RRC Group D Previous Year Paper 2 (Held On: 18 Sep 2018 Shift 1)

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

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CBT

Q1. (136 ÷ 17) + (17 × 13) – (103 – 85) × (62 + 145) ÷ 23 = ?

(a) 75
(b) 67
(c) 59
(d) 76

Q2. An electric lamp of 120 W is used for 8 hours per day. Calculate the units of energy consumed by the lamp in one day.

(a) 16.00 unit
(b) 1.50 unit
(c) 0.96 unit
(d) 2.00 unit

Q3. When was the Battle of Waterloo fought ?

(a) 1835
(b) 1815
(c) 1850
(d) 1840

Q4. Which of the following does NOT belong to this group?

1. Cotton
2. Wool
3. Rayon
4. Cardboard

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

Q5. Two resistors, one of 10 Ω and the other of 20 Ω. are connected in series to a 6 V battery. The current in the circuit will be?

(a) 0.3 A
(b) 0.2 A
(c) 0.9 A
(d) 0.6 A

Q6. If '+' becomes '÷' and '×' becomes '+' then what will be the value of {(36 + 6) + 6} × 12?

(a) 12
(b) 6
(c) 13

(d) 21

Q7. In what time can Saloni cover a distance of 450 m, if she runs at a speed of 20 Km/hr.?

(a) 81 sec
(b) 320 sec
(c) 3 minutes
(d) 102 sec

Q8. A merchant incurred a loss of 5% by selling a book for Rs. 25.65. If he sells it for Rs.31.05, find his gain percent or loss percent.

(a) Gain 15%
(b) Loss 15%
(c) Gain 10%
(d) Loss 10%

Q9. Consider the following statement and assumptions and decide which of the assumptions is implicit from the given statement.

Statement:

The school management has introduced compulsory swimming sessions for children below Class V.

Assumptions:

1. Younger children learn to swim faster.
2. The school wishes to enhance the overall development of children.

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

Q10. Which of the following events is celebrated every year on January 9 to mark the contribution of the overseas Indian community in the development of India?

(a) Unnatiya Bharat Divas (UBD)
(b) Overseas Indian Development Day (OIDD)
(c) Akhil Bharatiya Divas (ABD)
(d) Pravasi Bharatiya Divas (PBD)

Q11. When the following decimals are arranged in ascending order then what decimal number should be in the middle?

5.74, 6.03, 0.8, 0.658 and 7.2

(a) 6.03
(b) 5.74
(c) 7.2
(d) 0.8

Q12. If in a coded language, COCK is written as DPDL, then how will HEN be written in that language?

(a) HEO
(b) IDP
(c) ICO
(d) IFO

Q13. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statements:

I. Some pins are metals.

II. Some clips are metals.

Conclusions:

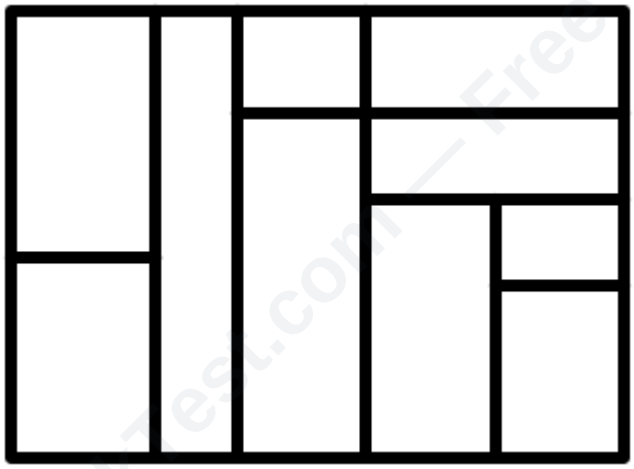
I. Some metals are pins.

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II. Some pins are clips.

(a) Both conclusions follow
(b) Only conclusion 2 follows
(c) Only conclusion 1 follows
(d) Neither conclusion follows

Q14. How many rectangles are there in the following picture?



(a) 20
(b) 21
(c) 22
(d) 24

Q15. Find the value of $\{(0.98)^3 + (0.02)^3 + 3 \times 0.98 \times 0.02 - 1\}$

(a) 1.98
(b) 1.09
(c) 1.562
(d) 0

Q16. The 2018 best tableau award in the republic day parade was given away by Union Defence Minister Nirmala Sitharaman to the state of:

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

Q17. Which one of the following is NOT a simple permanent tissue?

(a) Sclerenchyma
(b) Parenchyma
(c) Xylem
(d) Collenchyma

Q18. $\sin^2 60° + \cos^2 30° + \cot^2 45° + \sec^2 60° = ?$

(a) 15/2
(b) 13/2
(c) 7/2
(d) 5/2

Q19. Read the given question and decide which of the following equations is/are sufficient to answer the question.

Question:

What is the value of x?

Equations:

1. $x^2 - 18x + 81 = 0$
2. $p + q + r = 0$

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

Q20. The pH of the solution is given. Which of the solutions has the highest concentration of hydrogen ions?
(a) 10.1
(b) 4.7
(c) 2.4
(d) 8.0

Q21. A train crossed a 110 m long platform in 13.5 seconds and a 205 m long platform in 18.25 seconds. What was the speed of the train?
(a) 72 km/h
(b) 66 km/h
(c) 69 km/h
(d) 75 km/h

Q22. A cistern can be filled by two pipes A and B in 4 hours. When full, the tank can be emptied by a third pipe C in 8 hours. If all taps are turned on at the same time, the cistern will be full in?
(a) 4 hours
(b) 8 hours
(c) 16 hours
(d) 8/3 hours

Q23. Aadhya walks 500 m towards North and then turns left and walks 250 m, In which direction is she with respect to her initial position?
(a) South-East
(b) North-West
(c) North-East
(d) South-West

Q24. In which of the following plants is the plant body NOT differentiated into roots, stem, and leaves, and is also a Pteridophyte?
(a) Riccia
(b) Chara
(c) Marsilea
(d) Spirogyra

Q25. Consider the given statement and decide which of the following assumptions is/are implicit in the statement.

Statement:

"The final exams are getting near", Rina reminded her daughters.

Assumptions:

She wants them to remember about their study schedule.

She wants them to give serious thought to their exams.

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

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Q26. The Central Government's initiative aimed at bringing masses within the formal banking system is called:

(a) Jan Bank Yojana
(b) Jan Dhan Yojana
(c) Jan Aadmi Yojana
(d) Jan Rupaya Yojana

Q27. In March 2018, who released Rs. 1,000 and 10 commemorative coins on the occasion of the Nabakalebara festival at a function held in Puri, Odisha?

(a) The Governor of Odisha
(b) The Chief Minister of Odisha
(c) The Prime Minister of India
(d) The President of India

Q28. 4 + 4.44 + 44.4 + 4.04 + 444 – 20 = ?

(a) 480.88
(b) 472.88
(c) 495.22
(d) 577.2

Q29. In which group of the modern periodic table are halogens placed?

(a) 16^(th)
(b) 18^(th)
(c) 1^(st)
(d) 17^(th)

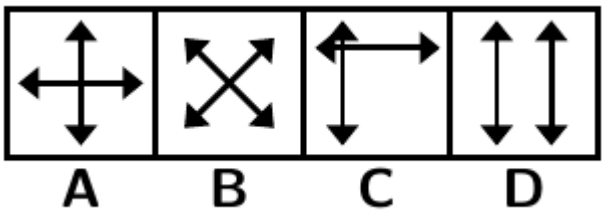
Q30. Senior IAS officer S Selvakumar has been appointed as the new chairman and managing director of _____ with effect from January 16, 2018.

(a) The Development and Educational Communication Unit (DECU)
(b) Security Printing and Minting Corporation of India Limited (SPMCIL)
(c) The SHAR Centre
(d) The Vikram Sarabhai Space Centre (VSSC)

Q31. A car covers a distance of 44 km using 23/4 litres of petrol. What distance can the car cover using 1 litre of petrol?

(a) 19 km
(b) 16 km
(c) 13 km
(d) 15 km

Q32. Find the odd one out.



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

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Q33. Which of the following hormones brings about changes in appearance seen in boys at the time of puberty?

(a) Thyroxin
(b) Testosterone
(c) Animal hormone
(d) Insulin

Q34. Which of the following states emerged as overall champions of the first (inaugural) edition of Khelo India School Games (KISG) held from 31^(st) January to 8^(th) February 2018 at Indira Gandhi Indoor Stadium?

(a) Haryana
(b) Gujarat
(c) Maharashtra
(d) Uttar Pradesh

Q35. From which Indian princely state did Velu Thampi Dalava hail? He is known for revolting against the British.

(a) Chola Kingdom
(b) Mysore Kingdom
(c) Vijayanagaram
(d) Travancore

Q36. Select the option that is related to the third word in the same way as the second word is related to the first word.

Glass : Transparent ? Wood : ?

(a) Furniture
(b) paint
(c) Block
(d) Opaque

Q37. If two unequal masses possess the same kinetic energy, then the heavier mass has:

(a) equal momentum
(b) lesser momentum
(c) greater momentum
(d) Can't say

Q38. If 15 boys earn Rs. 750 in 5 days, then how much money 25 boys will earn in 6 days?

(a) Rs. 960
(b) Rs. 1500
(c) Rs. 1200
(d) Rs. 900

Q39. Which of the following compounds does NOT possess water of crystallization?

(a) Gypsum
(b) Washing soda
(c) Copper sulphate
(d) Baking soda

Q40. The velocity of a vertically thrown ball, with time, will be:

(a) Downwards positive
(b) Upwards negative
(c) Upwards positive
(d) None of the above

Q41. Given is a statement followed by two assumptions numbered I and II. Consider the statement and the following assumptions and decide which of the assumptions is/are implicit in the statement.

Statement:

Sustainability can be defined as the practice of meeting the needs of the current generation without degrading or destroying the natural resources (e.g. water, soil, biodiversity, oil, minerals.)

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Assumptions:

1. Our lives and economies are dependent on natural capital, which is made up of these natural resources and natural services, and the energy provided by the sun.

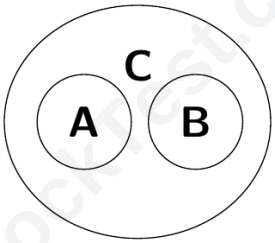
2. Just as every investor knows, we should invest our capital and live off on the interest, it provides. To live sustainably, we need to do the same: protect our natural capital and live off our biological income.

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

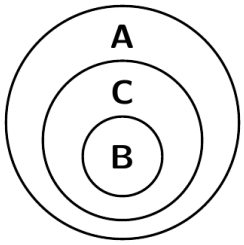
Q42. Which of the following Venn diagrams correctly represents the relationship between the given classes?

1. Table
2. cloth
3. Wood

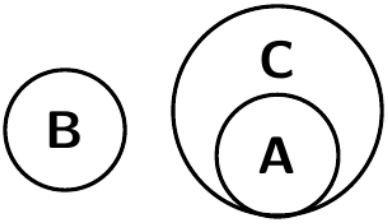
(a)



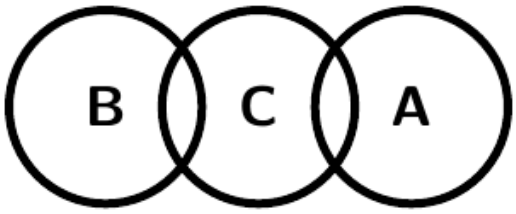
(b)



(c)



(d)



Q43. If South becomes South-East, then what will North become?

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

Q44. Lata makes 20 kg paneer at home and sells it every morning. From one litre of milk, she makes 200 gms of paneer. The cost of a litre of milk is Rs. 40. How much money does she spend in procuring milk every day?

