RRC Group D Previous Year Paper 47 (Held On: 10 Dec 2018 Shift 1)

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

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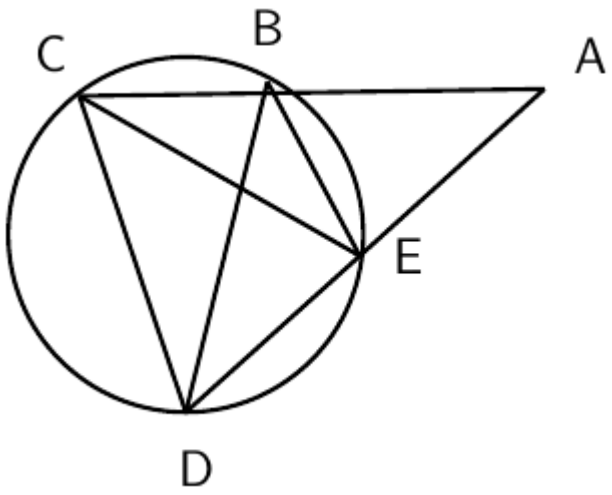
Q1. _____ propagates through stem.

(a) Bryophyla
(b) Tamarind
(c) Rose
(d) Bryophyllum

Q2. If sin θ = cos θ, then what will be the value of sec θ?

(a) √2
(b) 1/(√2)
(c) 1
(d) 2

Q3.



In the above figure, angle BAE = 30°, angle ABE = 80°and angle DBE = 50°. What is the value of angle BCE?

(a) 25°
(b) 5°
(c) 10°
(d) 20°

Q4. Read the following statements and decide which of the two conclusions logically follows them.

Statement:

Freedom and discipline are very important for a good society.

Conclusions:

1. Society has to face problems because of people who lack freedom and discipline.

2. No one has freedom and discipline in society.

(a) Only conclusion (1) follows.
(b) Both conclusions (1) and (2) follow.
(c) Only conclusion (2) follows.
(d) Neither (1) nor (2) follows.

Q5. Which of the following number is divisible by 6?

(a) 12346
(b) 12348
(c) 12344
(d) 12340

Q6. 'g' (acceleration due to gravity) = ?

(a) GR^2/M
(b) GM/R^2
(c) G/MR^2
(d) R^2M/G

Q7. What will be come in place of '?' mark?

5.4 × 0.0015 = _____?

(a) 0.81
(b) 0.00081
(c) 0.081
(d) 0.0081

Q8. The highest common factor of 117 and another number is 13. The second number cannot be which of the following:

(a) 169
(b) 143
(c) 156
(d) 130

Q9. The chemical formula of sodium carbonate is _____.

(a) Na2CO3
(b) NaCO3
(c) Na3CO2
(d) NaCO2

Q10. A cosmetic shop has different brands of cosmetics and ingredients. 50% of the shop's sales are made from hair material. 40% of sales are from personal hygiene products. The store sales average Rs.15,00,000 every quarter. What is the average monthly sales per store for personal hygiene products?

(a) Rs. 3,00,000
(b) Rs. 2,50,000
(c) Rs. 5,00,000
(d) Rs. 2,00,000

Q11. Which of the following is not true about manganese?

(a) It is used in heating elements of electric irons, toasters etc.
(b) Manganese is an electronegative element.
(c) Temperature affects its resistance at high levels.
(d) It does not oxidize easily.

Q12. In the year 1778, the British established the first printing press in _____.

(a) Madras
(b) Bombay
(c) Ahmedabad

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(d) Calcutta

Q13. Which of the following is gymnosperm?

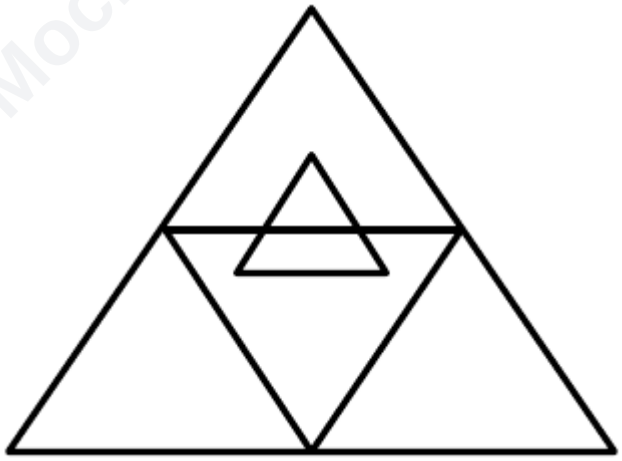
(a) Fern
(b) Pine
(c) Mango
(d) Moss

Q14. Superman is flying over the home krypton. Krypton is spherical in shape. It is in Pune city, which is situated on the equator. It is now facing towards the North Pole. He crosses the equator and flies to his left and reaches Mumbai, which is just opposite the equator of Pune city. He decides to fly to the South Pole, but he stops in Delhi on half way. What are the measurements of the following angles, considering the center of the krypton as a reference point?

1. Pune-Center-Delhi
2. Pune-Center-Mumbai
3. Mumbai-Center-Delhi

(a) 120, 180, 45
(b) 120, 0, 45
(c) 135, 180, 45
(d) 45, 180, 135

Q15. What is the number of triangles in the following figure?



(a) 7
(b) 9
(c) 11
(d) 5

Q16. Three of the four options below are related in a particular way. Choose the option which is different or mismatched from the others.

(a) Sutlej
(b) Ravi
(c) Chenab
(d) Yamuna

Q17. Raksha can do a work in 27 days while Esther takes 45 days to do it herself. They start working together, but Raksha leaves 9 days before the work is over. How many days does Esther work?

(a) 18
(b) 27
(c) 13.5
(d) 22.5

Q18. _____ is a Pacific form of phytochrome.

(a) P760
(b) P730
(c) P660
(d) P630

Q19. What will be the next term in the following category?

5E, 7G, 9I, 11K, _____

(a) 14N
(b) 13N
(c) 13M
(d) 14M

Q20. Rani and Radha were walking in opposite directions. If Radha was moving towards the north-east direction, then towards which direction was the Rani moving?

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

Q21. Who played the lead role in the movie "Hindi Medium" released in 2017?

(a) Nawazuddin Siddiqui
(b) Raj Kumar Rao
(c) Irrfan Khan
(d) Akshay Kumar

Q22. A is standing at the entrance of the mall waiting for his friend to come. He is facing east. He then turns his head to the right to see that his friend has arrived. From which direction is he expecting his friend to come?

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

Q23. The pH scale measures the hydrogen ion concentration in a solution. What does p mean in this?

(a) Power
(b) Potential, Which means comfort in German.
(c) Potency, Which means power in German.
(d) Potenz, Which means power in German.

Q24. Consider the following question and decide which of the statements is/are sufficient to answer the question.

Statement:

Find the value of Z from the statements.

Statement:

I) A + Z = 19

II) Z + P = 12

(a) Only statement II is sufficient.
(b) Neither statement I nor II is sufficient.
(c) Either statement I or II is sufficient.
(d) Only statement I is sufficient.

Q25. Read the given statements and conclusions carefully and select which conclusions logically follow the statements.

Statement:

Some jaguars are cheetahs, some cheetahs are leopards.

Conclusions:

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1. No leopard is Jaguar.
2. Some jaguars are leopards.

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

Q26. George Soders, an American writer, won the 2017 Man Booker Award for Fiction for his novel _____.

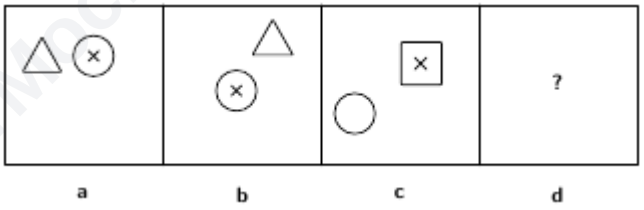
(a) Lincoln in the Bardo
(b) Lincoln the Lone Walk
(c) Lincoln Letters
(d) Speech and Writing

Q27. Mayurbhanj mines are known for which of the following metals?

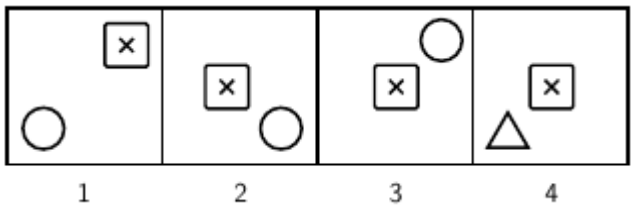
(a) Copper
(b) Aluminum
(c) Iron-ore
(d) Bauxite

Q28. Which answer figure will replace the question mark (?) given in the question figure.

Question figure:



Answer figures:



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

Q29. The velocity of a wave is 'v', frequency 'f', and wavelength 'λ' is _____?

(a) $v = 1/f\lambda$
(b) $v = f/\lambda$
(c) $v = f\lambda$
(d) $v = \lambda/f$

Q30. The capillaries of collenchyma tissue become thick due to the deposit of _____.

(a) Cellulose and Pectin
(b) Lignin and Cutin
(c) Pectin and Chitin
(d) Suberin and Cellulose

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Q31. Three resistors of value 9Ω, 4Ω and 12Ω are connected in parallel. What will be the equivalent resistance of the circuit?

(a) 0.8
(b) 2.2
(c) 1.9
(d) 2.6

Q32. Select the correct option to complete the following series.

2, 5, 9, 19, _____?

(a) 41
(b) 43
(c) 37
(d) 36

Q33. Anantnag is a city in _____.

(a) Himachal Pradesh
(b) Jammu and Kashmir
(c) Uttarakhand
(d) Sikkim

Q34. Ankita is two years younger than Anu. After four years from today, Anu's age will be two times of Ankita's age three years ago. Find the present age of Ankita and Anu.

(a) 13 years and 15 years
(b) 14 years and 16 years
(c) 12 years and 14 years
(d) 15 years and 17 years

Q35. 276x1 is divisible by 3. What is the sum of the possible values of x?

(a) 18
(b) 15
(c) 12
(d) 21

Q36. Find the next word in the series.

3X24C, 5V22E, _____.

(a) 8T20G
(b) 9T21G
(c) 8T21G
(d) 7T20G

Q37. A tank can be filled with a tap in 10 hours. However it takes 11 hours to fill the tank due to a leak. The tap is closed when the tank is full. How many hours will the tank take to empty due to leakage?

(a) 50
(b) 130
(c) 100
(d) 110

Q38. In 2018, the Ministry of Drinking Water and Sanitation has started the second project of the Swajal Scheme in which village?

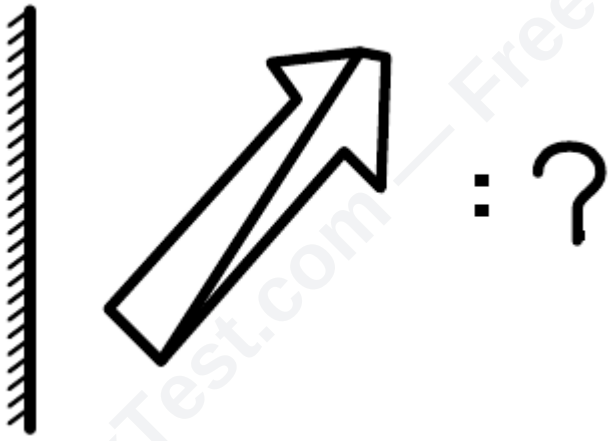
(a) Bhikampura, Karauli, Haryana
(b) Bhikampura, Karauli, Rajasthan
(c) Bhikampura, Karauli, Himachal Pradesh
(d) Bhikampura, Karauli, Gujarat

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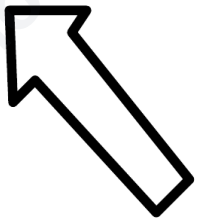
Q39. Which country will host the 2023 Rugby World Cup?

(a) Argentina
(b) France
(c) Brazil
(d) England

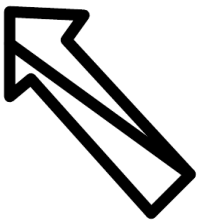
Q40. If a mirror is placed to the left of the figure, indicate the appropriate mirror image of the given figure.



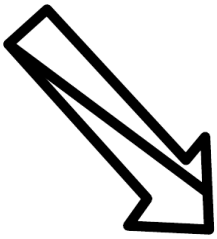
(a)



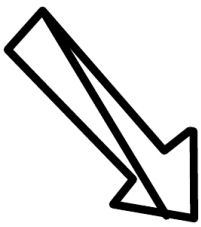
(b)



(c)



(d)



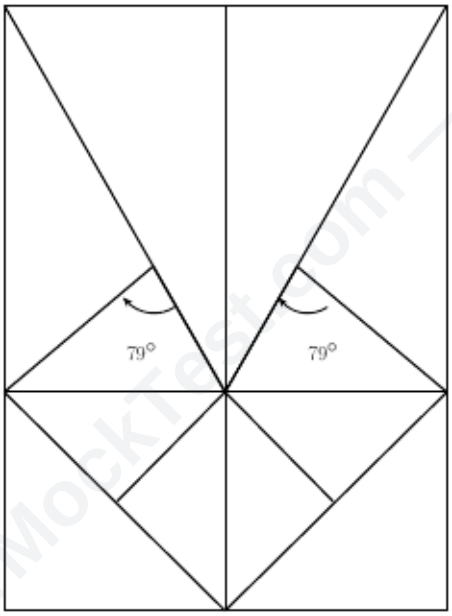
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Q41. Select the option that is related to the third term in the same way as the second term is related to the first term.

Vacant : Empty :: Sedate : ?

(a) Defect
(b) Car
(c) Cat
(d) Calm

Q42. How many right-angled triangles exist in the picture below?

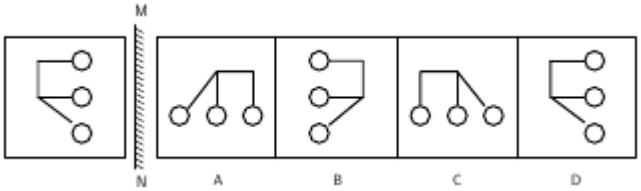


(a) 12
(b) 5
(c) 4
(d) 8

Q43. Narmada and Tapi are the rivers flowing towards _____.

