conclusion that the human brain responds to music is possible but not definite.

• Thus, conclusion I does not follow.

The statement says that specific type of frequencies aid in the healing of problems related to the human brain.

• As the brain is an internal organ of the human body, it is safe to conclude that these frequencies are used to heal diseases (at least related to the brain) in human body.

Therefore, conclusion II follows.

Hence, only conclusion II follows.

Q4. Answer: (b) UF21

The pattern followed is,

Hence, UF21 is the correct answer.

Q5. Answer: (b) 2/√5

Shortcut Trick

Volume of Hemisphere = Volume of Cone => $(2/3)\pi r^3 = (1/3)\pi r^2 h$ => $h = 2r$.

Slant height (l) of cone = $\sqrt{(r^2 + h^2)} = \sqrt{(r^2 + (2r)^2)} = r\sqrt{5}$.

Ratio of CSAs = $(2\pi r^2) : (\pi rl) = 2r^2 : (r \times r\sqrt{5}) = 2 : \sqrt{5}$.

Therefore The correct answer is $2/\sqrt{5}$.

Alternate Method

Given: Radius of Hemisphere = r, Base radius of Cone = r.

Formula Used: Volume of Hemisphere = $(2/3)\pi r^3$; Volume of Cone = $(1/3)\pi r^2 h$; CSA of Hemisphere = $2\pi r^2$; CSA of Cone = πrl.

=> Volume of Hemisphere = Volume of Cone

=> $(2/3)\pi r^3 = (1/3)\pi r^2 h$

=> $2r = h$

=> Slant height of cone (l) = $\sqrt{(r^2 + h^2)} = \sqrt{(r^2 + 4r^2)} = r\sqrt{5}$

=> Ratio = (CSA of Hemisphere) / (CSA of Cone)

=> Ratio = $(2\pi r^2) / (\pi rl) = (2\pi r^2) / (\pi r \times r\sqrt{5})$

=> Ratio = $2/\sqrt{5}$

Therefore The correct answer is $2/\sqrt{5}$.

Additional Information

Total Surface Area (TSA)

TSA of Hemisphere = $3\pi r^2$ and TSA of Right Circular Cone = $\pi r(l + r)$.

Melting and Recasting Rule

When one solid is melted and recast into another, the Volume remains constant, regardless of the change in shape.

Slant Height Property

In a cone, the relationship between radius (r), height (h), and slant height (l) is given by the Pythagorean theorem: $l^2 = r^2 + h^2$.

Q6. Answer: (c) 33

Shortcut Trick

The overall average of 4 numbers is 26.5.

The average of the first 2 numbers (a and b) is 20, which is 6.5 below the overall average.

To maintain the balance, the average of the remaining 2 numbers (c and d) must be 6.5 above the overall average.

Required Average = 26.5 + 6.5 = 33.

Therefore The correct answer is 33.

Alternate Method

Given:

Number of observations (n) = 4

Overall average of (a, b, c, d) = 26.5

Average of (a, b) = 20

Formula Used:

Sum of observations = Average × Total number of observations

=> Total sum (a + b + c + d) = 26.5 × 4

=> Total sum = 106

=> Sum of (a + b) = 20 × 2

=> Sum of (a + b) = 40

=> Sum of (c + d) = Total sum − Sum of (a + b)

=> Sum of (c + d) = 106 − 40 = 66

=> Average of (c and d) = 66 ÷ 2

=> Average of (c and d) = 33

Therefore The correct answer is 33.

Additional Information

Basic Average Formula

The average is calculated as the Sum of all observations ÷ Total number of observations.

Sum of Observations

If the average and number of items are known, the Total Sum is found by Average × Number of items.

Weighted Average

When combining two groups, the combined average = (n1x1 + n2x2) ÷ (n1 + n2), where n is the count and x is the group average.

Q7. Answer: (a) Meghalaya

• 2018 Assembly elections took place in Meghalaya, which was held on 27^(th) February 2018.

• In this election three largest parties, Indian National Congress (INC) won 21 seats, National People's Party(NPP) won 19 seats and the United Democratic Party (UDP) won 6 seats.

• The Chief Minister of Meghalaya is Conrad Sangma belongs to the National people's party.

Meghalaya:

Capital: Shillong

State Animal: Cloud Leopard

State Bird: Hill Myna

State Tree: White Teak

State Flower: Lady Slipper

Q8. Answer: (a) Only conclusion 2 follows

Least possible venn diagram is,

1. All leopards are jaguars → False

2. Some panthers are cheetahs → True

Hence, only conclusion 2 follows.

Q9. Answer: (b) 20TS19

The pattern followed here is,

Number are given in descending order.

24 – 23, 22 – 21, 20 – 19.

According to alphabetical series,

24 → X

23 → W

22 → V

21 → U

20 → T

19 → S

Hence, "20TS19" is the correct answer.

Q10. Answer: (a) Defence Acquisition Council

• The Defence Acquisition Council (DAC) which is the ministry of defence's highest decision-making body approved the proposal for the Indian Navy.

• In this proposal, DAC approved the procurement of 111 utility helicopters for the Indian Navy at a cost of over 21000 crores.

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• The utility helicopters will be used in attack missions as well as for search and rescue and surveillance operations.

• This is the first project under the MoD's prestigious Strategic Partnership model that aims at providing significant fillip to the government's 'Make in India' programme.

Q11. Answer: (d) Nucleotides

The correct answer is Nucleotides.

Key Points

• The Genetic information is carried by the long chains of molecules that are called the Nucleotides

• Nucleotides are molecules, which is consisting of nucleoside and phosphate groups.

• A nucleotide consists of three components: a phosphate group, a sugar (deoxyribose in DNA and ribose in RNA), and a nitrogenous base (adenine, guanine, cytosine, thymine in DNA; adenine, guanine, cytosine, uracil in RNA).

• Nucleotides link together through their phosphate and sugar groups to form the long chains of DNA or RNA, which are the molecules that carry genetic information.

• Nucleotides are the basic unit of building a structure of DNA and RNA.

Q12. Answer: (a) Sound waves can’t travel in space

• Astronauts in space communicate with each other by the radio links because sound waves can’t travel in space.

• A sound is a mechanical wave, which requires a medium to travel.

• In this, the motion of the particle of the medium vibrates parallel to the motion of the wave, which characterizes the sound as the longitudinal wave.

Q13. Answer: (b) C

The mirror image will be,

Hence, option c is the correct answer.

Q14. Answer: (a) Rajagopalan Vasudevan

• Rajagopalan Vasudevan is also called as the ‘Plastic Man of India’ who has found a way to reuse plastic waste and make durable rods.

• Rajagopalan Vasudevan is an Indian scientist who basically works for waste management system.

• He is currently working as a professor at Thiagarajar college of engineering.

• He developed an innovative method to reuse of plastics waste to better, durable and cost-effective roads, has recently been awarded for this work of India's fourth-highest civilian honor Padma Shri in 2018.

Q15. Answer: (b) South

According to given information,

At point F, the man is facing towards the South direction.

Hence, South is the correct answer.

Q16. Answer: (b) m°

The correct answer is m°.

As per the question, it is given that mass of the object is =m,

The body is moving under the constant force.

a = F/m

We know that,

=> $v^2 = u^2 + 2as$

=> $v^2 = 2as$

=> $v = \sqrt{2as}$

=> $v = \sqrt{(2\ (F/m)s)}$

Now, the kinetic energy of the object

KE = fracmv²2

=> KE = m/2(2Fs/m) = Fs

Hence, it is independent of mass.

Q17. Answer: (d) Akbar

• The royal city at Fatehpur Sikri was built by the Mughal emperor Akbar during the second half of the 16^(th) century.