(a) Rs. 3,000
(b) Rs. 4,000
(c) Rs. 2,000
(d) Rs. 2,500

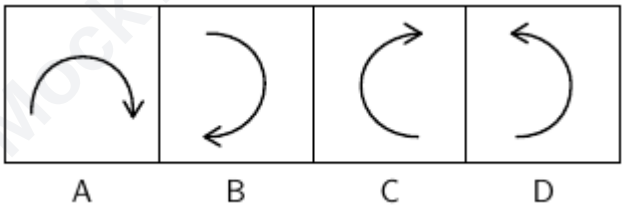
Q45. If α and β are roots of the equation $x^2 – x – 1 = 0$, then the equation whose roots are α/β and β/α is:

(a) $x^2 + 3x – 1 = 0$
(b) $x^2 + x – 1 = 0$
(c) $x^2 – x + 1 = 0$
(d) $x^2 + 3x + 1 = 0$

Q46. If $a + b + c = 2s$, then $[(s – a)^2 + (s – b)^2 + (s – c)^2 + s^2] = ?$

(a) $(s^2 – a^2 – b^2 – c^2)$
(b) $(s^2 + a^2 + b^2 + c^2)$
(c) $(a^2 + b^2 + c^2)$
(d) $(4s^2 – a^2 – b^2 – c^2)$

Q47. Find the odd one out.



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

Q48. Consider the following statements to be true even if they seem to be at variance from commonly known facts and decide which of the conclusions logically follows from the statements.

Statements:

1. No glass is a paddle.
2. All paddles are brakes.

Conclusions:

1. All brakes are paddles.
2. Some brakes are paddles.
3. No brake is glass.

(a) Only conclusion 3 follows
(b) Only conclusion 2 follows
(c) All the three conclusions follow
(d) Only conclusion 1 follows

Q49. Which one of the following animals reproduce by budding and can also carry out regeneration?

(a) Hydra
(b) Plasmodium
(c) Planaria
(d) Yeast

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Q50. If North-East becomes North, then what will East become?

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

Q51. Karewas, a type of soil/deposit, is found in which Indian state?

(a) Jammu and Kashmir
(b) West Bengal
(c) Rajasthan
(d) Nagaland

Q52. Choose the missing digit 'x' from the options given for the number 987x54, so that the number is completely divisible by 6.

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

Q53. Electric bulbs are usually filled with chemically-inactive gases like _____.

(a) hydrogen
(b) oxygen
(c) nitrogen
(d) chlorine

Q54. If the length and breadth of a rectangle are increased by 8% and 12% respectively, then by what percent does the area of that rectangle increase?

(a) 22%
(b) 24%
(c) 20%
(d) 20.96%

Q55. Who classified elements based on atomic numbers?

(a) Newlands
(b) Mendeleev
(c) Dobereiner
(d) Moseley

Q56. Who has been crowned Femina Miss India 2018?

(a) Anukreethy Vas
(b) Shreya Rao Kamavarapu
(c) Sunaina Kamath
(d) Meenakshi Chaudhary

Q57. A chemical reaction in which heat is generated is called a/an _____.

(a) endothermic reaction
(b) exothermic reaction
(c) combustion reaction
(d) displacement reaction

Q58. Which of the following sport is Yuzvendra Chahal related to?

(a) Tennis
(b) Hockey
(c) Shooting
(d) Cricket

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Q59. Who won the Filmfare Best Actor in a Leading Role (Male) award 2017?

(a) Shahrukh Khan
(b) Ranveer Singh
(c) Aamir Khan
(d) Ranbir Kapoor

Q60. Which of the following does NOT belong to this group?

A. Nail
B. Hair
C. Acne
D. Toe

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

Q61. Find the next number in the following series.

16, 18, 22, 24, 28, 30,?

(a) 25
(b) 30
(c) 27
(d) 34

Q62. Consider the given statements to be true even if they seem to be at variance with the commonly known facts and decide which of the given conclusions logically follow(s) from the statements.

Statements:

I. All covers are plastic.

II. All plastic are toxic.

Conclusions:

1. All plastic are covers.

2. All toxic are covers.

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

Q63. There are four numbers in a set. The mean of the three smallest numbers is 9, whereas the mean of the three largest ones is 11. What is the range of the data set?

(a) 3
(b) 6
(c) 9
(d) 5

Q64. The point where the entire weight of an object acts is known as the _____.

(a) center of friction
(b) center of area
(c) center of gravity
(d) center of pressure

Q65. 22- [23-{24 - (27 - 25 - 30)}] = ?

(a) -7
(b) 7
(c) -9

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(d) -8

Q66. If '+' means '÷', '÷' means '-', '-' means '×' and '× 'means '+', then what is the value of

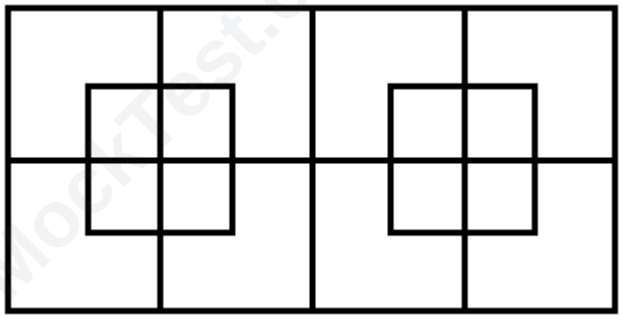
80 + 20 ÷ 5 - 12 × 92

(a) 28
(b) 22
(c) 36
(d) 35

Q67. The weight of an object on the moon is how many times its weight on the earth.

(a) 1/5 times
(b) 1/6 times
(c) 5 times
(d) 6 times

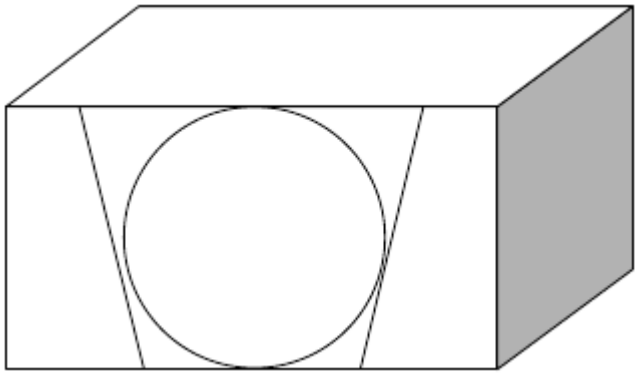
Q68. Find the number of squares in the following figure.



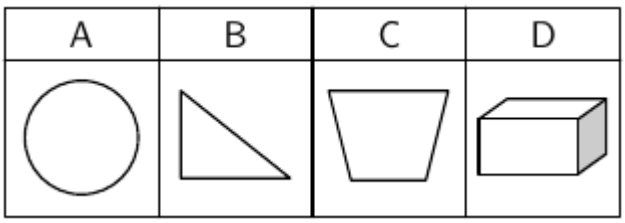
(a) 22
(b) 21
(c) 23
(d) 20

Q69. Which of the following option figures are combined to form the question figure?

Question figure



Option figure



(a) C, D and A
(b) A and D

(c) B, C and D
(d) C and D

Q70. The correct formula of calcium hydroxide is:
(a) CaOH2
(b) Ca2OH
(c) Ca(OH)2
(d) CaOH

Q71. Name the book authored by K. R. Meera which raises pertinent questions about the politics of faithfulness and the price of idealism.
(a) Gilletin
(b) Nethromeelanam
(c) The Gospel of Yudas
(d) Aarachar

Q72. In a class, there were 9 boys and some girls. In a test, the mean score obtained by the boys was 13 while that obtained by the girls was 15. If the overall average was 14.28, what was the total number of students in the class?
(a) 24
(b) 26
(c) 27
(d) 25

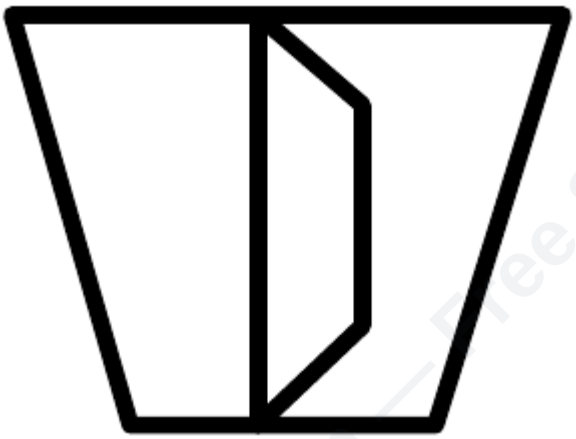
Q73. Mamata is the mother of Surya. How is Mamata's brother related to Surya's brother?
(a) Grandfather
(b) Father
(c) Brother
(d) Maternal uncle

Q74. The name of the comprehensive mentorship programme tailored exclusively for Indian startups that are using Machine Learning (ML) and Artificial Intelligence (AI) to build solutions for the pressing problems in the country is:
(a) Launchpad Accelerator India
(b) Modernization Accelerator India
(c) Automation Accelerator India
(d) MLAI Accelerator India

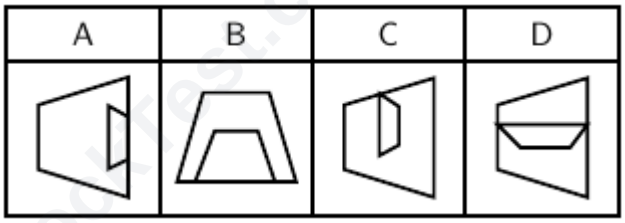
Q75. A ray of light passes from water to glass. It bends _____.
(a) Away from the normal and speeds up
(b) Away from the normal and slows down
(c) Towards the normal and slows down
(d) Towards the normal and speeds up

Q76. Which of the option figures bears the closest resemblance to the question figure?
Question figure:

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Option figures:



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

Q77. A 40 kg girl runs up a flight of stairs having a rise of 5 m in 4 s. The power developed by her will be _____. (take g = 10 m/s²)

(a) 100 W
(b) 200 W
(c) 500 W
(d) 2000 W

Q78. If Rs. 686 is divided, into four parts, in proportions 1/2 :2/3 :3 :4, then find the first part is:

(a) Rs. 52
(b) Rs. 42
(c) Rs. 56
(d) Rs. 48

Q79. The Election Commission of India (ECI) celebrated 8^(th) National Voters Day across the nation on _____ for enhanced participation of citizens in the electoral process.

(a) 28^(th) January
(b) 25^(th) January
(c) 24^(th) January
(d) 26^(th) January

Q80. Which is the longest river of Europe?

(a) Danube
(b) Volga
(c) Ural
(d) Rhine

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Q81. Find compound interest on Rs. 50000 at 12% per annum for 6 months, compounded quarterly.

(a) Rs. 3045
(b) Rs. 2875
(c) Rs. 3125
(d) Rs. 2965

Q82. The Ministry of Women and Child Development had launched a social media campaign to mark _____ on 11 August 2016.

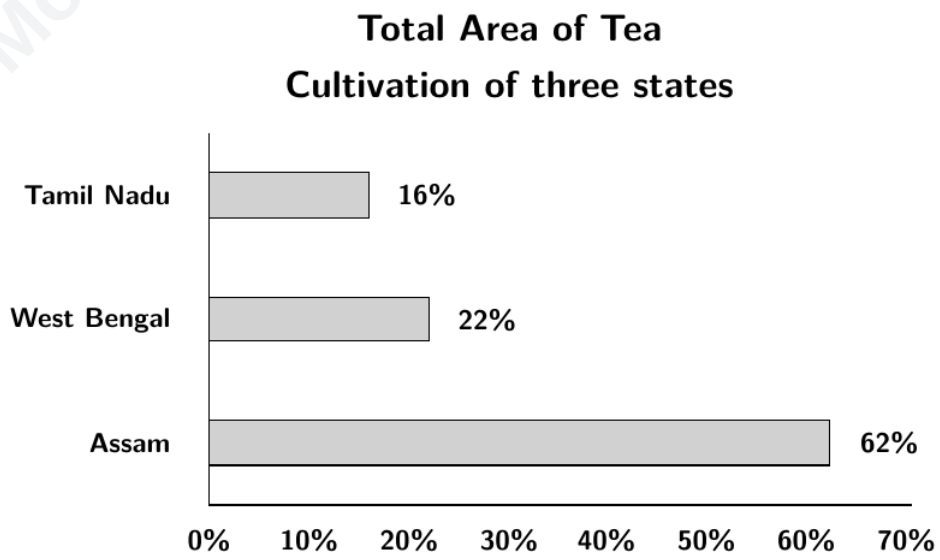
(a) Women's Day
(b) Daughter's Day
(c) Son's Day
(d) Men's Day

Q83. The induced current is highest when the direction of motion of the coil is at _____ with respect to the magnetic field.