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

Q44. What will be the mirror image of the given image if the mirror is on MN?



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

Q45. Sangai deer recently seen in the news is the state animal of which state?

(a) Manipur
(b) Jammu & Kashmir
(c) Gujarat
(d) Tamilnadu

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Q46. You have to decide which of these assumptions is/are implicit in the statement, considering the statement and the assumptions that follow it.

Statement:

I like the soldiers.

I want to become a soldier.

Assumptions:

I) I am not a soldier.

II) I am a soldier.

(a) Neither assumption I nor II is implicit.
(b) Only assumption II is implicit.
(c) Only assumption I is implicit.
(d) Either assumption I or II is implicit.

Q47. A block of 2 kg slides on a parallel surface at a speed of 4 m/s. It falls on an unpressed spring and presses it until the block is completely motionless. The amount of kinetic friction is 15 N and the spring constant is 10,000 N/m. Spring presses with _____.

(a) 5.5 m
(b) 8.5 m
(c) 5.5 cm
(d) 8.5 cm

Q48. All samples of carbon dioxide contain carbon and oxygen in the mass ratio of 3 : 8. This is an agreement with the Law of _____.

(a) Conservation of Mass
(b) Constant Proportion
(c) Reciprocal proportion
(d) Conservation of Energy

Q49. Find the next number in the following series.

71, 63, 55, _____?

(a) 47
(b) 45
(c) 46
(d) 48

Q50. Consider the following question and decide which of the statements is/are sufficient to answer the question.

Question:

Find the value of x, if

Statement:

1) $1/(x) + 1/9 = 1/27$

2) $a^2 + p^2 = q^2$

(a) Neither 1 nor 2 is sufficient.
(b) Only 2 is sufficient.
(c) Only 1 is sufficient.
(d) Either 1 or 2 is sufficient.

Q51. A tent is such that its lower part is like a cylinder of 24 m height, which is 126 m in diameter. Its apex is like a cone with a base of the same diameter of 126 m and is 80 m slant high. Its canvas is 8 m wide. Calculate the length of the canvas required to make the tent.

(a) 3168 m
(b) 3020 m
(c) 3296 m
(d) 3190 m

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Q52. Which of the following metals does not react with air?

(a) Gold, Platinum
(b) Silver, Platinum
(c) Potassium, Mickel
(d) Gold, Silver

Q53. Read the following information carefully and answer the question given below:

Abinav and Barani play golf and volleyball.
Krish and Dev play tennis and cricket.
Barani and Krish play cricket and volleyball.
Abinav and Dev play golf and tennis.
Who plays tennis, volleyball and golf?

(a) Dev
(b) Krish
(c) Abinav
(d) Barani

Q54. If $(\sqrt{3} - 1)/(\sqrt{3} + 1) = a + b\sqrt{3}$, then what will be the value of $a^2 + b^2$?

(a) 7
(b) 6
(c) $\sqrt{8}$
(d) 5

Q55. Which of the following words is related to basketball?

(a) Upper cut
(b) Penalty corner
(c) Flagrant foul
(d) Bicycles kick

Q56. A 141.5 m long train, at a speed of 57 km/h, crosses a platform in 39 seconds. What is the length of the platform?

(a) 476 m
(b) 586 m
(c) 613.5 m
(d) 461 m

Q57. Calculate the acceleration produced when a force of 100 N is applied to an object of mass 50 kg.

(a) $0.2\ ms^2$
(b) 0.2 ms^(-2)
(c) 2 ms^(-2)
(d) $2\ ms^2$

Q58. _____ tissue cells separate to form different types of permanent tissue.

(a) Parenchyma
(b) Collenchyma
(c) Meristem
(d) Sclerenchymas

Q59. If cosec θ = α => cosec^(-1)α = θ and secΦ = β => sec^(-1)β = Φ then what will be the value of cosec^(-1)γ + sec^(-1)γ?

(a) 45°
(b) 90°
(c) 60°
(d) 30°

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Q60. Choose the odd.

A	B	C	D
3C6F	6G10J	11K14N	15O18R

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

Q61. If equation 20x + 5y + 11 = 0 and 50x – ky – 9 = 0 has no solution, then the value of k is:
(a) • 18
(b) 12.5
(c) -12.5
(d) 18

Q62. Who said, "The present changes the past. Looking back you do not find what you left behind."?
(a) Vikram Seth
(b) Khushwant Singh
(c) RK Narayan
(d) Kiran Desai

Q63. The Comptroller and Auditor General of India is appointed by-
(a) Chief Minister
(b) Vice President
(c) Prime minister
(d) President

Q64. The radius of a sphere is three times the radius of the base of a cylinder. The height of the cylinder is nine times the radius of its base. If the total surface area of the cylinder and the numerical values of the volume of the sphere are equal, then what is the height of the cylinder?
(a) 4.5 units
(b) 5 units
(c) 2.25 units
(d) 3 units

Q65. In a certain language, if BOXER is coded as CQAIW, which word will be coded as BEWSW?
(a) ADTOR
(b) ACSOR
(c) ACTOR
(d) AFTOR

Q66. The ratio of two numbers is 19 : 26. If 2 is added to a small number, the ratio will be 3 : 4. What is the big number?
(a) 91
(b) 104
(c) 130
(d) 78

Q67. Between Shivani and Parinita, a money was distributed in the ratio of 5 : 7. If Parinita gives Rs. 5 to Shivani, the ratio will change to 3 : 4. What is the amount divided?
(a) Rs. 396
(b) Rs. 408
(c) Rs. 420
(d) Rs. 432

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Q68. 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B

In the above series, which term is 8th to the left of 5th term from the right is:

(a) 5
(b) P
(c) O
(d) H

Q69. Raman said to Anant, "Day before yesterday I taught the only brother of my paternal grandmother's daughter". Who did Raman teach?

(a) Son
(b) Father-in-Law
(c) Father
(d) Bother

Q70. Starting from point O, a person walks towards west facing 4 km and reaches point A. From there, he walks 4 km to the right and reaches point B, then he walks 4 km to the right and reaches point C. After that, he again turns right and walks 3 km to reach point D. Now he walks 4 km to the left and reaches point E. Then he turns right and walks 5 km and reaches F. The minimum distance (in km) between point A and point E is:

(a) 5√65
(b) √68
(c) √65
(d) 2√65

Q71. Which schedule of the Indian constitution is about scheduled languages?

(a) VIII
(b) V
(c) I
(d) VII

Q72. Which famous scientist has been appointed as the Chairman of the Space Agency (ISRO) for three years in 2018?

(a) Dr. A. P.J. Abdul Kalam
(b) A. S. Kiran Kumar
(c) Dr. K. Siwan
(d) Rakesh Sharma

Q73. Name the physical quantity that is equal to the product of force and velocity.

(a) Energy
(b) Acceleration
(c) Work
(d) Power

Q74. What is the square root of 16129?

(a) 137
(b) 117
(c) 127
(d) 143

Q75. The car's odometer states 2,000 km at the start of the journey and 2,400 km at the end of the journey. If the journey takes 8 hours, find the average speed of the car (in ms^(-1)).

(a) 14.9 ms^(-1)
(b) 13.9 ms^(-1)
(c) 15.9 ms^(-1)
(d) 12.9 ms

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Q76. The mean of three numbers is 21. The range of this data set is 12 and difference between the two smallest numbers is 3. The greatest of three numbers is:

(a) 27
(b) 24
(c) 25
(d) 28

Q77. Suppose the given statements are true when they seem to be different from the commonly known facts and decide which of the conclusions completely follows the statement.

Statement:

To get involved in a long and complicated dispute, one has to be very intelligent, because they are very talkative and boring.

Conclusions:

I. All intelligent people are boring.

II. All intelligent people are quite capable of handling long and complicated disputes.

(a) Either conclusion I or II follows.
(b) Both conclusions I and II do not follow.
(c) Only conclusion I follows.
(d) Only conclusion II follows.

Q78. If an atom of an element has 11 protons and 12 neutrons in its nucleus, the mass number of the element is:

(a) 35
(b) 12
(c) 23
(d) 11

Q79. How many districts are there in Uttar Pradesh?

(a) 79
(b) 77
(c) 73
(d) 75

Q80. At the railway platform crossing before sunset, Sachin and Anjali were talking to each other face to face. If Sachin's shadow was exactly to Anjali's right, then in which direction did Sachin facing?

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

Q81. At which of the following places is the gravitational acceleration zero?

(a) At sea level
(b) At the poles
(c) At the equator
(d) At the center of the earth

Q82. What products are formed when ferrous sulfate crystals are heated in a test tube?

(a) Ferric oxide + water + sulfur trioxide
(b) Ferric oxide + water + sulfur dioxide + sulfur trioxide
(c) Ferric oxide + sulfur dioxide
(d) Ferric oxide + sulfur dioxide + water

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Q83. Ramesh has coins of 50 paise, Rs. 1 and Rs. 5 in the ratio of 2 : 3 : 5 respectively. He has a total amount of Rs. 116. How many coins does he have for 50 paise?

(a) 12
(b) 4
(c) 6
(d) 8

Q84. Moti Masjid or Pearl Mosque is the most beautiful structure of _____ fort.

(a) Agra
(b) Golkunda
(c) Jaipur
(d) Amer

Q85. Who was appointed as the Chairman of DRDO in August 2018?

(a) K. Siwan
(b) Malti Verma
(c) Satish Dhawan
(d) Dr. G. Satish reddy

Q86. What do helium and argon have in common?

(a) Both elements are liquid metals.
(b) The outermost shells of both are fully filled.
(c) Both have high diffusion rates.
(d) Both metals are used in balloons.

Q87. Consider the given statement and decide which of the given assumptions is implicit in the statement.

Statement:

This container contains gas.

Assumptions:

(I) Container contains oxygen.

(II) Container contains helium.

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

Q88. $3\sqrt{147} - 7/3\sqrt{(1/3)} + 7\sqrt{(1/3)} = ?$

(a) $400/9\sqrt{3}$
(b) $203/9\sqrt{3}$
(c) $403/9\sqrt{3}$
(d) $200/9\sqrt{3}$

Q89. If an airplane covers a distance of 4000 m and the work done is 20000 J, find the force applied.

(a) 50 N
(b) 0.2 N
(c) 10 N
(d) 5 N

Q90. A tank can be filled by tap A in 3 hrs and B can fill it in 4 hrs. Tap C can empty this filled tank in 6 hrs. If all three taps are opened simultaneously, how long will it take to fill the tank completely?

(a) 8 hrs
(b) 10/7 hrs
(c) 5 hrs
(d) 12/5 hrs

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Q91. Which country did not participate in the 2018 Champions Trophy hockey?

(a) Malaysia
(b) Pakistan
(c) India
(d) Netherlands

Q92. The 5/12 of a number is 3/4. What is the number?

(a) 14/5
(b) 31/5
(c) 17/15
(d) 15/16

Q93. Whose name is associated with the modern periodic table?

(a) Newland
(b) Hund
(c) Mendeleev
(d) Alfred Nobel

Q94. Abhay Bang and Rani Bang are known for revolutionizing the health care sector in the _____ district of Maharashtra.

(a) Nanded
(b) Latur
(c) Gadchiroli
(d) Gondia

Q95. Rajdeep Sardesai is known for which of the following roles?

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

Q96. What is the relationship between frequency and duration?

(a) T = 1 + υ
(b) T = υ
(c) T = 1/υ
(d) T = 1 × υ

Q97. A and B can complete a work in 1.8 days. However, if A works alone, then half of the work is done and he takes a break and then B alone finishes the remaining work, it takes 3.75 days to complete the work. If B is more efficient than A, how much time would B have taken to complete this task himself?

(a) 3.3
(b) 2.25
(c) 3.0
(d) 2.7

Q98. Which of the following numbers is divisible by 3?

(a) 1711
(b) 1311
(c) 1411
(d) 1111

Q99. Gold is mixed with copper _____.

(a) To make gold soft
(b) To make gold more yellow
(c) To harden gold

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(d) To give gold shine

Q100. Read the given statements and conclusions carefully and choose which of the statements logically follows the conclusions.

Statement:

The owner says to his daily wage workers, "Late workers will not be given extra time to complete their work for the day."

Conclusions:

I. Daily wage workers are expected to complete the work allotted by the end of the day.

II. Those whom the owner is addressing used to come late for work.

(a) Both conclusions follow.
(b) Only conclusion I follows.
(c) Only conclusion II follows.
(d) No conclusion follows.

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (c) Rose

The correct answer is Rose.

• Rooting stem cuttings is a common way of propagating herbaceous plants.

• But it also can work with woody-stemmed plants, including roses.

• Native roses root easily, more so than grafted varieties, though you shouldn't expect every cutting to be successful.

Additional Information

• Most rose varieties grow readily from stem cuttings, which allows you to expand your garden with minimal out-of-pocket costs.

• A cutting from a healthy, productive stem can produce its own root system and quickly grow into a new flowering bush.

• The propagation of roses can be performed in different ways: - By plant division and layering (for hardwood species). - By seeding (as for all species giving grains). - "in vitro" propagation: a very short time, 1 to 2 months instead of 12 to 18 months with upper methods.

• Wild roses (Rosa spp.) propagate through either sexual reproduction -- pollination and seeding -- or asexual reproduction, such as when their stems root as they trail along the ground in fertile soil or when their roots send up new shoots from underground.

Q2. Answer: (a) √2

Shortcut Trick

If sin θ = cos θ, then tan θ = 1.

This occurs when θ = 45°.

Value of sec 45° = √2.

Therefore The correct answer is √2.

Alternate Method

Given: sin θ = cos θ

Formula Used: tan θ = sin θ / cos θ and sec θ = 1 / cos θ

=> sin θ / cos θ = 1

=> tan θ = 1

=> Since tan 45° = 1, Therefore θ = 45°

=> sec θ = sec 45°

=> sec 45° = √2

Therefore The correct answer is √2.