• It was celebrated as the city of Victory of the Mughal empire, which was the capital city for more than 10 years from 1571 to 1585.

• It was turned as a Fatehabad (the city of Victory) where the legend sons of Akbar were born.

• It's also known for the complex of monuments and temples all in uniform architectural style.

Q18. Answer: (b) Only conclusion 2 follows

The use of the word 'definitely' indicates the employer's need for a good computer programmer.

Therefore, conclusion 2 follows.

The author of the statement certainly needs a good computer programmer.

But we cannot conclude that this is the case in general for any employer.

Nor do we know if there are as many jobs as the number of good computer programmer.

Therefore, conclusion 1 does not follow.

Hence, only conclusion 2 follows.

Q19. Answer: (c) ÷ & ×

Option 1: × & +

$5 \times 6 + 3 - 4 \div 2 = 30 + 3 - 2 = 31 \neq -1$

Option 2: - & ÷

$5 + 6 \times 3 \div 4 - 2 = 5 + 4.5 - 2 = 7.5 \neq -1$

Option 3: ÷ & ×

$5 + 6 \div 3 - 4 \times 2 = 5 + 2 - 8 = 7 - 8 = -1$

Option 4: + & -

$5 - 6 \times 3 + 4 \div 2 = 5 - 18 + 2 = -11 \neq -1$

Hence, " ÷ & × " is the correct answer.

Q20. Answer: (b) Home

Alight and Descend are synonyms,

Similarly,

House and Home are synonyms.

Hence, Home is the correct answer.

Q21. Answer: (b) Smaller atomic radii.

• Non-Metals are generally more electronegative due to their Smaller atomic radii.

• Non-metals having high pull forces on their electron because they are closer to having a full valance shell, which makes them stable.

• The much number of valance electrons have more electronegative.

Q22. Answer: (a) The statements are not sufficient

Statement 1: The shape of 6 tins is such that in one trolley, only 2 can fit.

No relation with trolly is given so not sufficient to answer the question.

Statement 2: The tins contain processed sauce.

Data given in this statement is not relevant to question.

Hence, "The statements are not sufficient ".

Q23. Answer: (c) Aamir Khan

• Amir Khan played the lead role in the movie 'Dangal' released in 2016.

• The director of the movie 'Dangal' is Nitesh Tiwari, which was released on 23 December 2016.

• In this movie, a character Mahaveer Singh Phogat, a farmer wrestler decides to full fill his dream of winning the gold medal for his country by training his daughter for the commonwealth games.

Q24. Answer: (c) 40°

Shortcut Trick

angle CBE = 180° − 80° = 100° (Opposite angles of cyclic quadrilateral BCDE).

In isosceles triangle BCE, angle BCE = (180° − 100°) ÷ 2 = 40°.

By Alternate Segment Theorem, angle BEA = angle BCE = 40°.

Therefore The correct answer is 40°.

Alternate Method

Given: angle CDE = 80°, m(BC) = m(BE), AF is a tangent at E.

Formula Used: Sum of opposite angles of a cyclic quadrilateral is 180°; Alternate Segment Theorem.

=> BC

Q25. Answer: (b) Malleability

• The property of the metals wherein they can be beaten into thin sheets is called the Malleability.

• Malleability is the ability of the material to deform under the pressure.

• Malleability occurs in metal because of the metallic bonds that keep the metal in place. Metallic bonds are characterized as the sea of the electron, and electrons easily can move from atom to another, which allows the atom to slide on each other by applying the force.

• Expansion- It is the action of becoming larger.

• Ductility- It is the physical property of the material which is associated with the ability to be hammered thin or stretched wire without breaking.

• Conduction- It is the property of the material to allow the flow of charges in the metals.

Q26. Answer: (c) Density

CONCEPT:

• Pressure (P): The force per unit area is called pressure.

• The SI unit of pressure is the pascal (Pa).

Pressure (P) = Force (F)/ Area (A)

• Force (F): The interaction that changes the state of rest or state of motion of a body is called force.

• The SI unit of force is Newton (N).

Force (F) = Mass (m) × acceleration (a)

• Density (ρ): The mass per unit volume is called density.

• The SI unit of Density is Kilogram per cubic meter (kg/m^3).

Density (ρ) = Mass (m)/Volume (V).

EXPLANATION:

Mass/Volume = Density.

So option 3 is correct.

Q27. Answer: (d) Adipose

• Adipose tissue is found beneath the skin, around the kidneys, and between the internal organs.

• Ligament- It connects one bone to another bone to form joints.

• Areolar- It is the loose connective tissue that consists of a meshwork of collagen elastic tissue and reticular fibers with many connective tissue cells in between meshwork of fibers.

• Tendons-It connects bones to muscles. It is the tough band of fibrous connective tissue that connects muscle to bone and is capable of withstanding tension.

Q28. Answer: (b) Comptroller & Auditor General

• The comptroller and Auditor General of India is also known as the Guardian of Public Purse.

• All the govt. official payment goes through the approval of the comptroller and Auditor General of India.

• This authority was given to general under article 148 constitution of India.

Q29. Answer: (b) Only I follows

The least possible venn diagram:

I) All crayons are nibs → True

II) All nibs are crayons → False (Possible but not definite)

Hence, only conclusion I follows.

Q30. Answer: (c) 30000

The solution is in Hindi. Read it online.

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Q31. Answer: (c) Newton

• The SI unit of thrust is Newton.

• When any object is put into the water then the object will replace the water the same as its volume and the cause of which there is a force acting upwards, to balance this weight is called the thrust force.

Q32. Answer: (b) Magnetic field

CONCEPT:

• Electrostatic field: Filed of lines starts from the positive charge and end at the negative charge.

• It is formed only by a charged particle, not by electric current.

• Magnetic field: Magnetic field line starts from the North pole and ends at the south pole, it always makes a closed loop.

• It is formed by electric currents and magnets.

• Magnetic field lines: The imaginary lines which represent the direction of the magnetic field are called magnetic field lines.

• The tangent at any point on the field lines gives the direction of the magnetic field vector at that point.

• Magnetic lines of force always emerge or start from the North Pole and terminate on the South Pole.

• Electromagnetic field: It is a field that is getting produced by the accelerated charged particle.

• Static field: It is a kind of field, which is getting produced by the state charge.

EXPLANATION:

• From the above discussion, we can say that the magnetic field lines are produced by a current-carrying wire. So option 2 is correct.

• In the case of electric current, the electrons flow in the wire but there are equal and opposite charges, that is the same number of protons are there in that wire which doesn't flow.

• That's why the overall current-carrying wire is neutral and it can't produce an electric field.

• A charge at rest produces an electric field only.

• A charge moving with a constant velocity produces both electric field as well as the magnetic field.

• A charge moving with some acceleration produces electromagnetic waves/fields.

Q33. Answer: (c) 20%

Shortcut Trick

Ratio of Selling Price to Cost Price percentage: 125% corresponds to Rs. 6250.

Unitary method: Rs. 1 = 125 ÷ 6250 %.

For Rs. 6000: (125 ÷ 6250) × 6000 = 120%.

Profit percentage = 120% − 100% = 20%.

Therefore The correct answer is 20%.

Alternate Method

Given → SP1 = Rs. 6250, Profit% = 25%, SP2 = Rs. 6000.

Formulas: CP = [SP × 100] ÷ [100 + P%] | Profit% = [(SP − CP) ÷ CP] × 100

=> First, find the Cost Price (CP): CP = (6250 × 100) ÷ (100 + 25)

=> CP = (6250 × 100) ÷ 125 = 50 × 100 = Rs. 5000.

=> Now, if New SP = Rs. 6000, then New Profit = 6000 − 5000 = Rs. 1000.

