RRC Group D Previous Year Paper 7 (Held On: 25 Sep 2018 Shift 1)

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

Take this paper as a timed mock test

Practise under exam conditions, then review your answers after you submit.

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Scan the QR code or click the link to open it.

1 question is in Hindi and not printed here. Each one links to the online version, where you can read it.

CBT

Q1. The salivary gland secretes _____ enzyme.

(a) amylase
(b) lipase
(c) pepsin
(d) trypsin

Q2. The famous football player Maradona belongs to which among the following countries?

(a) Mexico
(b) Ireland
(c) Argentina
(d) Germany

Q3. The average salary of male employees in a firm is Rs. 5200 and that of females is Rs. 4200. The mean salary of all the employees is Rs. 5000. The percentage of male employees in that firm is:

(a) 20%
(b) 60%
(c) 40%
(d) 80%

Q4. If NOT is coded as 141520, then what is the code the EMBLEM?

(a) 513312513
(b) 513212514
(c) 523212513
(d) 513212513

Q5. Who among the following won the 2017 World Rapid Chess Championship?

(a) Vladimir Fedoseev
(b) Viswanathan Anand
(c) Ian Nepomniachtchi
(d) Kutwal Magnus Carlsen

Q6. An object with a mass of 30 kg moving with a velocity of 5 m/s. What is the kinetic energy possessed by the object?

(a) 375 N
(b) 375 kg m/s
(c) 375 J
(d) 375 Pa

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Q7. 0.023636..., written as a regular fraction in its simplest form, is equal to:

(a) 13/550
(b) 13/3300
(c) 13/1100
(d) 13/9999

Q8. The product of velocity and time gives:

(a) Distance
(b) speed
(c) Displacement
(d) Momentum

Q9. Consider the following question and decide which of the statements is sufficient to answer the question.

Question:

Mika is the niece of Mahi. Determine the present ages of Mika and Mahi.

Statements:

1. Their mean age is 27.
2. After 15 years, Mahi's age will be twice that of Mika's.

(a) Statement 1 and 2 together are not sufficient
(b) Statement 1 and 2 together are sufficient
(c) Statement 1 alone is sufficient
(d) Statement 2 alone is sufficient

Q10. If the frequency of a wave is doubled then its wavelength will be:

(a) half of the original
(b) three times the original
(c) one-third the original
(d) double the original

Q11. The Khangchendzonga Biosphere Reserve which was included in UNESCO's World Network of Biosphere Reserve is in:

(a) Maharashtra
(b) Madhya Pradesh
(c) Sikkim
(d) Assam

Q12. Find the next term in this series

75, 81, 88, 96, ____

(a) 110
(b) 104
(c) 115
(d) 105

Q13. Which of the following does NOT belong to this group?

a. Mercury
b. Paraffin
c. Coconut oil
d. Sediment

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

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Q14. Choose the organisation that does NOT belong to the given group:

(a) IIM, Ahmedabad
(b) NIT, Warangal
(c) Reserve Bank of India, Mumbai
(d) IISC, Bangalore

Q15. In which city will India's first defence incubators come up?

(a) Hyderabad
(b) New Delhi
(c) Bengaluru
(d) Ahmedabad

Q16. Pipe A can empty a filled tank in 5.6 hours while Pipe B can fill the same tank in 7 hours when it is empty. If Pipes A and B are alternately turned on for an hour each time, starting when the tank is full, how long will it take to empty the tank?

(a) 55 hours
(b) 48 hours
(c) 56 hours
(d) 47 hours

Q17. _____ can be used as an olfactory indicator.

(a) Tamarind
(b) Amla
(c) Alum
(d) Vanilla

Q18. Given is a question followed by two arguments. Decide which of the arguments is/are strong with respect to the question.

Question:

Should children be taught to wisely use the Internet?

Arguments:

I. Yes, this way, they will know to use the Internet responsibly.

II. No, they learn a lot by exploring on their own.

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

Q19. In the series below one of the terms following the sequence is wrong. Find out the wrong option:

11111, 235656, 39816561, 41625665536

(a) 41625665536
(b) 39816561
(c) 235656
(d) 11111

Q20. Find simple interest earned on a sum of Rs. 1640 invested at 7.5% simple interest for 6 years.

(a) Rs. 742
(b) Rs. 738
(c) Rs. 748
(d) Rs. 750

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Q21. In a bank, Deepa deposits a sum of Rs. 6250, which amounts to Rs. 7840 in two years, compounded annually. The rate of interest is:

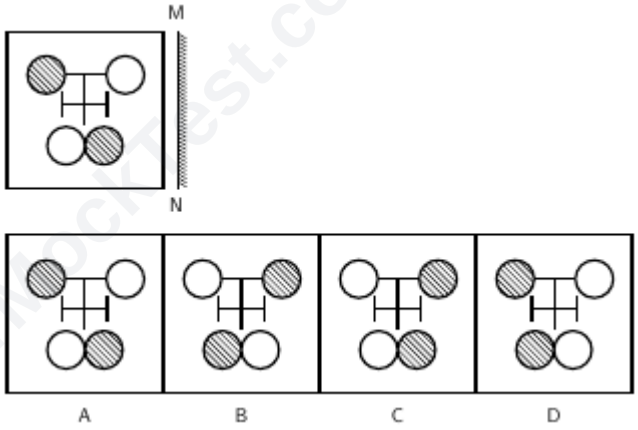
(a) 10%
(b) 12%
(c) 13%
(d) 11%

Q22. What is the next term in the given series?

12B, 2H, 14C, 4G, 16D, _____

(a) 6Q
(b) 6F
(c) 6E
(d) 18E

Q23. Choose the mirror image of the following figure:



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

Q24. In the Union Budget 2018, the Union government had announced that it would build a tunnel through the Sela Pass. In which state is the Sela Pass located?

(a) Assam
(b) Arunachal Pradesh
(c) Tripura
(d) Meghalaya

Q25. If the work done by an elevator is 1000 J with a constant force of 200 N, then the distance covered by elevator is:

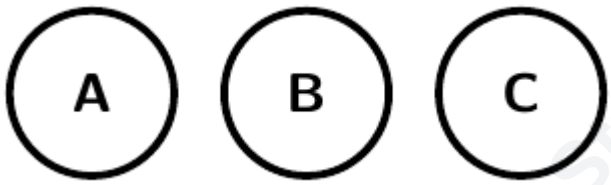
(a) 0.2 m
(b) 2 m
(c) 1 m
(d) 5 m

Q26. Which of the following correctly represents the relationship between

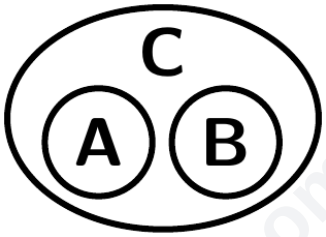
A. Length
B. breadth
C. Dimension

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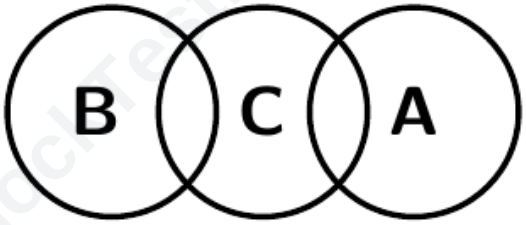
(a)



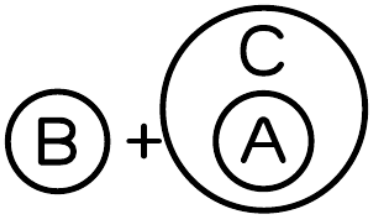
(b)



(c)



(d)



Q27. This question is in Hindi. Read it online.

Q28. A cone of diameter 14 cm and height 24 cm is placed on top of a cube of side 14 cm. Find the surface area of the whole figure.

(a) 1675 sq cm
(b) 1900 sq cm
(c) 1572 sq cm
(d) 1726 sq cm

Q29. Which of the following Veda mentions about magical rituals and charms?

(a) Samaveda
(b) Yajurveda
(c) Atharva Veda
(d) Rigveda

Q30. In the Indian economy, _____ are the principal means of transportation.

(a) ships
(b) bullock carts
(c) cycles
(d) the railways

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Q31. 21 g of MgC03 will have _____ moles of magnesium.

(a) 0.31
(b) 0.21
(c) 0.25
(d) 0.51

Q32. Raju gained a profit of 6% by selling a washing machine for Rs. 689. What was the cost price of the washing machine?

(a) Rs. 625
(b) Rs. 635
(c) Rs. 650
(d) Rs. 700

Q33. The reproductive parts of angiosperms are located in the _____.

(a) Roots
(b) Flowers
(c) Stem
(d) Leaves

Q34. Which of the following does NOT belong to the given group?

A. Ride
B. Crawl
C. Swim
D. Think

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

Q35. Which app has the Government of India launched for Road Safety and Highway Users?

(a) Sukh Yatra
(b) Surakshith Yatra
(c) Sulabh Yatra
(d) Sukhad Yatra

Q36. Find the odd one out.

A	B	C	D
6F	P14	U21	W23

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

Q37. The lens formula is _____.

(a) 1/v + 1/u = 1/f
(b) 1/f + 1/v = 1/u
(c) 1/f - 1/u = 1/v
(d) None of the above

Q38. An object travels 15 m in 4s and then another 16 m in 2s. What is the average speed of the object?

(a) 5.17 s^(-1)
(b) 5.17 ms^(-1)
(c) 6.17 ms^(-1)

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(d) 5.17 m

Q39. The width of each of five continuous classes in a frequency distribution is 5 and the lower class limit of the lowest class is 10. What is the upper-class limit of the highest class?

(a) 45
(b) 35
(c) 15
(d) 25

Q40. What day would it be on 19^(th) April 2020?

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

Q41. Pani's house faces West. On entering her home, you will find the kitchen to the right-hand side. With respect to the entrance, in which direction is the kitchen?

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

Q42. If LEGEND is written as 12575144, then what is the code for TREND?

(a) 20175144
(b) 21185144
(c) 19185144
(d) 20185144

Q43. Find the value of 22 - [23 - {24 - (27 - 29 - 30)}].

(a) 1
(b) -3
(c) -4
(d) -5

Q44. Which river flows through Surat?

(a) Mahanadi
(b) Kim
(c) Tapi
(d) Rupen

Q45. The number of diagonals in a 26-gon is:

(a) 300
(b) 325
(c) 299
(d) 650

Q46. Fuel formed under the earth's surface by the decomposition of organic matter is called _____ fuel.

(a) charcoal
(b) fossil
(c) biomass
(d) wood

Q47. If a current of 0.3 A is passed through a coil of resistance 418 ohms for 1 min, find the heat energy generated.

(a) 360 cal
(b) 540 cal
(c) 54 cal

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(d) 36 cal

Q48. _____ element is added with copper and zinc to form bronze.