Additional Information

Trigonometric Ratios at 45°

For θ = 45°, sin θ = 1/√2, cos θ = 1/√2, tan θ = 1, and sec θ = √2.

Reciprocal Identities

sec θ = 1/cos θ, cosec θ = 1/sin θ, and cot θ = 1/tan θ.

Pythagorean Identity

$\sin^2\theta + \cos^2\theta = 1$ and $1 + \tan^2\theta = \sec^2\theta$.

Q3. Answer: (d) 20°

Shortcut Trick

angle ABC = angle ABE + angle DBE = 80° + 50° = 130°

In cyclic quad ABCD, angle ADC = 180° − angle ABC = 180° − 130° = 50°

angle BDC = angle BAC = 30° (Angles in same segment)

angle ADB = angle ADC − angle BDC = 50° − 30° = 20°

angle BCE = angle BCA = angle ADB = 20°

Therefore The correct answer is 20°.

Alternate Method

Given: angle BAE = 30°, angle ABE = 80°, angle DBE = 50°

Formula Used: Sum of opposite angles of a cyclic quadrilateral is 180°. Angles subtended by the same arc at the circumference are equal.

=> From the figure, E is the intersection of diagonals AC

Q4. Answer: (a) Only conclusion (1) follows.

Given,

Statement:

Freedom and discipline are very important for a good society.

Conclusions:

1. Society has to face problems because of people who lack freedom and discipline. → Follow as freedom and discipline are very important for a good society, a lack of the same can cause problems.

2. No one has freedom and discipline in society. → Does not follow as it is not known how many people are lacking freedom and discipline.

Hence, the correct answer is Only conclusion (1) follows.

Q5. Answer: (b) 12348

Shortcut Trick

A number is divisible by 6 if it is divisible by both 2 and 3.

Check divisibility by 3 (sum of digits) for the even options:

12348 → 1 + 2 + 3 + 4 + 8 = 18 (Divisible by 3).

Therefore The correct answer is 12348.

Alternate Method

Given: Numbers 12346, 12348, 12344, 12340.

Rule: For a number to be divisible by 6, it must satisfy two conditions:

1. The number must be even (divisible by 2).

2. The sum of its digits must be divisible by 3.

=> Option 1: 12346 → Sum = 1+2+3+4+6 = 16 (Not divisible by 3)

=> Option 2: 12348 → Sum = 1+2+3+4+8 = 18 (Divisible by 3)

=> Option 3: 12344 → Sum = 1+2+3+4+4 = 14 (Not divisible by 3)

=> Option 4: 12340 → Sum = 1+2+3+4+0 = 10 (Not divisible by 3)

Therefore The correct answer is 12348.

Additional Information

Divisibility by 4

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

Divisibility by 9

A number is divisible by 9 if the sum of its digits is divisible by 9.

Divisibility by 11

The difference between the sum of digits at odd places and the sum of digits at even places must be 0 or a multiple of 11.

Q6. Answer: (b) GM/R²

The correct answer is GM/R2.

• The gravity of Earth, which is denoted by g, refers to the acceleration that the Earth imparts to objects on or near its surface. In SI units this acceleration is measured in meters per second squared (in symbols, m/s²) or equivalently in newtons per kilogram (N/kg).

Additional Information

• Here, g is the acceleration due to gravity on the surface of the earth. g' = g Thus acceleration due to gravity is least at the equator and maximum at the poles.

• The acceleration of an object changes with altitude.

• As the distance is tripled, the gravitational acceleration decreases by a factor of 9, and so on.

• At the surface of the Earth, the acceleration due to gravity is roughly 9.8 m/s2 (32 ft/s2).

• The average distance to the center of the Earth is 6,371 km (3,959 mi).

Q7. Answer: (d) 0.0081

Given:

5.4 × 0.0015

Concept Used:

Change the decimal into Fraction and Simplify.

Calculation:

(54/10) × (15/10000)

=> (54 × 15)/100000 = 810/100000

=> 810/100000 = 0.0081

Therefore The value of given expression is 0.0081

Q8. Answer: (c) 156

Shortcut Trick

HCF of 117 and x is 13.

117 = 13 × 9. Since HCF is 13, the other number x must be a multiple of 13, but the quotient (x ÷ 13) must not share any common factor with 9.

Check 156: 156 ÷ 13 = 12. Since 12 and 9 share a common factor 3, the HCF would become 13 × 3 = 39.

Therefore The correct answer is 156.

Alternate Method

Given: First number = 117, HCF = 13.

Formula: If HCF(a, b) = h, then a = hx and b = hy where x and y are co-prime numbers.

=> 117 = 13 × 9

=> Let the second number be N = 13 × k

=> For HCF to remain 13, k and 9 must be co-prime (no common factor other than 1).

=> Option 1: 169 = 13 × 13. (13 and 9 are co-prime → Possible)

=> Option 2: 143 = 13 × 11. (11 and 9 are co-prime → Possible)

=> Option 3: 156 = 13 × 12. (12 and 9 share factor 3 → HCF becomes 39 → NOT Possible)

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=> Option 4: 130 = 13 × 10. (10 and 9 are co-prime → Possible)

Therefore The correct answer is 156.

Additional Information

Definition of HCF

The Highest Common Factor is the largest positive integer that divides each of the integers without a remainder.

Co-prime Numbers

Two numbers are co-prime if their only common positive factor is 1, i.e., HCF(x, y) = 1.

Product Rule

For any two numbers a and b, HCF(a, b) × LCM(a, b) = a × b.

Q9. Answer: (a) Na2CO3

The correct answer is Na2CO3.

Key Points

• The washing soda formula is written as Na2CO3. 10H2O. The chemical name of washing soda is sodium carbonate.

• Chemically soda ash is a hydrated salt of sodium carbonate.

Additional Information

• The basic test for the presence of carbonate salts is a reaction with a diluted acid solution that leads to the release of bubbles of the gas carbon dioxide and follows the reaction: NaHCO3 + HCl = NaCl + H2O + CO2.

• An additional test is required to distinguish between sodium bicarbonate and sodium carbonate.

• Sodium carbonate is a chemical compound with the molecular formula Na2CO3.

• It's commonly referred to as washing soda and is used in cleaning products, glass production, as a food additive, and more.

Q10. Answer: (d) Rs. 2,00,000

Shortcut Trick

Total Quarterly Sales = Rs. 15,00,000.

Monthly Sales = 15,00,000 ÷ 3 = Rs. 5,00,000.

Personal Hygiene share = 40% of Monthly Sales.

Personal Hygiene Sales = 5,00,000 × 0.4 = Rs. 2,00,000.

Therefore The correct answer is Rs. 2,00,000.

Alternate Method

Given → Quarterly Sales = Rs. 15,00,000 | Hygiene Share = 40% | 1 Quarter = 3 months.

Formulas: Average Monthly Sales = Total Quarterly Sales ÷ 3 | Category Sales = Total Sales × (Category Percentage ÷ 100).

=> Total sales for the Quarter (3 months) = Rs. 15,00,000.

=> Sales for Personal Hygiene per quarter = 40% of 15,00,000 = (40 ÷ 100) × 15,00,000 = Rs. 6,00,000.

=> Average monthly sales for Personal Hygiene = Quarterly Hygiene Sales ÷ 3.

=> Monthly Sales = 6,00,000 ÷ 3 = Rs. 2,00,000.

Therefore The correct answer is Rs. 2,00,000.

Additional Information

Quarterly Calculation

A quarter represents a three-month period in a financial year. There are 4 quarters in a year.

Percentage Application

To find the value of a specific component, multiply the total by the percentage rate (x/100).

Q11. Answer: (c) Temperature affects its resistance at high levels.

The correct answer is Temperature affects its resistance at high levels.

• Manganese is a naturally occurring element and an essential mineral nutrient.

• It’s important for maintaining good health, though manganese can be toxic at high levels.

• Manganese is the fifth most abundant metal in the Earth's crust.

• Its minerals are widely distributed, with pyrolusite (manganese dioxide) and rhodochrosite (manganese carbonate) being the most common.

• Manganese is a chemical element with the symbol Mn and atomic number 25.

• It is not found as a free element in nature; it is often found in minerals in combination with iron.

• Manganese is a transition metal with a multifaceted array of industrial alloy uses, particularly in stainless steel.

• The main mining areas for manganese are in China, Africa, Australia, and Gabon.

• An element's electronegativity is the power of an atom when in a molecule to attract electron density to itself. The electronegativity depends upon a number of factors and in particuler as the other atoms in the molecule.

• Electronegativity of Manganese is 1.55 (Pauling Scale).

Additional Information

• Our body contains numerous proteins called enzymes.

• Enzymes help to speed up chemical reactions.

• Manganese is a necessary component of several important enzymes in your body that work to process carbohydrates, amino acids, and cholesterol.

• Manganese is essential for enzymes that help form bone and cartilage.

• Manganese is present in an enzyme that provides an amino acid called proline.

• Proline is necessary for the production of collagen in our skin cells. Collagen formation is essential to wound healing.

Q12. Answer: (d) Calcutta

The correct answer is Calcutta.

• The first press was established in Calcutta, Bengal.

• The establishment of the Baptist Mission press is the printing press in the Fort William College in Calcutta.

Additional Information

• Printing came to Bengal in 1777 when two presses were set up almost simultaneously, one in Calcutta by James Augustus Hicky (famous for later printing India's first newspaper, Hicky's Bengal Gazette) and another in the small town of Hooghly by Nathaniel Brassey Halhed and Charles Wilkins (famous for printing Grammar of the Bengal Language).

• It is unclear which press was established first.

• In November 1777, a missionary named Johann Zachariah Kiernander approached Hicky to print calendars for the next year. Kiernander had been importing calendars from South India and was looking for a cheaper alternative.

Q13. Answer: (b) Pine

The correct answer is Pine.

• Gymnosperms are vascular plants of the subkingdom Embyophyta and include conifers, cycads, ginkgoes, and gnetophytes.

• Some of the most recognizable examples of these woody shrubs and trees include pines, spruces, firs, and ginkgoes.

Additional Information

• The gymnosperms, also known as Acrogymnospermae, are a group of seed-producing plants that includes conifers, cycads, Ginkgo, and gnetophytes. Pinus gerardiana, known as the chilgoza pine is a king of Gymnosperm.

• In gymnosperms, pollination involves pollen transfer from the male cone to the female cone.

• Upon transfer, the pollen germinates to form the pollen tube and the sperm for fertilizing the egg.

• Pollination takes two forms: self-pollination and cross-pollination.

Q14. Answer: (c) 135, 180, 45

Given,

• Superman is flying over the home krypton. Krypton is spherical in shape.

• It is in Pune city, which is situated on the equator. It is now facing towards the North Pole.

• He crosses the equator and flies to his left and reaches Mumbai, which is just opposite the equator of Pune city.

• He decides to fly to the South Pole, but he stops in Delhi halfway

• The angles are represented by the following diagram,

• Pune-Center-Delhi

• Pune-Center-Mumbai

• Mumbai-Center-Delhi

Thus, we get

1. Pune-Center-Delhi → 135^0

2. Pune-Center-Mumbai → 180^0

3. Mumbai-Center-Delhi → 45^0

Therefore, the correct angles are 135, 180, 45.

Hence, the correct answer is 135, 180, 45.

Q15. Answer: (a) 7

Given,

The number of triangles are,

Small triangles = 6

Large triangle = 1

Therefore Total number of triangles = 7

Hence, the correct answer is 7.

Q16. Answer: (d) Yamuna

Given,

Sutlej, Ravi, Chenab, Yamuna

The following shows the map of indian rivers,

Here we see all are West flowing rivers except Yamuna.

Hence, the correct answer is Yamuna.

Q17. Answer: (d) 22.5

Shortcut Trick

Let the total work be LCM(27, 45) = 135 units.

Efficiency of Raksha = 135 ÷ 27 = 5 units/day; Efficiency of Esther = 135 ÷ 45 = 3 units/day.

If a person leaves x days before completion, add their potential work to the total: 135 + (5 × 9) = 180 units.

Total time taken = Total units ÷ Combined efficiency = 180 ÷ (5 + 3) = 180 ÷ 8 = 22.5 days.

Therefore The correct answer is 22.5 days.

Alternate Method

Person	Days	Total Work	Efficiency
Raksha	27	135	5
Esther	45	3	

Given: Raksha leaves 9 days before completion. Let total days be D.

Formula: Total Work = (Efficiency1 × Time1) + (Efficiency2 × Time2)

=> Total work = 135 units

=> Esther worked for D days and Raksha worked for (D − 9) days.

=> 5 × (D − 9) + 3 × D = 135

=> 5D − 45 + 3D = 135

=> 8D = 135 + 45

=> 8D = 180

=> D = 180 ÷ 8 = 22.5 days.

Therefore The correct answer is 22.5 days.

Additional Information

Work Left Before Completion Rule

When a person leaves 'n' days before completion, the total work is increased by (Efficiency × n) to find the time as if they never left.

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken to complete a work. Efficiency = Total Work ÷ Time.

Q18. Answer: (c) P660

The correct answer is P660.

• Phytochromes are a class of photoreceptors in plants, bacteria, and fungi used to detect light.

• They are sensitive to light in the red and far-red region of the visible spectrum and can be classed as either Type I, which are activated by far-red light, or Type II that are activated by red light.

Additional Information

• Phytochrome regulates the expression of many plant genes, and it may control plant development primarily through its role in regulating gene expression.

• As a result, it is important to determine the specific mechanism by which phytochrome regulates gene expression.

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• Phytochrome has been found in most of the organs of seed plants and free-sporing plants.
• It has also been found in green algae. Although phytochrome is an important plant pigment.
• It occurs in very low concentrations and is not visible unless chemically purified.

Q19. Answer: (c) 13M

We know,
Given,
5E, 7G, 9I, 11K, _____
The pattern followed here is,
Hence, the correct answer is 13M.