=> New Profit% = (1000 ÷ 5000) × 100 = 1/5 × 100 = 20%.

Therefore The correct answer is 20%.

Additional Information

Cost Price & Selling Price Relation

When there is a profit, Selling Price is always greater than Cost Price. The formula is SP = CP + Profit.

Profit Percentage Calculation

Profit percentage is always calculated on the Cost Price unless stated otherwise. Formula: Profit% = (Profit ÷ CP) × 100.

Q34. Answer: (b) Cartilage

• Cartilage- In the cartilage tissue, the cells are widely spaced. This tissue helps in soothing the bone surfaces at the joints.

• Tendons-It connects bones to muscles. It is the tough band of fibrous connective tissue that connects muscle to bone and is capable of withstanding tension.

• Bone- Bone is rigid organs in the body that provide the shape and strength to the body.

• Ligament- It connects one bone to another bone to form joints

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Q35. Answer: (c) Tamil Nadu

• All India Anna Dravida Munnetra Kazhagam (AIADMK) party is a regional political party of Tamil Nadu and the union territory of Puducherry.

• The founder of the AIADMK party is MG Ramachandran on 17 October 1972.

• From the 1989 to 5 December 2016 J. Jayalalitha led this party who serves six times a CM of Tamil Nadu, the party has won seven times in the majority.

• J. Jayalalitha was known as the Mother of AIADMK.

Q36. Answer: (a) Thrust

• We know that Pressure= Force Thrust/ Area

• Thrust Force= Pressure × Area

• Thrust is a kind of pull force, which is applied by the medium on the object.

• Inertia- It is a kind of resistive force of any object to change its state.

• Momentum- When any massive object moving with a certain velocity, then the momentum of that object will be multiplication of the mass and velocity.

• Volume-It is the quantity of three-dimensional space enclosed by a closed surface.

Q37. Answer: (d) 1

The inside figure is rotated by 45° in an anticlockwise direction and an alphabet/ symbol is added from the extreme end in each step.

In step number f, one symbol is towards the end of c.

Complete series will be,

Hence, figure given in option 1 will complete the series.

Q38. Answer: (d) 6.33 cm

Shortcut Trick

Volume of hollow sphere = Volume of cylinder

$4/3 \times \pi \times (R^3 - r^3) = \pi \times R_c^2 \times h$

$4/3 \times (12^3 - 8^3) = 16^2 \times h$

$4/3 \times (1728 - 512) = 256 \times h \Rightarrow 4/3 \times 1216 = 256 \times h$

$h = 1216 / (3 \times 64) = 19 / 3 = 6.33$ cm

Therefore The correct answer is 6.33 cm.

Alternate Method

Given:

External diameter (D) = 24 cm => External radius (R) = 12 cm

Internal diameter (d) = 16 cm => Internal radius (r) = 8 cm

Cylinder diameter = 32 cm => Cylinder radius (R_c) = 16 cm

Formula Used:

Volume of hollow sphere = $4/3 \times \pi \times (R^3 - r^3)$

Volume of cylinder = $\pi \times r^2 \times h$

Calculations:

=> Volume of metal in sphere = $4/3 \times \pi \times (12^3 - 8^3)$

=> Volume of metal = $4/3 \times \pi \times (1728 - 512) = 4/3 \times \pi \times 1216$ cm³

=> Let height of cylinder be h.

=> Volume of cylinder = $\pi \times 16^2 \times h = 256 \times \pi \times h$

=> Equating volumes: $256 \times \pi \times h = 4/3 \times \pi \times 1216$

=> $256 \times h = 4864 / 3$

=> $h = 4864 / (3 \times 256) = 1216 / (3 \times 64)$

=> $h = 19 / 3 \approx 6.333...$ cm

Therefore The correct answer is 6.33 cm.

Additional Information

Volume Invariance

When a solid is melted and recast into another shape, the total volume remains constant, provided there is no wastage.

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Cylinder Properties

Curved Surface Area (CSA) = 2πrh and Total Surface Area (TSA) = 2πr(r + h).

Sphere Properties

Surface Area of a sphere = $4\pi r^2$. For a hollow sphere, the material surface area is $4\pi(R^2 + r^2)$.

Q39. Answer: (a) [figure]

By combining given pieces,

Hence, option 1 is the correct answer.

Q40. Answer: (b) Agra

• Dr. Bhimrao Ambedkar University is a non zero profit public higher education institution located in the urban setting of the large city of Agra, Uttar Pradesh.

• It is founded in 1927 and officially accredited by University Grants Commission, India.

• Initially in this institute had only four faculties Arts, Sciences, Commerce and Law.

• It is also known as the Agra university, which was established by the great efforts of the educationalist Rev Canon, AW Davis, Munshi Narayan Prashad Asthana, etc which was later renamed as Dr. B. R. Ambedkar University in 1996.

Q41. Answer: (c) Maharashtra

• Ratnagiri mines are found in Maharastra.

• It is the part of the Konkan division and a port town in the Maharastra.

• This district was founded by the British.

• Minerals like Bauxite, Ilmenite found in these mines.

• It was also a birthplace of great Indian freedom fighter Lokmanya Bal Gangadhar Tilak.

Q42. Answer: (b) 18

• 18 groups are there in the modern periodic table.

• In each group, have the same number of a valance electron.

• Mendeleev was the first scientist who arranges the known elements as per the order of their atomic weight.

• The concept of the modern periodic table was given by the chemist Mosely, in which he arranged the elements based on their atomic number.

Q43. Answer: (b) (10x + 3) (3x - 5) = 0

Shortcut Trick

If a root is given as a fraction a/b, the corresponding linear factor is (bx − a).

For the root 5/3, the factor is (3x − 5).

For the root −3/10, the factor is (10x − (−3)) = (10x + 3).

The quadratic equation is the product of these factors: (10x + 3) (3x − 5) = 0.

Therefore The correct answer is (10x + 3) (3x − 5) = 0.

Alternate Method

Given:

Roots of the quadratic equation are x = 5/3 and x = −3/10.

Formula Used:

If α and β are the roots, the equation is represented as (x − α)(x − β) = 0.

Calculations:

=> First root (α) = 5/3 → (x − 5/3) = 0

=> 3x − 5 = 0

=> Second root (β) = −3/10 → (x + 3/10) = 0

=> 10x + 3 = 0

=> Combining the linear factors to form the equation:

=> (10x + 3) × (3x − 5) = 0

Therefore The correct answer is (10x + 3) (3x − 5) = 0.

Additional Information

Standard Form of Quadratic Equation

The general form is $ax^2 + bx + c = 0$, where $a \neq 0$.

Sum and Product of Roots

For roots α and β, the Sum (α + β) = −b/a and the Product (αβ) = c/a.

Nature of Roots

The value of the discriminant ($D = b^2 - 4ac$) determines if roots are real and distinct ($D > 0$), real and equal ($D = 0$), or imaginary ($D < 0$).

Q44. Answer: (a) North-west

According to given information:

Hence, North- West is the correct answer.

Q45. Answer: (c) 100 years

Let,

Age of Heera = x

Arijit's age = 1.5x + 3

According to given conditions,

2/3 of Deepika' s age = x – 10

Deepika's Age = 3/2x - 15

According to given conditions,

(15x)/2 - 75 = 4.5x + 9

15x - 150 = 9 x + 18

6x = 18 + 150

x = 28

Age of Heera = 28

Age of Arijit = 45

Age of Deepika = 27

Total = 28 + 45 + 27 = 100

Hence, 100 is the correct answer.

Q46. Answer: (b) Den

Birds live in Nest.

Similarly,

Lion lives is Den.

Hence, Den is the correct answer.