(a) Sn
(b) Pb
(c) Au
(d) Al

Q49. $15 \times 3 - 9 \times (5^2 \div 5) \div 5 \div (1 \div 3) + 10 = ?$

(a) 28
(b) 18
(c) 8
(d) 30

Q50. Consider the given statement and decide which of the following assumptions is/are implicit in the statement.

Statement:

"March endings are always hectic", says the Branch Manager to his colleague.

Assumptions:

I. There is more work at the end of March.

II. Much work gets piled up due to lack of timely work.

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

Q51. If RARE is written as 181185, then what is the code for YELL?

(a) 2551313
(b) 2551212
(c) 2561212
(d) 2451212

Q52. Find the odd one out.

A	B	C	D
9I	O15	5E	21U

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

Q53. The diagonals of a rhombus are 12 cm and 16 cm, respectively. The mid points of the sides of the rhombus are joined. Find the area of the thus formed figure.

(a) 192 cm^2
(b) 48 cm^2
(c) 64 cm^2
(d) 96 cm^2

Q54. _____ is a martial art form of Manipur.

(a) Bagurumba
(b) Rouff
(c) Thang Ta
(d) Bihu

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Q55. Which type of reproduction can bring greater diversity?

(a) Regeneration
(b) Sexual
(c) Asexual
(d) Budding

Q56. As of August 2018, DMK and AIADMK are the regional parties of which state?

(a) Andhra Pradesh
(b) Tamil Nadu
(c) Kerala
(d) Karnataka

Q57. Aqua regia is a mixture of concentrated HNO3 and concentrated HCl in the ratio _____.

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

Q58. Fe + CuSO4 → FeSO4 + Cu

The given reaction is an example of _____.

(a) Displacement Reaction
(b) Combustion reaction
(c) Dissolution reaction
(d) Coupling reaction

Q59. A cycle company sells two brands of cycles in a day with a total profit of Rs. 6,000. If the profit from one brand of cycle is 45% of the total profit, what is the profit amount made by selling the other brand of cycle?

(a) Rs. 5,000
(b) Rs. 3,000
(c) Rs. 3,300
(d) Rs. 3,250

Q60. When was the Theosophical Society founded?

(a) 1876
(b) 1875
(c) 1873
(d) 1885

Q61. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statements:

• Some racoons are multicoloured

• Some parrots are multicoloured

Conclusions:

1. Some raccoons are parrots

2. All parrots are racoons

(a) Both the conclusions follow
(b) None of the conclusions follows
(c) Only conclusion 1 follows
(d) Only conclusion 2 follows

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Q62. PCA (supervisory tools to maintain the sound financial health of banks) stands for:

(a) Prompt Corrective action
(b) Possible Collective Action
(c) Possible Corrective Action
(d) Prompt Collective Action

Q63. Evaporation of water occurs at _____.

(a) at freezing point
(b) at all temperatures
(c) at boiling point
(d) at fusion temperature

Q64. The mass of an object on the earth is 10 kg. What is its weight on the earth?

(a) 10 N
(b) 9.8 N
(c) 980 N
(d) 98 N

Q65. Ruksana went to the city from her home at a speed of 6 km/h but came back by the same route at a speed of 5 km/h. The two-way journey took her 161/2 hours in total. How far from the city does Ruksana live?

(a) 45 km
(b) 37.5 km
(c) 52.5 km
(d) 60 km

Q66. Direction: In the following question, a given question is followed by information in two statements. You have to find out the data in which statement (s) is sufficient to answer the question and mark your answer accordingly.

Leela has 4 pens of 3 different colours. How many blue pens does he have?

Statement:

I. 2 pens are of different colours.

II. The colour of 2 pens is the same which is red.

(a) Statement I and Statement II together are sufficient.
(b) Statement I and Statement II together are not sufficient.
(c) Statement II alone is sufficient to answer the question.
(d) Statement I alone is sufficient to answer the question.

Q67. A bullet of mass 12 g is fired from a rifle. The bullet takes 0.006 seconds to move through its barrel and leaves it with a velocity of 300 m/s. What is the force exerted on the bullet by the rifle?

(a) 180 N
(b) 900 N
(c) 720 N
(d) 600 N

Q68. Name the eminent personality from Hindi litterateurs who was awarded the 53^(rd) Jnanpith Award for the year 2017?

(a) Krishna Sobti
(b) Rashmi Bansal
(c) Jasodhara Bagchi
(d) Sushmita Banerjee

Q69. Which of the given assumptions are implied from the below statement?

Statement:

The school management has announced the addition of the music arts session to each standard.

Assumptions:

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I. The management wants to create a holistic approach to learning.

II. The management wants to give children a foundation to learn arts.

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

Q70. The Report on Indian constitutional reforms, commonly known as the Montagu-Chelmsford Report was published in:

(a) 1905
(b) 1910
(c) 1920
(d) 1918

Q71. In a bag containing red, green and pink tokens, the ratio of red to green tokens was 5 : 11 while the ratio of pink to red tokens was 7 : 15. What was the ratio of green to pink tokens?

(a) 77 : 75
(b) 75 : 77
(c) 11 : 7
(d) 33 : 7

Q72. Who is the youngest Indian golfer to participate in any major event?

(a) Jyoti Randhawa
(b) Jeev Milkha Singh
(c) Shubhankar Sharma
(d) Anirban Lahiri

Q73. Who is the brand ambassador of the gaming platform Dream 11?

(a) Suresh Raina
(b) Virat Kohli
(c) Sunil Gavaskar
(d) M.S. Dhoni

Q74. Which of the following worms causes elephantiasis?

(a) Filarial worms
(b) Roundworms
(c) Hookworms
(d) Tapeworms

Q75. Complete the following series.

30, 42, 54, 66, _____

(a) 80
(b) 81
(c) 78
(d) 82

Q76. The time duration that would elapse between 5:47 p.m of 21^(st) June 2027 and 5:39 p.m. of 22^(nd) June 2028 is:

(a) 365 days 23 hours 52 mins
(b) 366 days 8 mins
(c) 366 days 23 hours 52 mins
(d) 367 days 8 mins

Q77. Which among the following is a rational number?

(a) cbrt2 – 2
(b) cbrt8 – 2
(c) cbrt12 + 1

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(d) cbrt4 + 4

Q78. Which of the following elements does NOT belong to group 17?

(a) Bromine
(b) Argon
(c) Chlorine
(d) Fluorine

Q79. What is twice the value of p if p = 36 – 2(20 + 12 ÷ 4 × 3 – 2 × 2) + 10?

(a) -4
(b) -10
(c) -2
(d) -8

Q80. _____ is/are harmful radiation emitted by the sun.

(a) Gamma rays
(b) Alpha rays
(c) Ultraviolet radiation
(d) Infrared radiation

Q81. A shopkeeper multiplied 6245 by 62 instead of 52. How much was his answer greater than the correct answer?

(a) 62450
(b) 62455
(c) 60425
(d) 61455

Q82. To which block do the elements with atomic number 56 belong?

(a) p
(b) f
(c) d
(d) s

Q83. Leena can go to her office in two ways also return to her home from the same route. The distance of the first route is 5 km while the distance of the second route is 7 km. For some reasons, she is unable to go to the office for two consecutive days by the same route. If she goes through the first route on Monday, then how many km does she cover the second route that week?

(a) 21 km
(b) 14 km
(c) 42 km
(d) 28 km

Q84. What was the day of the week on 7th January 2011?

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

Q85. What would be get when 8 kg 25 g is multiplied by 25?

(a) 200 kg
(b) 200.625 kg
(c) 199.625 kg
(d) 199 kg

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Q86. If LOAD is written as 121514, then what is the code for DEAR?

(a) 94511
(b) 45119
(c) 45218
(d) 45118

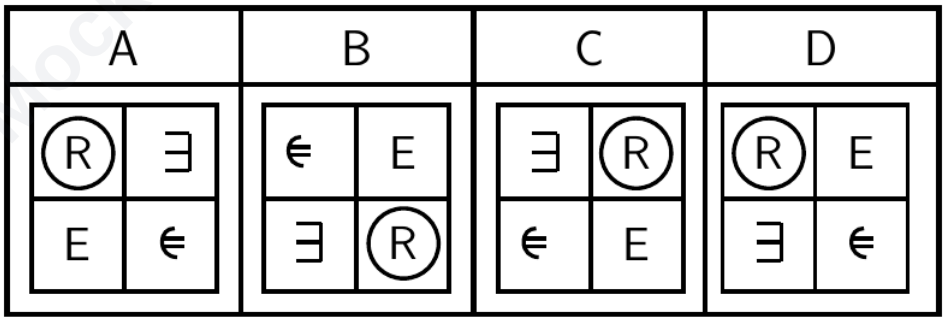
Q87. A hostel had provision for 60 men for 35 days. After 10 days, 15 more men arrived at the hostel. How long would the remaining provision last at the same rate?

(a) 18 days
(b) 15 days
(c) 20 days
(d) 25 days

Q88. Identify the option that will replace the question mark (?)



Option figure:



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

Q89. Sukanya walks 2 km towards South and then turns left and walks 500 m. In which direction is she with respect to her initial position?

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

Q90. If cosx + sinx = √2cosx then the value of cot x is:

(a) √2 + 1
(b) 1
(c) √2 – 1
(d) √2

Q91. Which of the following is NOT a bryophyte?

(a) Marchantia
(b) Funaria
(c) Chara
(d) Riccia

Q92. When two trains are moving in opposite direction at a speed of 40 km/hr and 32 km/hr respectively, the faster train passes a man sitting in the slower train in 15 seconds. Find the length of the faster train.

(a) 120 m
(b) 300 m
(c) 200 m
(d) 100 m

Q93. Consider the following question and decide which of the statements is sufficient to answer the question.

Shiju has 10 bags that each weigh the same. What is the total weight of the 10 bags?

Statements:

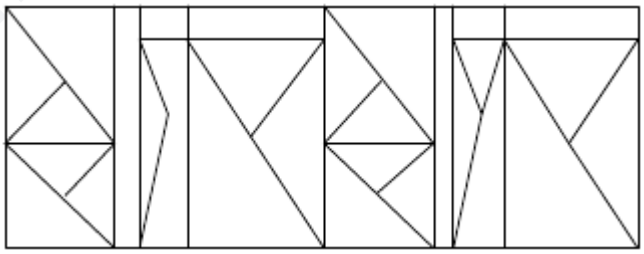
1. One-third of the weight of each bag is 8 kg.
2. The bags contain rice.

(a) Statement 1 and 2 together are not sufficient
(b) Statement 1 alone is sufficient
(c) Either statement 1 or 2 is sufficient
(d) Statement 2 alone is sufficient

Q94. Find the L.C.M of 1/2, 2/5, 4/7, and 6/17.