(a) 0°
(b) 45°
(c) 180°
(d) 90°

Directions

Directions: Study the following graph carefully and answer the question that follows.



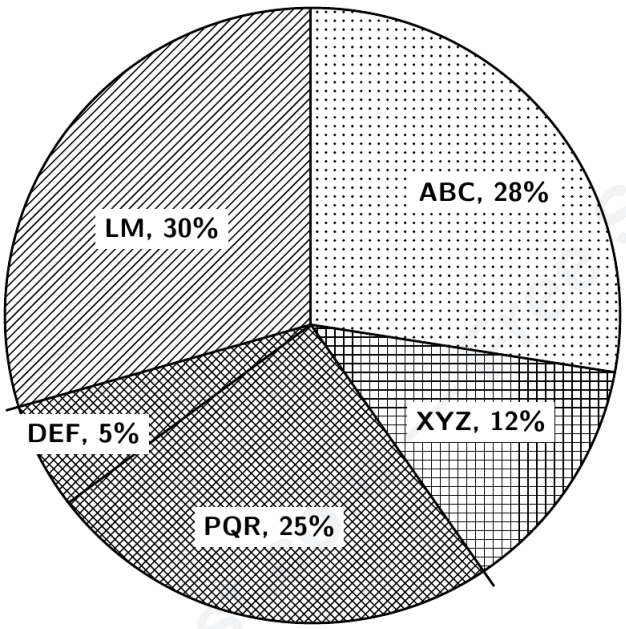
Q84. Area cultivated in West Bengal is what percentage more than that cultivated in Tamil Nadu?

(a) 37.5%
(b) 25%
(c) 50%
(d) 30%

Directions

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

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Q85. How many units of mobile phones are manufactured by company 'DEF'?

(a) 1,24,000
(b) 62,000
(c) 31,000
(d) 15,600

Q86. The breakdown of pyruvate using O2 takes place in the _____.

(a) lysosomes
(b) nucleus
(c) vacuoles
(d) mitochondria

Q87. Which of the following nations is the only country to win the ICC Under-19 Cricket World Cup four times?

(a) New Zealand
(b) South Africa
(c) Australia
(d) India

Q88. Which of the following numbers will have an irrational square root?

(a) 11025
(b) 6025
(c) 9025
(d) 3025

Q89. Who was awarded the 2017 Sahitya Academy award for his English novel 'The Black Hill'?

(a) Vikram Seth
(b) Chetan Bhagat
(c) Amitav Ghosh
(d) Mamang Dai

Q90. The digit in the unit's place of the number represented by (7^(95) – 3^(58)) is:

(a) 6
(b) 7
(c) 0
(d) 4

Q91. The lengths of one side of a rhombus and one of the two diagonals are 6 cm each. Find the area of the rhombus (in cm^2).

(a) $27\sqrt{3}$
(b) 18
(c) $9\sqrt{3}$
(d) $18\sqrt{3}$

Q92. The ratio 75 : 125 in its simplest form is written as:

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

Q93. Which of the following is malleable and ductile?

(a) Phosphorus
(b) Sulphur
(c) Carbon
(d) Copper

Q94. Sound waves with frequencies below the audible range are called _____.

(a) ultrasonic
(b) infrasonic
(c) supersonic
(d) None of these

Q95. Which among the following union ministers of India launched the mobile app 'Celebrating Yoga' to connect people through Yoga for Scientific healthy living?

(a) Mahesh Sharma
(b) Harsh Vardhan
(c) Jagat Prakash Nadda
(d) Smriti Irani

Q96. A ball is dropped from a height of 80 m. The distance travelled by it in the fourth second will be _____.
(take g = 10 m/s^2)

(a) 50 m
(b) 15 m
(c) 80 m
(d) 35 m

Q97. 5 – 8% of acetic acid is called:

(a) glacial acetic acid
(b) vinegar
(c) ester
(d) ethanol

Q98. If P is 15 years old now and Q will be 26 years old after 6 years, what is the ratio of their present ages?

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

Q99. Given is a statement followed by two arguments numbered I and II. Consider the statement and the following arguments and decide which of the arguments is/are strong?

Statement:

Are 21st century teenagers under stress?

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Arguments:

I. Yes, teenagers' perception is that are expected to be successful or good at everything. Failure has somehow gone from being viewed as a learning opportunity to being clearly unacceptable.

II. No, stress is a relative perception that can be managed with proper guidance.

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

Q100. Find the day name of 24 March 2006?

(a) Monday
(b) Friday
(c) Wednesday
(d) Sunday

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) 67

Using BODMAS we get,
=> (136 ÷ 17) + (17 × 13) – (103 – 85) × (62 + 145) ÷ 23,
=> 8 + 221 – 18 × 207 ÷ 23
=> 8 + 221 – 18 × 9
=> 8 + 221 – 162
=> 67

Q2. Answer: (c) 0.96 unit

Given data
=> Rated value of the electric lamp (P) = 120 watts
=> Amount of time the lamp is being used = 8 hours/day
=> t = 8 h
We know that, Power(P) = E/t
Where 'P' is power in watts and 'E' is energy consumed in watt-hours and 't' is time.
Substituting the values in the equation above,
120 = E/8
E = 960 Watt-Hours
E = 0.96 kWh or units. (1 Kilo Watt Hour = 1 unit)
Hence, the energy consumed by the lamp in 1 day (E) = 0.96 units

Q3. Answer: (b) 1815

The correct answer is 1815.

Key Points

• The Battle of Waterloo, which took place in Belgium on June 18, 1815, was marked as the final defeat of Napoleon Bonaparte.

• He conquered much of Europe in the early 19th century.

• Napoleon rose through the ranks of the French army during the French Revolution and seized control of the French government in 1799.

• He became emperor in 1804.

• The French Emperor Napoleon Bonaparte escaped from exile in March 1815 and returned to power.

• He decided to go on the offensive, hoping to win a quick victory that would tear apart the coalition of European armies formed against him.

• He expanded his empire across western and central Europe. The Battle of Waterloo, in which Napoleon's forces were defeated by the British and Prussians, marked the end of his reign and of France's domination in Europe.

• The Battle of Waterloo, in which Napoleon’s forces were defeated by the British and Prussians, marked the end of his reign and of France’s domination in Europe.

Important Points

The battle of Waterloo is still considered to be important due to the following reasons:

• It paved a way for the UK to become a global power.

• The Prussians’ contribution to the defeat of the French Army at Waterloo entered the mythology of the Prussian state, creating a sense of nationalism

• which then played a key role in the formation of the new German Empire after 1870

• Historian John Sadler states that "Many who died that day in Waterloo were buried in shallow graves but their bodies were later disinterred and their skeletons were taken.

Q4. Answer: (a) D

Cotton, wool and rayon are fibres but Cardboard is not a fibre.

Hence, “Cardboard” is the correct answer.

Q5. Answer: (b) 0.2 A

As the Resistors are connected in series the equivalent resistance will be -

$R_{(eqv)} = R1 + R2$

$= 10\ \Omega + 20\ \Omega$

$= 30\ \Omega$

According to Ohm’s law -

→ $V = IR$

→ $I = V/R$

→ $I = 6/30 = 1/5$ [$V = 6$ V given]

→ $I = 0.2$ A

Q6. Answer: (c) 13

Symbol	**•**	**×**
Meaning	÷	•

Given expression: {(36 + 6) + 6} × 12

After changing the symbols:

{(36 ÷ 6) ÷ 6} + 12

= {6 ÷ 6} + 12

= 1 + 12 = 13

Hence, “13” is the correct answer.

Q7. Answer: (a) 81 sec

Shortcut Trick

Convert speed to m/s: 20 × (5/18) = 50/9 m/s.

Time = Distance ÷ Speed.

Time = 450 ÷ (50/9) = 9 × 9 = 81 seconds.
Therefore The correct answer is 81 sec.
Alternate Method
Given:
Distance = 450 m
Speed = 20 km/hr
Formula Used:
Time = Distance ÷ Speed
1 km/hr = 5/18 m/s
Calculations:
=> Speed in m/s = 20 × (5/18) m/s
=> Speed = 100/18 = 50/9 m/s
=> Time = 450 ÷ (50/9)
=> Time = 450 × (9/50)
=> Time = 9 × 9
=> Time = 81 seconds
Therefore The correct answer is 81 sec.
Additional Information
Unit Conversion
To convert km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.
Basic Speed Formula
Speed = Distance ÷ Time; Distance = Speed × Time; Time = Distance ÷ Speed.
Average Speed
Average Speed = Total Distance ÷ Total Time. For two equal distances with speeds x and y, Average Speed = 2xy/(x+y).

Q8. Answer: (a) Gain 15%

Shortcut Trick
Loss of 5% means SP1 is 95% of CP.
95% → Rs. 25.65
1% → 25.65 ÷ 95 = 0.27
New SP2 as percentage of CP = 31.05 ÷ 0.27 = 115%
Since 115% > 100%, Gain% = 115% − 100% = 15%.
Therefore The correct answer is Gain 15%.
Alternate Method
Given: First Selling Price (SP1) = Rs. 25.65, Loss = 5%, Second Selling Price (SP2) = Rs. 31.05.
Formulas: CP = SP × 100 ÷ (100 − Loss%), Gain% = (SP − CP) ÷ CP × 100
=> Cost Price (CP) = 25.65 × 100 ÷ (100 − 5) = 25.65 × 100 ÷ 95
=> CP = 2565 ÷ 95 = Rs. 27
=> Profit = New SP − CP = 31.05 − 27 = Rs. 4.05
=> Gain% = (4.05 ÷ 27) × 100 = 0.15 × 100 = 15%
Therefore The correct answer is Gain 15%.
Additional Information
Profit and Loss on CP
Unless otherwise stated, Profit percentage and Loss percentage are always calculated on the Cost Price (CP).
Unitary Method for SP
If CP is assumed as 100 units, then SP at x% profit is (100 + x) units and SP at y% loss is (100 − y) units.

Q9. Answer: (c) Only assumption II is implicit

The statement given us no information to support the fact that younger children learn swimming faster. Hence assumption I is not implicit.
It is given in the statement school has made it compulsory for the children to learn swimming, this implies that the school is serious about the overall development of children. Hence, assumption II is also implicit.

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Q10. Answer: (d) Pravasi Bharatiya Divas (PBD)

• Pravasi Bharatiya Divas is held traditionally on 9th January every year to commemorate the return of Mahatma Gandhi as a Pravasi from South Africa to India.

• It also marks the contribution of the overseas Indian community in the development of India.

• The 15^(th) Pravasi Bharatiya Divas 2019 was celebrated with the theme "Role of Indian Diaspora in building a New India."

Q11. Answer: (b) 5.74

When the numbers are arranged in ascending order we get,

0.658, 0.8, 5.74, 6.03, 7.2

Therefore The required decimal number is 5.74

Q12. Answer: (d) IFO

Given,

Similarly,

Hence, "IFO" is the correct answer.