Q20. Answer: (a) South-West

Given,
Rani and Radha were walking in opposite directions. If Radha was moving towards the north-east direction.
Therefore
Here we see Rani is moving in the South-West direction.
Hence, the correct answer is South-West.

Q21. Answer: (c) Irrfan Khan

The correct answer is Irrfan Khan.
• At the 63rd Filmfare Awards, the film garnered six nominations, winning for Best Film and Best Actor for Khan.
Additional Information
• Filmmaker Saket Chaudhary, who helmed the sleeper hit Hindi Medium starring Irrfan and Saba Qamar in 2017, revealed that he was approached to direct its sequel Angrezi Medium.
• Hindi Medium follows the story of a couple want to give their daughter the best education so she will be accepted by the elite. Brilliant performances by Irrfan Khan & Saba Qamar.
• The film emerged as a sleeper hit at the box office.
• Its worldwide gross was Rs. 1.09 billion (US$15 million) by July 2017.

Q22. Answer: (a) South

Given,
A is standing at the entrance of the mall waiting for his friend to come. He is facing east. He then turns his head to the right to see that his friend has arrived.
Therefore
Here we see A is expecting his friend to come from the South.
Hence, the correct answer is South.

Q23. Answer: (d) Potenz, Which means power in German.

The correct answer is Potenz, Which means power in German.
• pH is the negative log of hydrogen ion concentration in a water-based solution.
• pH is an abbreviation for "power of hydrogen" where "p" is short for the German word for power, potenz and H is the element symbol for hydrogen.
Additional Information
• To calculate the pH of an aqueous solution you need to know the concentration of the hydronium ion in moles per liter (molarity).
• The pH is then calculated using the expression: pH = - log [H3O+]. On a calculator, calculate 10-8.34, or "inverse" log (- 8.34).
• The pH of pure water (H20) is 7 at 25^oC, but when exposed to the carbon dioxide in the atmosphere this equilibrium results in a pH of approximately 5.2.
Mistake Points
• A scale for measuring hydrogen ion concentration in a solution called the pH scale has been developed.
• The p in pH stands for ‘Potenz’ in German, meaning power. On the pH scale. According to NCERT.

Q24. Answer: (b) Neither statement I nor II is sufficient.

Shortcut Trick
Statement I: One equation with two variables (A, Z). Z remains unknown.
Statement II: One equation with two variables (Z, P). Z remains unknown.

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Combined: Two equations with three variables (A, Z, P). A unique value for Z cannot be found.

Therefore The correct answer is Neither statement I nor II is sufficient.

Alternate Method

Given:

Statement I: A + Z = 19

Statement II: Z + P = 12

Analysis:

=> From Statement I, A + Z = 19. Here, Z depends on the value of A. Since A is not given, Z cannot be determined.

=> From Statement II, Z + P = 12. Here, Z depends on the value of P. Since P is not given, Z cannot be determined.

=> When we combine Statement I and Statement II, we have a system of two equations:

1) A + Z = 19

2) Z + P = 12

=> There are three variables (A, Z, and P) but only two independent equations.

=> Mathematically, to find the unique value of n variables, we require at least n independent equations.

=> Since variables (3) > equations (2), a unique value for Z cannot be calculated.

Therefore The correct answer is Neither statement I nor II is sufficient.

Additional Information

Linear Equations Rule

For a unique solution in a system of linear equations, the number of independent equations must be equal to the number of variables (n equations for n variables).

Consistency of Equations

A system is called underdetermined if it has fewer equations than unknowns, leading to infinitely many solutions unless other constraints are provided.

Data Sufficiency Strategy

In Data Sufficiency, always evaluate each statement independently before attempting to combine them. If any one statement provides a unique answer, that statement alone is sufficient.

Q25. Answer: (c) Either 1 or 2 follows.

Given,

Statement:

Some jaguars are cheetahs, some cheetahs are leopards.

Conclusions:

1. No leopard is Jaguar.

2. Some jaguars are leopards.

The least possible Venn diagram for the given statements is as follows,

Conclusions:

1. No leopard is Jaguar → False (It is possible but not definite)

2. Some jaguars are leopards → False (It is possible but not definite)

Conclusion 1 and 2 form a complementary pair.

Hence, the correct answer is Either 1 or 2 follows.

Q26. Answer: (a) Lincoln in the Bardo

The correct answer is Lincoln in the Bardo.

• Lincoln in the Bardo by George Saunders was named winner of the 2017 Man Booker Prize for Fiction.

Additional Information

• The Man Booker Prize was open only to writers from the Commonwealth, Ireland, and Zimbabwe.

• The International Prize was open to all nationalities who had work available in English including translations.

• Margaret Atwood and Bernardine Evaristo have been named the joint winners of the 2019 Booker Prize after the judges broke their rules by declaring a tie. Atwood's The Testaments, the Canadian writer's follow-up to The Handmaid's Tale, was recognized alongside Londoner Evaristo's novel Girl, Woman, Other.

• The Booker Prize, formerly known as the Booker Prize for Fiction (1969–2001) and the Man Booker Prize (2002–2019), is a literary prize awarded each year for the best novel written in English and published in the United Kingdom or Ireland.

Q27. Answer: (c) Iron-ore

The correct answer is Iron-ore.

• The town is famous for iron ore mines, which were the first iron ore mines developed in India in 1910, by Maharaja Sriram Chandra Bhanj Deo ruler of Princely State of Mayurbhanj.

• He appointed Pramatha Nath Bose, a leading geologist in 1908 to survey the ore deposits.

Additional Information

• Mayurbhanj is famous for its Chhau dance.

• North Orissa University is located at Takatpur, Baripada (District Headquarter) in Mayurbhanj District.

• Baripada is the district headquarters of Mayurbhanj. The Mayurbhanj palace, temples of Lord Jagannath & Mata Ambika are situated here among others.

• Badampahar in mayurbhanj is the place where the iron ore mine located in the Indian sub-continent.

• When taking into consideration, it is noted that in India, leading iron core manufacturing is made in the state of Orissa.

Q28. Answer: (b) 3

Given,

Here we see figure b is related to figure a, in which the triangle is shifted on the opposite corner.

Similarly, figure d will be related to figure c in the same manner as figure b is related to figure a.

Therefore The figure that will replace the question mark (?) will be

Hence, the correct answer is 3.

Q29. Answer: (c) v = fλ

The correct answer is v = fλ.

• The wave velocity and the wavelength are related to the wave's frequency and period by vw=λT or vw=fλ.

• The time for one complete wave cycle is the period T.

• The number of waves per unit time is the frequency f.

• The wave frequency and the period are inversely related to one another.

Additional Information

• Wavelength is the measure of the length of a complete wave cycle. The velocity of a wave is the distance traveled by a point on the wave.

• The velocity of light, v, is the product of its wavelength, λ, and its frequency, f.

• This means that the wavelength is the velocity, v, divided by the frequency, f.

• In the electromagnetic spectrum, there are many different types of waves with varying frequencies and wavelengths.

• They are all related by one important equation: Any electromagnetic wave's frequency multiplied by its wavelength equals the speed of light.

Q30. Answer: (a) Cellulose and Pectin

The correct answer is Cellulose and Pectin.

Explanation:

• Collenchyma, in plants, supports tissue of living elongated cells with irregular cell walls.

• Collenchyma cells have thick deposits of cellulose in their cell walls and appear polygonal in cross-section.

• The strength of the tissue results from these thickened cell walls and the longitudinal interlocking of the cells.

Additional Information

• Collenchyma tissue is composed of elongated living cells of uneven primary thick walls, which possess hemicellulose, cellulose, and pectic materials.

• It provides support, structure, mechanical strength, and flexibility to the petiole, leaf veins, and stem of young plants, allowing for easy bending without breakage.

• Collenchyma is a supporting tissue characteristic of the growing organs of many herbaceous and woody plants, and it is also found in stems and leaves of mature herbaceous plants, including those that are only slightly modified by secondary growth.

Q31. Answer: (b) 2.2

The correct answer will be 2.2Ω.

Key Points

Concept:

When the resistances are connected in series, the equivalent resistance is given by

R_(eq) = R1 + R2 + … + R_n

The equivalent resistance is greater than the largest resistance in the series circuit

When the resistances are connected in parallel, the equivalent resistance is given by

1/(R_(eq)) = 1/R1 + 1/R2 + … + 1/R_n

The equivalent resistance is lesser than the smallest resistance in the series circuit

Calculation:

R1 = 9 ohm, R2 = 4 ohm, R3 = 12

1/(R_(eq)) = 1/9 + 1/4 + 1/12

1/(R_(eq)) =0.44

R_(eq) = 1/0.44=2.2 Ω

Q32. Answer: (c) 37

Shortcut Trick

The pattern follows a mixed operation: multiply the previous term by 2 and then alternatively add 1 or subtract 1.

Pattern: ×2 + 1, ×2 − 1, ×2 + 1, ×2 − 1.

Final term calculation: 19 × 2 − 1 = 38 − 1 = 37.

Therefore The correct answer is 37.

Alternate Method

Given: The series is 2, 5, 9, 19, ?

2

×2 + 1

→

5

×2 − 1

→

9

×2 + 1

→

19

×2 − 1

→

37

The logic follows a recursive multiplication pattern with alternating addition and subtraction.

=> 2 × 2 + 1 = 5

=> 5 × 2 − 1 = 9

=> 9 × 2 + 1 = 19

=> 19 × 2 − 1 = 37

Therefore The correct answer is 37.

Additional Information

Mixed Operator Series

These series involve more than one mathematical operation, such as multiplication followed by addition or subtraction (e.g., an + b or an − b).

Alternating Series

A pattern where the logic or the constants used in the operation alternate at every step, requiring observation of at least 3 gaps to confirm.

Double Difference

If no direct multiplication pattern is visible, check the difference of the differences to find hidden arithmetic progressions.

Q33. Answer: (b) Jammu and Kashmir

The correct answer is Jammu and Kashmir.

• Anantnag was called Islamabad when Pakistan did not even exist.

• The town was named Islamabad after governor Islam Khan during the Mughal era in the 1600s.

• It was renamed to Anantnag only in the 1950s. Everyone in Kashmir calls it Islamabad.

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Additional Information

• The top attractions to visit in Anantnag District are Amarnath Cave. Aru Valley. Betaab Valley.

• Anantnag or the land of several springs is a beautiful and historic town, situated about 55 km south of Srinagar on the banks of Jhelum.

• The name Anantnag is thought to originate from the Sanskrit term Ananta, meaning "infinite", and Kashmiri word nāga, "water spring"; Anant-nāg would thus mean "numerous springs", as there are indeed many springs in the town.

• The total area of Anantnag is 189 km² including 143.12 km² rural area and 45.71 km² urban area. Anantnag has a population of 3,64,763 peoples. There are 48,726 houses in the sub-district. There are about 104 villages in the Anantnag block.

Q34. Answer: (c) 12 years and 14 years

Shortcut Trick

Check options for the condition: Anu = Ankita + 2 years.

From option (3): Ankita = 12, Anu = 14.

After 4 years, Anu = 14 + 4 = 18 years.

3 years ago, Ankita = 12 − 3 = 9 years.

Condition check: 18 = 2 × 9 (Satisfied).

Therefore The correct answer is 12 years and 14 years.

Alternate Method

Given:

Let the present age of Ankita be x years.

Then, the present age of Anu = x + 2 years.

Formula Used:

Age after n years = Present age + n

Age n years ago = Present age − n

Calculations:

=> Anu's age after 4 years = (x + 2) + 4 = x + 6

=> Ankita's age 3 years ago = x − 3

=> According to the question: (x + 6) = 2 × (x − 3)

=> x + 6 = 2x − 6

=> 2x − x = 6 + 6

=> x = 12

=> Ankita's present age = 12 years

=> Anu's present age = 12 + 2 = 14 years

Therefore The correct answer is 12 years and 14 years.

Additional Information

Age Difference Property

The difference between the ages of two persons remains constant regardless of the number of years passed or gone by.

Ratio of Ages

If the current ratio is a:b, after k years, the ages become (ax+k) and (bx+k). The ratios change over time unlike the age difference.

Q35. Answer: (b) 15

Shortcut Trick

Divisibility rule of 3: Sum of digits must be divisible by 3.

Sum of digits in 276x1 = 2 + 7 + 6 + x + 1 = 16 + x.

Possible values for x (0 to 9) making (16 + x) divisible by 3 are 2, 5, and 8.

Sum of possible values = 2 + 5 + 8 = 15.

Therefore The correct answer is 15.

Alternate Method

Given: Number 276x1 is divisible by 3.

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

=> Sum = 2 + 7 + 6 + x + 1 = 16 + x

=> For 16 + x to be divisible by 3, the nearest multiples are 18, 21, and 24.

=> If 16 + x = 18, then x = 2

=> If 16 + x = 21, then x = 5

=> If 16 + x = 24, then x = 8

=> Sum of values = 2 + 5 + 8 = 15

Therefore The correct answer is 15.

Additional Information

Divisibility by 9

Similar to the rule of 3, a number is divisible by 9 if the sum of its digits is divisible by 9.

Divisibility by 6

A number is divisible by 6 if it is divisible by both 2 (even number) and 3 (sum of digits rule).

Digit Range

Since x is a single digit in a number, its value must always be an integer from 0 to 9 inclusive.

Q36. Answer: (d) 7T20G

We know,

Given,

3X24C, 5V22E, _____.

The pattern followed here is,

Here we see the letters are written in a particular pattern and positional values are also written.

Hence, the correct answer is 7T20G.

Q37. Answer: (d) 110

Shortcut Trick

Product of times ÷ Difference of times

Leakage time = (11 × 10) ÷ (11 − 10)

Leakage time = 110 ÷ 1 = 110 hours

Therefore The correct answer is 110 hours.

Alternate Method

Given: Filling time = 10 hours, Filling with leak time = 11 hours

Component	Time (hr)	Total Work (LCM)	Efficiency
Tap (Filling)	10	110 units	+11 units/hr
Tap + Leak	11	+10 units/hr	

Efficiency of Leak = (Efficiency of Tap + Leak) − (Efficiency of Tap)

=> Efficiency of Leak = 10 − 11 = −1 unit/hr

=> Time to empty the tank = Total Work ÷ Efficiency of Leak

=> Time = 110 ÷ 1 = 110 hours

Therefore The correct answer is 110 hours.