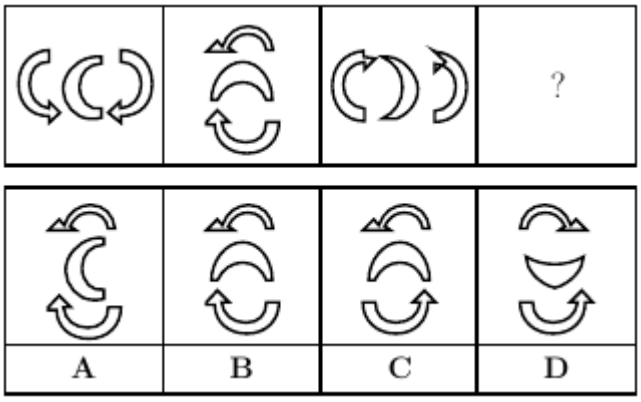
(a) 24
(b) 6
(c) 12
(d) 18

Q95. How many triangles are there in the following figure?



(a) 20
(b) 34
(c) 30
(d) 14

Q96. Study the following patterns and decide which pattern will follow next.



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

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Q97. Shubhangi Swaroop became the first-ever female pilot to be inducted into the _____.

(a) Indian R & AW
(b) Indian Air Force
(c) Indian Navy
(d) Indian Army

Q98. _____ is an ore of mercury.

(a) Magnetite
(b) Cinnabar
(c) Hematite
(d) Bauxite

Q99. Who was honoured with the Indian Film Personality of 2017 Award at the 48^(th) International Film Festival of India (IFFI)?

(a) Shammi Kapoor
(b) Akshay Kumar
(c) Prabhas
(d) Amitabh Bachchan

Q100. What is the total area of Gujarat?

(a) 1,96,204 km²
(b) 1,66,024 km²
(c) 1,99,724 km²
(d) 1,96,024 km²

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) amylase

• Salivary amylase is an enzyme present in the human saliva which is produced by the salivary glands.

• It helps in the process of digestion as it breaks down complex carbohydrates such as starch into simpler sugars like glucose and maltose.

• It is also called ptyalin.

Enzymes	Definition
Lipase	• It is an enzyme that splits fats so the intestines can absorb them. - It hydrolyzes fats like triglycerides into their component fatty acid and glycerol molecules. - It is secreted by Pancreas.

Pepsin	• Pepsin is an enzyme found in the gastric juice that digests proteins. - It was founded by German physiologist Theodor Schwann. - It affects only partial degradation of proteins into smaller units called peptides which are absorbed by the intestines or broken down further by the pancreatic enzymes.
Trypsin	• Trypsin is secreted by the Pancreas. - It is a protein-digesting enzyme present in pancreatic juices secreted into the small intestine during a meal. - The pancreas secretes trypsin is an inactive proenzyme called trypsinogen.

Q2. Answer: (c) Argentina

• Diego Maradona, Former Argentina captain and World Cup-winner, belongs to Argentina.

• Diego Maradona was in the news because he was seen smoking a cigar in the stands during Argentina's match, despite smoking and tobacco being banned at all the venues of the FIFA World Cup 2018.

Q3. Answer: (d) 80%

Shortcut Trick

Apply the Rule of Alligation to find the ratio of male to female employees.

Difference 1 (Male part) = Mean Salary − Female Salary = 5000 − 4200 = 800

Difference 2 (Female part) = Male Salary − Mean Salary = 5200 − 5000 = 200

Ratio of Male : Female = 800 : 200 = 4 : 1

Percentage of Male = [4 ÷ (4 + 1)] × 100 = 80%

Therefore The correct answer is 80%.

Alternate Method

Given:

Average salary of male employees = Rs. 5200

Average salary of female employees = Rs. 4200

Mean salary of all employees = Rs. 5000

By Alligation Method, the ratio of the number of males to females is:

=> Number of Males : Number of Females = (5000 − 4200) : (5200 − 5000)

=> Ratio = 800 : 200

=> Ratio = 4 : 1

Now, to find the percentage of male employees:

=> Total Ratio Parts = 4 + 1 = 5

=> Male % = (Male Parts ÷ Total Parts) × 100

=> Male % = (4 ÷ 5) × 100

=> Male % = 0.8 × 100 = 80%

Therefore The correct answer is 80%.

Additional Information

Rule of Alligation

It is used to find the ratio in which two ingredients at given prices/averages must be mixed to produce a mixture at a given mean price/average.

Weighted Average Formula

Mean = (n1x1 + n2x2) ÷ (n1 + n2), where n represents quantity and x represents the average value.

Percentage Calculation

To convert a ratio a : b into a percentage of the first part, use the formula: [a ÷ (a + b)] × 100.

Q4. Answer: (d) 513212513

The positional value table is as follows:

The pattern followed here is as follows,

Every letter is assigned to its positional value as per the English alphabetical order.

Similarly,

Hence, “513212513” is the correct answer.

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Q5. Answer: (b) Viswanathan Anand

• Viswanathan Anand defeated Russia's Vladimir Fedoseev by 2-0 score to reclaim the title he had won in 2003 in the final tie-breaker mini-match.

• The 2017 World Rapid Fire Chess Championship played in Riyadh, Saudi Arabia, was won by Viswanathan Anand.

• He was awarded Rajiv Gandhi Khel Ratna Award in 1991 and Padma Vibhushan Award in 2007.

• Viswanathan Anand secured 5th place in the Shamkir Chess 2019 tournament, Shamkir, Azerbaijan.

Q6. Answer: (c) 375 J

Concept:

Kinetic energy is defined as the energy needed to move the body of mass m from one point to another with stated velocity v.

• Kinetic energy is given as:

$K.E = ½ \times m V^2$

Where K.E = Kinetic Energy

M = mass of object

V = Velocity of object

Calculation:

Given that,

m = 30 kg,

v = 5 m/s

Now as explained above kinetic energy is given as

Therefore $K.E = ½ \times 30 \times 5^2$

K.E = 375 J

Therefore, the kinetic energy of the object is 375 J

Q7. Answer: (a) 13/550

Suppose

=> p/q = 0.0236363636 ----(1)

Multiplying equation (1) by 100, we get

=> 100p/q = 2.36363636 ----(2)

Multiplying equation (2) by 100 we get,

=> 10000p/q = 236.363636 ----(3)

Subtracting equation (2) from (3), we get,

=> 9900p/q = 234

=> p/q = 234/9900 = 13/550

Therefore The required fraction is 13/550.

Q8. Answer: (c) Displacement

The correct answer is Displacement.

Key Points

• The product of velocity and time gives Displacement.

• It is the shortest distance between the initial and final position. It is a vector quantity i.e. it has both magnitude and direction.

• Distance can't be zero but Displacement is zero in some cases like for example when the person/thing returns to its initial position.

• Similarly, the average speed of a moving body can never be zero, but the average velocity of a moving body can be zero.

Q9. Answer: (b) Statement 1 and 2 together are sufficient

Shortcut Trick

Statement 1 provides the sum of ages: (Mika + Mahi) = 27 × 2 = 54.

Statement 2 provides a linear relationship between their ages after 15 years.

Since we have two independent linear equations with two variables (Mika and Mahi), a unique solution for both ages can be determined.

Solving simultaneously: (y + 15) = 2(x + 15) and x + y = 54 gives x = 13 and y = 41.

Therefore The correct answer is Statement 1 and 2 together are sufficient.

Alternate Method

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Given: Mika is the niece of Mahi. Let Mika's present age be 'x' and Mahi's present age be 'y'.

From Statement 1: Mean age of Mika and Mahi = 27

=> (x + y) ÷ 2 = 27

=> x + y = 54 — (Equation 1)

From Statement 2: After 15 years, Mahi's age will be twice that of Mika's.

=> (y + 15) = 2 × (x + 15)

=> y + 15 = 2x + 30

=> y − 2x = 15 — (Equation 2)

Combining Equation 1 and 2:

=> (54 − x) − 2x = 15

=> 54 − 3x = 15

=> 3x = 39

=> x = 13 (Mika's Age)

=> y = 54 − 13 = 41 (Mahi's Age)

Therefore The correct answer is Statement 1 and 2 together are sufficient.

Additional Information

Data Sufficiency in Ages

To find two unknown ages, at least two independent linear equations or conditions are required. A single equation with two variables (like sum or ratio) results in infinite possibilities.

Age Gap Property

The difference between the ages of two people remains constant regardless of the number of years passed. If Mahi is 'd' years older than Mika now, she will be 'd' years older 15 years later.

Mean Age Formula

Mean age of 'n' people = (Sum of ages of 'n' people) ÷ n. For two people, Sum = 2 × Mean.

Q10. Answer: (a) half of the original

• λ x f = c, Where

λ = Wavelength

f = Frequency

c = Speed of Light

→ λ = C/f

→ Now, Speed of Light is constant

Therefore, λ prop. to 1/f i.e Frequency is Inversely proportional to the Wavelength

Hence, If the frequency of a wave is doubled then its wavelength will be half of the original.

Q11. Answer: (c) Sikkim

• Khangchendzonga Biosphere Reserve, also known as Kanchenjunga National Park, is located in North-Eastern state Sikkim.

• Inscribed in the UNESCO World Heritage Sites list on July 17, 2016, it is one of the widest altitudinal ranges of any protected area worldwide.

• The park gets its name from the mountain Kanchenjunga, the highest mountain peak in India.

Q12. Answer: (d) 105

Shortcut Trick

Identify the increasing difference between consecutive terms.

Differences are: 6, 7, 8... the next difference must be 9.

Next term = 96 + 9 = 105.

Therefore The correct answer is 105.

Alternate Method

75

+6

→

81

+7

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→

88

+8

→

96

+9

→

105

The pattern follows a simple arithmetic progression in the differences between terms.

=> 81 − 75 = 6

=> 88 − 81 = 7

=> 96 − 88 = 8

=> Following the logic, the next difference is 9.

=> Next term = 96 + 9 = 105

Therefore The correct answer is 105.

Additional Information

Arithmetic Series

A sequence where the difference between consecutive terms is constant or follows a simple linear progression like +1, +2, +3.

Number Series Identification

Always check the first-order difference first; if it increases linearly, it is a Double Difference series where the second difference is constant (+1 in this case).

Q13. Answer: (d) D

• Sediment does not belong to the given group.

• M ercury, Paraffin and Coconut oil has a definite chemical composition, while Sediment is any matter that can be transported by fluid flow and gets deposited as a layer of solid particles on the bottom or bed of a body of water or other liquid.

Q14. Answer: (c) Reserve Bank of India, Mumbai

Here, The Reserve Bank of India is India's central banking institution. Whereas other options are institutes for research and higher education.