Q47. Answer: (d) Aunt

Drawing family tree diagram:

Hence, Preethi is the Aunt of Kajol.

Q48. Answer: (d) 13310

Shortcut Trick

Rate is 30% per annum, so for 4 months, Rate = 30% ÷ 3 = 10%.

Time is 1 year, so number of periods (n) = 3 (since 12 ÷ 4 = 3).

Using the ratio method for 10% (10 → 11): $(10)^3 \rightarrow (11)^3$ => 1000 → 1331.

Given 1000 units = Rs. 10000 => 1 unit = Rs. 10.

Therefore The correct answer is Rs. 13310.

Alternate Method

Given:

Principal (P) = Rs. 10000

Annual Rate (R) = 30%

Time (T) = 1 year

Compounding Period = 4 months

Formula Used:

Amount $(A) = P(1 + r/100)^n$

Where r = rate per conversion period and n = total number of conversion periods.

Calculations:

=> Conversion periods in a year = 12 months ÷ 4 months = 3 periods.

=> Rate per period (r) = 30% ÷ 3 = 10%.

=> Total periods (n) = 1 × 3 = 3.

=> $A = 10000 \times (1 + 10/100)^3$

=> $A = 10000 \times (11/10)^3$

=> $A = 10000 \times (1331 / 1000)$

=> $A = 10 \times 1331 = 13310$

Therefore The correct answer is Rs. 13310.

Additional Information

Effective Annual Rate (EAR)

The actual interest rate earned or paid after compounding. Formula: $EAR = [1 + (R/n)]^n - 1$, where n is the number of compounding periods per year.

Compounding Frequencies

For half-yearly compounding, divide rate by 2 and multiply time by 2. For quarterly compounding, divide rate by 4 and multiply time by 4.

Difference between CI and SI

For the first period (e.g., first 4 months here), Simple Interest and Compound Interest are identical. The difference arises from the second period onwards due to interest on interest.

Q49. Answer: (b) 76166

Shortcut Trick

A number is divisible by 4 if its last two digits are divisible by 4.

Check options: (1) 00 → Yes, (2) 66 → No (66/4 = 16.5), (3) 84 → Yes, (4) 08 → Yes.

The number 76166 is the only one not divisible by 4.

Therefore The correct answer is 76166.

Alternate Method

Given: Numbers (1) 89700, (2) 76166, (3) 43584, (4) 74708.

Rule Used: Divisibility test of 4 states that a number is divisible by 4 if the number formed by the tens and units digits is divisible by 4 or if both digits are zero.

=> For 89700: Last two digits = 00. Since 00 is divisible by 4, 89700 is divisible.

=> For 76166: Last two digits = 66. 66 ÷ 4 = 16 remainder 2. So, 76166 is NOT divisible.

=> For 43584: Last two digits = 84. 84 ÷ 4 = 21. So, 43584 is divisible.

=> For 74708: Last two digits = 08. 08 ÷ 4 = 2. So, 74708 is divisible.

Therefore The correct answer is 76166.

Additional Information

Divisibility by 2

A number is divisible by 2 if its unit digit is even (0, 2, 4, 6, or 8).

Divisibility by 8

A number is divisible by 8 if the number formed by its last three digits is divisible by 8.

Divisibility by 3

A number is divisible by 3 if the sum of its digits is divisible by 3.

Q50. Answer: (c) 1 km/h

Calculation:

• As per the question, the mass of the moving body = m and velocity=4 km/hour

• Mass of the second object = 3m

• The velocity of the second object after the collision will be

• Here, masses are getting coalesced, which means here collision is inelastic,

• Hence, applying the conservation of momentum,

=> $P_i = P_f$

=> $Mu = (m1+m2) V$

=> $4m = (m+3m)v$

=> V= 4/4 = 1 km/hr

Q51. Answer: (d) 43264

Shortcut Trick

A rational square root exists only for perfect square numbers.

A perfect square never ends with the unit digits 2, 3, 7, or 8.

Option 1 ends in 8, Option 2 ends in 2, Option 3 ends in 3 → All irrational.

Only Option 4 ends in 4, which can be a perfect square.

Therefore The correct answer is 43264.

Alternate Method

Given: Four numbers to check for rational square roots.

Concept: The square root of a natural number is rational if and only if the number is a perfect square.

=> Step 1: Check unit digits of all options.

=> 16848 ends in 8 (Not a perfect square).

=> 41872 ends in 2 (Not a perfect square).

=> 49883 ends in 3 (Not a perfect square).

=> 43264 ends in 4 (Potential perfect square).

=> Step 2: Verify 43264 using long division or estimation.

=> $200^2 = 40000$ and $210^2 = 44100$.

=> Since 43264 ends in 4, the root could be 208.

=> 208 × 208 = 43264.

Therefore The correct answer is 43264.

Additional Information

Properties of Perfect Squares

The digital root (sum of digits) of a perfect square is always 1, 4, 7, or 9. For 43264: 4+3+2+6+4 = 19 → 1+9 = 10 → 1+0 = 1.

Last Two Digits Rule

The last two digits of a perfect square must be the same as the last two digits of the squares of numbers from 1 to 24.

Rational vs Irrational Roots

If √n is not an integer for a natural number n, then √n is always an irrational number.

Q52. Answer: (a) 14

Number of triangles in the figure are as fillows,

Hence, 14 is the correct answer.

Q53. Answer: (c) Rajasthan

• The eighth nuclear power station is located at Rawatbhata in Rajasthan.

• Rawatbhata is tehsil, city and Nagar Palika of Chittorgarh district in Rajasthan, India.

• Rawatbhata also has one of the biggest dams in Rajasthan, called Rana Pratap Sagar Dam, which is on the Chambal river.

Q54. Answer: (d) 273

Shortcut Trick

Apply divisibility rules for prime numbers like 3, 7, or 13.

For 273, the sum of digits is 2 + 7 + 3 = 12.

Since 12 is divisible by 3, the number 273 is also divisible by 3.

Any number with more than two factors is a composite number.

Therefore The correct answer is 273.

Alternate Method

Given: Numbers 263, 293, 283, 273.

To identify a composite number, we check for factors other than 1 and the number itself.

=> 263: Not divisible by 2, 3, 5, 7, 11, 13, 17. (√263 ≈ 16.2). It is Prime.

=> 283: Not divisible by 2, 3, 5, 7, 11, 13, 17. (√283 ≈ 16.8). It is Prime.

=> 293: Not divisible by 2, 3, 5, 7, 11, 13, 17. (√293 ≈ 17.1). It is Prime.

=> 273: Sum of digits = 2 + 7 + 3 = 12 (Divisible by 3).

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=> 273 = 3 × 91 = 3 × 7 × 13.

Therefore The correct answer is 273.

Additional Information

Composite Numbers

Numbers that have more than two factors (1 and themselves) are called composite numbers.

Prime Testing Rule

To check if N is prime, test divisibility by all primes up to √N.

Divisibility by 3

A number is divisible by 3 if the sum of its digits is a multiple of 3.

Q55. Answer: (a) 52

The pattern followed is,

48 – 1 = 47

47 + 3 = 50

50 – 1 = 49

49 + 3 = 52

Hence, 52 is the correct answer.

Q56. Answer: (b) Prasoon Joshi

• Prasoon Joshi was appointed as the new Chairman of the Central Board of Film Certification(CBFC), in February 2018.

• The Union Information and Broadcasting Ministry has appointed Prasoon Joshi. He replaced the Pahlaj Nihalani and shall have the tenure of three years.

• The central board of film certification film rating system is also known as the Censor board.

• It is a statutory censorship and classification body under the ministry of information and broadcasting, Govt of India.

• It is established with regulation and public exhibition of films under the provisions of the Cinematography act 1952.