Additional Information

Pipes and Cisterns Efficiency

Filling pipes have positive efficiency, while leaks or outlet pipes have negative efficiency. Net work = Σ Efficiency × Time.

Shortcut for Leakage

If a pipe fills in 'x' hours and with a leak it takes 'y' hours, the leak empties the full tank in (xy) ÷ (y − x) hours.

Q38. Answer: (b) Bhikampura, Karauli, Rajasthan

The correct answer is Bhikampura, Karauli, Rajasthan.

• Union Minister of Drinking Water and Sanitation, Sushri Uma Bharti, today launched the Swajal pilot project at Village Bhikampura, Karauli, Rajasthan.

Additional Information

• Ministry of Jal Shakti aims to provide every rural person with adequate safe water for drinking, cooking, and other domestic basic needs on a sustainable basis.

• This basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in all situations.

• Under the National Rural Drinking Water Programme, the Ministry in February 2018 has initiated a project in the name of

"Swajal" that is designed as a demand-driven and community-centred program to provide sustainable access to drinking water to people in rural areas.

• Initially "Swajal" scheme was launched in February 2018 as a pilot scheme in six states of Bihar, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, and Uttarakhand.

Q39. Answer: (b) France

The correct answer is France.

• The 2023 Rugby World Cup, to be hosted by France, is scheduled to be the tenth men's Rugby World Cup, taking place in the year of the 200th anniversary of the 'invention' of the sport by William Webb Ellis from 8 September to 21 October.

Additional Information

• The Russian Rugby Federation (FRR) has announced it is looking to bid for the 2031 Rugby World Cup, as well as the 2027 edition.

• On 14 September 2019, President of Colombia Ivan Duque confirmed Colombia would bid to host the 2030 FIFA World Cup along with Ecuador and Peru.

• The highest World Cup score was when the All Blacks beat Japan 145-17 in South Africa on 4 June 1995.

• The final will take place at the Stade de France.

• It will be the second time France has hosted the Rugby World Cup, having previously hosted the 2007 event.

• It precedes the 2024 Summer Olympics in Paris and will take place less than a year before the Olympic opening ceremony.

Q40. Answer: (a) [figure]

Given,

In the mirror image the top and bottom part of the figure remains the same and left and right part of the figure interchanges.

Therefore

Here we see the mirror image is

Hence, the correct answer is option 1.

Q41. Answer: (d) Calm

Given,

Vacant : Empty :: Sedate : ?

Here we see empty is synonym of vacant.

Similarly, the word calm is the synonym of sedate.

Hence, the correct answer is Calm.

Q42. Answer: (a) 12

Given,

The right-angled triangles are denoted by blue as follow,

Therefore The total number of right-angled triangles = 12

Hence, the correct answer is 12.

Q43. Answer: (c) West

The correct answer is West.

• It originates from Mount Amarkantak in Madhya Pradesh.

• As it flows down the hill, it is trapped in a rift valley between the Vindhya and the Satpura mountain ranges which leads it to the west towards Gujarat, where it drains into the Gulf of Khambat

Additional Information

• The two major west-flowing rivers are the Narmada and the Tapi.

• This exceptional behaviour is because these rivers didn't form valleys and instead they flow through faults (linear rift, rift valley, trough) created due to the bending of the northern peninsula during the formation process of Himalayas.

• Narmada rises from Amarkantak Plateau in Anuppur district Madhya Pradesh.

• It forms the traditional boundary between North India and South

• India and flows westwards over a length of 1,312 km (815.2 mi) before draining through the Gulf of Khambhat into the Arabian Sea, 30 km (18.6 mi) west of Bharuch city of Gujarat.

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Q44. Answer: (c) B

Given,

In the mirror image top and bottom part of the figure remains the same and left and right part of the figure interchanges.

Therefore

Hence, the correct answer is B.

Q45. Answer: (a) Manipur

The correct answer is Manipur.

• The brow-antlered deer is found in Keibul Lamjao National Park in Manipur.

• It is largely seen over the floating biomass, locally called “phumdi” in the South-Eastern part of Loktak Lake inside the park.

Additional Information

• Dancing Deer is the popular name of Sangai Deer, which is found only in Keibul Lamjao National Park (KLNP) in Loktak Lake in Manipur.

• Loktak is known for Phumdis (floating vegetation) and the deer often needs to balance itself on them, so it appears that they are dancing.

• Sangai is one of the three subspecies of Eld's deer found in South and Southeast Asia.

• It has adapted itself to a unique habitat of the floating meadows or phumdi at KLNP, a mark difference from the other two.

Q46. Answer: (c) Only assumption I is implicit.

Given,

Statement:

• I like the soldiers.

• I want to become a soldier.

Assumptions:

I) I am not a soldier → Implicit as statement states that "I want to become a soldier."

II) I am a soldier → Not implicit as it is a contradiction to the statement "I want to become a soldier."

Here we see only the assumption I, is implicit.

Hence, the correct answer is the Only assumption I, is implicit.

Q47. Answer: (c) 5.5 cm

The correct answer is 5.5 cm.

• The total kinetic energy possessed by the block goes into the potential energy of the spring and the work done against friction.

• K.E. supplied = Work done against friction + P.E. of spring

• $1/2\ mv^2 = Fx + 1/2\ kx^2$

• Suppose x be the compression of the spring.

• Here:

• mass=2 kg,υ = 4 m/s

• Force of kinetic friction, F = 15 N

• spring constant, K = 10000 N/m

• $1/2 \times 2 \times 4^2 = 15x + 10000/2x^2$

• $5000x^2 + 15x - 16 = 0$

• x=0.055m=5.5cm

Additional Information

• Kinetic energy, the form of energy that an object or a particle has by reason of its motion.

• If work, which transfers energy, is done on an object by applying a net force, the object speeds up and thereby gains kinetic energy.

• Kinetic friction is defined as a force that acts between moving surfaces.

• A body moving on the surface experiences a force in the opposite direction of its movement.

• The magnitude of the force will depend on the coefficient of kinetic friction between the two materials.

Q48. Answer: (b) Constant Proportion

The correct answer is Constant Proportion.

• The Law of Conservation of Mass dates from Antoine Lavoisier's 1789 discovery that mass is neither created nor destroyed in chemical reactions.

• In other words, the mass of any one element at the beginning of a reaction will equal the mass of that element at the end of the reaction.

Additional Information

• In chemistry, the law of definite proportion, sometimes called Proust's law, or the law of constant composition states that a given chemical compound always contains its component elements in a fixed ratio (by mass) and does not depend on its source and method of preparation.

• If two different elements combine separately with a fixed mass of a third element, the ratio of the masses in which they do so are either the same as or a simple multiple of the ratio of the masses in which they combine with each other.

• The combination which illustrates the law of reciprocal proportion is CS2, SO2, CO2.

• The law of reciprocal proportion is also known as the law of equivalent proportion.

• This law states that there is a constant proportion of the two substances which combine to form a compound.

Q49. Answer: (a) 47

Shortcut Trick

The series follows a constant difference of −8.

Next number = 55 − 8 = 47.

Therefore The correct answer is 47.

Alternate Method

Given Number Series: 71, 63, 55, ?

71

−8

→

63

−8

→

55

−8

→

47

The pattern is a subtraction series where each subsequent term is 8 less than the previous term.

=> 71 − 8 = 63

=> 63 − 8 = 55

=> 55 − 8 = 47

Therefore The correct answer is 47.

Additional Information

Arithmetic Series

A sequence of numbers in which the difference between any two consecutive terms is constant, known as the common difference (d).

Types of Series

Series can be Increasing (positive difference), Decreasing (negative difference), Geometric (constant ratio), or based on Squares/Cubes.

General Term of AP

The n^(th) term is calculated as a_n = a + (n−1)d, where 'a' is the first term.

Q50. Answer: (c) Only 1 is sufficient.

Shortcut Trick

Statement 1 is a linear equation in one variable x, which will always yield a unique value for x.

Statement 2 involves variables a, p, and q but does not contain the variable x.

Since Statement 1 provides a direct path to solve for x and Statement 2 provides no information about x, only 1 is sufficient.

Therefore The correct answer is Only 1 is sufficient.

Alternate Method

Given:

Statement 1: 1/x + 1/9 = 1/27

Statement 2: $a^2 + p^2 = q^2$

Analysis of Statement 1:

=> $1/x = 1/27 - 1/9$

=> $1/x = (1 - 3) / 27$

=> $1/x = -2/27$

=> $x = -27/2 = -13.5$

Since we obtained a unique value for x, Statement 1 alone is sufficient.

Analysis of Statement 2:

=> $a^2 + p^2 = q^2$

This equation represents a relationship between a, p, and q (similar to the Pythagoras theorem).

There is no variable x present in this statement, making it impossible to determine the value of x.

Thus, Statement 2 alone is not sufficient.

Therefore The correct answer is Only 1 is sufficient.

Additional Information

Data Sufficiency Rules

A statement is considered sufficient if it leads to exactly one unique numerical value for the unknown variable.

Linear Equations in One Variable

An equation of the form $ax + b = c$ (where $a \neq 0$) will always provide a single unique solution for x.

Variable Independence

If a statement contains only variables that are independent of the target variable, that statement cannot be used to find the target value.

Q51. Answer: (a) 3168 m

Shortcut Trick

Total Surface Area = Curved Surface Area (CSA) of Cylinder + CSA of Cone

CSA = $(2 \times \pi \times r \times h) + (\pi \times r \times l) = \pi \times r \times (2h + l)$

Total Area = $(22/7) \times 63 \times (2 \times 24 + 80) = 22 \times 9 \times (48 + 80) = 198 \times 128 = 25344\ m^2$

Length of Canvas = Total Area ÷ Width = 25344 ÷ 8 = 3168 m

Therefore The correct answer is 3168 m.

Alternate Method

Given:

Diameter (d) = 126 m => Radius (r) = 126 ÷ 2 = 63 m

Height of Cylinder (h) = 24 m

Slant height of Cone (l) = 80 m

Width of Canvas = 8 m

Formula Used:

CSA of Cylinder = $2\pi rh$

CSA of Cone = πrl

Calculations:

=> Total Area of Canvas = $2\pi rh + \pi rl$

=> Total Area = $\pi r(2h + l)$

=> Total Area = $(22/7) \times 63 \times (2 \times 24 + 80)$

=> Total Area = $22 \times 9 \times (48 + 80)$

=> Total Area = $198 \times 128 = 25344\ m^2$

=> Length of Canvas × Width = 25344

=> Length × 8 = 25344

=> Length = 25344 ÷ 8 = 3168 m

Therefore The correct answer is 3168 m.

Additional Information

Curved Surface Area of Cylinder

The CSA of a cylinder excludes the base and top areas, given by $2\pi rh$.

Curved Surface Area of Cone

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The CSA of a cone is πrl, where l is the slant height, calculated as $\sqrt{(r^2 + h^2)}$.

Canvas Calculations

For fabric/canvas problems, Area = Length × Width. Always ensure units are consistent before division.

Q52. Answer: (a) Gold, Platinum

The correct answer is Gold, Platinum.

• Gold, Platinum metals do not react with air.

• Metals are lustrous, malleable, ductile, and good conductors of heat and electricity.

• Metals are solids at room temperature with the exception of mercury, which is liquid at room temperature (Gallium is liquid on hot days).

Additional Information

• Many chemical elements are referred to as metals.

• These are the bulk of the periodic table elements. Generally, such components have the following characteristics: these can conduct heat and electricity. They can be easily shaped.

• Oxygen is a non-metal that is used for breathing by plants and animals.

• It is essential to maintain our life.

• It is used in the process of fuel-burning in homes, factories, and vehicles for transport.

• Oxygen is an essential non-metal for our life and it is inhaled during breathing by all living beings.

• The non-metal used in the rockets is liquid hydrogen.

• They are separate hydrogen and oxygen tanks that combine and burn to start the rocket.

• Due to its high calorific value, hydrogen is used.

Q53. Answer: (c) Abinav

Given,

Abinav and Barani play golf and volleyball.

Krish and Dev play tennis and cricket.

Barani and Krish play cricket and volleyball.

Abinav and Dev play golf and tennis.

Therefore

Name	Games played
Abinav	Golf, Volleyball, Tennis
Barani	Golf, Volleyball, Cricket
Krish	Tennis, Cricket, Volleyball
Dev	Tennis, Cricket, Golf

Here we see Abinav plays tennis, volleyball and golf.

Hence, the correct answer is Abinav.

Q54. Answer: (d) 5

Given:

$(\sqrt{3} - 1)/(\sqrt{3} + 1) = a + b\sqrt{3}$

Concept used:

Rationalization method and comparing method used.

Calculation:

$(\sqrt{3} - 1)/(\sqrt{3} + 1) = a + b\sqrt{3}$

$\Rightarrow ((\sqrt{3} - 1))/((\sqrt{3} + 1)) \times ((\sqrt{3} - 1))/((\sqrt{3} - 1)) = a + b\sqrt{3}$

$\Rightarrow ((\sqrt{3} - 1)^2)/((3 - 1)) = a + b\sqrt{3}$

$\Rightarrow (3 + 1 - 2\sqrt{3})/2 = a + b\sqrt{3}$

$\Rightarrow (4 - 2\sqrt{3})/2 = a + b\sqrt{3}$

$\Rightarrow 2 - \sqrt{3} = a + b\sqrt{3}$

Comparing the equation both side we get,

a = 2 and b = -1

Therefore The value of a2 + b² = 4 + 1 = 5

Q55. Answer: (c) Flagrant foul

The correct answer is Flagrant foul.

• These five fundamental skills of basketball are dribbling, passing, shooting, rebounding, and defence.

Additional Information

• Basketball is a game played between two teams of five players each on a rectangular court, usually indoors.