Hence, “Reserve Bank of India, Mumbai” is the correct option.

Additional Information

Educational institutes' accrediting bodies are Statutory bodies to maintain the quality of education. They are:

1. The National Council for Teacher Education (NCTE)

• This is a national-level statutory body of the Government of India, established in 1995.

• Its objective is to plan the coordinated by development of the teacher education system, regulate, maintain, and monitor norms and standards in teacher education.

2. University Grants Commission (UGC)

• It is a Government of India entity and is responsible for coordination, determination, and maintenance of standards, and release of central grants to the universities.

• Apart from this, the Government of India has also established sixteen central universities in the country, which are totally funded by the UGC.

3. Council for Technical Education (AICTE)

• It was established by an Act of Parliament to develop, promote, and co-ordinate technical education in the country.

• Technical Education broadly covers the field of engineering & technology, architecture & town planning, management, pharmacy, and applied arts & crafts.

4. Council for Agriculture Research (ICAR)

It keeps the information and provides consultancy on agriculture, horticulture, resource management, animal sciences, agricultural engineering, fisheries, agricultural extension, agricultural education, home science, and agricultural communication.

Q15. Answer: (a) Hyderabad

• India’s first Defence incubators will come up in Hyderabad, which is India’s missile development center.

• The T-Hub is India's largest incubator that will be funded through the Ministry’s Innovation for Defence Excellence (iDEX) scheme.

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• The iDEX will be funded and managed by a Defence Innovation Organisation. Initially, a corpus of Rs. . 100 crore has been created by two PSUs--HAL and BEL.

Q16. Answer: (d) 47 hours

Shortcut Trick

Let Total Capacity of tank = 28 units (LCM of 5.6 and 7).

Efficiency: A (Emptying) = −5 units/hr, B (Filling) = +4 units/hr.

Net work in 2 hours = −5 + 4 = −1 unit (emptying).

To reach near 28, but keeping last emptying cycle of A (−5) in mind: Target = 28 − 5 = 23 units.

Time for 23 units = 23 × 2 = 46 hours. Remaining work = 28 − 23 = 5 units.

In 47^(th) hour, A will empty the remaining 5 units.

Therefore The correct answer is 47 hr.

Alternate Method

Given: Emptying Pipe A time = 5.6 hr, Filling Pipe B time = 7 hr.

Pipe	Time (hr)	Total Work (LCM)	Efficiency
A (Emptying)	5.6	28 units	28 ÷ 5.6 = −5
B (Filling)	7.0	28 ÷ 7 = +4	

Calculations:

=> Total capacity = 28 units.

=> Cycle of 2 hours (A then B) = −5 + 4 = −1 unit emptied.

=> Since A starts first and it is an emptying pipe, we calculate for 23 units first to avoid the tank being emptied mid-cycle.

=> Time taken to empty 23 units = 23 cycles × 2 hr/cycle = 46 hours.

=> Remaining units to be emptied = 28 − 23 = 5 units.

=> On the 47^(th) hour, it is Pipe A's turn.

=> Time taken by A to empty 5 units = 5 ÷ 5 = 1 hour.

=> Total time = 46 + 1 = 47 hours.

Therefore The correct answer is 47 hr.

Additional Information

Alternate Work Logic

In alternate work involving an emptying pipe, always subtract the first mover's efficiency from the total work before calculating cycles to find the exact point where the task completes.

Negative Efficiency

Emptying pipes (leakages) are always represented with a negative efficiency sign, while filling pipes (inlets) are represented with a positive sign.

Pipes and Cisterns Formula

Net Work Done = (Efficiency1 × Time1) + (Efficiency2 × Time2). For alternating hours, time is 1 hr each.

Q17. Answer: (d) Vanilla

• A substance whose smell varies when it is mixed with an acidic or basic solution is known as an olfactory indicator.

• These type of substances are used to differentiate or check the acidic or basic solution.

• Vanilla is one of the examples of olfactory indicators as It loses its smell when added to the basic solution and retains its smell in the acidic solution.

Q18. Answer: (d) Only argument I is strong.

In the 21^(st)-century internet is expanding exponentially and contains a lot of information that should not be viewed by children. Argument I holds strong on the note that children should “know how to use the Internet responsibly”. While “exploring on their own” will definitely help them to “learn a lot”, it can mislead children and influence them in a wrong way. Thus argument II does not hold strong.

Hence “only argument I is strong”.

Q19. Answer: (c) 235656

The pattern followed here is as follows,

Here, each term is a series. In each series the number is followed by its square. and this is repeated generally four times

depending upon the number of digits required in each term.. Also, the number if digits in each term are in increasing order. [They are 5, 6(+1), 8(+2) and 11(+3) respectively]

From the pattern followed “235656” is the wrong term in the series.

The correct series is as follows,

Hence, “235656” is the wrong term in the series.

Q20. Answer: (b) Rs. 738

Shortcut Trick

The effective Rate of Interest for the entire period is the product of the annual rate and time.

Effective Rate = 7.5% × 6 = 45%

Simple Interest = 45% of Principal = 0.45 × 1640

Interest = 820 (50%) − 82 (5%) = 738

Therefore The correct answer is Rs. 738.

Alternate Method

Given:

Principal (P) = Rs. 1640

Rate (R) = 7.5% per annum

Time (T) = 6 years

Formula Used:

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

Calculations:

=> SI = (1640 × 7.5 × 6) ÷ 100

=> SI = (1640 × 45) ÷ 100

=> SI = 16.4 × 45

=> SI = 738

Therefore The correct answer is Rs. 738.

Additional Information

Amount in Simple Interest

The total sum payable after time T is given by A = P + SI, which can be simplified to A = P(1 + RT/100).

Compound Interest Formula

For interest compounded annually, the Amount is A = P(1 + R/100)^T and Compound Interest CI = A − P.

SI vs CI Difference for 2 Years

The difference between Compound Interest and Simple Interest for two years is D = P(R/100)².

Q21. Answer: (b) 12%

Shortcut Trick

Ratio of Principal (P) to Amount (A) = 6250 : 7840 = 625 : 784

For two years, take the square root of the ratio: √625 : √784 = 25 : 28

Interest earned on 25 units = 28 − 25 = 3 units

Rate of Interest = (3 ÷ 25) × 100 = 12%

Therefore The correct answer is 12%.

Alternate Method

Given:

Principal (P) = Rs. 6250

Amount (A) = Rs. 7840

Time (n) = 2 years

Formula Used:

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

Calculations:

=> $7840 = 6250(1 + R/100)^2$

=> $7840 \div 6250 = (1 + R/100)^2$

=> $784 \div 625 = (1 + R/100)^2$

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=> √(784 ÷ 625) = 1 + R/100

=> 28 ÷ 25 = 1 + R/100

=> R/100 = (28 ÷ 25) − 1

=> R/100 = 3 ÷ 25

=> R = (3 × 100) ÷ 25

=> R = 12%

Therefore The correct answer is 12%.

Additional Information

Difference between SI and CI

For a period of 2 years, the difference (D) between Compound Interest and Simple Interest is given by $D = P(R/100)^2$.

Effective Rate of Interest

The effective rate for 2 years compounded annually can be calculated as R_(eff) = x + y + (xy/100), where x and y are rates for the first and second years.

Rule of 72

To find the approximate time it takes for an investment to double at a given annual rate, divide 72 by the Rate of Interest (72 ÷ R).

Q22. Answer: (b) 6F

The positional Value table is as follows:

The pattern followed here is as follows,

Hence, “6F” is the correct answer.

Q23. Answer: (a) B

The mirror image of the given figure is as follows,

In mirror image the image is flipped on vertical axis. So, the changes will be from left to right Parts of images which are near the mirror will be near the mirror but now to the right of mirror.

Hence, “option figure B” is the correct answer.

Q24. Answer: (b) Arunachal Pradesh

• Arun Jaitley proposed the construction of a new tunnel through the Sela pass in Arunachal Pradesh.

• The tunnel is to be constructed under Sela Pass. Earlier Rohtang tunnel was built which has ensured all-weather connectivity to the Ladakh region and “Zojila Pass tunnel" is being constructed.

• With increased friction with China along the border, the government is focussing on improving connectivity in such areas.

Q25. Answer: (d) 5 m

• Work Done = Force × Distance (in the direction of the force)

1000 J = 200 N × D

D = 1000/200

D = 5 m

• Therefore, the distance covered by the elevator is 5 meters.

Q26. Answer: (b) [figure]

The logic followed here is:

The relationship between length, breadth and Dimension is as follows:

All length are dimensions.

All breadth are dimension.

No length is breadth.

Thus, the Venn diagram is as follows,

Hence, “option figure 2” is the correct answer.

Q27. Answer: (b)

From the statement given “Should the Integrity of Wildlife Sanctuaries be maintained?”, argument I holds strong because it gives reason that we should “give endangered species a special place to live in” and that will “promote ecological balance”.

Argument II talks about generating income. That piece of information is not given in the statement. The fact is that the main purpose of wildlife sanctuary is to protect endangered species and not to generate income. So, the argument II does not hold strong.

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Hence, “Only argument 1 is a ‘strong’ argument”

Q28. Answer: (c) 1572 sq cm

Shortcut Trick

Total Surface Area = Cube surface + Cone curved surface − Common base area.

Surface area = $(6 \times 14^2) + (\pi \times 7 \times 25) - (\pi \times 7^2)$.

Surface area = 1176 + 550 − 154 = 1572 sq cm.

Therefore The correct answer is 1572 sq cm.

Alternate Method

Given: Side of cube (a) = 14 cm, Diameter of cone = 14 cm → Radius (r) = 7 cm, Height of cone (h) = 24 cm.

Step 1: Find the slant height (l) of the cone.

=> $l = \sqrt{(r^2 + h^2)}$

=> $l = \sqrt{(7^2 + 24^2)} = \sqrt{(49 + 576)} = \sqrt{625} = 25$ cm.

Step 2: Calculate the Total Surface Area (TSA) of the figure.

=> TSA = TSA of Cube + CSA of Cone − Base area of Cone

=> $TSA = (6 \times a^2) + (\pi rl) - (\pi r^2)$

=> $TSA = (6 \times 14 \times 14) + (22/7 \times 7 \times 25) - (22/7 \times 7 \times 7)$

=> TSA = 1176 + 550 − 154

=> TSA = 1572 sq cm.

Therefore The correct answer is 1572 sq cm.

Additional Information

Surface Area of Solids

Total Surface Area of Cube = $6a^2$. Curved Surface Area of Cone = πrl, where l is the slant height.

Combined Figures Rule

When one solid is placed on another, the common overlapping area must be subtracted from the sum of their individual surface areas.

Slant Height Relationship

In a right circular cone, the relation between height (h), radius (r), and slant height (l) is given by $l^2 = r^2 + h^2$.