Q13. Answer: (c) Only conclusion 1 follows

The minimum possible Venn diagram of the given statements,

Conclusions:

I. Some metals are pins → True

II. Some pins are clips → False (its possible but not definite)

Hence, only conclusion I follows.

Q14. Answer: (d) 24

We can count the rectangles as follows,

Hence, there are "24" rectangles in the given figure.

Q15. Answer: (d) 0

Given:

{(.98)3 + (0.02)3 + 3 × 0.98 × 0.02 – 1}

Concept used:

(a + b)3 = a3 + b3 + 3ab(a + b)

Calculation:

{(.98)³ + (0.02)³ + 3 × 0.98 × 0.02 – 1

=> [(.98)³ + (0.02)³ + 3 × 0.98 × 0.02(0.98 + 0.02)} – 1]

Now, first term is of the form (a + b)3 where a = .98 and b = 0.02

=> (0.98 + 0.02)³ – 1 = 1 – 1 = 0

Therefore The value is 0.

Q16. Answer: (c) Maharashtra

• Union Defence Minister of India Nirmala Sitharaman gave away Republic Day Parade 2018 best tableau award to Maharashtra.

• Tripura bagged the best state tableau in 2019 Republic Day parade With the theme 'Empowering Rural Economy the Gandhian Way'.

• The second position was bagged by Jammu and Kashmir while the state of Punjab was placed in the third spot.

• India celebrated the 69^(th) republic day this year and Cyril Ramaphosa, President of South Africa was the chief guest for this year republic day parade.

Q17. Answer: (c) Xylem

• Xylem and Phloem are Complex Permanent Tissue while the other three are simple permanent tissues.

Xylem	**Xylem is the tissue that carries water up through a plant. It is made up of vessels or tracheids, xylem parenchyma, and xylem fiber.**
Sclerenchyma	Sclerenchyma is the simple permanent tissue that makes a plant hard and stiff.

Parenchyma	Parenchyma are thin-walled tissues which are involved in food storage, photosynthesis, and other activities of plant life.
Collenchyma	Collenchyma cells are those which have irregularly thick cell walls which provide support and structure.

Q18. Answer: (b) 13/2

Shortcut Trick

Directly substitute the standard trigonometric values.

sin 60° = √3/2, cos 30° = √3/2, cot 45° = 1, sec 60° = 2.

$(\sqrt{3}/2)^2 + (\sqrt{3}/2)^2 + 1^2 + 2^2 = 3/4 + 3/4 + 1 + 4 = 6/4 + 5 = 1.5 + 5 = 6.5$.

6.5 = 13/2.

Therefore The correct answer is 13/2.

Alternate Method

Given: $\sin^2 60° + \cos^2 30° + \cot^2 45° + \sec^2 60°$

Formula Used: Standard trigonometric ratios at specific angles.

=> sin 60° = √3/2

=> cos 30° = √3/2

=> cot 45° = 1

=> sec 60° = 2

Calculations:

$=> (\sqrt{3}/2)^2 + (\sqrt{3}/2)^2 + (1)^2 + (2)^2$

=> (3/4) + (3/4) + 1 + 4

=> 6/4 + 5

=> 3/2 + 5

=> (3 + 10) / 2

=> 13/2

Therefore The correct answer is 13/2.

Additional Information

Trigonometric Identities

$\sin^2\theta + \cos^2\theta = 1$; $1 + \tan^2\theta = \sec^2\theta$; $1 + \cot^2\theta = \text{cosec}^2\theta$.

Complementary Angles

$\sin(90°-\theta) = \cos\theta$ and $\cot(90°-\theta) = \tan\theta$. This explains why sin 60° = cos 30°.

Reciprocal Relations

$\sec\theta = 1/\cos\theta$; $\text{cosec}\theta = 1/\sin\theta$; $\cot\theta = 1/\tan\theta$.

Q19. Answer: (a) Only 1 is sufficient

Shortcut Trick

In Data Sufficiency, a statement is sufficient if it yields a unique value for the required variable.

Equation 1 is a quadratic equation in x, which simplifies to $(x - 9)^2 = 0$, giving a unique value x = 9.

Equation 2 involves independent variables (p, q, r) and provides no information regarding x.

Therefore The correct answer is Only 1 is sufficient.

Alternate Method

Given Equations:

1. $x^2 - 18x + 81 = 0$

2. p + q + r = 0

Analysis of Equation 1:

$=> x^2 - 9x - 9x + 81 = 0$

=> x(x − 9) − 9(x − 9) = 0

=> (x − 9)(x − 9) = 0

=> x = 9, 9

Since Equation 1 provides a definite value for x, it is sufficient.

Analysis of Equation 2:

=> p + q + r = 0

This equation contains three variables p, q, and r. There is no relationship or data provided to link these variables to x.

Thus, Equation 2 is insufficient to determine the value of x.

Therefore The correct answer is Only 1 is sufficient.

Additional Information

Quadratic Identity

The expression $a^2 - 2ab + b^2$ is a perfect square which equals $(a - b)^2$. In Equation 1, $x^2 - 2(x)(9) + 9^2$ fits this form perfectly.

Nature of Roots

For $ax^2 + bx + c = 0$, if the discriminant $D = b^2 - 4ac$ is equal to 0, the equation has two equal real roots, providing a unique solution for the variable.

Data Sufficiency Rule

A statement is considered sufficient if it leads to one and only one specific answer. If multiple values or no values can be determined, the statement is insufficient.

Q20. Answer: (c) 2.4

- The pH level is a measure of the number of Hydrogen ions in a solution.
- The lower the solution or compound on the pH scale, the higher will be the concentration of hydrogen ions.
- Therefore the solution having a pH of 2.4 will have the highest concentration of hydrogen ions.
- The pH scale ranges from 0 to 14.
- A pH value of 7 is considered neutral, example - water and pH value > 7 is Basic > pH value < 7 is Acidic

Q21. Answer: (a) 72 km/h

Shortcut Trick

Speed = Difference in Distance ÷ Difference in Time

Distance difference = 205 − 110 = 95 m

Time difference = 18.25 − 13.5 = 4.75 seconds

Speed in m/s = 95 ÷ 4.75 = 20 m/s

Speed in km/h = 20 × (18/5) = 72 km/h

Therefore The correct answer is 72 km/h.

Alternate Method

Given: Platform1 = 110 m, Time1 = 13.5 s, Platform2 = 205 m, Time2 = 18.25 s.

Formula Used: Speed = (Train Length + Platform Length) ÷ Time

=> Let the length of the train be L.

=> Speed = (L + 110) / 13.5 = (L + 205) / 18.25

=> 18.25(L + 110) = 13.5(L + 205)

=> 18.25L + 2007.5 = 13.5L + 2767.5

=> 4.75L = 760

=> L = 160 m

=> Speed = (160 + 110) / 13.5 = 270 / 13.5 = 20 m/s

=> Speed in km/h = 20 × (18/5) = 72 km/h

Therefore The correct answer is 72 km/h.

Additional Information

Unit Conversion

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

Train Crossing Stationary Object

When a train crosses a platform or bridge, the total distance covered is the sum of the train length and the object length.

Relative Speed

For two objects moving in the same direction, relative speed = S1 − S2. For opposite directions, relative speed = S1 + S2.

Q22. Answer: (b) 8 hours

Shortcut Trick

Net filling rate = (1/Time A&B) − (1/Time C)

Net filling rate = (1/4) − (1/8) = (2 − 1)/8 = 1/8

Time taken = 1 ÷ (1/8) = 8 hours

Therefore The correct answer is 8 hr.

Alternate Method

Given: Filling time for A & B = 4 hours, Emptying time for C = 8 hours.

Formula Used: Total Work = LCM of time taken; Efficiency = Total Work ÷ Time.

Pipes	Time (hr)	Total Work (units)	Efficiency
A + B (Fill)	4	8	+2
C (Empty)	8	−1	

=> Net efficiency of A + B + C = (+2) + (−1) = +1 unit/hr

=> Total time required = Total Work ÷ Net Efficiency

=> Total time = 8 ÷ 1 = 8 hours

Therefore The correct answer is 8 hr.

Additional Information

Inlet and Outlet Pipes

An inlet pipe fills the tank (positive work), while an outlet pipe empties it (negative work).

Net Work Formula

If an inlet fills in x hours and an outlet empties in y hours, net part filled in 1 hour = (1/x) − (1/y).

Pipes and Cisterns Logic

This topic follows the same principles as Time and Work, where efficiency is inversely proportional to time.

Q23. Answer: (b) North-West

Hence, Aadhya is in North-West direction with respect to her initial position.

Q24. Answer: (c) Marsilea

• Marsilea is a Pteridophyte, and unlike algae (like Chara and Spirogyra) or bryophytes (like Riccia), Pteridophytes have a plant body differentiated into true roots, stems, and leaves. However, in the context of typical biology questions regarding non-differentiated bodies, algae are the primary examples. If the question asks for the plant body NOT differentiated, and we must remove ambiguity, we should change the options to exclude multiple thallophytes. Given the constraint to only correct the ambiguity: Marsilea is the only one here that IS differentiated. If the question asks for NOT differentiated, and we have Riccia (Bryophyte - thalloid), Chara (Algae - thalloid), Spirogyra (Algae - thalloid), the question is flawed. Let's adjust the question to ask for one that IS differentiated to make Marsilea the unique answer.

Q25. Answer: (a) Both I and II are implicit.

From the given statement, we understand the following things: the word ‘reminded’ tells us that Rina ‘wants them to remember about their study schedule’ and because ‘the final exams are getting near’, she wants them to ‘give serious thought to their exams’. From this we can safely state that both the assumptions are implied.

Q26. Answer: (b) Jan Dhan Yojana

• The Pradhan Mantri Jan Dhan Yojana was launched on 28th August 2014 by Prime Minister Narendra Modi.

• It also entered into the Guinness Book of World Record for having most bank accounts opened in one week.

• The scheme sought to financially empower the poor by providing them access to the formal banking system.

Q27. Answer: (d) The President of India

• The President of India Ram Nath Kovind released Rs 1,000 and Rs 10 commemorative coins on the occasion of Nabakalebar festival.

• The government had announced the release of the coins marking the festival which is a symbolic recreation of sibling deities -- Lord Jagannath, Balabhadra and Devi Subhadra.

• The commemorative coins were released at a function of Rashtriya Sanskrit Sansthan at Puri in Odisha

Q28. Answer: (a) 480.88

=> 4 + 4.44 + 44.4 + 4.04 + 444 – 20 = 480.88

Q29. Answer: (d) 17^(th)

The correct answer is 17th.

• The Halogens are the elements belonging to Group 17 in the periodic table.

• A periodic table is an arrangement of elements based on their atomic numbers and chemical properties.
• It is divided into 18 groups and 7 periods running vertically and horizontally respectively.
• The periodic table accommodates a discrete combination of metal, non-metals, and metalloids.
• The elements in the periodic table are arranged horizontally in ascending order of their atomic numbers known as periods.
• Vertically the elements having identical chemical properties are clubbed together known as groups.
• The 18 groups are also known as columns and the 7 periods are also known as the rows.

Explanation:

Periods:

• Elements are arranged in increasing the atomic number of elements in a period.
• One extra electron gets added to the outermost shell as we move along the periods from left to right.
• The electron gets added to the same shell or orbit and thus the electrons present for bonding increase by one unit.
• Thus, the shell number remains the same but the number of electrons present for bonding increases along a period.

Groups:

• Elements having the same number of outer electrons are put in the same group of the periodic table.
• When we move down a group, new shells get added.
• The outermost shell has electrons present for bonding.
• Though the number of shells increases as we go down in a group, the number of electrons in the outermost shell remains the same.
• For example, the Halogens F, Cl, Br, I, At all belong to group 17 and have 7 electrons in the outermost shell.
• Similarly, Group 16 elements have 6 electrons in the outermost shell, group 15 has 5 electrons in the outermost shell, and so on.