• Each team tries to score by tossing the ball through the opponent's goal, an elevated horizontal hoop and net called a basket.

• Basketball has had a number of players that have helped make basketball popular as a spectator sport including Magic Johnson, Larry Bird, Wilt Chamberlain, and Oscar Robinson.

• Perhaps the most famous and arguably the greatest basketball player of all time is Michael Jordan.

Q56. Answer: (a) 476 m

Shortcut Trick

Convert speed to m/s: 57 × (5/18) = 95/6 m/s.

Total distance (Train + Platform) = Speed × Time = (95/6) × 39 = 617.5 m.

Platform length = Total distance − Train length = 617.5 − 141.5 = 476 m.

Therefore The correct answer is 476 m.

Alternate Method

Given:

Length of train (L1) = 141.5 m

Speed of train (S) = 57 km/h

Time taken (T) = 39 seconds

Formula Used:

Total Distance = (Length of Train + Length of Platform)

Distance = Speed × Time

1 km/h = 5/18 m/s

Calculations:

=> Speed in m/s = 57 × (5/18) = 15.833 m/s

=> Total Distance = Speed × Time

=> 141.5 + Platform Length (L2) = (57 × 5/18) × 39

=> 141.5 + L2 = (95/6) × 39

=> 141.5 + L2 = 95 × 6.5

=> 141.5 + L2 = 617.5

=> L2 = 617.5 − 141.5

=> L2 = 476 m

Therefore The correct answer is 476 m.

Additional Information

Unit Conversion

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

Relative Speed

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

Crossing Objects

If a train crosses a pole/man, distance = length of train. If it crosses a bridge/platform, distance = length of train + length of object.

Q57. Answer: (c) 2 ms^(-2)

The correct answer is 2 ms^(-2)

Key Points

• We know that according to Newton's 2^(nd) law,

• Force = Mass × Acceleration

• or (vec F = m × vec a)

• Here, F = 100 N and Mass = 50 Kg

• So, 100 = 50x a => a = 100/50 = 2.

• Hence, the acceleration will be 2 ms^(-2).

Additional Information

• Force: A force is something that changes the state of rest or motion of a body.

• It causes the body to start moving if it is at rest or stops if it is in motion or deflects from the initial path.

• Force is a vector quantity having SI unit Newton (N) and dimension (MLT^(-2)).

• According to Newton's Second law of motion

• The rate of change of momentum of a body is directly proportional to the resulting force acting on a body

• Mathematically it can be expressed as

• vec F prop. to (dvec p)/dt or vec F = m × a

Q58. Answer: (c) Meristem

The correct answer is Meristem.

• Permanent tissues are derived from meristematic tissue once they lose the ability to divide.

• They are classified as simple and complex tissues.

• Parenchyma, collenchyma and sclerenchyma are three types of simple tissues.

• Parenchyma tissue is involved in photosynthesis, secretion, food storage, and other activities of plant life.

• Collenchyma tissue provides support, structure, mechanical strength, and flexibility to the petiole, leaf veins, and stem of young plants, allowing for easy bending without breakage.

• Sclerenchyma is one of the three types of ground, or fundamental, tissue in plants; the other two types are parenchyma (living thin-walled tissue) and collenchyma (living support tissue with irregular walls).

• Xylem is planted vascular tissue. It transports water and dissolved minerals from the roots to the rest of the plant and also provides physical support.

Additional Information

• Permanent tissues in a plant are those tissues that contain non-dividing cells.

• The cells are also modified to perform specific functions in the plants.

• The cells of the permanent tissue are derived from the meristematic tissue.

• The permanent tissue cells are also fully differentiated. The cells are large and a definite shape and size.

• The metabolism that occurs in the cells of the permanent tissue is fairly at a lower rate.

• The permanent tissue in plants mainly helps in providing support, protection as well as in photosynthesis and conduction of water, minerals, and nutrients. Permanent tissue cells may be living or dead.

Q59. Answer: (b) 90°

Shortcut Trick

By using the standard Inverse Trigonometric Identity for complementary ratios.

The sum of cosec^(−1)x and sec^(−1)x for any valid domain is always constant.

Identity: cosec^(−1)y + sec^(−1)y = π/2 = 90°.

Therefore The correct answer is 90°.

Alternate Method

Given: cosec^(−1)y = θ and sec^(−1)y = Φ

Formula Used: In a Right-Angled Triangle, if cosec θ = y, then sin θ = 1/y.

=> cosec θ = y => θ = cosec^(−1)y

=> sec Φ = y => cos Φ = 1/y

=> Since sin θ = cos Φ = 1/y, and sin θ = cos(90° − θ)

=> Φ = 90° − θ

=> θ + Φ = 90°

=> cosec^(−1)y + sec^(−1)y = 90°

Therefore The correct answer is 90°.

Additional Information

Inverse Trigonometric Identities

Standard identities: sin^(−1)x + cos^(−1)x = 90°, tan^(−1)x + cot^(−1)x = 90°, and cosec^(−1)x + sec^(−1)x = 90° for all x in the defined domain.

Domain Restrictions

For cosec^(−1)y and sec^(−1)y to be defined, the value of |y| must be ≥ 1.

Complementary Angles

Two angles are complementary if their sum is 90°. In any right triangle, the two non-right angles are always complementary.

Q60. Answer: (a) B

We know,

Given,

A	B	C	D
3C6F	6G10J	11K14N	15O18R

Here we see the letters are in a particular pattern and the respective positional value are written.

A	B	C	D
3 → C 6 → F	6→ G 10 → J	11 → K 14 → N	15 → O 18 → R

But in 'B' the positional value of G is 6.

Therefore The odd one is 6G10J.

Hence, the correct answer is B.

Q61. Answer: (c) -12.5

Shortcut Trick

For a system of linear equations to have no solution, the lines must be parallel.

Condition: a1/a2 = b1/b2 ≠ c1/c2

Comparing ratios of x and y coefficients: 20/50 = 5/(−k)

=> 2/5 = −5/k

=> 2k = −25 => k = −12.5

Therefore The correct answer is − 12.5.

Alternate Method

Given:

Equation 1: 20x + 5y + 11 = 0

Equation 2: 50x − ky − 9 = 0

Condition Used:

For parallel lines (no intersection/no solution): a1/a2 = b1/b2

Calculations:

Identify coefficients from the equations:

a1 = 20, b1 = 5, c1 = 11

a2 = 50, b2 = −k, c2 = −9

=> a1/a2 = 20/50 = 2/5

=> b1/b2 = 5/(−k)

According to the condition:

=> 2/5 = −5/k

=> 2 × k = −5 × 5

=> 2k = −25

=> k = −25/2

=> k = −12.5

Verify c1/c2: 11/(−9) ≈ −1.22. Since 0.4 ≠ −1.22, the no solution condition is fully satisfied.

Therefore The correct answer is − 12.5.

Additional Information

Unique Solution Condition

A system has exactly one solution if the lines intersect at one point: a1/a2 ≠ b1/b2.

Infinite Solutions Condition

A system has infinitely many solutions if the lines are coincident: a1/a2 = b1/b2 = c1/c2.

Consistency of Equations

Systems with at least one solution are Consistent; a system with No Solution is called Inconsistent.

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Q62. Answer: (d) Kiran Desai

The correct answer is Kiran Desai.

• Kiran Desai was born in India in 1971 and grew up there before moving to England, aged fourteen years.

Additional Information

• She was educated in India, England and the US.

• Her first novel, Hullabaloo in the Guava Orchard (1998) won a 1998 Betty Trask Award, and her second novel, The Inheritance of Loss (2006), set in the mid-1980s in a Himalayan village, won the 2006 Man Booker Prize for Fiction.

• Her first novel, Hullabaloo in the Guava Orchard (1998), is a pacy, fresh look at life in the sleepy provincial town of Shahkot in India.

• The central character of the novel, Sampath Chawla, failed postal clerk and pathological dreamer, escapes from his work and his oppressive family to live in a guava tree.

Q63. Answer: (d) President

The correct answer is President.

• The Union Audit Reports prepared by the Comptroller and Auditor General of India show the findings of the transaction audit and performance audit in the areas of Civil Audit, Audit of Autonomous Bodies, Defence Services, Railways, Receipts of the Government and Central Commercial.

Additional Information

• Shri Girish Chandra Murmu assumed office as the Comptroller and Auditor General of India on 8th August 2020.

• Prior to this, Shri Murmu was the first Lieutenant Governor of the Union Territory of Jammu and Kashmir.

• There are several provisions in the Constitution for safeguarding the independence of CAG.

• CAG is appointed by the President by warrant under his hand and seal and provided with tenure of 6 years or 65 years of age, whichever is earlier.

• CAG shall be removed from office in like manner and on like grounds as a Judge of the Supreme Court.

Q64. Answer: (b) 5 units

Shortcut Trick

Let the radius of the cylinder be r.

Radius of sphere (R) = 3r and Height of cylinder (h) = 9r.

Total Surface Area of Cylinder = $2\pi r(r + h) = 2\pi r(10r) = 20\pi r^2$.

Volume of Sphere = $(4/3)\pi R^3 = (4/3)\pi(3r)^3 = 36\pi r^3$.

Given: $20\pi r^2 = 36\pi r^3 \Rightarrow r = 20/36 = 5/9$ units.

Height of cylinder (h) = $9r = 9 \times (5/9) = 5$ units.

Therefore The correct answer is 5 units.

Alternate Method

Given:

=> Radius of cylinder base = r

=> Radius of sphere (R) = 3r

=> Height of cylinder (h) = 9r

Formulas:

=> Total Surface Area (TSA) of Cylinder = $2\pi r(r + h)$

=> Volume (V) of Sphere = $(4/3)\pi R^3$

Calculations:

=> TSA of Cylinder = $2\pi r(r + 9r) = 2\pi r(10r) = 20\pi r^2$

=> Volume of Sphere = $(4/3)\pi(3r)^3 = (4/3)\pi(27r^3) = 36\pi r^3$

=> According to question: $36\pi r^3 = 20\pi r^2$

=> $36r = 20$

=> $r = 20/36 = 5/9$ units

=> Height (h) = $9r = 9 \times (5/9) = 5$ units

Therefore The correct answer is 5 units.

Additional Information

Properties of Sphere

Surface Area = $4\pi r^2$ and Volume = $(4/3)\pi r^3$. For a hemisphere, Curved Surface Area = $2\pi r^2$ and Total Surface Area = $3\pi r^2$.

Properties of Cylinder

Curved Surface Area = 2πrh, Total Surface Area = 2πr(r + h), and Volume = πr²h.

Numerical Equality

When numerical values of different physical quantities (like Area and Volume) are equated, the units are ignored during calculation to find the unknown dimensions.

Q65. Answer: (c) ACTOR

We know,

Given,

BOXER is coded as CQAIW.

The pattern followed here is,

Here we see the word 'ACTOR' is coded as 'BEWSW'.

Hence, the correct answer is the ACTOR.

Q66. Answer: (b) 104

Shortcut Trick

Initial Ratio = 19 : 26. Final Ratio = 3 : 4.

Multiply final ratio by 6.5 to equate the Big Number parts: (3 × 6.5) : (4 × 6.5) = 19.5 : 26.

Difference in Small Number parts = 19.5 − 19 = 0.5 units.

0.5 units = 2 => 1 unit = 4.

Big Number = 26 × 4 = 104.

Therefore The correct answer is 104.

Alternate Method

Given: Ratio = 19 : 26, Addition = 2 to small number, New Ratio = 3 : 4.

Let the Small Number be 19x and the Big Number be 26x.

=> (19x + 2) / 26x = 3 / 4

=> 4 × (19x + 2) = 3 × 26x

=> 76x + 8 = 78x

=> 78x − 76x = 8

=> 2x = 8

=> x = 4

=> Big Number = 26x = 26 × 4 = 104.

Therefore The correct answer is 104.

Additional Information

Ratio and Proportion

A Ratio compares two quantities. If a : b = c : d, then a × d = b × c (Product of extremes = Product of means).

Compounded Ratio

The Compounded Ratio of (a : b) and (c : d) is (ac : bd).

Invertendo and Alternando

If a/b = c/d, then b/a = d/c (Invertendo) and a/c = b/d (Alternando).

Q67. Answer: (c) Rs. 420

Shortcut Trick

Initial Ratio Shivani : Parinita = 5 : 7 (Total parts = 12)

Final Ratio Shivani : Parinita = 3 : 4 (Total parts = 7)

Since total amount remains constant, make total parts equal: LCM(12, 7) = 84.

New Ratios → Initial = 35 : 49 | Final = 36 : 48

Difference of 1 unit = Rs. 5 → Total Amount = 84 × 5 = Rs. 420.

Therefore The correct answer is Rs. 420.

Alternate Method

Given: Initial Ratio = 5 : 7 | Final Ratio = 3 : 4 | Transfer Amount = Rs. 5

=> Let the amounts be 5x and 7x.

=> According to the condition: (5x + 5) ÷ (7x − 5) = 3 ÷ 4

=> 4 × (5x + 5) = 3 × (7x − 5)

=> 20x + 20 = 21x − 15

=> 21x − 20x = 20 + 15

=> x = 35

=> Total Amount = 5x + 7x = 12x = 12 × 35 = 420

Therefore The correct answer is Rs. 420.

Additional Information

Ratio Constant Sum Concept

When values are transferred between two parties, the total sum of the ratios remains constant. Always equalize the sum of ratio parts to solve quickly.

Cross Multiplication Method

For equations like (ax+k)/(bx-k) = c/d, the cross multiplication ad - bc represents the change in units corresponding to the constant value k.

Proportion Rule

If a : b = c : d, then a × d = b × c. This property is used to verify the relationship after the transfer of funds.

Q68. Answer: (c) O

Given series:

Left end: 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B : Right end

5th from the right end = U

Left end: 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B : Right end

8th from the left of U = O

Thus we see the 8th to the left of the 5th term from the right is O.

Hence, the correct answer is "O".

Q69. Answer: (c) Father

Given,

Raman said to Anant, "Day before yesterday I taught the only brother of my paternal grandmother's daughter"

The family tree is as follows,

Here we see Raman taught his father.