Q29. Answer: (c) Atharva Veda

The correct answer is option 3, i.e. Atharva Veda.

• The Atharva Veda is one of the four Vedas which mentions about magical rituals and charms.

• The Atharva Veda is sometimes called the "Veda of magical formulas”, an epithet declared to be incorrect by other scholars.

• The Samhita layer of the text represents a developing 2^(nd) millennium BCE tradition of magico-religious rites to address superstitious anxiety, spells to remove maladies believed to be caused by demons, and herbs- and nature-derived potions as medicine.

• Vedas are the collection of Hindu and other ancient religious texts written in ancient India between 1500-1000 BCE.

• Rigveda is the oldest Veda of all.

Q30. Answer: (d) the railways

• Transportation is the process of carrying goods and people from one place to another.

• Rail Transport is the movement of goods by means of railways.

• In the Indian economy, Railways plays a very important role. It is the principal means of transportation.

• It binds the economic life of the country and accelerates the development of agriculture and industry.

Q31. Answer: (c) 0.25

• The mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilograms of carbon-12, Its symbol is “mol”.

• No. of particles (atoms, molecules, ions) present in one mole = $6.022140857 \times 10^{23}$

• It is also known as Avogadro Constant.

Molecular Mass of MgC03				
Element/Atom	No. of Atoms	Atomic Number	Atomic Mass	Total Atomic Mass

Magnesium (Mg)	1	12	24.30	24.30
Carbon (C)	1	6	12	12
Oxygen (O)	3	8	16	48
Total Molecular Mass of Magnesium carbonate (MgCO3)	84.30			

→ 84.30 gm of MgCO3 contains 24.30 gm or 1 mole of Magnesium (Mg)

→ By the unitary method,

84.30 g → 1 mole

1 g → 1 mole / 84.30 g

21 g → (1-mole × 21 g) / 84.30 g

= 0.24911 ~= 0.25 moles

Therefore, 21 g of MgCO3 will have 0.25 moles of magnesium.

Q32. Answer: (c) Rs. 650

Shortcut Trick

Profit = 6% => Selling Price (SP) = 106% of Cost Price (CP).

Given SP = Rs. 689.

106% => 689

1% => 689 ÷ 106 = 6.5

100% (CP) => 6.5 × 100 = 650.

Therefore The correct answer is Rs. 650.

Alternate Method

Given: Selling Price (SP) = Rs. 689, Profit% = 6%.

Formulas: SP = CP × (100 + P%) ÷ 100 | CP = (SP × 100) ÷ (100 + P%)

=> Cost Price (CP) = (689 × 100) ÷ (100 + 6)

=> CP = (689 × 100) ÷ 106

=> CP = 68900 ÷ 106

=> CP = 650.

Therefore The correct answer is Rs. 650.

Additional Information

Profit and Loss Basics

Profit occurs when the Selling Price is greater than the Cost Price. Profit = SP − CP.

Percentage Calculation

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

Q33. Answer: (b) Flowers

• The flower is the reproductive unit in angiosperms as it possesses the male and female reproductive organs.

• The Pistil or Carpel is the female reproductive organ and it consists of:

Stigma - receives the pollen

Ovary - where the egg is produced

Style - connects the stigma and ovary.

• Stamen is the male reproductive organ and it contains a long filament and an anther which produces pollen.

Q34. Answer: (a) D

All the words given refer to some kind of physical activity except the word “think”, which is related to mental activity.

Hence, “Think” does not belong to the given group.

Q35. Answer: (d) Sukhad Yatra

• Shri Nitin Gadkari launched a mobile App Sukahd Yatra and a Toll-free number.

• The app has been developed by NHAI (National Highways Authority of India), to empower the Highway users.

• A toll-free number, 1033, has also been launched, which will enable users to report an emergency condition, or highway-related

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feedback, across the highway.

Q36. Answer: (a) B

The Positional; Value of the English alphabets is as follows:

A	B	C	D
6F	P14	U21	W23

Here every letter is with the positional value of its own except “P14”. The positional value of P is 16.

Hence, “B” is the correct answer.

Q37. Answer: (d) None of the above

The correct answer is None of the above.

Key Points

• The lens formula is 1/v - 1/u= 1/f where f is the focal length,u is the distance of the object,v is the distance of the image. Options A and C are the same and are wrong. Option B is also incorrect according to the right formulae.

Concept:

• Lens: The transparent curved surface which is used to refract the light and make an image of any object placed in front of it is called a lens.

• Convex lens: A lens having two spherical surfaces, bulging outwards is called a double convex lens (or simply convex lens).

• It is thicker in the middle as compared to the edges.

• Convex lenses converge light rays and hence, convex lenses are also called converging lenses.

• The lens formula is given by:

1/v - 1/u = 1/f

Where V = Distance of image from the optical center, U = Distance of object from the optical center.

Mistake Points

Mirror Formula: The following formula is known as the mirror formula, which represents the relation between focal length, image distance, and object distance

1/f=1/u+1/v

Q38. Answer: (b) 5.17 ms^(-1)

Shortcut Trick

Total Distance = 15 m + 16 m = 31 m

Total Time = 4 s + 2 s = 6 s

Average Speed = 31 ÷ 6 = 5.166...

Rounding to two decimal places, we get 5.17 ms^(−1).

Therefore The correct answer is 5.17 ms^(−1).

Alternate Method

Given:

Distance 1 (d1) = 15 m, Time 1 (t1) = 4 s

Distance 2 (d2) = 16 m, Time 2 (t2) = 2 s

Formula Used:

Average Speed = (Total Distance Covered) ÷ (Total Time Taken)

Calculations:

=> Total Distance = d1 + d2 = 15 + 16 = 31 m

=> Total Time = t1 + t2 = 4 + 2 = 6 s

=> Average Speed = 31 ÷ 6

=> Average Speed = 5.1666... ms^(−1)

=> Average Speed ≈ 5.17 ms^(−1)

Therefore The correct answer is 5.17 ms^(−1).

Additional Information

Speed vs Velocity

Speed is a scalar quantity (magnitude only), whereas velocity is a vector quantity (magnitude and direction).

SI Units of Speed

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The standard unit is metres per second (m/s or ms^(−1)). To convert km/h to m/s, multiply by 5/18.

Average Speed for Equal Distances

If an object covers two equal distances at speeds u and v, the average speed is 2uv ÷ (u + v).

Q39. Answer: (b) 35

Calculation:

As 5 is width for five consecutive classes.

=> 10 - 15

=> 15 - 20

=> 20 - 25

=> 25 - 30

=> 30 - 35

Therefore 35 is the upper-class limit of the highest class.

Alternate MethodGiven:

Lower class limit = 10

Width of each class = 5

Calculation:

Width till the upper class limit for a frequency distribution having 5 classes

=> 5 × 5 = 25

The upper class limit of highest class =10 + 25 = 35

Therefore 35 is the upper-class limit of the highest class.

Q40. Answer: (b) Sunday

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

Number of leap years till 2019 = 4 (2004, 2008, 2012 and 2016)

Number of ordinary years till 2019 = 15

Number of odd days till 2020 = 15 + (4 × 2) = 23 odd days

Number of odd days in January 2020 = 3

Number of odd days in February 2020 (2020 is the leap year) = 1

Number of odd days in March 2020 = 3

Total number of odd days till 19^(th) April 2020 = 23 + 3 + 3 + 1 + 19 = 49 odd days = 0 odd days

So, the day on 19^(th) April 2020 is Sunday.

Q41. Answer: (a) South

The following figure shows the schematic representation of the given data,

Clearly, the kitchen is in the south direction with respect to the entrance.

Hence, “South” is the correct answer.

Q42. Answer: (d) 20185144

The logic followed here is:

The pattern followed here is as follows,

Every letter is assigned to its positional value as per the English alphabetical order.

Similarly,

Hence, “20185144” is the correct answer.

Q43. Answer: (d) -5

22 - [23 - {24 - (27 - 29 - 30)}]

=> 22 – [23 – {24 – (27 – (-1))}]

=> 22 – [23 – {24 – 28}]

=> 22 – [23 – (-4)]

=> 22 – 27

=> -5

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Q44. Answer: (c) Tapi

• Tapi river flows through Surat, Gujrat.

• Tapi discharges its water into the Arabian Sea. It rises in the Gawilgarh Hills of the Deccan plateau in Madhya Pradesh and then flows westward.

• Surat City is also called the Diamond City of India.

• Ukai dam is located on Tapi River in Gujarat.

• Mahanadi flows through Odisha and Chhattisgarh.

• Kim is a river in Gujarat.

• Rupen river flows through Mehsana district of Gujarat.

Q45. Answer: (c) 299

Shortcut Trick

The number of diagonals in any n-gon (a polygon with n sides) can be calculated directly using the formula:

Number of diagonals = n × (n − 3) ÷ 2

For a 26-gon, we have n = 26:

=> Number of diagonals = 26 × (26 − 3) ÷ 2

=> Number of diagonals = 13 × 23 = 299

Therefore The correct answer is 299 diagonals.

Alternate Method

Given:

Number of vertices/sides of the polygon (n) = 26

Formula Used:

A polygon with n vertices has a total of $^{n}C2$ possible straight lines connecting any two vertices. These lines consist of both the boundary sides of the polygon and its internal diagonals.

=> Total lines = Sides + Diagonals

=> $^{n}C2$ = n + Diagonals

=> Diagonals = $^{n}C2$ − n = [n × (n − 1) ÷ 2] − n = n × (n − 3) ÷ 2

Calculations:

=> Total lines connecting 26 vertices = ^(26)C2

=> Total lines = [26 × 25] ÷ [2 × 1] = 325 lines

=> Number of boundary sides = 26 sides

=> Number of diagonals = Total lines − Boundary sides

=> Number of diagonals = 325 − 26 = 299 diagonals

Evaluation of Options:

=> Option (1) 300: Incorrect calculation value.

=> Option (2) 325: Represents the total number of lines connecting all vertices (^(26)C2), which incorrectly includes the 26 boundary sides.

=> Option (3) 299: Correct number of diagonals after subtracting the 26 sides from 325.

=> Option (4) 650: Incorrect as it represents 26 × 25, which is double the total lines.

Therefore The correct answer is 299 diagonals.

Additional Information

Sum of Interior Angles of a Polygon

The sum of all interior angles of an n-gon is given by the formula: (n − 2) × 180°.

Sum of Exterior Angles of a Polygon

The sum of all exterior angles of any convex polygon is always equal to 360°.

Each Interior Angle of a Regular Polygon

For a regular n-gon, each interior angle is equal to [(n − 2) × 180°] ÷ n.

Q46. Answer: (b) fossil

• Fuel formed under the earth's surface by the decomposition of organic matter is called Fossil fuel.