Group number	Common name	Number of electrons for bonding
1	Alkali metals	1
2	Alkaline earth metals	2
14	Crystallogens	4
15	Pnictogens	5
16	Chalcogens	6
17	Halogens	7
18	Noble gases	8

Hence, group 17 is called halogens.

Q30. Answer: (b) Security Printing and Minting Corporation of India Limited (SPMCIL)

• The government appointed senior IAS officer S Selvakumar as Chairman and Managing Director (CMD) of Security Printing and Minting Corporation of India Ltd (SPMCIL).
• Mr. Selvakumar has replaced Mr. Anurag Agarwal.
• The SPMCIL is responsible for producing coins, banknotes, postage stamps, non-judicial stamps, and other official documents.

Q31. Answer: (b) 16 km

Shortcut Trick

Convert mixed fraction to improper: 2(3/4) = 11/4 litres.

Distance for 1 litre = Total Distance ÷ Total Petrol

=> 44 ÷ (11/4) = 44 × (4/11) = 4 × 4 = 16 km.

Therefore The correct answer is 16 km.

Alternate Method

Given:

Total Distance = 44 km

Total Petrol used = 2(3/4) litres = 11/4 litres

Calculations:

=> Distance covered in 11/4 litres = 44 km

=> Distance covered in 1 litre = 44 ÷ (11/4)

=> Distance covered in 1 litre = 44 × (4/11)

=> Distance covered in 1 litre = 4 × 4

=> Distance covered in 1 litre = 16 km

Therefore The correct answer is 16 km.

Additional Information

Unitary Method

It is a technique where we find the value of a single unit first to calculate the value of the required number of units.

Mileage/Fuel Efficiency

The distance a vehicle travels per unit of fuel consumed. Formula: Mileage = Total Distance ÷ Total Fuel.

Mixed Fraction Conversion

To convert a mixed fraction a(b/c) to improper, use (a×c + b)/c.

Q32. Answer: (a) D

Two lines are intersecting each other in figure A, B and C, but in figure D Both the lines are parallel to each other.

Hence, “D” is the odd one.

Q33. Answer: (b) Testosterone

Explanation:

• Testosterone is the hormone that develops male characteristics in the human body. When XY chromosomes meet, they form a male body. It is a hormone secreted by the male reproductive organ Testes.

• Testosterone plays a key role in the development of male reproductive tissues such as the testes and prostate, as well as promoting secondary sexual characteristics such as increased muscle and bone mass, and the growth of body hair.

Additional Information

• Insulin is a hormone secreted by the β cells of islets of Langerhans. Insulin is released into the bloodstream to lower down blood sugar levels and prevent hyperglycemia.

• Thyroxine: It is an endocrine secretion of the thyroid gland. The thyroid gland requires 120 microgram Iodine per day for the production of thyroxine It regulates the basal metabolic rate of the body.

Q34. Answer: (a) Haryana

• The first Khelo India School Games was held in New Delhi where Haryana topped the overall medal tally with 102 medals- 38 gold and 26 silver.

• Maharashtra won 110 medals (36 gold) and finished second while Delhi with 94 medals came third.

• Sports Minister, Col Rajyavardhan Rathore presented the trophy to the top state Haryana.

• The first Khelo India School Games were launched by Prime Minister Narendra Modi at Indira Gandhi Indoor Stadium in New Delhi.

• It was introduced to revive the sports culture in India at the grass-root level.

Q35. Answer: (d) Travancore

• Velu Thampi Dalava was the ruler of the Indian kingdom of Travancore between 1802 and 1809.

• He is best known to rebel against the British East India Company's supremacy in India.

Q36. Answer: (d) Opaque

Here, analogy pair is Glass that is transparent and wood will be opaque.

Hence, “opaque” is the correct answer.

Q37. Answer: (c) greater momentum

CONCEPT:

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

The expression for kinetic energy is given by:

$KE = 1/2mv^2$

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

• Momentum (p): The product of mass and velocity is called momentum.

Momentum (p) = mass (m) × velocity (v)

The relationship between the kinetic energy and Linear momentum is given by:

As we know,

$KE = 1/2mv^2$

Divide numerator and denominator by m, we get

KE = 1/2(m^2v^2)/m = 1/2($(mv)^2$)/m = 1/2(p^2)/m [p = mv]

Therefore KE = 1/2(p^2)/m

p = √2mKE

EXPLANATION:

Given that:

K.E1 = K.E2= K.E (let say)

The relation between the momentum and the kinetic energy is given by:

P = √(2m K.E)

But as K.E is same

Therefore P prop. to √m

Or, P1/P2 = √(m1/m2)

Here, if m1 > m2 then p1> p2

• If two unequal masses possess the same kinetic energy, then the heavier mass has greater momentum. So option 3 is correct.

Q38. Answer: (b) Rs. 1500

Shortcut Trick

Use the MDH/W formula: (M1 × D1) / W1 = (M2 × D2) / W2

Substitute values: (15 × 5) / 750 = (25 × 6) / W2

75 / 750 = 150 / W2 => 1 / 10 = 150 / W2

W2 = 150 × 10 = Rs. 1500

Therefore The correct answer is Rs. 1500.

Alternate Method

Given:

Case 1: Boys (M1) = 15, Days (D1) = 5, Earnings (W1) = Rs. 750

Case 2: Boys (M2) = 25, Days (D2) = 6, Earnings (W2) = ?

Formula Used:

Work (Earnings) is directly proportional to the number of men and the number of days: W prop. to M × D

Calculations:

=> Earnings per boy per day = 750 / (15 × 5)

=> Earnings per boy per day = 750 / 75 = Rs. 10

=> Earnings for 25 boys in 1 day = 25 × 10 = Rs. 250

=> Earnings for 25 boys in 6 days = 250 × 6 = Rs. 1500

Therefore The correct answer is Rs. 1500.

Additional Information

Chain Rule in Work and Wages

The amount of work done or wages earned is directly proportional to the number of persons and the time duration: (M1D1H1)/W1 = (M2D2H2)/W2.

Direct vs Inverse Proportion

Men and Days are inversely proportional for a fixed work (M1D1 = M2D2), while Men and Wages are directly proportional (M1/W1 = M2/W2).

Q39. Answer: (d) Baking soda

• The number of water molecules that combine chemically in definite molecular proportion, with the concerned salt in the crystalline state is known as the water of crystallization.

• Baking soda does NOT possess water of crystallization while other three do so.

Compounds	Chemical Formula
Gypsum	CaSO4·2H2O
Washing soda	Na2CO_(3.)10H2O
Copper sulphate	CuSO4.5H2O
Baking soda	NaHCO3

Q40. Answer: (c) Upwards positive

The correct answer is Upwards positive.

Key Points

• The velocity of a vertically thrown ball, with time, will be “up” in the positive direction.

• Gravity pulls the ball down, and since that is the only force acting on the ball, neglecting air resistance, the acceleration is always 9.8 m/s² down or -9.8 m/s².

• Since, u=0

v(t) = u + at, so v(t) = - 9.8t.

CONCEPT:

• Velocity: The rate of change of position i.e. rate of displacement with time is called velocity.

v = (s2 - s1)/(t2 - t1) = (Δ s)/(Δ t)

Where s2 = displacement of the object at t2 and s1 = displacement of the object at t1

• It is a vector quantity having the symbol vec v.

EXPLANATION:

• When the ball goes upwards the direction of the velocity of the ball decreases but in the cartesian plane when the ball goes upward its speed is positive and when the ball comes downward its velocity is negative.

Additional Information

• The velocity and time are linearly proportional to each other which is the same as the equation of a straight line.

• Therefore the correct velocity-time graph is

Q41. Answer: (c) Only assumption I is implicit.

The statement talks about the definition and process of sustainability and its concurrent practices. It also talks about the human capital is the underlying basis for all sustainable approaches. Hence assumption I follows.

Assumption II seems not to connect with the statement, as, it is moving to investors and invest. So, Assumption II not follows.

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

Q42. Answer: (c) [figure]

• Table is made of wood and cloth is different.

Therefore, the best possible Venn diagram representation will be,

Hence, “option 3” is the correct answer.

Mistake Points

• Some tables are made of plastic too. However, an option indicating this is not given.

• We must choose the best possible option from the given ones.

Q43. Answer: (d) North - West

Hence, North become “north-west”.

Q44. Answer: (b) Rs. 4,000

Shortcut Trick

Milk required for 1 kg paneer = 1000 / 200 = 5 Litres

Total milk for 20 kg paneer = 20 × 5 = 100 Litres

Total cost per day = 100 × 40 = Rs. 4,000

Therefore The correct answer is Rs. 4,000.

Alternate Method

Given:

Total paneer produced daily = 20 kg

Paneer produced from 1 litre of milk = 200 gms

Cost of 1 litre of milk = Rs. 40

Calculations:

=> Total weight of paneer in grams = 20 × 1000 = 20,000 gms

=> Total milk required = Total paneer ÷ Paneer per litre

=> Total milk required = 20,000 ÷ 200 = 100 Litres

=> Money spent on milk = Total milk × Cost per litre

=> Total money spent = 100 × 40 = Rs. 4,000

Therefore The correct answer is Rs. 4,000.

Additional Information

Unit Conversion

Always ensure units are consistent before calculation. 1 kg = 1000 grams.

Unitary Method

Value of a required quantity = (Value of known unit quantity × required quantity) ÷ known quantity.

Total Cost Calculation

Total Expenditure = Quantity × Rate per unit.

Q45. Answer: (d) $x^2 + 3x + 1 = 0$

Shortcut Trick

From the equation $x^2 - x - 1 = 0$, the sum of roots $(\alpha + \beta) = 1$ and product of roots $(\alpha\beta) = -1$.

The sum of the new roots $(\alpha/\beta + \beta/\alpha) = (\alpha^2 + \beta^2) / \alpha\beta = [(\alpha + \beta)^2 - 2\alpha\beta] / \alpha\beta$.

New Sum = $[1^2 - 2(-1)] / (-1) = 3 / -1 = -3$.

The product of the new roots $(\alpha/\beta \times \beta/\alpha) = 1$.

The required equation is $x^2 - (\text{Sum})x + (\text{Product}) = 0 \Rightarrow x^2 - (-3)x + 1 = 0 \Rightarrow x^2 + 3x + 1 = 0$.

Therefore The correct answer is $x^2 + 3x + 1 = 0$.

Alternate Method

Given:

Quadratic equation: $x^2 - x - 1 = 0$ with roots α and β.

Formula Used:

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

The equation with roots r1 and r2 is $x^2 - (r1 + r2)x + (r1r2) = 0$.

Calculations:

$\Rightarrow \alpha + \beta = -(-1)/1 = 1$

$\Rightarrow \alpha\beta = -1/1 = -1$

$\Rightarrow$ New roots are $r1 = \alpha/\beta$ and $r2 = \beta/\alpha$.

$\Rightarrow$ Sum $(S) = \alpha/\beta + \beta/\alpha = (\alpha^2 + \beta^2) / \alpha\beta$

$\Rightarrow \alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = (1)^2 - 2(-1) = 1 + 2 = 3$

$\Rightarrow S = 3 / (-1) = -3$

$\Rightarrow$ Product $(P) = (\alpha/\beta) \times (\beta/\alpha) = 1$

$\Rightarrow$ Required equation: $x^2 - (S)x + P = 0$

$\Rightarrow x^2 - (-3)x + 1 = 0$

$\Rightarrow x^2 + 3x + 1 = 0$

Therefore The correct answer is $x^2 + 3x + 1 = 0$.

Additional Information

Relation between Roots and Coefficients

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

Symmetric Functions of Roots

Functions of roots that remain unchanged when roots are interchanged, such as $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta$ and $\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$.