Hence, the correct answer is Father.

Q70. Answer: (c) √65

The direction and distance diagram is given below -

By Pythagoras theorem,

$AE^2 = AE'^2 + E'E^2$

Therefore $AE^2 = 8^2 + 1^2$

Therefore AE = √65

Hence, the correct answer is √65

Q71. Answer: (a) VIII

The correct answer is VIII.

Key Points

• The scheduled languages of according to the Constitution: Assamese, Bengali, Bodo, Dogri, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Nepali, Oriya, Punjabi, Sanskrit, Santhali, Sindhi, Tamil, Telegu, Urdu.

Additional Information

• There are 22 official languages in India and they are covered under the 8th schedule of the Indian Constitution.

• The Eighth Schedule of the Indian Constitution lists 22 languages, which have been referred to as scheduled languages and given recognition, status, and official encouragement.

• In addition, the Government of India has awarded the distinction of classical language to Kannada, Malayalam, Odia, Sanskrit, Tamil, and Telugu.

• Bodo, Dongri, Maithili, and Santhali were added to it by the 92nd Amendment Act of 2003.

• However, the long-standing demand for the recognition and inclusion of the Bhoti language in the 8th Schedule has not been met.

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Q72. Answer: (c) Dr. K. Siwan

The correct answer is Dr. K. Siwan.

• Sivan was appointed the chief of ISRO in January 2018 and he assumed office on 15 January.

• Under his chairmanship, ISRO launched Chandrayaan 2, the second mission to the moon on July 22, 2019.

• On December 30, his chairmanship was extended by a year to January 2022, his early tenure was up to January 2021.

Additional Information

• Satish Dhawan was the longest-serving Chairman for 12 years from 1972 to 1984 and the shortest stint was held by Shailesh Nayak, who was at the helm for just 12 days from January 1-12, 2015.

• ISRO develops and delivers application-specific satellite products and tools to the Nation: broadcasts, communications, weather forecasts, disaster management tools, Geographic Information Systems, cartography, navigation, telemedicine, dedicated distance education satellites being some of them.

• The prime objective of ISRO is to develop space technology and its application to various national needs.

• ISRO has established two major space systems, INSAT for communication, television broadcasting, and meteorological services, and Indian Remote Sensing Satellites (IRS) system for resources monitoring and management.

Q73. Answer: (d) Power

The correct answer is Power.

• The physical quantity obtained by the product of force and velocity is Power.

• It is a Scalar quantity.

• Work done is generally referred to relate to the force applied while energy is used in reference to other factors such as heat.

• Power is defined as work done per unit time.

• Energy is the ability to perform work. Energy can neither be created nor destroyed.

• It can only be transformed from one kind to another.

• The unit of energy is the as of Work i.e. Joules.

• Energy is found in many things and thus there are different types of energy.

• Power is a physical concept that has several different meanings, depending on the context and the information that is available.

• We can define power as the rate of doing work. It is the amount of energy consumed per unit of time.

Q74. Answer: (c) 127

Shortcut Trick

Check the unit digit: 16129 ends in 9, so the square root must end in 3 or 7.

Check the range: $120^2 = 14400$ and $130^2 = 16900$.

Since $14400 < 16129 < 16900$, the root lies between 120 and 130.

With unit digit 7, the only possible number is 127.

Therefore The correct answer is 127.

Alternate Method

Given: Number = 16129

Method: Long Division Method

=> Grouping digits from right to left: 1, 61, 29

=> Step 1: $1 \times 1 = 1$. Remainder = 0. Bring down 61.

=> Step 2: Double the quotient ($1 \times 2 = 2$). Find 'x' such that $2x \times x \leq 61$. Here, $22 \times 2 = 44$.

=> Step 3: Remainder = $61 - 44 = 17$. Bring down 29. New number = 1729.

=> Step 4: Double the current quotient ($12 \times 2 = 24$). Find 'y' such that $24y \times y = 1729$.

=> Step 5: $247 \times 7 = 1729$. Remainder = 0.

=> Square root = 127.

Therefore The correct answer is 127.

Additional Information

Unit Digit Property

If a perfect square ends in 9, its square root must end in either 3 or 7 (e.g., $3^2 = 9$, $7^2 = 49$).

Perfect Square Identification

A number ending in 2, 3, 7, or 8 can never be a perfect square.

Digital Sum Rule

The digital sum of a perfect square is always 1, 4, 7, or 9. For 16129, 1+6+1+2+9 = 19 → 1+9 = 10 → 1.

Q75. Answer: (b) 13.9 ms^(-1)

The correct answer is 13.9 ms-1

• It is given that the total distance travelled by car is

• 2400 km - 2000 km

• 400 km, i.e. 400000 m

• The total time is taken = 8 hours,

• that is, 8×60×60= 28800 seconds.

• Average speed in m/s = total distance/total time

• 400000/28800 = 13.89 ms^(-1).

Q76. Answer: (d) 28

Shortcut Trick

Sum of three numbers = 21 × 3 = 63.

Let the smallest number be x. Then middle = x + 3 and greatest = x + 12 (since range is 12).

Total Sum: x + (x + 3) + (x + 12) = 63 => 3x + 15 = 63.

3x = 48 => x = 16.

Greatest number = 16 + 12 = 28.

Therefore The correct answer is 28.

Alternate Method

Given:

Mean of 3 numbers = 21

Range of data set = 12

Difference between two smallest numbers = 3

Formula Used:

Mean = Sum of observations ÷ Total number of observations

Range = Maximum value − Minimum value

=> Sum of the three numbers = 21 × 3 = 63

=> Let the numbers be x, y, and z in ascending order.

=> Range = z − x = 12 => z = x + 12

=> Difference between smallest two = y − x = 3 => y = x + 3

=> x + y + z = 63

=> x + (x + 3) + (x + 12) = 63

=> 3x + 15 = 63

=> 3x = 48

=> x = 16

=> Greatest number (z) = x + 12 = 16 + 12 = 28

Therefore The correct answer is 28.

Additional Information

Mean (Arithmetic Average)

The sum of all values divided by the total count of values. Formula: Mean = (Σx) ÷ n.

Range

The statistical measure of the spread of data, calculated as the difference between the maximum and minimum values.

Median

The middle value in a sorted list of numbers. For an odd number of terms (n), it is the ((n+1)÷2)^(th) term.

Q77. Answer: (d) Only conclusion II follows.

Given,

Statement:

To get involved in a long and complicated dispute, one has to be very intelligent, because they are very talkative and boring.

Conclusions:

I. All intelligent people are boring → Does not follow as this conclusion is irrelevant.

II. All intelligent people are quite capable of handling long and complicated disputes → Follow as this conclusion supports the

statement.

Hence, the correct answer is the Only conclusion II follows.

Q78. Answer: (c) 23

The correct answer is 23.

• The mass number is the total of the protons and neutrons together, and it is given the symbol A.

• Example: A sodium atom contains 11 protons and 12 neutrons; its mass number is 23.

Additional Information

• The atomic number is the number of protons in the nucleus of an atom.

• The number of protons determines how many electrons surround the nucleus, and it is the arrangement of these electrons that determines most of the chemical behaviour of an element.

• Atomic number, the number of a chemical element in the periodic system, whereby the elements are arranged in order of increasing number of protons in the nucleus.

• Accordingly, the number of protons, which is always equal to the number of electrons in the neutral atom, is also the atomic number.

• The atomic symbol is used to identify the element to which an atom belongs and the number of electrons, protons, and neutrons it contains.

Q79. Answer: (d) 75

The correct answer is 75.

• Uttar Pradesh is divided into 75 Districts and 18 Divisions.

Additional Information

• Lakhimpur Kheri is the largest district in Uttar Pradesh, India, on the border with Nepal.

• Its administrative capital is the city of Lakhimpur.

• Lakhimpur Kheri district is a part of Lucknow division, with a total area of 7,680 square kilometres (2,970 sq mi).

Q80. Answer: (b) South

Given,

At the railway platform crossing before sunset, Sachin and Anjali were talking to each other face to face. If Sachin's shadow was exactly to Anjali's right.

Therefore

Here we see Sachin is facing South direction.

Hence, the correct answer is South.

Q81. Answer: (d) At the center of the earth

The correct answer is At the centre of the earth.

• If you are at the centre of the earth, gravity is zero because all the mass around you is pulling "up" (every direction there is up!).

Additional Information

• Zero Gravity or Zero-G can simply be defined as the state or condition of weightlessness.

• It also refers to the state in which the net or an apparent effect of gravity (i.e. the gravitational force) is zero.

• The condition of apparent weightlessness occurs when a body in a gravitational field changes places to neutralize its gravitational force.

• For example, astronauts are seen floating around in outer space because of this phenomenon.

• Astronauts orbiting the Earth in a space station experience zero gravity or weightlessness because their spacecraft continuously undergoes changes in velocity in its orbit in order to prevent it from being pulled into the atmosphere.

• This acceleration, which is often known as a centrifugal force, counterbalances gravity. Hence, they experience Zero Gravity or weightlessness.

Q82. Answer: (b) Ferric oxide + water + sulfur dioxide + sulfur trioxide

The correct answer is Ferric oxide + water + sulfur dioxide + sulfur trioxide.

• On heating, ferrous sulphate crystals lose water and anhydrous ferrous sulphate ($FeSO_4$) is formed.

• So their colour changes from light green to white. On further heating, anhydrous ferrous sulphate decomposes to form ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3).

Additional Information

• Ferrous sulphate crystals contain water molecules ($FeSO_4.7H_2O$).
• On heating, ferrous sulphate crystals lose water and anhydrous ferrous sulphate ($FeSO_4$) is formed.
• So their colour changes from light green to white.
• On further heating, anhydrous ferrous sulphate decomposes to form ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3).
• So, the gas emitted smells like burning sulphur.
• In this reaction, the single reactant $FeSO_4$ decomposes to form three different products.
• So, the reaction is a decomposition reaction.

Q83. Answer: (d) 8

Shortcut Trick

Value ratio of 50 paise, Rs. 1, and Rs. 5 coins = (2 × 0.5) : (3 × 1) : (5 × 5) = 1 : 3 : 25.

Total value units = 1 + 3 + 25 = 29 units.

Given total amount = Rs. 116. Therefore 29 units = 116 → 1 unit = 4.

Number of 50 paise coins = 2 × 1 unit = 2 × 4 = 8 coins.

Therefore The correct answer is 8.

Alternate Method

Given: Ratio of coins = 2 : 3 : 5; Total Amount = Rs. 116.

Formula Used: Total Value = ∑(Number of coins × Denomination value)

=> Let the number of coins be 2x, 3x, and 5x.

=> Total value in Rs. = (2x × 0.50) + (3x × 1) + (5x × 5) = 116

=> 1x + 3x + 25x = 116

=> 29x = 116

=> x = 116 ÷ 29 = 4

=> Number of 50 paise coins = 2x = 2 × 4 = 8.

Therefore The correct answer is 8.

Additional Information

Coin Denomination Conversion

Always convert all denominations to a single unit (either all Paise or all Rupees) to avoid calculation errors. 1 Rupee = 100 Paise.

Ratio of Values vs Ratio of Numbers

Value Ratio = (Coin Count Ratio × Face Value of Coin). If the ratio of values is given, divide by face value to find the ratio of the number of coins.

Unitary Method in Ratios

The sum of parts in a ratio represents the total quantity. Finding the value of 1 'unit' or 'part' is the key to solving most ratio problems.

Q84. Answer: (a) Agra

The correct answer is Agra

Key Points

• The Moti Masjid is a white marble mosque inside the Agra Fort complex in India.
• The name translates into English as "Pearl Mosque."
• It is located to the west of the Hammam and close to the Diwan-i-Khas.
• It was built by the Mughal emperor Shah Jahan.

Additional Information

• During the rule of Shah Jahan the Mughal emperor, numerous architectural wonders were built, the most famous of them being the Taj Mahal.
• Moti Masjid earned the epithet Pearl Mosque for it shone like a pearl.
• The mosque is plastered in white on the outside.
• Inside is the white marble courtyard and a prayer hall, which stands on a higher level than the courtyard.
• The floor of the prayer-hall is inlaid with outlines of small carpets for prayers (musalla) in black marble.
• In the middle of the courtyard is a small, square ablution fountain.
• The courtyard measures 40 x 35 feet.

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Q85. Answer: (d) Dr. G. Satish reddy

The correct answer is Dr G. Satish Reddy.

• Dr G. Satheesh Reddy, Head of the Defence Research and Development Organisation (DRDO), has been given a two-year extension as the Secretary, Department of Defence Research and Development and Chairman DRDO beyond his tenure of August 26, 2020.

• This was approved by the Appointments Committee of the Cabinet.

Additional Information

• Defence Research and Development Organisation (DRDO) is a defence R&D hub which develops defence technologies, systems/products that are required for Indian Armed Forces.

• DRDO develops defence technologies in the project mode.

• Avinash Chander is an Indian scientist who was Scientific Adviser to the Defence Minister, the Director-General of Defence Research and Development Organisation (DRDO), and Secretary, Department of Defence Research and Development.

• He had succeeded V. K. Saraswat to this post.

• Current Chairman: Samir V Kamat

Q86. Answer: (b) The outermost shells of both are fully filled.

The correct answer is The outermost shells of both are fully filled.

• The filled outer shells of Group VIIA of the noble gases make all members of this family (including Helium, Neon, and Argon) the most stable of all the elements.

• These three elements have this property in common, a filled stable outer electron shell.

Additional Information

• These gases all have similar properties under standard conditions: they are all odorless, colorless, monatomic gases with very low chemical reactivity.

• The six noble gases that occur naturally are helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe), and Radon (Rn).

• Argon makes blue light, and neon makes the clear orange-red that is familiar in neon signs, said Bill Concannon, a neon-sign artist, and owner of Aargon Neon, a sign shop in Crockett, California.

• Argon is neither flammable nor reactive. If a tank of argon is heated or punctured, the tank may rupture and cause physical injury.