• Sedimentary rocks are a source of fossil fuels.

• The dead and decaying animals and plants get buried under layers of silt and sediments over millions of years which eventually harden and turn into sedimentary rocks.

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• These rocks put pressure and heat on the organic matter which then turns into fossil fuels.

Q47. Answer: (b) 540 cal

CONCEPT:

• When an electric current is passed through a conductor, the conductor becomes hot after some time and produce heat.

• This happens due to the conversion of some electric energy passing through the conductor into heat energy. This effect of electric current is called the heating effect of the current or Joule heating effect.

• The appliances based on the heating effect of electric current work on both AC and DC supply.

• The amount of heat liberated can be given as

• H = Pt/4.2

• H = W = Pt = I^2R

Electric current passing through conductor = IT

The power dissipated across copper coil = P

Work done by current = W

The resistance of wire = R

Heat dissipated because of current = H

time period = t

CALCULATION:

Given data

=> The resistance of a coil = 418 ohms

=> Amount of time the current is passed = 1 × 60 = 60 sec

=> Current Passed = 0.3 A

→ As

H = I^2RT where,

H = Heat Generated in Joules

I = Current in Amperes

R = Resistance of coil in Ohms

T = time in seconds

→ H = $(0.3)^2$× 418 × 60

= 2257.2 joules

→ 1 calorie = 4.184 joules or

4.184 joules = 1 calorie

1 Joules = 1 / 4.184 calorie

2257.2 joules = (1 / 4.184) × 2257.2 calorie

= 539.48 ~= 540 calorie

The heat energy generated is 540 calorie

Q48. Answer: (a) Sn

• Tin (Sn) is added with copper and zinc to form bronze.

• Bronze is a metallic alloy of copper and tin. Its composition is 90% copper and 10% tin.

• The Atomic number of Sn (Tin) is 50.

NOTE: Sometimes Bronze may also contain manganese, aluminum, nickel, phosphorus, silicon, arsenic, or zinc but main components of bronze are Copper and Tin.

Q49. Answer: (a) 28

=> 15 × 3 – 9 × (5^2 ÷ 5) ÷ 5 ÷ (1 ÷ 3) + 10

=> 15 × 3 – 9 × 5 ÷ 5 ÷ (1/3) + 10

=> 15 × 3 – 9 × 1 × 3 + 10

=> 45 – 27 + 10

=> 28

Q50. Answer: (b) Only I is implicit.

March endings are yearly closing days as the economic year ends on the last day of March. In the statement, the Branch Manager is saying that “March endings are always hectic”. Thus, we can assume that “There is more work at the end of March”.

There is no information provided in the statement that supports the assumption that “much work gets piled up due to lack of timely work”. Hence, “Only assumption I is implicit”.

Q51. Answer: (b) 2551212

The positional value table is as follows:

The pattern followed here is as follows,

Every letter is assigned to its positional value as per the English alphabetical order.

Similarly,

Hence, “2551212” is the correct answer.

Q52. Answer: (a) B

Position values of the letters according to the English alphabet series.

The pattern followed here is that

• The positional value of the letter is kept before the letter. Except “O15” where the positional value is kept after the letter.

The pattern here is:

	Position Value	Letter
A	9	I
B	O	15
C	5	E
D	21	U

• Positional Value > Letter

• While the pattern in option 1 is:

• Letter > Positional Value

Hence, “O15” is the odd one.

Q53. Answer: (b) 48 cm²

Shortcut Trick

The area of the figure formed by joining the midpoints of the sides of any quadrilateral is always exactly half the area of the original quadrilateral.

Area of Rhombus = 1/2 × d1 × d2

=> Area = 1/2 × 12 × 16 = 96 cm²

Area of the formed figure = 1/2 × 96 = 48 cm²

Therefore The correct answer is 48 cm².

Alternate Method

Given:

Diagonal 1 (d1) = 12 cm

Diagonal 2 (d2) = 16 cm

Formula Used:

Area of Rhombus = 1/2 × d1 × d2

Area of Rectangle = Length × Breadth

Calculations:

=> Area of Rhombus ABCD = 1/2 × 12 × 16 = 96 cm²

=> By the Midpoint Theorem, the sides of the formed figure PQRS are parallel to the diagonals of the rhombus and are half their lengths.

=> Length of side PQ = 1/2 × Diagonal AC = 1/2 × 12 = 6 cm

=> Length of side QR = 1/2 × Diagonal BD = 1/2 × 16 = 8 cm

=> Since the diagonals of a rhombus intersect at 90°, the figure formed by joining the midpoints is a rectangle.

=> Area of Rectangle PQRS = 6 × 8 = 48 cm²

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Therefore The correct answer is 48 cm².

Additional Information

Varignon's Theorem

The quadrilateral formed by joining the midpoints of the sides of any quadrilateral is a parallelogram, and its area is half the area of the original shape.

Midpoint Figure of a Rhombus

Joining the midpoints of a rhombus always results in a rectangle because the diagonals of a rhombus are perpendicular to each other.

Area of a Rhombus

The area can be calculated using the formula Area = 1/2 × d1 × d2, where d1 and d2 are the lengths of the diagonals.

Q54. Answer: (c) Thang Ta

• Thang-ta is a martial art form mainly practiced in the state of Manipur.

• Here Thang refers to a 'Sword' and Ta refers to 'Spear'.

• In this martial art form when unarmed combat is involved or no weapon is used while performing it, then it is known as Sarit Sarak.

• It is also known as Huyen Lallong and Chebi Gatka.

Q55. Answer: (b) Sexual

• Sexual reproduction allows for a greater genetic diversity through the process of Fertilisation.

• It involves the meiosis process which means a cell doubling its DNA, shuffling its genes and then dividing the shuffled DNA among four cells.

• Each resulting cell after dividing the shuffled DNA, or gamete, resulting from meiosis has only half the amount of DNA as the parent cell.

• Therefore, in order to form a new organism, two gametes - the sex cells, sperm, and egg - must fuse, further mixing the genes to produce more genetic diversity.

Q56. Answer: (b) Tamil Nadu

• Dravida Munnetra Kazhagam (DMK) and All India Anna Dravida Munnetra Kazhagam (AIADMK) are the regional parties mainly belonging to Tamil Nadu state.

DMK	AIADMK
→ C.N. Annadurai in the year 1949 founded the Dravida Munnetra Kazhagam (DMK) party. → It's a state political party active in Tamil Nadu and Puducherry. → The formation of the DMK party took place due to the breakdown of the Dravidar Kazhagam. → It was the first party other than the Indian National Congress to form government independently in a state.	→ All India Anna Dravida Munnetra Kazhagam (AIADMK) is a Dravidian party → It was founded by M. G. Ramachandran on 17 October 1972 → It was formed as a breakaway faction of the Dravida Munnetra Kazhagam (DMK).

Q57. Answer: (d) 1 : 3

• Aqua regia is a mixture of concentrated nitric acid and concentrated hydrochloric acid, optimally in a molar ratio of 1 : 3.

• It is a yellow-orange fuming liquid and was so named because it can dissolve the noble metals gold and platinum.

Q58. Answer: (a) Displacement Reaction

• Fe + CuSO4 → FeSO4 + Cu is an example of displacement reaction since in this reaction iron being more reactive than copper displaces copper from copper sulphate (CuSO4).

Displacement reaction	**When a more reactive element displaces a less reactive element from its compound then that is known as displacement reaction. Both metals and nonmetals take part in displacement reactions E.g - Thermite Welding, Steelmaking**
Combustion reaction	Burning of any substance in the presence of Air/ Oxygen is called Combustion Reaction E.g - Burning of coal or wood, Gasoline in cars

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Q59. Answer: (c) Rs. 3,300

Shortcut Trick

Total profit is always 100%.

Profit from Brand 1 = 45%.

Profit from Brand 2 = 100% − 45% = 55%.

Profit amount for Brand 2 = 55% of 6,000.

Profit = 55 × 60 = Rs. 3,300.

Therefore The correct answer is Rs. 3,300.

Alternate Method

Given: Total profit = Rs. 6,000 | Profit % of first brand = 45%.

Formulas: Amount = (Percentage ÷ 100) × Total | Remaining Amount = Total − First Amount.

=> Profit from first brand = (45 ÷ 100) × 6,000

=> Profit from first brand = 45 × 60 = Rs. 2,700

=> Profit from other brand = Total Profit − Profit from first brand

=> Profit from other brand = 6,000 − 2,700

=> Profit from other brand = Rs. 3,300

Therefore The correct answer is Rs. 3,300.

Additional Information

Percentage Breakdown

When a whole is divided into two parts, if one part is x%, the other part is (100 − x)%.

Profit Calculation

Profit amount is calculated on the total value unless specified otherwise. Formula: (Part % × Total) ÷ 100.

Q60. Answer: (b) 1875

Option 2 is correct, i.e. 1875.

• The Theosophical Society was founded by Madame H. P. Blavatsky and Colonel Olcott in New York in 1875.

• In 1882, the headquarters of the Society were established in Adyar, near Madras (now Chennai) in India.

• It is an unsectarian body of seekers after Truth, who endeavour to promote Brotherhood and strive to serve humanity.

Link: http://www.open.ac.uk/researchprojects/makingbritain/content/theosophical-society

Q61. Answer: (b) None of the conclusions follows

The minimum possible Venn diagram of the given statements,

Conclusions:

1. Some raccoons are parrots → False (it is possible but not definite)

2. All parrots are racoons → False (it is possible but not definite)

Hence, None of the conclusions follows.

Q62. Answer: (a) Prompt Corrective action

• PCA Stands for Prompt corrective action.

• The Reserve Bank of India has issued a Prompt Corrective Action framework to maintain the sound financial health of banks.

• It facilitates banks in breach of risk thresholds for identified areas of monitoring, such as asset quality, capital, and profitability, to take corrective measures.

• The RBI, through the corrective framework, encourages banks to abstain from riskier activities.

Q63. Answer: (b) at all temperatures

Key Points Evaporation:

• Evaporation is the conversion of liquid into its vapour, below the boiling point of the liquid.

• During evaporation, a small fraction of particles at the surface, having higher kinetic energy, is able to break away from the forces of attraction of other particles and gets converted into vapour.

• Evaporation of water generally occurs at all temperatures.

• It is the process of transformation of water from liquid to gas phase when it moves from the ground or bodies of water into the overlying atmosphere.

• The primary source of energy for evaporation is solar radiation.

Boiling:

• Boiling is the process in which a liquid is converted into its vapour when heated to its boiling point.

Important Points

Evaporation	Boiling
Surface phenomenon.	Bulk phenomenon.
Slow process.	Quick process.
Takes place at all temperatures.	Takes place at a specific temperature - boiling point.
No bubbles formed.	Bubbles are formed.
Energy is absorbed from the surroundings.	An energy source is needed.