Q57. Answer: (d) 56

By counting number of sectors,

Sectors with internal angle 45° = 8

Sectors with internal angle 90° = 8

Sectors with internal angle 135° = 8

Sectors with internal angle 180° = 8

Sectors with internal angle 225° = 8

Sectors with internal angle 270° = 8

Sectors with internal angle 315° = 8

Total = 7 × 8 = 56

Hence, 56 is the correct answer.

Q58. Answer: (a) Acidic

• The Oxides of non-metals are usually acidic in nature.

• Non-metal react with oxygen in the presence of air and produce non-metal oxides.

• Non-metal oxides are usually gases at room temperature.

• Non-metal oxides are easily dissolved in the water and form an acidic solution.

Q59. Answer: (d) Myrmecophily

• Myrmecophily describes pollination by the agency of ants.

• Ants are the busy insect and great lover of nectar, who used to crawl over the flower and carry the nectar without effectively cross-pollinating the flower.

• In the exchange of food and shelter, ants add myrmecophyte in pollination.

• The domatia adopted to ants may be called as the myrmecodomatia.

• Emasculation: Removal of stamens or anthers or killing the pollen of a flower without the female reproductive organ.

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Q60. Answer: (c) Journalist

• BarkhaDutt is known for her role as a Journalist.

• She is an Indian television journalist working with the Tiranga TV.

• BarkhaDutt is born on 18 December 1971 in Delhi. She was previously working with NDTV for the last 21 years.

• She left NDTV in 2017. She emerged as a prominent figure after the reporting on the frontline of the Kargil war between India and Pakistan in 1999.

Q61. Answer: (d) Ovulation

• The process of releasing an egg from the ovary is called the Ovulation.

• The process of Ovulation occurs in women when the ovarian follicles rupture and release the secondary oocyte ovarian cells.

• Reproduction-It is defined as the biological process by which new individual organisms are produced from their "parents".

• Fertilization- It is the process of fusion of haploid gametes, egg, and sperm to form the diploid zygote.

• Gestation- It is defined as the time between conception and birth.

Q62. Answer: (b) 117

span style='display: flex;gap: 6px;align-items: center;'> Shortcut Trick

Sum of 4 numbers = 90 × 4 = 360.

To maximize range, minimize the smallest number.

Maximize other two distinct numbers: 119 and 118 (less than 120).

Smallest number = 360 − (120 + 119 + 118) = 3.

Therefore The correct answer is 117.

Alternate Method

Given: Arithmetic mean = 90, Number of observations (n) = 4, Greatest number = 120.

Formula: Sum = Mean × n | Range = Maximum − Minimum.

=> Total Sum of four numbers = 90 × 4 = 360

=> Let the four distinct numbers be x1 < x2 < x3 < x4

=> Given x4 = 120

=> x1 + x2 + x3 + 120 = 360 => x1 + x2 + x3 = 240

=> To maximize Range (x4 − x1), we must minimize x1

=> To minimize x1, we maximize x2 and x3 such that x1 < x2 < x3 < 120

=> Max possible integer values are x3 = 119 and x2 = 118

=> x1 = 240 − (119 + 118) = 240 − 237 = 3

=> Maximum Range = 120 − 3 = 117

Therefore The correct answer is 117.

Q63. Answer: (c) 8

Calculation:

105 × 2 ÷ (3 × 5) - 6

=> 105 × 2 ÷ (15) - 6

=> 105 × 2/15 - 6

=> 7 × 2 - 6

=> 14 - 6

=> 8

Shortcut Trick => 105 × 2 / (3 × 5) - 6

=> (210 / 15) - 6

=> 14 - 6 = 8

Q64. Answer: (a) 20 years

Let,

Present age of Mohan = x

Mohan’s age 10 years ago = x – 10

Mohan’s mothers age, 10 years ago = 4x – 40

Mohan’s age after 10 year = x + 10

Mohan's mothers age, after 10 years = 2x + 20
Mohan's mother's present age = 4x – 40 + 10 = 2x + 20 – 10
4x – 40 + 10 = 2x + 20 – 10
2x = 10 + 30
x = 40 ÷ 2 = 20
Hence, 20 is the correct answer.

Q65. Answer: (d) 4.05 cm

Shortcut Trick
Rise in water level = Volume of immersed object ÷ Base Area of vessel
Volume of cube = 9 × 9 × 9 = 729 cm^3
Base area of vessel = 12 × 15 = 180 cm^2
Rise = 729 ÷ 180 = 4.05 cm
Therefore The correct answer is 4.05 cm.
Alternate Method
Given:
Edge of the cube (a) = 9 cm
Dimensions of the rectangular vessel base = 12 cm × 15 cm
Formula Used:
Volume of cube = a^3
Volume of water displaced = Base Area × Rise in height
Calculations:
=> Volume of the cube = 9 × 9 × 9 = 729 cm^3
=> Let the rise in water level be h cm.
=> Volume of water displaced = 12 × 15 × h
=> 180 × h = 729
=> h = 729 ÷ 180
=> h = 4.05 cm
Therefore The correct answer is 4.05 cm.
Additional Information
Archimedes Principle in Mensuration
When a solid is completely immersed in a liquid, the volume of liquid displaced is exactly equal to the volume of the solid.
Volume of Cuboid
The volume of a rectangular vessel (cuboid) is given by Length × Breadth × Height.
Base Area Relationship
For any uniform cross-section vessel, Rise in level = Volume added ÷ Area of base.

Q66. Answer: (d) M

8^(th), 12^(th),13^(th),15^(th) letters from left are, O T M E
Meaningful word will be, TOME.
M is at 3^(rd) place.
Hence, M is the correct answer.

Q67. Answer: (d) 12

Shortcut Trick
The first 25 whole numbers are 0, 1, 2, 3, ..., 24.
This is an Arithmetic Progression (AP) with first term (a) = 0 and last term (l) = 24.
For any AP, the Median is equal to the Arithmetic Mean of the first and last terms.
Median = (First term + Last term) ÷ 2
Median = (0 + 24) ÷ 2 = 12.
Therefore The correct answer is 12.
Alternate Method
Given: First 25 whole numbers.

Formula Used:

Median (when n is odd) = ((n + 1) ÷ 2)^(th) term.

=> First 25 whole numbers = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24}

=> Total terms (n) = 25 (which is odd)

=> Median = ((25 + 1) ÷ 2)^(th) term

=> Median = (26 ÷ 2)^(th) term = 13^(th) term

=> Since the sequence starts from 0, the k^(th) term = k − 1

=> 13^(th) term = 13 − 1 = 12

Therefore The correct answer is 12.

Additional Information

Whole Numbers

Whole numbers include all natural numbers (1, 2, 3...) along with zero (0). The first n whole numbers always range from 0 to (n − 1).

Median for Even n

If n is even, the median is the average of the (n/2)^(th) and (n/2 + 1)^(th) observations.

Mean of First n Whole Numbers

The arithmetic mean of the first n whole numbers is given by the formula: (n − 1) ÷ 2.

Q68. Answer: (c) A convex mirror converges light, as does a concave lens.

• The lens is a transparent device which has two curved surfaces, It is usually made of glasses or plastics.

• In the lense, a ray of light is getting refract.

• It has two focal lengths, on both sides of the lens.

• Mirror- It can be a curved surface or plane, and here a ray of light is getting reflected back in the same medium.

• The mirror can have a maximum one focal length.

Q69. Answer: (a) 40

Shortcut Trick

Difference in percentage = 80% − 75% = 5%

This 5% difference is caused by 2 students.

Therefore 5% → 2 students

Total students (100%) = 2 × 20 = 40 students.

Therefore The correct answer is 40.