Q87. Answer: (d) Neither I nor II are implicit.

Given,

Statement:

This container contains gas.

Assumptions:

(I) Container contains oxygen → Not implicit as we don't know the container contains which gas.

(II) Container contains helium → Not implicit as we don't know the container contains which gas.

Hence the correct answer is Neither I nor II is implicit.

Q88. Answer: (b) 203/9√3

Given:

3√147 - 7/3√(1/3) + 7√(1/3)

Calculation:

=> 21√3 - 7/3√(1/3) + 7√(1/3)

=> 21√3 + √(1/3) (7 - 7/3)

=> 21√3 + 14/(3√ 3)

=> (189 + 14)/(3√ 3)

=> 203/(3√ 3)

Rationalizing, we get

=> 203/9√ 3

Hence the correct answer is 203/9√ 3

Q89. Answer: (d) 5 N

The correct answer is 5N.

Given Data:

Distance d = 4000m

Work done W= 20000J

Work Done = F × d

F=work done/d

F=20000/4000=5

F= 5N.

Q90. Answer: (d) 12/5 hrs

Shortcut Trick

Net efficiency = Efficiency of (A + B − C)

LCM of 3, 4, and 6 is 12 (Total Work)

Efficiencies: A = 4, B = 3, C = −2

Combined Efficiency = 4 + 3 − 2 = 5

Time taken = 12 ÷ 5 hours

Therefore The correct answer is 12/5 hr.

Alternate Method

Given:

Time taken by Tap A = 3 hrs

Time taken by Tap B = 4 hrs

Time taken by Tap C (emptying) = 6 hrs

Formula Used:

Efficiency = Total Work ÷ Time

Person	Days	Total Work	Efficiency
Tap A	3	12	4
Tap B	4	3	
Tap C	6	−2	

Calculations:

=> Total capacity of tank = LCM(3, 4, 6) = 12 units

=> Efficiency of A = 12 ÷ 3 = 4 units/hr

=> Efficiency of B = 12 ÷ 4 = 3 units/hr

=> Efficiency of C = 12 ÷ 6 = −2 units/hr (Negative as it empties)

=> Net efficiency when all three are open = 4 + 3 − 2 = 5 units/hr

=> Time required to fill the tank = 12 ÷ 5 hrs

Therefore The correct answer is 12/5 hr.

Additional Information

Pipes and Cisterns Logic

Inlet pipes contribute positive efficiency while outlet (leak) pipes contribute negative efficiency.

Unitary Method for Two Pipes

If pipe A fills in x hrs and pipe B empties in y hrs, net time = (x × y) ÷ (y − x).

Work and Time Relation

Time is inversely proportional to efficiency: Time = 1 ÷ Efficiency.

Q91. Answer: (a) Malaysia

The correct answer is Malaysia.

• Following a two-year gap between the first (1978) and second (1980) editions of the Hockey Champions Trophy, the competition was played on an annual basis until 2012.

• The Champions Trophy reverted to a biennial event in 2014.

Additional Information

• It was held from 23 June to 1 July 2018 in Breda, Netherlands.

• The tournament replaced by the Hockey Pro League (HPL) in 2019.

• Australia won their 15th title by defeating India in the final after penalties.

• On March 17, in the first-ever Stanley Cup playoff game, the Montreal Hockey Club (Montreal HC) defeated the Montreal

Victorias, 3–2. Five days later, in the first Stanley Cup Finals game, Montreal HC beat the Ottawa Hockey Club 3–1.

• The 2018 Champions Trophy hockey tournament featured six of the top hockey-playing nations in the World.

• The FIH tournament was played in the Netherlands from June 23-July 1, 2018.

Q92. Answer: (a) 14/5

Shortcut Trick

Multiply the result by the reciprocal of the given fraction.

Number = (3/4) × (12/5)

Number = (3 × 3) / 5 = 9/5

Number = 1(4/5)

Therefore The correct answer is 1(4/5).

Alternate Method

Given:

Fraction of the number = 5/12

Resulting value = 3/4

Let the number be x.

According to the question:

=> (5/12) × x = 3/4

=> x = (3/4) ÷ (5/12)

=> x = (3/4) × (12/5)

=> x = (3 × 3) / 5

=> x = 9/5

=> x = 1(4/5)

Therefore The correct answer is 1(4/5).

Additional Information

Reciprocal of a Fraction

The reciprocal of a fraction a/b is b/a. To divide by a fraction, we multiply by its reciprocal.

Mixed Fraction Conversion

An improper fraction (numerator > denominator) like 9/5 is converted to a mixed fraction by dividing: 9 ÷ 5 = 1 with remainder 4, written as 1(4/5).

Word-to-Math Translation

In mathematical word problems, the word 'of' usually signifies multiplication and 'is' signifies equality (=).

Q93. Answer: (c) Mendeleev

The correct answer is Mendeleev.

• In 1869 Russian chemist Dimitri Mendeleev started the development of the periodic table, arranging chemical elements by atomic mass.

• He predicted the discovery of other elements and left spaces open in his periodic table for them.

Additional Information

Hund rule:

• It states that every orbital in a subshell is singly occupied with one electron before any one orbital is doubly occupied, and all electrons in singly occupied orbitals have the same spin.

Newlands octaves-

• law of octaves made by the English chemist J.A.R. Newlands in 1865 that, if the chemical elements are arranged according to increasing atomic weight, those with similar physical and chemical properties occur after each interval of seven elements

Alfred Nobel,

• He is a Swedish chemist, engineer, and industrialist who invented dynamite and other more powerful explosives and who also founded the Nobel Prizes.

History of the periodic table

• The history of the periodic table reflects over two centuries of growth in the understanding of the chemical and physical properties of the elements, with major contributions made by Antoine-Laurent de Lavoisier, Johann Wolfgang Döbereiner, John Newlands, Julius Lothar Meyer, Dmitri Mendeleev, Glenn T.

• The periodic law was developed independently by Dmitri Mendeleev and Lothar Meyer in 1869.

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• Mendeleev created the first periodic table and was shortly followed by Meyer.

• They both arranged the elements by their mass and proposed that certain properties periodically reoccur.

Q94. Answer: (c) Gadchiroli

The correct answer is Gadchiroli.

• Dr. Abhay Bang and Dr. Rani Bang are Indian social activists, researchers working in the field of community health in the Gadchiroli district of Maharashtra, India.

• Dr. Abhay Bang and Dr. Rani Bang have helped revolutionize healthcare for the poorest people in India and have substantially reduced infant mortality rates in one of the most poverty-stricken areas in the world.

Additional Information

• Dr. Abhay Bang grew up in the Sevagram Ashram of Mahatma Gandhi.

• He was inspired by the social ideals and trained in India (MD) and at the Johns Hopkins School of Public Health, (MPH).

• He was a top notcher in the University and won 3 Gold Medals.

• Along with his wife Dr. Rani Bang, he founded the voluntary organization, SEARCH, (Society for Education, Action, and Research in Community Health) 17 years ago in one of the most underdeveloped districts, Gadchiroli, in the state of Maharashtra in India, where they have been working with the people in 150 villages to provide community-based health care and conduct research.

• They have developed a village health care program which has now become a nationally and internationally famous model.

Q95. Answer: (c) Journalist

• The correct answer is Journalist.

• Rajdeep Sardesai (born 24 May 1965) is an Indian news anchor, journalist, and author.

• He is a consulting editor at the India Today group and is an anchor for India Today Television.

• He was the Editor-in-Chief of Global Broadcast News, which included CNN-IBN, IBN7, and IBN-Lokmat, before resigning in July 2014.

Additional Information

• Rajdeep Sardesai is a senior journalist and author of the best-selling book, '2014: The Election that Changed India'.

• With 26 years of journalistic experience in print and TV, Sardesai was managing editor of the NDTV network before he set up the IBN 18 network with channels like CNN IBN as founder editor.

• He began his career with the Times of India and was the city editor of its Mumbai edition at the age of 26. He is presently a consulting editor with the India Today Group and anchors a prime time show on India Today.

• Specializing in national politics, Sardesai has won numerous awards for journalistic excellence including the prestigious Padma Shri for Journalism in 2008, the International Broadcasters Award for coverage of the 2002 Gujarat riots, and the Ramnath Goenka Excellence in Journalism Award for 2007.

Q96. Answer: (c) T = 1/υ

The correct answer is T = 1/υ.

• The period is the duration of time of one cycle in a repeating event, so the period is the reciprocal of the frequency.

• For example: if a newborn baby's heart beats at a frequency of 120 times a minute (2 hertz), its period, T, — the time interval between beats—is half a second (60 seconds divided by 120 beats).

Additional Information

• Frequency is the number of occurrences of a repeating event per unit of time.

• Frequency is measured in hertz (Hz) which is equal to one occurrence of a repeating event per second.

• The period is the duration of time of one cycle in a repeating event, so the period is the reciprocal of the frequency.

• The total dose or amount is determined by the three components of activity: frequency, duration, and intensity. Frequency is commonly expressed in sessions, episodes, or bouts per day or per week.

• Duration is the length of time for each bout of any specific activity.

Q97. Answer: (c) 3.0

Shortcut Trick

Total work (combined) = 1.8 days. Combined efficiency (A+B) = 1/1.8 = 5/9 units/day.

Condition: 0.5/A + 0.5/B = 3.75 => 1/A + 1/B = 7.5 days (Sum of individual times if half work done separately).

Since B is more efficient than A, B's time must be less than 3.75 days but such that B × A / (B + A) = 1.8.

Testing option (3): If B = 3 days, then A + 3 = 7.5 => A = 4.5 days.

Check: (3 × 4.5) / (3 + 4.5) = 13.5 / 7.5 = 1.8 days. Matches perfectly.

Therefore The correct answer is 3.0 days.

Alternate Method

Person	Days	Total Work (Assume)	Efficiency
A + B	1.8	9 units	5

Let efficiency of A be x and B be (5 − x). Total work = 9 units.

=> Time for half work by A + Time for half work by B = 3.75

=> (4.5 / x) + (4.5 / (5 − x)) = 3.75

=> 4.5 [(5 − x + x) / (x(5 − x))] = 3.75

=> (4.5 × 5) / (5x − x^2) = 3.75

=> 22.5 = 18.75x − 3.75x^2

=> 3.75x^2 − 18.75x + 22.5 = 0

=> x^2 − 5x + 6 = 0

=> (x − 2)(x − 3) = 0 => x = 2 or 3

Since B is more efficient, efficiency of B = 3 and A = 2.

=> Time taken by B = Total Work ÷ Efficiency of B = 9 ÷ 3 = 3 days.

Therefore The correct answer is 3.0 days.

Additional Information

Efficiency and Time Relation

Efficiency is inversely proportional to the time taken to complete a task. Efficiency × Time = Total Work.

Combined Work Formula

If two people take A and B days respectively, they together take (A × B) / (A + B) days.

Quadratic Nature of Work Problems

When parts of work are done at different rates, the total time equation often forms a quadratic equation $ax^2 + bx + c = 0$.

Q98. Answer: (b) 1311

Shortcut Trick

Apply the divisibility rule of 3: A number is divisible by 3 if the sum of its digits is divisible by 3.

Option 1: 1+7+1+1 = 10 (No)

Option 2: 1+3+1+1 = 6 (Yes, 6 is divisible by 3)

Option 3: 1+4+1+1 = 7 (No)

Option 4: 1+1+1+1 = 4 (No)

Therefore The correct answer is 1311.

Alternate Method

Given: Four numbers 1711, 1311, 1411, 1111.

Formula Used: Divisibility by 3 => Sum of digits ÷ 3

=> For 1711: 1+7+1+1 = 10. Since 10 is not divisible by 3, 1711 is not divisible by 3.

=> For 1311: 1+3+1+1 = 6. Since 6 ÷ 3 = 2 (remainder 0), 1311 is divisible by 3.

=> For 1411: 1+4+1+1 = 7. Since 7 is not divisible by 3, 1411 is not divisible by 3.

=> For 1111: 1+1+1+1 = 4. Since 4 is not divisible by 3, 1111 is not divisible by 3.

Therefore The correct answer is 1311.

Additional Information

Divisibility by 9

Similar to the rule for 3, a number is divisible by 9 if the sum of its digits is divisible by 9.

Divisibility by 6

A number is divisible by 6 if it is divisible by both 2 and 3 (i.e., it must be an even number and its sum of digits must be divisible by 3).

Divisibility by 11

A number is divisible by 11 if the difference between the sum of digits at odd places and the sum of digits at even places is either 0 or a multiple of 11.

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Q99. Answer: (c) To harden gold

The correct answer is To harden gold.

• Pure gold is very soft and the most malleable metal. It is mixed with metals such as copper and nickel to make it harder and cheaper.

Additional Information

• Mixing alloys makes the texture of gold harder and hence jewellery becomes durable.

• The 18 Karat gold comprises of 75% gold mixed with 25% of other metals such as copper, silver, and other alloys.

• This type of gold is used to make stone studded jewellery and other diamond jewellery.

• Rose gold is an alloy made from a combination of pure gold and copper. The blend of the two metals changes the color of the final product and its karat.

• KDM gold is a type of gold alloy where 92 percent gold and 8 percent cadmium alloy are mixed.

• this is where the term KDM gold came from. This mixture was used to attain a high standard of purity in gold.

• Now cadmium is replaced with advanced solder metal such as Zinc and other metals.

Q100. Answer: (b) Only conclusion I follows.

Statement:

• The owner says to his daily wage workers, "Late workers will not be given extra time to complete their work for the day."

Conclusions:

• Daily wage workers are expected to complete the work allotted by the end of the day → logically follows. (As extra time will not be allotted, the workers will have no choice but to complete the work before the day ends.)

• Those whom the owner is addressing used to come late for work → Logically does not follow (It is mentioned that the owners are speaking with their daily wage workers. These workers could include those who come late and those who don't. The statement of the owner might just be him informing the rules of the workplace to the workers. Because we are not certain about the people whom the owner is addressing, conclusion II does not follow.)

• Hence, the correct answer is "Only conclusion I follows."

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