Thus, evaporation of water occurs at all temperatures.

Q64. Answer: (d) 98 N

Concept:

• Weight is defined as the force of gravity on an object.

• It is denoted by the formula:

• W = mg,

• Since weight is actually a force, the S.I. unit of weight is Newton.

where

W= Weight,

m = Mass of the object

g = Gravitational Acceleration

Calculation:

Given that,

mass of object, m = 10 kg

From the above explanation, we can see that

W = 10 × 9.8

W = 98 N

Therefore, the weight of the object on earth will be 98 N

Q65. Answer: (a) 45 km

Shortcut Trick

Ratio of speeds (v1 : v2) = 6 : 5

Since distance is constant, Ratio of time (t1 : t2) = 5 : 6

Total time units = 5 + 6 = 11 units → 16.5 hours

1 unit = 1.5 hours => t1 = 5 × 1.5 = 7.5 hours

Distance = Speed × Time = 6 × 7.5 = 45 km

Therefore The correct answer is 45 km.

Alternate Method

Given: Speed going (v1) = 6 km/h, Speed returning (v2) = 5 km/h, Total time (T) = 16.5 hours.

Formula Used: Distance (d) = [(v1 × v2) ÷ (v1 + v2)] × Total Time

=> Total Time = 16(1/2) = 16.5 hours

=> Distance = [(6 × 5) ÷ (6 + 5)] × 16.5

=> Distance = [30 ÷ 11] × 16.5

=> Distance = 30 × 1.5

=> Distance = 45 km

Therefore The correct answer is 45 km.

Additional Information

Average Speed for Constant Distance

When a person travels equal distances at speeds x and y, the average speed for the whole journey is (2xy) ÷ (x + y).

Relationship between Speed and Time

For a constant distance, speed is inversely proportional to time (S1/S2 = T2/T1).

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Distance formula using Time Difference

If the difference in time taken at two speeds is ΔT, then Distance = [(v1 × v2) ÷ (v1 − v2)] × ΔT.

Q66. Answer: (c) Statement II alone is sufficient to answer the question.

Given : Leela has 4 pens of 3 different colours.

Statement I: 2 pens are of different colours.

This statement gives information about 2 pens without specifying their colours and hence, is not sufficient.

Statement II. The colour of 2 pens is the same which is red.

From statement II, we get to know that 2 pens out of the 4 pens with Leela are of red colour

We are already given that Leela has 4 pens of 3 different colours. This means that out of the remaining 2 pens, exactly 1 pen must be of blue colour. So, statement II alone is sufficient to answer the question.

Hence, statement II alone is sufficient to answer the question.

Q67. Answer: (d) 600 N

CONCEPT:

• Force: The interaction which after applying on a body changes or try to change the state of motion or state of rest is called force.

• Force is denoted by F and the SI unit is Newton (N).

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

where, F = force

m = mass of the body

a = acceleration

Calculation:

Given that,

Mass of the bullet, m = 12 g = 12/1000 = 0.012 kg

Time taken, t = 0.006 seconds

Final velocity, v = 300 m/s

Initial velocity, u = 0 m/s

From the above explanation, we can see that force exerted on barrel will be

F = m × a

Here, acceleration = (final velocity - initial velocity)/time

a = (v - u) / t

→ F = m × a = m × (v - u)/t

= 0.012 × (300 - 0)/0.006

= 600 N

• So, 600 N of the force is exerted on the bullet by the rifle

Q68. Answer: (a) Krishna Sobti

• Krishna Sobti was awarded the 53^(rd) Jnanpith Award for the year 2017.

• She was the 8th woman to win this award.

• She was an essayist and a Hindi fiction writer.

• She was known for experimenting with new writing styles.

• She passed away in January 2019.

Q69. Answer: (d) Both assumptions I and II are implicit

From the statement “the school management has announced the addition of music and art session to each standard”, we can assume that “the management wants to create a holistic approach to learning”. Because the holistic approach to learning refers to addressing the whole person, including their physical, mental, and emotional health. Assumption II talks about giving a foundation to learn arts which is also true.

Hence, Both assumptions I and II are implicit

Q70. Answer: (d) 1918

• The Report on Indian constitutional reforms, commonly known as the Montagu-Chelmsford Report was published in 1918.

• The Government of India Act 1919 led to the creation of the Post “High Commissioner for India”.

• It was popularly known as Montagu-Chelmsford Reforms 1919.

• The main feature of this act was Dyarchy i.e dual government in which the Provincial subjects are divided into two subjects namely Reserved Subjects and Transferred Subjects.

• Reserved subjects were to be administered by the Governor and his council whereas the Transferred subjects by Governor and Council of Ministers.

Q71. Answer: (d) 33 : 7

Shortcut Trick

Combine ratios by making the common term (Red tokens) equal.

Red : Green = 5 : 11 (Multiply by 3) → 15 : 33

Pink : Red = 7 : 15

Now, Pink : Red : Green = 7 : 15 : 33

Ratio of Green : Pink = 33 : 7

Therefore The correct answer is 33 : 7.

Alternate Method

Given:

Ratio of Red (R) to Green (G) = 5 : 11

Ratio of Pink (P) to Red (R) = 7 : 15

Calculations:

=> R/G = 5/11

=> P/R = 7/15

=> To find G/P, we can multiply the reciprocal of (R/G) with (R/P):

=> G/P = (G/R) × (R/P)

=> G/P = (11/5) × (15/7)

=> G/P = (11 × 3) / 7

=> G/P = 33 / 7

Therefore The correct answer is 33 : 7.

Additional Information

Compound Ratio

The compound ratio of two ratios a : b and c : d is (a × c) : (b × d).

Ratio Balancing

To combine ratios like A:B and B:C, multiply terms to make the value of common variable 'B' identical in both sets.

Reciprocal Ratio

The inverse or reciprocal ratio of a : b is b : a, which is useful when changing the subject of the comparison.

Q72. Answer: (c) Shubhankar Sharma

• Golf player Shubhankar Sharma became the youngest Indian golfer to win on the European Tour by six years

• He also became the first Indian to emerge as the 'Sir Henry Cotton Rookie of the Year 2018' on the European Tour and the youngest Indian to win the 'Asian Tour Order of Merit' on 8 December 2018.

• Before him, Jyoti Randhawa (2002), Arjun Atwal (2003), Jeev Milkha Singh (2006 and 2008), and Anirban Lahiri (2015) won the 'Asian Tour Order of Merit'.

Q73. Answer: (d) M.S. Dhoni

• Mahendra Singh Dhoni is the brand ambassador of gaming platform Dream 11 app.

• It is a platform which allows users to play fantasy sports such as cricket, football, basketball, etc.

• The gaming platform has a current user base of 2 crore sports fans playing fantasy cricket, football, kabaddi, and NBA.

Q74. Answer: (a) Filarial worms

• Lymphatic Filariasis commonly known as Elephantiasis is one of the oldest tropical Diseases which is caused by Filarial worms.

• Filarial worms are the human parasitic roundworm known as Wuchereria Bancrofti.

• Elephantiasis is spread by a mosquito named Culex, which mainly grows in dirty accumulated water.

Q75. Answer: (c) 78

Shortcut Trick

The series follows a constant addition pattern.

Difference between consecutive terms: 42 − 30 = 12, 54 − 42 = 12, 66 − 54 = 12.

Next term = 66 + 12 = 78.

Therefore The correct answer is 78.

Alternate Method

Given: The number series is 30, 42, 54, 66, _____.

30

+12

→

42

+12

→

54

+12

→

66

+12

→

78

Pattern Explanation: This is an Arithmetic Progression (AP) where each term is obtained by adding a fixed number to the preceding term.

=> First term (a) = 30

=> Common difference (d) = 42 − 30 = 12

=> Fifth term = Fourth term + d

=> Fifth term = 66 + 12 = 78

Therefore The correct answer is 78.

Additional Information

Arithmetic Progression (AP)

A series where the difference between consecutive terms is constant. General term $T_n = a + (n - 1)d$.

Common Difference

The fixed value added to each term, calculated as $d = T_n - T_{(n-1)}$.

Types of Number Series

Common patterns include Addition/Subtraction, Multiplication/Division, Squares/Cubes, and Prime Numbers.

Q76. Answer: (c) 366 days 23 hours 52 mins

We know that 1 day added in the leap year, 2028 is the leap year.

Therefore total number of days from 5:47 p.m 21^(st) June 2027 to 5:47 p.m 21^(st) June 2028 = 366 days (365 + 1 leap day)

Now from 5:47 p.m 21^(st) June 2028 to 5:47 p.m 22^(nd) June 2028 = 1 day => 24 hrs.

But we have given the time till 5:39 pm on 22^(nd) June 2028 => 8 min. less that 24 hrs = 24 hrs – 8 min.

= 23 hrs 52 min.

Therefore the total time duration that will elapse between 5:47 p.m of 21^(st) June 2027 and 5:39 p.m. of 22^(nd) June 2028 is 366 days 23 hours 52 mins.

Hence, “366 days 23 hours 52 mins” is the correct answer.

Q77. Answer: (b) cbrt8 – 2

Shortcut Trick

Check for perfect cubes inside the cube root ($\sqrt[3]{}$) to eliminate irrationality.

In option (2), $8 = 2^3$, so $\sqrt[3]{8} = 2$.

=> 2 − 2 = 0.

Since 0 is an integer, it is a rational number.

Therefore The correct answer is $\sqrt[3]{8} - 2$.

Alternate Method

Given: A list of expressions involving cube roots.

Concept: A rational number is any number that can be expressed in the form p/q, where p and q are integers and q ≠ 0. For a

cube root $\sqrt[3]{x}$ to be rational, x must be a perfect cube.

=> Option (1): $\sqrt[3]{2} - 2$. Since 2 is not a perfect cube, $\sqrt[3]{2}$ is irrational. Irrational − Rational = Irrational.

=> Option (2): $\sqrt[3]{8} - 2$.

=> $\sqrt[3]{(2^3)} - 2$

=> 2 − 2 = 0.

=> 0 can be written as 0/1, which is a rational number.

=> Option (3): $\sqrt[3]{12} + 1$. Since 12 is not a perfect cube, the result is irrational.

=> Option (4): $\sqrt[3]{4} + 4$. Since 4 is not a perfect cube, the result is irrational.

Therefore The correct answer is $\sqrt[3]{8} - 2$.

Additional Information

Rational Numbers

Numbers that have terminating or repeating decimal expansions. All integers and fractions are rational.

Irrational Numbers

Numbers that cannot be written as p/q. Their decimal expansion is non-terminating and non-repeating (e.g., $\sqrt{2}$, π, e).