Alternate Method

Given: Initial pass percentage = 75%, New pass percentage = 80%, Difference in count = 2 students.

Let the total number of students in the class be x.

=> 75% of x + 2 = 80% of x

=> 0.75x + 2 = 0.80x

=> 0.80x − 0.75x = 2

=> 0.05x = 2

=> x = 2 ÷ 0.05

=> x = 200 ÷ 5 = 40

Therefore The correct answer is 40.

Additional Information

Percentage Change

To find the total value when a percentage change is given: Total = (Change in Value ÷ Change in Percentage) × 100.

Base Value Concept

Always ensure the percentages refer to the same base value (total students) before subtracting or adding them directly.

Q70. Answer: (a) Hockey

• The Mission Olympic Cell (MOC) of the Union Ministry of Sports and youth affairs included the Men’s Hockey team of India in the Target Olympic Podium Scheme(TOPS).

• The decision has been taken after reviewing the improved performance as they had finished the runners up in the champion trophy in the Netherlands.

• Under the TOPS, 18 team member will be given 50,000 Rs. each monthly allowance.

• TOPS was launched within the ministry of sports within the ambit of the National sports of Development Fund.

Q71. Answer: (a) The pH will decrease

• The pH will decrease if its Hydrogen ion concentration is increased.

• If we are increasing the concentration of the Hydrogen ion, then the pH value of the solution is getting decrease because the system is getting more acidic.

• When we are mixing the acid with the water, then the H-Plus ion is getting dissociate from the acid and starts to bonding with water and they form the hydronium ions.

Q72. Answer: (c) 141

Shortcut Trick:

Q73. Answer: (d) Noble gases

• The least reactive element of the periodic table is Noble gases.

• It is not reacting with the other elements in the normal state, for this reason, they are also called the inert gases.

• The octave of the noble gases are completely filled, so they don't have a tendency to loss of an electron, or gain of electron or share of the electron, so the noble gases are nonreactive in nature under the normal condition.

Q74. Answer: (d) Explains about change in momentum

CONCEPT:

Newton's First law:

• A body continues to be in its state of rest or of uniform motion along a straight line unless it is acted upon by some external force to change the state.

• If no net force acts on a body, then the velocity of the body cannot change i.e. the body cannot accelerate.

• Newton's first law defines inertia and is rightly called the law of inertia.

Newton's Second Law:

• The rate of change of linear momentum of a body is directly proportional to the external force applied on the body and this change takes place always in the direction of the applied force.

• If a body of mass m moves with velocity vec v then its linear momentum can be given by vec p = mvec v and if force vec F is applied on a body, then

Therefore vec F = mvec a

Where F = Force, m = mass and a = acceleration

Newton's Third Law:

• To every action, there is always an equal (in magnitude) and opposite (in direction) reaction.

• When a body exerts a force on any other body, the second body also exerts an equal and opposite force on the first.

• Forces in nature always occur in pairs. A single isolated force is not possible.

EXPLANATION:

• From above it is clear that Newton's second law of motion explains about change in momentum. Therefore option 4 is correct

Q75. Answer: (c) 44

Shortcut Trick

Difference Method: The HCF must be a factor of the difference between the numbers.

Difference = 176 − 132 = 44

Check if 44 divides both numbers: 132 ÷ 44 = 3 and 176 ÷ 44 = 4.

Since 44 divides both, it is the Highest Common Factor.

Therefore The correct answer is 44.

Alternate Method

Given: Numbers are 132 and 176.

Method: Prime Factorization

=> Prime factorization of 132 = 2 × 2 × 3 × 11

=> Prime factorization of 176 = 2 × 2 × 2 × 2 × 11

=> Common factors = 2 × 2 × 11

=> HCF = 4 × 11 = 44

Therefore The correct answer is 44.

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Additional Information

HCF and LCM Relation

The product of two numbers is equal to the product of their HCF and LCM. Formula: n1 × n2 = HCF × LCM.

Successive Division Method

Divide the larger number by the smaller number, then divide the previous divisor by the remainder until the remainder is 0. The last divisor is the HCF.

HCF of Fractions

HCF of fractions = (HCF of Numerators) ÷ (LCM of Denominators).

Q76. Answer: (a) 45

Shortcut Trick

Actual Travel Time = Total Distance ÷ Average Speed = 420 ÷ 60 = 7 hours.

Total Break Time = Total Journey Time − Travel Time = 8 − 7 = 1 hour = 60 minutes.

Break Ratio (Shorter : Longer) = 1 : 3 → Total units = 4.

Long break = (3 ÷ 4) × 60 minutes = 45 minutes.

Therefore The correct answer is 45 minutes.

Alternate Method

Given: Total distance = 420 km, Total time allowed = 8 hours, Average speed = 60 km/h.

Formula: Time = Distance ÷ Speed

=> Time spent driving = 420 ÷ 60 = 7 hours

=> Total rest time = Total journey time − Driving time = 8 − 7 = 1 hour

=> Convert to minutes: 1 hour = 60 minutes

=> Let long break be 3x and shorter break be x

=> x + 3x = 60 => 4x = 60 => x = 15 minutes

=> Long break = 3 × 15 = 45 minutes

Therefore The correct answer is 45 minutes.

Additional Information

Average Speed with Stoppages

Average speed including stoppages is always less than the speed excluding stoppages. Stoppage time per hour = (Speed_(excl) − Speed_(incl)) ÷ Speed_(excl).

Time, Speed, and Distance Relation

Distance = Speed × Time. To convert km/h to m/s, multiply by 5/18. To convert m/s to km/h, multiply by 18/5.

Ratio Division

To divide a quantity Q in ratio a:b, the parts are [a/(a+b)] × Q and [b/(a+b)] × Q.

Q77. Answer: (d) 2000 J – 5000 J

The correct answer is 2000 J – 5000 J

Concept:

• Kinetic energy (K.E): The energy possessed by a body by the virtue of its motion is called kinetic energy.

The expression for kinetic energy is given by:

KE = 1/2mv²

Where m = mass of the body and v = velocity of the body

Calculation:

As per the given question,

• We know that the average weight of the man is between 50 - 65 kg,

• Hence the average weight of the athlete = 60 kg

• Distance covered by man = 100 m

• Time is taken by the athlete to cover 100 m = 10 sec

• Let the initial speed of the athlete = 0 m/ sec

Speed = 100/10 = 10 m/s

Now we can calculate the kinetic energy,

Now, applying the conservation of energy =

K.E = 1/2 mv²

K.E = 1/2 × 60 × 10^2 = 3000 J

Hence option 4 (2000 J – 5000 J) is the correct answer.

Q78. Answer: (a) Rs. 40000

Shortcut Trick

For half-yearly compounding, the rate becomes 5% (10% ÷ 2) and the time becomes 2 periods (1 year × 2).

Using the fraction method: 5% = 1/20. So, the Principal to Amount ratio for one period is 20 : 21.

For 2 periods, the ratio is 20^2 : 21^2 => 400 : 441.

Given Maturity Amount (441 units) = Rs. 44,100 => 1 unit = Rs. 100.

Sum invested (400 units) = 400 × 100 = Rs. 40,000.

Therefore The correct answer is Rs. 40000.

Alternate Method

Given:

Maturity Amount (A) = Rs. 44,100

Rate of Interest (R) = 10% per annum

Time Period (T) = 1 year

Compounding: Half-yearly

Formula Used:

$A = P(1 + r/100)^n$

Where r = half-yearly rate (R/2) and n = number of half-years (2T).