Reciprocal Roots

If the roots of $ax^2 + bx + c = 0$ are reciprocals of each other, then the product of roots $c/a = 1$, which implies $c = a$.

Transformation of Equations

To find an equation with roots $1/\alpha$ and $1/\beta$, replace x with $1/x$ in the original equation $ax^2 + bx + c = 0$ to get $cx^2 + bx + a = 0$.

Q46. Answer: (c) $(a^2 + b^2 + c^2)$

Shortcut Trick

Use the Value Substitution Method: Assume a = 2, b = 2, and c = 2.

According to the condition $a + b + c = 2s$, we have $2 + 2 + 2 = 2s \Rightarrow s = 3$.

Substitute these values into the given expression: $(3 - 2)^2 + (3 - 2)^2 + (3 - 2)^2 + 3^2$

$\Rightarrow 1^2 + 1^2 + 1^2 + 9 = 1 + 1 + 1 + 9 = 12$.

Check Option (3): $a^2 + b^2 + c^2 = 2^2 + 2^2 + 2^2 = 4 + 4 + 4 = 12$.

Therefore The correct answer is $(a^2 + b^2 + c^2)$.

Alternate Method

Given: $a + b + c = 2s$

We need to find the value of the algebraic expression: $(s - a)^2 + (s - b)^2 + (s - c)^2 + s^2$

Using the identity $(x - y)^2 = x^2 - 2xy + y^2$, expand each term:

$\Rightarrow (s^2 - 2as + a^2) + (s^2 - 2bs + b^2) + (s^2 - 2cs + c^2) + s^2$

Now, group the terms by combining like powers:

$\Rightarrow (s^2 + s^2 + s^2 + s^2) - (2as + 2bs + 2cs) + (a^2 + b^2 + c^2)$

$\Rightarrow 4s^2 - 2s(a + b + c) + (a^2 + b^2 + c^2)$

Substitute the given condition $a + b + c = 2s$ into the equation:

$\Rightarrow 4s^2 - 2s(2s) + (a^2 + b^2 + c^2)$

$\Rightarrow 4s^2 - 4s^2 + a^2 + b^2 + c^2$

$\Rightarrow a^2 + b^2 + c^2$

Therefore The correct answer is $(a^2 + b^2 + c^2)$.

Additional Information

Trinomial Square Identity

The expansion of the square of a sum of three terms is $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$.

Semi-perimeter Property

In geometry, specifically in Hero's formula for the area of a triangle, s represents the semi-perimeter where $2s = a + b + c$.

Difference of Squares Expansion

The square of a binomial difference is always expanded as $(x - y)^2 = x^2 - 2xy + y^2$.

Q47. Answer: (c) D

In figure A, B and C arrow is moving in a clockwise direction but in figure, D arrow is moving in an anticlockwise direction.

Hence, “figure D” is odd one out.

Q48. Answer: (b) Only conclusion 2 follows

The minimum possible Venn diagram of the given statements,

Conclusions:

1) All brakes are paddles → False (it is possible but not definite)

2) Some brakes are paddles → True.

3) No brake is glass → False (it is possible but not definite)

Hence, only conclusion 2 follows.

Q49. Answer: (a) Hydra

• Hydra can reproduce by regeneration and budding.

• In budding, initially buds appear as a small bulge. They further grow, and within 2-4 days they become fully-formed hydra. Then it detaches from the parent body.

• In regeneration, regrowth of damaged or lost part takes place.

• Hydra belongs to Phylum Coelenterata.

• Yeast is a fungi and it reproduces asexually through budding.

• Plasmodium is a protozoan and it has sexual cycle in mosquito and asexual cycle in humans. In asexual cycle it undergoes multiple fission.

• Planaria reproduces asexually through regeneration. In fact it possess the highest power of regeneration.

Q50. Answer: (b) North-East

Here, axes are shifting 45 degrees in the Anticlockwise direction, hence, northeast would become north direction.

Similarly, the northeast will be there in place of the East.

Hence, East will become “North-East”

Q51. Answer: (a) Jammu and Kashmir

• Karewas are lacustrine deposits (deposits in a lake) in the valley of Kashmir and in Bhadarwah Valley of the Jammu division of Jammu and Kashmir.

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• These are the flat-topped mounds that border the Kashmir valley on all sides. They are characterized by fossils of mammals and at places by peat. The various crops grown in this area are saffron, almond, apples, walnut, peaches, pears, cherry and plum.

• Ling nut is grown in tropical and subtropical areas of West Bengal, Bihar and Jharkhand.

Q52. Answer: (b) 3

Shortcut Trick

For 987x54 to be divisible by 6, it must be divisible by both 2 and 3.

Since the last digit is 4, it is divisible by 2.

Sum of digits = 9 + 8 + 7 + x + 5 + 4 = 33 + x.

For (33 + x) to be divisible by 3, x must be 3 (from options, 33 + 3 = 36 is divisible by 3).

Therefore The correct answer is 3.

Alternate Method

Given number is 987x54.

Check divisibility by 2:

=> Last digit is 4, which is even, so the number is divisible by 2.

Check divisibility by 3:

=> Sum of digits = 9 + 8 + 7 + x + 5 + 4

=> Sum of digits = 33 + x

Let us test the given options for x:

=> If x = 5, sum = 33 + 5 = 38 (not divisible by 3)

=> If x = 3, sum = 33 + 3 = 36 (divisible by 3)

=> If x = 2, sum = 33 + 2 = 35 (not divisible by 3)

=> If x = 1, sum = 33 + 1 = 34 (not divisible by 3)

=> Therefore, the value of x must be 3.

Therefore The correct answer is 3.

Additional Information

Divisibility Rule of 3

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

Divisibility Rule of 6

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

Divisibility Rule of 9

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

Q53. Answer: (c) nitrogen

• Electric bulbs are usually filled with chemically-inactive gases like Argon and Nitrogen.

• When a bulb is filled with an inert gas, it slows down the evaporation of the tungsten filament compared to operating it in a vacuum.

• This allows greater temperatures and therefore greater efficacy with less reduction in filament life.

Q54. Answer: (d) 20.96%

Shortcut Trick

Apply Successive Percentage formula: x + y + (x × y)/100

Here, x = 8 and y = 12

Net increase = 8 + 12 + (8 × 12)/100

Net increase = 20 + 0.96 = 20.96%

Therefore The correct answer is 20.96%.

Alternate Method

Given: Increase in length (L) = 8%, Increase in breadth (B) = 12%.

Formula Used: Area of Rectangle = Length × Breadth

=> Let initial Length = 100 and initial Breadth = 100

=> Initial Area = 100 × 100 = 10,000

=> New Length = 100 + 8% of 100 = 108

=> New Breadth = 100 + 12% of 100 = 112

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=> New Area = 108 × 112 = 12,096

=> Increase in Area = 12,096 − 10,000 = 2,096

=> Percentage Increase = (2,096 / 10,000) × 100 = 20.96%

Therefore The correct answer is 20.96%.

Additional Information

Successive Percentage Change

Used when a value is changed and then the resultant value is changed again. Net % = x + y + xy/100.

Area and Volume Changes

For 2D shapes (Area), use successive change twice. For 3D shapes (Volume), apply the formula thrice.

Successive Discount

Equivalent discount for two discounts d1 and d2 is (d1 + d2 − d1d2/100)%.

Q55. Answer: (d) Moseley

The correct answer is Moseley.

Key Points

• Henry Moseley classified elements based on Atomic numbers.

• In 1913 A.D. the English scientist Henry Moseley demonstrated, with the help of the experiments done using an X-ray tube, that the atomic number (Z) of an element corresponds to the positive charge on the nucleus or the number of protons in the nucleus of the atom of that element.

• This revealed that ‘atomic number’ is a more fundamental property of an element than its atomic mass.

Q56. Answer: (a) Anukreethy Vas

• Tamil Nadu's Anukreethy Vas was named Miss India 2018.

• The 55^(th) Femina Miss India 2018 was held Mumbai.

• Miss World 2017 Manushi Chhillar, crowned Anukreethy, who will go on to represent India at Miss World.

• Haryana's Meenakshi Chaudhary stood second and Andhra Pradesh's Shreya Rao Kamavarapu ranked third. Malaika Arora and Irfan Pathan were among the judges.

Q57. Answer: (b) exothermic reaction

Endothermic reaction	**• An endothermic reaction is that in which heat is absorbed. - E. g - Melting of Ice, Evaporation of Liquids.**
Exothermic reaction	• An exothermic reaction is a reaction in which heat is released or generated. - E. g - Combustion of fuels, Thermite reaction.
Combustion reaction	• Burning of any substance in the presence of Air/ Oxygen is called a Combustion Reaction. - E.g - Burning of coal or wood, Gasoline in cars
Displacement reaction	• A reaction in which a more reactive element displaces a less reactive element from its compound. - Both metals and non-metals take part in displacement reactions. - E.g - Thermite Welding, Steelmaking.

Q58. Answer: (d) Cricket

• Yuzvendra Chahal is a former chess player and an Indian Cricketer who represented India in both One day international and Twenty-20 Internationals

• He played for Mumbai Indians, Royal Challengers Bangalore and now playing for Rajasthan Royals (2022) in the IPL and for Haryana in domestic cricket.

Q59. Answer: (c) Aamir Khan

• Aamir Khan won the best actor award at 2017 Filmfare awards for playing the character of Mahavir Singh Phogat in the movie Dangal.

• The 1st Filmfare Awards were held on March 21, 1954, which honoured the best in Hindi cinema in 1953.

• That year they were known as Clare Awards, after Clare Mendonca, a film critic of The Times of India who had died in the same year. The award for best actor was won by Dilip Kumar for his movie Daag.

64^(th) Filmfare Awards 2019	

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Best Actor	Ranbir Kapoor for Sanju
Best Actress	Alia Bhatt for Raazi
Best Director	Meghna Gulzar for Raazi
Critics Best Actor	Ranveer Singh for Padamavat
Best Film	Raazi
Critics Best Film	Andhadhun

Q60. Answer: (d) C

Nail, hair and toe are parts of the body and thus form a group whereas acne is a skin disease.

Hence, acne(C) does not belong to the group.

Q61. Answer: (d) 34

Here, the pattern followed here is,

Hence, “34” is the correct answer.

Q62. Answer: (d) No conclusions follow

The minimum possible Venn diagram of the given statements,

Conclusions:

All plastic are covers → False (it is possible but not definite)

All toxic are covers → False (it is possible but not definite)

Hence, “No conclusions follow”.

Q63. Answer: (b) 6

Shortcut Trick

Range of n numbers when means of subsets are given = (Difference in Means) × (Number of elements in subset).

Difference in mean = 11 − 9 = 2.

Number of elements in each subset = 3.

Range = 2 × 3 = 6.

Therefore The correct answer is 6.

Alternate Method

Given:

Mean of the three smallest numbers = 9

Mean of the three largest ones = 11

Formula Used: Range = Largest value − Smallest value

Let the four numbers in ascending order be a, b, c, and d.

=> Sum of three smallest numbers (a + b + c) = 9 × 3 = 27 → (Eq. 1)

=> Sum of three largest ones (b + c + d) = 11 × 3 = 33 → (Eq. 2)

Subtracting (Eq. 1) from (Eq. 2):

=> (b + c + d) − (a + b + c) = 33 − 27

=> d − a = 6

Therefore The correct answer is 6.

Q64. Answer: (c) center of gravity

• Centre of gravity is an imaginary point in a body of matter where the entire weight of an object acts.

• This is sometimes useful in designing static structures (e.g., buildings and bridges) or tp predict the behaviour of a moving body when it is acted on by gravity.