Calculations:

=> Effective Rate (r) = 10% ÷ 2 = 5%

=> Total periods (n) = 1 × 2 = 2 half-years

=> 44100 = $P(1 + 5/100)^2$

=> 44100 = $P(1 + 1/20)^2$

=> 44100 = $P(21/20)^2$

=> 44100 = P × (441 / 400)

=> P = (44100 × 400) / 441

=> P = 100 × 400

=> P = 40,000

Therefore The correct answer is Rs. 40000.

Additional Information

Effective Rate for Half-Yearly Compounding

When interest is compounded half-yearly, the effective annual rate is always slightly higher than the nominal rate, calculated as $R_{(eff)} = (1 + r/200)^2 - 1$.

Compound Interest Formula Variations

For quarterly compounding, the rate is divided by 4 and the time is multiplied by 4 in the formula A = P(1 + R/400)^(4T).

Comparison with Simple Interest

For the first year with annual compounding, SI and CI are equal. However, for half-yearly compounding, CI is greater than SI even in the first year.

Q79. Answer: (a) Jhelum

Betwa, Chambal and Yamuna are rivers which flow inside india.

But Jhelum has some part in Pakistan too.

Hence, Jhelum is the correct answer.

Q80. Answer: (d) NHAI

• The NHAI(National Highways Authority of India) has created a National Highways Investment Promotion Cell (NHIPC) for attracting domestic and foreign investment for highways projects.

• The main focus of the government to attract global investors in road infrastructure projects.

• The govt is ambitious to make a 35000 km road with an investment of 535000 crore rs under the project of Bharatmala.

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Q81. Answer: (a) Neither conclusion I nor II follows

The statement does not mention anything about the taste or the temperature of the tea in the cup.

Hence, neither conclusion I nor conclusion II follows.

Q82. Answer: (a) Daughter

Family tree diagram,

Hence, daughter is the correct answer.

Q83. Answer: (c) [figure]

Professor, Student, Player.

A professor can also be student to someone else and can also be a player.

A student can be a professor and a player.

Hence, option 3 is the correct answer.

Q84. Answer: (c) Magahi

• SheshAnandMadhukar is a Magahi writer who was honored with the Sahitya Academy BhasaSamman Award in January 2018.

• Madhukar conferred this award by Sahitya Academy President ViswanathPrashad Tiwari.

• Madhukar started his career from BSK college as a professor of Hindi literature. His contribution to the research and development of the Magahi language is very significant.

• He has written a few famous books like- Magahi KavitaKeBimb, Eklavya, andBhagwanBirsa.

Q85. Answer: (d) KCOLC

Pattern followed here is,

Similarly,

Hence, KCOLC is the correct answer.

Q86. Answer: (b) 7

VI, IX, VII are roman number.

7 is not a roman number.

Hence, 7 is the correct answer.

Q87. Answer: (a) 45

Shortcut Trick

Total Work (LCM of 36, 90, 60) = 180 units.

Efficiency of Sarthak = 180 ÷ 36 = 5 units/day.

Efficiency of Vivan = 180 ÷ 90 = 2 units/day.

Efficiency of Ali (Outlet) = −(180 ÷ 60) = −3 units/day.

Combined Efficiency = 5 + 2 − 3 = 4 units/day.

Time taken = 180 ÷ 4 = 45 days.

Therefore The correct answer is 45 days.

Alternate Method

Given:

Time taken by Sarthak (Positive work) = 36 days

Time taken by Vivan (Positive work) = 90 days

Time taken by Ali (Negative work/Emptying) = 60 days

Person	Days	Total Work	Efficiency
Sarthak	36	180	5
Vivan	90	2	
Ali	60	−3	

Formula Used:

Total Efficiency = Efficiency_(Sarthak) + Efficiency_(Vivan) − Efficiency_(Ali)

Time = Total Work ÷ Total Efficiency

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Calculations:

=> Total Work = LCM(36, 90, 60) = 180 units

=> Net efficiency of all three = 5 + 2 − 3

=> Net efficiency = 4 units/day

=> Time required to fill the pit = 180 ÷ 4

=> Time = 45 days

Therefore The correct answer is 45 days.

Additional Information

Pipes and Cisterns Logic

Filling a sandpit is analogous to inlet pipes, while removing sand is analogous to an outlet pipe. Work done by an outlet pipe is always taken as negative.

LCM Method for Time and Work

To find Total Work, calculate the Least Common Multiple of individual time periods. Efficiency is then calculated as Total Work ÷ Individual Time.

Net Work Done

If A and B are filling and C is emptying, 1/Total Time = 1/A + 1/B − 1/C.

Q88. Answer: (b) East

• Godavari, Krishna, Kaveri, and Vaigai are flowing in the direction of the East.

• Godavari river- Godavari river is India's second-largest river after the Ganga, it originates from the Triambakeshwar, Maharastra and ends at the way of Bengal.

• Krishna river- The river Krishna is the 3^(rd) longest river India after the Brahmaputra, Ganga and Godavari. The source of this river is Mahabaleshwar, Maharastra and ends at the Bay of Bengal, it is also called the Krishnaveni.

• Kaveri-This the third-longest river in south India after the Godavari and Krishna, this river originates from Tala Kaveri and ends at the Bay of Bengal.

Q89. Answer: (c) Irrational number

Shortcut Trick

Let a rational number be 2 and an irrational number be √3.

Sum = 2 + √3

Since the sum contains a non-terminating and non-repeating decimal part, the result is always irrational.

Therefore The correct answer is Irrational number.

Alternate Method

Given: A rational number (r) and an irrational number (i).

Property: The sum of any rational number and any irrational number is always an irrational number.

=> Let r = p/q (where p, q are integers and q ≠ 0)

=> Let s = r + i

=> If we assume s is rational, then i = s − r

=> Since the difference of two rational numbers is always rational, this would mean i is rational.

=> This contradicts the fact that i is irrational.

=> Therefore The sum must be irrational.

Therefore The correct answer is Irrational number.

Additional Information

Product of Rational and Irrational

The product of a non-zero rational number and an irrational number is always irrational.

Sum of two Irrational Numbers

The sum of two irrational numbers may be rational or irrational (e.g., √2 + (−√2) = 0, which is rational).

Definition of Rational Numbers

Numbers that can be expressed in p/q form where p and q are integers and q ≠ 0.

Q90. Answer: (b) Both 1 and 2 are sufficient

Shortcut Trick

To find the value of z, we need the value of the variable a from Statement 1.

Statement 2 provides the value of x = 8, which allows us to calculate a = x^2 = 64.

By combining both, $z^2 = 36 + 64 = 100$, which gives $z = \pm 10$.

Neither statement alone can provide the value of z as they contain interdependent unknowns.

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

Alternate Method

Given:

Statement 1: $z^2 = 36 + a$

Statement 2: $a = x^2$ and $x = 8$

Calculations:

From Statement 1 alone:

=> $z^2 - a = 36$

=> There are two variables and only one equation, so z cannot be determined.

From Statement 2 alone:

=> $x = 8$

=> $a = 8^2 = 64$

=> This provides the value of a but no information about z.

Combining Statement 1 and Statement 2:

=> Substitute $a = 64$ into the equation from Statement 1.

=> $z^2 = 36 + 64$

=> $z^2 = 100$

=> $z = \sqrt{100} = \pm 10$

=> Since the value of z can be determined using both statements together, they are sufficient.

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

Additional Information

Data Sufficiency Rules

A question is sufficient if a unique value or a consistent set of values can be derived. If multiple statements are needed to solve for variables, they are mutually dependent.

Algebraic Equations

To solve for n unknown variables, at least n independent equations are required. Here, z, a, and x are three variables requiring three relationships (provided by the two statements).

Square Roots

When solving $x^2 = k$, the roots are always $\pm\sqrt{k}$. In data sufficiency, finding a specific range or set of roots is often considered a sufficient result.

Q91. Answer: (b) When the pH of the mouth is higher than 5.5, then tooth decay starts.

• When the pH of the mouth is less than 5.5, then tooth decay starts. Because the bacteria present in the mouth produce acids by the degradation of sugar and food particles remaining in the mouth after eating. The acid produced in the mouth attack the enamel results in creating tooth decay.

• Tooth enamel made of calcium phosphate is the hardest substance in the body.

• Using toothpaste, which are generally basic, helps neutralize the excess acid and prevent tooth decay.

Q92. Answer: (a) 105, 210 and 70

Shortcut Trick

Total Work (LCM of 70, 52.5, 42) = 210 units.

Efficiencies: (A+B) = 3, (B+C) = 4, (C+A) = 5.

2(A+B+C) = 3 + 4 + 5 = 12 => A+B+C = 6.

Individual efficiencies: C = 6−3 = 3, A = 6−4 = 2, B = 6−5 = 1.

Days: A = 210÷2 = 105, B = 210÷1 = 210, C = 210÷3 = 70.

Therefore The correct answer is 105, 210 and 70 days.

Alternate Method

Given: (A+B) = 70 days, (B+C) = 52.5 (or 105/2) days, (C+A) = 42 days.

Formula Used: Efficiency = Total Work ÷ Time

Person	Days	Total Work	Efficiency

A + B	70	210	3
B + C	52.5	4	
C + A	42	5	

=> Summing efficiencies: 2(A + B + C) = 3 + 4 + 5 = 12

=> A + B + C = 6

=> Efficiency of A = (A+B+C) − (B+C) = 6 − 4 = 2

=> Efficiency of B = (A+B+C) − (A+C) = 6 − 5 = 1

=> Efficiency of C = (A+B+C) − (A+B) = 6 − 3 = 3

=> Time taken by A = 210 ÷ 2 = 105 days

=> Time taken by B = 210 ÷ 1 = 210 days

=> Time taken by C = 210 ÷ 3 = 70 days

Therefore The correct answer is 105, 210 and 70 days.

Additional Information

Combined Work Principle

When individuals work in pairs, summing their combined efficiencies gives twice the total efficiency: 2(A+B+C) = E_((A+B)) + E_((B+C)) + E_((C+A)).

LCM Method for Fractions

To find the LCM of fractions like 105/2 and 70, take (LCM of Numerators) ÷ (HCF of Denominators).

Work and Wages

Wages are always distributed in the ratio of the efficiencies of the workers if they work for the same amount of time.

Q93. Answer: (a) $s = ut + 1/2at^3$

CONCEPT:

• Equation of motion: The mathematical equations used to find the final velocity, displacements, time, etc of a moving object without considering force acting on it are called equations of motion.

• These equations are only valid when the acceleration of the body is constant and they move on a straight line.

There are three equations of motion:

V = u + at

V2 = u2 + 2 a S

$S = ut + 1/2at^2$

Where, V = final velocity, u = initial velocity, s = distance travelled by the body under motion, a = acceleration of body under motion, and t = time taken by the body under motion.

EXPLANATION:

• From the above explanation, it is clear that the equation given in option 1 is not the equation of motion. So option 1 is correct.

Q94. Answer: (a) The Jungle Book

• The Jungle Book is the children's movie features the famous song "The Bare Necessities".

• This song is written by Gilkyson from the animated Disney film the Jungle book.

• This song was sung by Phil Harris as Baloo and Bruce Reitherman as the Mowgli.

• The movie Jungle featured by the Doctor Dolittle and composed by Terry Gilkyson.

Q95. Answer: (a) Both statements I and II are sufficient

Shortcut Trick

To find the Principal (P), we need the Simple Interest (SI), Rate (R), and Time (T).

The formula is P = (SI × 100) ÷ (R × T).

Given SI = Rs. 100, we still have two unknowns (R and T).

Statement I gives R = 20% and Statement II gives T = 5 years.

Combining both, we can uniquely determine P.

Therefore The correct answer is Both statements I and II are sufficient.

Alternate Method

Given:

Simple Interest (SI) = Rs. 100

Formula Used:

Simple Interest (SI) = (P × R × T) ÷ 100

Where P = Sum/Principal, R = Rate of Interest, T = Time period.

Calculations:

From Statement I: Rate (R) = 20%. (Insufficient alone as T is unknown)

From Statement II: Time (T) = 5 years. (Insufficient alone as R is unknown)

Combining Statement I and Statement II:

=> 100 = (P × 20 × 5) ÷ 100

=> 100 = (P × 100) ÷ 100

=> 100 = P

=> Principal (P) = Rs. 100

Since the value of Sum can be calculated using both statements together.

Therefore The correct answer is Both statements I and II are sufficient.

Additional Information

Simple Interest (SI) Properties

The Simple Interest remains constant every year if the Principal and Rate are fixed. Formula: SI = P × R × T ÷ 100.

Amount Calculation

The total Amount (A) at the end of the term is the sum of the Principal and the Interest: A = P + SI.

Data Sufficiency Tips

In Data Sufficiency, do not calculate the final value unless necessary; only check if the available variables can satisfy the independent equations needed.

Q96. Answer: (b) Two or more resistors are said to be connected in series if the same current flows through them.

• In the series connection of the two or more two resistors, then the current flows in all the resistors will always be the same.

• In the series connection of the resistor, the equivalent resistance will be equal to the sum of all the resistors individually.

• In the parallel combination, the potential difference is always is the same in all the combinations.

Q97. Answer: (b) 51

The correct answer is 51.

Key Points

• The electronic configuration of elements that will gain 3 electrons in the 5th shell will be 2, 8, 18, 18,5.

• This is true for atomic number 51.

• 51 is the atomic number of element, Antimony.

• When the last orbit of any element contains the 8 electrons, then it will be in a stable state.

• The electron configuration for antimony is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}4p^6\ 5s^24d^{10}\ 5p^3$.

• The rest of all elements have 6 shells.

Important Points

• The electronic configuration of Lanthanum is: 1s2 2s2 2p6 3s2 3p6 3d10 4s2 4p6 4d10 5s2 5p6 5d1 6s2.

• The atomic number of Lanthanum is 57.

• Full electron configuration of cesium: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6\ 6s^1$

• Electronic configuration of Praseodymium

• 1s2 2s2 2p6 3s2 3p6 3d10 4s2 4p6 4d10 5s2 5p6 4f35d06s

Additional Information

Name of the element	Atomic Number
Lanthanum	57
Antimony	51
Caesium	55
Praseodymium	59

Q98. Answer: (d) Real Numbers

Quadratic equation, Cubic Equation, Liner equation are type of equations.

While, Real number are numbers.

Hence, “Real Numbers” is odd among them.

Q99. Answer: (c) Begum Hazratmahal trophy

• Begum Hazratmahal trophy is not associated with cricket. It is associated with Football.

• Irani trophy-It is related to the cricket, the name of this trophy is on the behalf of Z.R. Irani. Which was conceived during 1959 to 60, called the Z R. Irani cup

• Ranji trophy- It belongs to the cricket game, which is the frist class domestic championship trophy played between the states of India.

• Vijay Hazare trophy-Vijay Hazare Trophy is also known as Ranji one day trophy which was started in 2002-03 as a limited over cricket domestic cricket competition, in which the state team is involving from the Ranji trophy plates.

Q100. Answer: (b) Kerala

• Raja Ravi Verma was a painter and sculptor from the state of Kerala.

• He born inApril 1848 in the Kilimanoor Palace near to the Trivandrum, Travancore, princely state British India now in Thiruvananthapuram, Kerala and died on 2^(nd) October 1906 inKilimanoor palace.

• He won the Governer’s Gold medal in 1873 for the Paintings.

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