Q65. Answer: (c) -9

Given:

22-[23-{24-(27 - 25 - 30)}]

Concept Used:

Calculation:

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=> 22-[23-{24-(27 - (- 5)}]
=> 22 – [23 – {24 – (27 + 5)}]
=> 22 – [23 – {24 – 32}]
=> 22 – [23 – (-8)]
=> 22 – [23 + 8]
=> 22 – 31
Therefore -9

Q66. Answer: (c) 36

Symbol	•	÷	•	×
Meaning	÷	•	×	•

Given expression: 80 + 20 ÷ 5 - 12 × 92
After changing the symbols: 80 ÷ 20 - 5 × 12 + 92
= 4 - 5 × 12 + 92
= 4 - 60 + 92
= 96 - 60
= 36
Hence, 36 is the correct answer.

Q67. Answer: (b) 1/6 times

• The mass of the moon is 1/100 times the mass of Earth and the radius of the moon is ¼ times the radius of the Earth.
• As a result, the gravitational attraction on the moon is about one-sixth when compared to that of the Earth.
• The weight of an object depends on the value of g, i.e. acceleration due to gravity.
• Hence the weight of an object on the moon is 1/6^(th) of the weight on the Earth.

Q68. Answer: (b) 21

Hence, “21” is the correct answer.

Q69. Answer: (a) C, D and A

Here, by combining A, C and D we can get the question figure, as following,
Hence, “C, D and A” is the correct answer.

Q70. Answer: (c) Ca(OH)2

• Calcium Hydroxide is Ca(OH)2 which is also known as Slaked lime.
• It is an inorganic compound.
• It is a white powder or colorless crystal which is obtained when Quicklime (calcium oxide) is mixed with water.
• It is used in the Cement Industry.

Q71. Answer: (c) The Gospel of Yudas

• The Gospel of Yudas is the book about the politics of faithfulness and the price of idealism written by K. R. Meera.
• Aarachar and Nethromeelanam are also other famous novels written by K.R Meera.

Q72. Answer: (d) 25

Shortcut Trick
Apply the Alligation Method on the mean scores of Boys and Girls.
Ratio of Boys to Girls = (15 − 14.28) : (14.28 − 13) = 0.72 : 1.28.
Simplified ratio = 72 : 128 => 9 : 16.
Since the number of boys is 9 (9 units = 9), the number of girls must be 16 (16 units = 16).
Total students = 9 + 16 = 25.
Therefore The correct answer is 25 students.
Alternate Method
Given:
Number of boys (n_B) = 9

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Mean score of boys (M_B) = 13

Mean score of girls (M_G) = 15

Overall average (M_(avg)) = 14.28

Formula Used:

Total Average = [(n_B × M_B) + (n_G × M_G)] ÷ (n_B + n_G)

Calculations:

Let the number of girls be x.

=> 14.28 = [(9 × 13) + (x × 15)] ÷ (9 + x)

=> 14.28 × (9 + x) = 117 + 15x

=> 128.52 + 14.28x = 117 + 15x

=> 15x − 14.28x = 128.52 − 117

=> 0.72x = 11.52

=> x = 11.52 ÷ 0.72 = 16

=> Total number of students = 9 + 16 = 25

Therefore The correct answer is 25 students.

Additional Information

Weighted Average Concept

It is used when groups have different sizes. The formula is A_w = (n1A1 + n2A2) ÷ (n1 + n2).

Rule of Alligation

Ratio of quantities = (Higher value − Mean) : (Mean − Lower value). This provides the inverse ratio of the weights of the two components.

Deviation Method

The sum of deviations of all observations from their mean is always zero. This can be used to check if the calculated mean or student count is correct.

Q73. Answer: (d) Maternal uncle

From the given information we can draw following family tree,

Clearly, Mamata's brother is maternal uncle of Surya's brother.

Hence, "Maternal uncle" is the correct answer.

Q74. Answer: (a) Launchpad Accelerator India

• Launchpad Accelerator India is a mentorship program launched in 2018 that would aim to support Indian startups that deploy artificial intelligence and machine learning to build solutions for local needs.

• The three-month accelerator will provide a cohort of 8-10 Indian startups with the mentorship of Google.

• The start-ups will also get up to $1,00,000 of Google Cloud credits.

Q75. Answer: (c) Towards the normal and slows down

• It is known that light ray that is travelling from a Rarer medium to a Denser medium will bend towards the normal at the point of incidence and conversely, a ray of light travelling from a Denser medium to the Rarer medium bends away from the normal.

• Glass is denser than Water, therefore, a ray of light travelling from Water to Glass will bend towards the normal and slow down.

• Glass has a higher refractive index than water. The refractive index of window glass is 1.52, and that of pure water is 1.33.

Q76. Answer: (c) D

Here, if the question figure is rotated by 90° clockwise we get the figure in option D.

Hence, "D" is the correct answer.

Q77. Answer: (c) 500 W

→ Given data -

• Mass, m = 40 kg

Height, h = 5m

Time, t = 4s

• Work done, W = mgh

W = 40 × 10 × 5 [g = 10 m/s², given]

W = 2000 joules

→ Power, P = work done /time

P = 2000/4

P = 500 joule/sec

P = 500 W

Q78. Answer: (b) Rs. 42

Shortcut Trick

Convert ratio 1/2 : 2/3 : 3 : 4 to integers by multiplying by LCM(2, 3) = 6.

New ratio => 3 : 4 : 18 : 24. Total units = 3 + 4 + 18 + 24 = 49 units.

49 units = Rs. 686 → 1 unit = 686 ÷ 49 = Rs. 14.

First part (3 units) = 3 × 14 = Rs. 42.

Therefore The correct answer is Rs. 42.

Alternate Method

Given: Total amount = Rs. 686, Ratio = 1/2 : 2/3 : 3 : 4.

Step 1: Simplify the ratio

=> (1/2 × 6) : (2/3 × 6) : (3 × 6) : (4 × 6)

=> 3 : 4 : 18 : 24

Step 2: Sum of ratios

=> 3 + 4 + 18 + 24 = 49

Step 3: Calculate the first part

=> First part = (3 ÷ 49) × 686

=> First part = 3 × 14

=> First part = 42

Therefore The correct answer is Rs. 42.

Additional Information

Ratio Simplification

To simplify a fractional ratio a/b : c/d, multiply all terms by the Least Common Multiple (LCM) of the denominators b and d.

Proportional Division

If a total amount T is divided in the ratio a : b : c, the first share is calculated as [a / (a + b + c)] × T.

Compound Ratio

The compound ratio of two ratios (a : b) and (c : d) is found by multiplying corresponding terms: (a × c) : (b × d).

Q79. Answer: (b) 25^(th) January

• National Voters Day is celebrated on January 25 every year to encourage more young voters to take part in the political process.

• It started from January 25^(th), 2011 to mark the Commission's foundation day.

• The Election Commission of India (ECI) celebrated 8^(th) National Voters Day across the nation on 25^(th) January 2018 for enhanced participation of citizens in the electoral process.

Q80. Answer: (b) Volga

• The Volga is the longest river in Europe.

• It is the national river of Russia flowing at a distance of 2294 miles.

• It originates in the Valdai Hills northwest of Moscow and discharges into the Caspian Sea. Out of the 20 largest cities of Russia, 11 are located in the river’s drainage basin.

• It has two main tributaries named Kama and Oka.

• The Danube is Europe's second longest river, after the Volga and flows through 10 countries.

Q81. Answer: (a) Rs. 3045

Shortcut Trick

For quarterly compounding, the Quarterly Rate = 12% ÷ 4 = 3%.

The Time Periods (n) for 6 months = 2 quarters.

Effective Percentage Rate for 2 periods = 3 + 3 + (3 × 3)/100 = 6.09%.

Compound Interest = 50000 × 6.09% = 50000 × 0.0609 = 3045.

Therefore The correct answer is Rs. 3045.

Alternate Method

Given:

Principal (P) = Rs. 50000

Rate (R) = 12% per annum

Time (T) = 6 months

Compounding: Quarterly

Formula Used:

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

Compound Interest (CI) = A − P

Calculations:

=> Quarterly Rate (r) = 12% ÷ 4 = 3%

=> Number of quarters (n) = 6 months ÷ 3 months = 2

=> $A = 50000 \times (1 + 3/100)^2$

=> $A = 50000 \times (103/100)^2$

=> $A = 50000 \times (1.03)^2$

=> $A = 50000 \times 1.0609$

=> A = 53045

=> CI = 53045 − 50000

=> CI = 3045

Therefore The correct answer is Rs. 3045.

Additional Information

Quarterly Compounding Rule

When interest is compounded quarterly, the annual rate is divided by 4 and the time in years is multiplied by 4.

Effective Rate of Interest

For two successive interest periods with rate r%, the effective rate is given by $(r + r + r^2/100)\%$.

Half-Yearly Compounding

When interest is compounded half-yearly, the annual rate is divided by 2 and the time in years is multiplied by 2.

Q82. Answer: (b) Daughter's Day

• The Women and Child Development Minister Maneka Gandhi launched a social media campaign to mark Daughters' Day on August 11, 2016.

• In this campaign, the entire week was celebrated as Daughters' Week as part of the government's 'Beti Bachao, Beti Padhao' programme to check female foeticide, improve sex ratio and educate girls across India.

Q83. Answer: (d) 90°

• The induced current is highest when the direction of motion of the coil is at 90° or perpendicular with respect to the magnetic field, as the flux cutting is maximum in this case.

• While it is minimum when the direction of motion of the coil is at 180° or parallel with respect to the magnetic field, as here the flux cutting by the coil will be minimum.

Q84. Answer: (a) 37.5%

=> Area cultivated in West Bengal = 22%

=> Area cultivated in Tamil Nadu = 16%

=> Required % = [(22 – 16)%/16%] × 100 = 37.5%

Q85. Answer: (b) 62,000

=> Mobile phone manufactured by DEF = 5% of 1240000 = 62000

Q86. Answer: (d) mitochondria

• The breakdown of pyruvate using O2 takes place in the mitochondria matrix.

• When glucose gets converted to pyruvate by glycolysis, only a small fraction of the total free energy potentially available from the glucose is released.

• In mitochondria, when the metabolism of sugars is completed: the pyruvate is imported into the mitochondria and oxidized by O2 to CO2 and H2O.

• This allows 15 times more ATP to be made as compared to that produced by glycolysis alone.

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Points to remember about Mitochondria
It is called the Powerhouse of the cell
They make energy through respiration
Adenosine triphosphate (ATP) is made in Mitochondria
Mitochondria are found in the Cytoplasm within the cell
The outer membrane of Mitochondria is made up of a phospholipid bilayer.

Q87. Answer: (d) India

The correct answer is India.

Key Points

• India is the only country to win the ICC Under-19 Cricket World Cup four times.
• India won the ICC Under-19 Cricket World Cup in the year 2000, 2008, 2012 and 2018.
• The 2018 Under-19 Cricket World Cup was held in New Zealand.
• India beat Australia by 8 wickets in the finals to win their fourth Under-19 World Cup, the most by any side.
• Rahul Dravid is the coach of the Indian Under-19 cricket team.
• In 2022, India beat England by four wickets to win their fifth Under-19 Cricket World Cup

Additional Information

Season	Year
ICC Under-19 World Cup (in Sri Lanka)	1999/2000
ICC Under-19 World Cup (in Malaysia)	2007/2008
ICC Under-19 World Cup (in Australia)	2012
ICC Under-19 World Cup (in New Zealand)	2017/2018
ICC Under-19 World Cup (in West Indies)	2021/2022

Q88. Answer: (b) 6025

Shortcut Trick

A number ending in 25 is a perfect square only if the digits before 25 are a product of two consecutive integers (n × (n+1)).

110 = 10 × 11 (Perfect Square)

90 = 9 × 10 (Perfect Square)

30 = 5 × 6 (Perfect Square)

60 is not a product of consecutive integers (7 × 8 = 56, 8 × 9 = 72).

Therefore The correct answer is 6025.

Alternate Method

Given: Four numbers ending in 25: 11025, 6025, 9025, 3025.

Property: To find the square root of a number ending in 25, take the square root of 25 (which is 5) and find the factor n such that n × (n+1) equals the remaining part.

=> For 11025: 110 = 10 × 11 Therefore √11025 = 105 (Rational)

=> For 9025: 90 = 9 × 10 Therefore √9025 = 95 (Rational)

=> For 3025: 30 = 5 × 6 Therefore √3025 = 55 (Rational)

=> For 6025: 60 cannot be expressed as n(n+1). Nearest products are 7 × 8 = 56 and 8 × 9 = 72.

=> Since 6025 is not a perfect square, its square root is irrational.

Therefore The correct answer is 6025.

Additional Information

Perfect Square Unit Digits

A perfect square always ends in 0, 1, 4, 5, 6, or 9. It can never end in 2, 3, 7, or 8.

Irrational Square Roots

The square root of any natural number that is not a perfect square is always an irrational number.

Rule for 5

If a number ends in 5, its square must always end in 25. Additionally, the preceding digits must form a product of two consecutive integers.

Q89. Answer: (d) Mamang Dai

• Mamang Dai was the winner of the Sahitya Akademi Award 2017 from the above.

• She won the award for her English novel The Black Hill.

• Ramesh Kuntal Megh also won 2017 Sahitya Akademi award for the work Vishw Mithak Sarit Sagar, a literary criticism in Hindi.

• Sahitya Akademi announces its annual Sahitya Akademi Awards in 24 languages. The award is in the form of a casket containing an engraved copper-plaque, a shawl and a cheque of Rs. 1 lakh.

• Anees Salim won the 2018 Sahitya Akademi award in the English language for his novel 'The Blind Lady's Descendants'.

Q90. Answer: (d) 4

Shortcut Trick

The cyclicity of both 7 and 3 is 4.

For 7^(95), remainder of 95 ÷ 4 is 3 → 7^3 ends in 3.

For 3^(58), remainder of 58 ÷ 4 is 2 → 3^2 ends in 9.

Unit digit => 3 − 9 → (borrow 10) → 13 − 9 = 4.

Therefore The correct answer is 4.

Alternate Method

Given expression: 7^(95) − 3^(58)

To find the unit digit, we use the power cycle of the base numbers.

=> Cyclicity of 7: 7^1=7, 7^2=9, 7^3=3, 7^4=1 (repeats every 4 powers).

=> Divide the power 95 by 4: 95 = (4 × 23) + 3. Remainder = 3.

=> Unit digit of 7^(95) = Unit digit of 7^3 = 3.

=> Cyclicity of 3: 3^1=3, 3^2=9, 3^3=7, 3^4=1 (repeats every 4 powers).

=> Divide the power 58 by 4: 58 = (4 × 14) + 2. Remainder = 2.

=> Unit digit of 3^(58) = Unit digit of 3^2 = 9.

=> Required unit digit = (Unit digit of 7^(95)) − (Unit digit of 3^(58))

=> Unit digit = 3 − 9.

=> Since 3 is less than 9, we take a carry from the tens place: 13 − 9 = 4.

Therefore The correct answer is 4.

Additional Information

Cyclicity of Digits

The unit digit of any number raised to a power repeats in a specific cycle. Digits 2, 3, 7, and 8 have a cyclicity of 4.

Special Cases (Cyclicity 1 and 2)

Digits 0, 1, 5, and 6 have a cyclicity of 1 (always end in themselves). Digits 4 and 9 have a cyclicity of 2.

Negative Unit Digit Rule

If the calculation of unit digits results in a negative value (e.g., a − b where a < b), simply add 10 to the result to find the correct unit digit.

Q91. Answer: (d) 18√3

Shortcut Trick

Since the side and one diagonal are both 6 cm, the rhombus consists of two equilateral triangles joined base-to-base.

Area of one equilateral triangle = (√3/4) × $(side)^2$

Total Area = 2 × (√3/4) × 6^2

Total Area = 2 × (√3/4) × 36 = 18√3 cm^2.

Therefore The correct answer is 18√3 cm^2.

Alternate Method

Given: Side (a) = 6 cm, Diagonal 1 (d1) = 6 cm.

Formula Used: $a^2 = (d1/2)^2 + (d2/2)^2$ and Area = (1/2) × d1 × d2

=> $6^2 = (6/2)^2 + (d2/2)^2$

=> $36 = 3^2 + (d2/2)^2$

=> $36 - 9 = (d2/2)^2$

=> 27 = (d2/2)²
=> d2/2 = √27 = 3√3
=> d2 = 6√3 cm
=> Area = (1/2) × 6 × 6√3
=> Area = 3 × 6√3 = 18√3 cm²
Therefore The correct answer is 18√3 cm².
Additional Information
Properties of Rhombus
All sides are equal, and diagonals bisect each other at 90°.
Rhombus Perimeter
Perimeter of a rhombus with side 'a' is given by 4 × a.
Relation between Side and Diagonals
4a² = d1² + d2², where a is the side and d1, d2 are diagonals.

Q92. Answer: (a) 3 : 5

Shortcut Trick
Identify the Highest Common Factor (HCF) of 75 and 125.
HCF(75, 125) = 25.
Divide both terms by 25: 75 ÷ 25 = 3 and 125 ÷ 25 = 5.
The simplest ratio is 3 : 5.
Therefore The correct answer is 3 : 5.
Alternate Method
Given: Ratio = 75 : 125
Formula Used: Simplest form = (Term1 ÷ HCF) : (Term2 ÷ HCF)
=> Express as a fraction: 75 / 125
=> Divide by 5: 15 / 25
=> Divide by 5 again: 3 / 5
=> Simplest form = 3 : 5
Therefore The correct answer is 3 : 5.
Additional Information
Simplest Form of a Ratio
A ratio a : b is in its simplest form if the Highest Common Factor (HCF) of a and b is 1.
Equivalent Ratios
Ratios obtained by multiplying or dividing both terms of a given ratio by the same non-zero number are called equivalent ratios.
HCF Calculation
To find the HCF of 75 (3 × 5²) and 125 (5³), we take the lowest power of common factors: 5² = 25.

Q93. Answer: (d) Copper

The correct answer is Copper.
Key Points
• Copper is a very good conductor.
• It is malleable and ductile, and also offers high resistance to corrosion.
• It is widely used for wires, cables, etc.
Additional Information

Properties	Definition
Malleable	A malleable material is one that can be easily converted into a thin sheet by hammering. Gold is the most malleable metal.
Ductile	A material that can easily be stretched into a wire when pulled. Here also gold is considered the most ductile metal.
Luster	It is a property that describes how light is reflected on the surface of a mineral. Mineralogists consider this when trying to determine the identity of a mineral.

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Element	Atomic No.
Phosphorus	15
Sulfur	16
Carbon	6
Copper	29

Q94. Answer: (b) infrasonic

Concept:

Sound: It is a form of energy produced by vibration or disturbance that propagates in a medium.

• It travels in the form of longitudinal waves (Compression or rarefaction)

Sound waves are of three types:

• Infrasonic waves: The sound waves of frequency between 0 Hz to 20 Hz are called infrasonic waves. Sound produced by thunders, volcano etc. Animals like elephants and whales can hear infrasonic sounds.

• Audible waves: The sound waves of frequency between 20 Hz to 20,000 Hz are called Audible waves. Human ear can able to listen to these frequencies

• Ultrasonic waves: The sound waves of frequency above 20,000 Hz are called ultrasonic waves. Many animals like bats, cats, dogs, mice etc.

So these are the ratios of different speed of the body, for

1. Hypersonic > 5.0 mach

2. Supersonic > 1 mach

3. Subsonic < 1 mach

Explanation:

• Ultrasonic - Above 20000 Hz or 20 kHz (Above audible range)

• Infrasonic - Between 0 Hz to 20 Hz (Below audible range)

• Supersonic - Speed of Sound

Q95. Answer: (b) Harsh Vardhan

• The government launched a mobile application, ahead of International Yoga Day in 2017, through which people can share their experience of participating in yoga and related activities.

• Union Minister for Science and Technology Harsh Vardhan launched the application, Celebrating Yoga.

• The app will give information to its users about studies conducted on yoga under the department's programme.

Q96. Answer: (d) 35 m

CONCEPT:

The distance travelled by a body in n^(th) second is given by:

Sn = u + a/2 (2n - 1)

Where u is the initial velocity of the body, a is acceleration, and n is nth second.

CALCULATION:

Given that:

The ball is dropped from 80 m height, so initial velocity (u) = 0 m/s

Acceleration is due to gravity (a) = 10 m/s^2

and n = 4

For nth second, S_n= u + a/2 (2n - 1)

Distance travelled in 4th second (S4) = 0 + 10/2 (2 × 4 - 1) = 35 m

• Therefore, the distance travelled by the ball in the fourth second will be 35 m. So option 4 is correct.

Alternate Method

Total Distance traveled in 3 seconds, $S3 = ut + (at^2)/2 = 0 + 1/2 \times 10 \times 3 \times 3 = 45m$.

Total Distance traveled in 4 seconds, $S4= ut + (at^2)/2 = 0 + 1/2 \times 10 \times 4 \times 4 = 80m$.

Thus, Distance travelled in 4th second would be = S4 - S3

=> S4 - S3 = 80 - 45 = 35m.

Therefore, the distance traveled by the ball in the fourth second will be 35 m. So option 4 is correct.

Q97. Answer: (b) vinegar

- The main constituent of vinegar is Acetic acid (CH3COOH), after adding 5-8% of acetic acid in water it becomes vinegar.
- Vinegar is acidic in nature having a pH around 2.5.
- It is used as a food preservative and is also useful for medicinal uses, household purposes, and in the food Industry.
- When acetic acid is undiluted, it is sometimes called glacial acetic acid.

Q98. Answer: (b) 3 : 4

Shortcut Trick

Present age of P = 15 years.

Present age of Q = 26 − 6 = 20 years.

Ratio of present ages P : Q = 15 : 20 = 3 : 4.

Therefore The correct answer is 3 : 4.

Alternate Method

Given:

Present age of P = 15 years

Age of Q after 6 years = 26 years

Calculations:

=> Present age of Q = Age after 6 years − 6

=> Present age of Q = 26 − 6 = 20 years

=> Ratio of their present ages = P / Q

=> Ratio = 15 / 20

=> Ratio = 3 / 4

Therefore The correct answer is 3 : 4.

Additional Information

Ages in Future and Past

If present age is x, then age after 'n' years is (x + n) and age 'n' years ago was (x − n).

Ratio of Ages

The ratio of ages changes over time, but the absolute difference between the ages of two people always remains constant.

Concept of Base Change

Always bring all given age data to the same reference point (usually the present) before calculating ratios.

Q99. Answer: (b) Both arguments I and II are strong.

In the last fifteen to eighteen years, the internet has expanded rapidly all over the world, leading to huge levels of exposure and judgement directed at teenagers. This has led to rising stress levels amongst teenagers who were not present in the last century. Hence, the argument I holds true.

A situation that might cause stress to one person might or might not be stressful to others. Hence, it is true that stress is a relative perception that can be managed with proper guidance.

Therefore, argument II also holds true.

Q100. Answer: (b) Friday

As 2000 is divisible by 400 the number of odd days is 0.

Number of leap years till 2005 = 1 (2004)

Number of ordinary years till 2005 = 4

Number of odd days till 2006 = 4 + (1 × 2) = 6 odd days

Number of odd days in January, 2006 = 3

Number of odd days in February, 2006 = 0

Total number of odd days till 24^(th) March 2006 = 6 + 3 + 24 = 33 odd days = 5 odd days

So, the day on 24^(th) March 2006 is Friday.

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