Perfect Cubes

Numbers like 1, 8, 27, 64, 125... whose cube roots are integers.

Q78. Answer: (b) Argon

• Argon is a gas from group 18 called noble gases which are highly unreactive.

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

Element Name	Symbol	Atomic Number
Fluorine	F	9
Chlorine	Cl	17
Bromine	Br	35
Iodine	I	53
Astatine	At	85

Q79. Answer: (d) -8

By BODMAS rule,

=> p = 36 – 2(20 + 12 ÷ 4 × 3 – 2 × 2) + 10

=> p = 36 – 2(20 + 3 × 3 – 2 × 2) + 10

=> p = 36 – 2(20 + 9 – 4) + 10

=> p = 36 – 2 × 25 + 10

=> p = 36 – 50 + 10

=> p = -4

=> 2p = -8

Q80. Answer: (c) Ultraviolet radiation

• Ultraviolet radiations are harmful radiations emitted by the sun.

• Exposure to ultraviolet (UV) radiation is responsible for most skin cancers.

• There are three types of UV rays: ultraviolet A (UVA), ultraviolet B (UVB), and ultraviolet C (UVC).

• It is the most abundant source of solar radiation at the earth's surface and penetrates beyond the top layer of human skin.

Q81. Answer: (a) 62450

Shortcut Trick

Identify the difference in multipliers: 62 − 52 = 10.

The difference in the final result is Number × Difference in Multipliers.

Difference = 6245 × 10 = 62450.

Therefore The correct answer is 62450.

Alternate Method

Given:

Original Number = 6245
Correct Multiplier = 52
Wrong Multiplier = 62
Calculations:
=> Correct Answer = 6245 × 52 = 324740
=> Wrong Answer = 6245 × 62 = 387190
=> Required Difference = Wrong Answer − Correct Answer
=> Difference = 387190 − 324740
=> Difference = 62450
Therefore The correct answer is 62450.
Additional Information
Distributive Property
The shortcut uses a × (b − c) = ab − ac, which simplifies calculations involving shared factors.
Error Calculation
Absolute error is the difference between the measured value and the true value.
Percentage Error
It is calculated as (Difference ÷ Correct Value) × 100.

Q82. Answer: (d) s

• Atomic number 56, Barium belongs to s - block elements.
• Electronic configuration for the Barium $[Xe]6s^2$
• Modern Periodic Table is classified into the following elements - p-block, s-block, d-block, and f-block.
• s-block elements include alkali metals and alkaline earth metals.

Q83. Answer: (c) 42 km

Shortcut Trick
Alternate days pattern for Monday to Sunday (7 days): 1st, 2nd, 1st, 2nd, 1st, 2nd, 1st.
Number of days using Route 2 = 3 days (Tuesday, Thursday, Saturday).
Total distance for Route 2 = 3 days × 2 (round trip) × 7 km = 42 km.
Therefore The correct answer is 42 km.
Alternate Method
Given:
Distance of Route 1 = 5 km
Distance of Route 2 = 7 km
Condition: Cannot use the same route for two consecutive days.
Starting day (Monday): Route 1.
Calculations:
=> Total days in a week = 7 (Monday to Sunday)
=> Route sequence: Mon(1), Tue(2), Wed(1), Thu(2), Fri(1), Sat(2), Sun(1)
=> Days on which Route 2 is used = 3 days
=> Each day involves a round trip (Office and return home) = 2 × Distance
=> Total distance on Route 2 = 3 × (2 × 7 km)
=> Total distance = 3 × 14 km = 42 km
Therefore The correct answer is 42 km.
Additional Information
Round Trip Calculation
Total daily distance = Distance to office + Distance from office. If the route is the same, it is 2 × single side distance.
Alternate Sequence Logic
In an odd number of days (like 7 days), if starting with A, then A occurs (n+1)/2 times and B occurs (n−1)/2 times.
Average Speed for Different Routes
Average Speed = Total Distance ÷ Total Time. Used when different routes or speeds are taken for different parts of a journey.

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Q84. Answer: (b) Friday

The logic followed here is:

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

Number of leap years till 2010 = 2 (2004, and 2008)

Number of ordinary years till 2010 = 8

Number of odd days till 2011 = 8 + (2 × 2) = 12 odd days

Total number of odd days till 7^(th) January 2011 = 12 + 7 = 19 odd days = 5 odd days

So, the day on 7^(th) January 2011 is Friday.

Q85. Answer: (b) 200.625 kg

8 kg 25 g = 8 × 1000 + 25 = 8025 g

8025 g × 25 = 200625 g = 200625/1000 kg = 200.625 kg

Q86. Answer: (d) 45118

The positional Value table is as follows:

The pattern followed here is as follows,

Every letter is coded as its positional value as per the English alphabetical order.

Similarly,

Hence, “45118” is the correct answer.

Q87. Answer: (c) 20 days

Shortcut Trick

Remaining provision is for 60 men for (35 − 10) = 25 days.

New total men = 60 + 15 = 75 men.

Using M1D1 = M2D2 for remaining work:

60 × 25 = 75 × Required Days

Required Days = 1500 ÷ 75 = 20 days.

Therefore The correct answer is 20 days.

Alternate Method

Given: Initial men = 60, Total provision = 35 days, Days passed = 10, New men arrived = 15.

Formula Used: Total Work (Provision) = Number of Men × Number of Days

=> Total provision units initially = 60 × 35 = 2100 units

=> Provision consumed in 10 days = 60 × 10 = 600 units

=> Remaining provision = 2100 − 600 = 1500 units

=> New total number of men = 60 + 15 = 75 men

=> Number of days the remaining provision will last = 1500 ÷ 75

=> Required Days = 20 days

Therefore The correct answer is 20 days.

Additional Information

Inverse Proportion in Work

When the amount of work (or provision) is constant, the number of men (M) is inversely proportional to the number of days (D). Formula: M1 × D1 = M2 × D2.

Chain Rule Formula

For problems involving men, days, and hours: (M1 × D1 × H1) ÷ W1 = (M2 × D2 × H2) ÷ W2, where W represents the total work.

Man-Days Concept

Total man-days is the product of the number of persons and the time they work, representing the total capacity or resource volume.

Q88. Answer: (d) C

The pattern followed here is as follows,

Every element is shifting in an anticlockwise direction in the succeeding image.

Similarly,

Hence, “option figure C” is the correct answer.

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Q89. Answer: (c) South-East

We can draw the following diagram as per the given information.

Given: Sukanya walks 2 km towards South and then turns left and walks 500 m.

Clearly, she is in the south-east direction with respect to the initial position.

Hence, “South-East” is the correct answer.

Q90. Answer: (a) √2 + 1

Shortcut Trick

Divide the given equation cosx + sinx = √2cosx by sinx throughout.

=> (cosx/sinx) + (sinx/sinx) = √2(cosx/sinx)

=> cotx + 1 = √2cotx

=> 1 = √2cotx − cotx => 1 = cotx(√2 − 1)

=> cotx = 1/(√2 − 1) = √2 + 1

Therefore The correct answer is √2 + 1.

Alternate Method

Given: cosx + sinx = √2cosx

Formula Used: cotx = cosx / sinx

=> sinx = √2cosx − cosx

=> sinx = cosx(√2 − 1)

=> 1/(√2 − 1) = cosx / sinx

=> cotx = 1 / (√2 − 1)

Rationalizing the denominator:

=> cotx = [1 × (√2 + 1)] / [(√2 − 1)(√2 + 1)]

=> cotx = (√2 + 1) / (2 − 1)

=> cotx = √2 + 1

Therefore The correct answer is √2 + 1.

Additional Information

Trigonometric Ratios

cotx is the reciprocal of tanx, defined as cosx/sinx. Similarly, tanx = sinx/cosx.

Rationalization

To rationalize a denominator of form (a−b), multiply numerator and denominator by its conjugate (a+b) using the identity (a−b)(a+b) = a^2-b^2.

Q91. Answer: (c) Chara

• Chara is not a Bryophyte. It is a green algae of the family Characeae.

• Bryophytes are small, non-vascular plants, such as mosses, liverworts, and hornworts.

• Bryophytes regulate ecosystems by providing an important buffer system for other plants.

• Bryophytes are also called amphibians of the plant kingdom because these plants mostly live in terrestrial habitat but they need water for sexual reproduction.

Q92. Answer: (b) 300 m

Shortcut Trick

Relative speed of trains in opposite directions = 40 + 32 = 72 km/hr.

Convert the relative speed to m/s = 72 × (5/18) = 20 m/s.

Since the faster train crosses a man (a point object) sitting in the slower train, the distance covered is equal to the length of the faster train.

Length of the faster train = Relative Speed × Time = 20 × 15 = 300 m.

Therefore The correct answer is 300 m.

Alternate Method

Faster: 40 km/hr

Slower: 32 km/hr

Man

Opposite Direction: Add Speeds

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Relative Speed = 40 + 32 = 72 km/hr

Given:

Speed of the faster train = 40 km/hr

Speed of the slower train = 32 km/hr

Time taken by the faster train to pass the man = 15 seconds

Formula Used:

Relative speed (Opposite direction) = S1 + S2

Distance = Speed × Time

Note: Since the man is a point object sitting in the slower train, the distance covered to pass him is exactly the length of the passing train.

Calculation:

=> Relative Speed = 40 + 32 = 72 km/hr

=> Convert km/hr to m/s: 72 × (5/18) = 20 m/s

=> Length of the faster train = Relative speed in m/s × Time

=> Length of the faster train = 20 × 15 = 300 m

Therefore The correct answer is 300 m.

Additional Information

Relative Speed Concept

When two objects move in opposite directions, their relative speed is the sum of their individual speeds (S1 + S2). If moving in the same direction, it is the difference (S1 − S2).

Unit Conversion

To convert speed from km/hr to m/s, multiply the value by 5/18. Conversely, to convert m/s to km/hr, multiply by 18/5.

Passing a Point Object vs Platform

When a train passes a man, pole, or tree, the total distance covered is merely the length of the train. When it passes a stationary platform or bridge, the distance covered is the length of the train plus the length of the object.

Q93. Answer: (b) Statement 1 alone is sufficient

Shortcut Trick

Total weight = Number of bags × Weight per bag.

From Statement 1: 1/3 of the weight of one bag = 8 kg.

=> Weight of one bag = 8 × 3 = 24 kg.

=> Total weight of 10 bags = 10 × 24 = 240 kg (Sufficient).

Statement 2 specifies the content (rice), which is irrelevant to calculating weight.

Therefore The correct answer is Statement 1 alone is sufficient.

Alternate Method

Given:

Total number of bags = 10.

All bags have the same weight.

Statement 1: (1/3) × Bag Weight = 8 kg.

Statement 2: Content = rice.

Formula Used:

Total weight = n × w (where n is the number of items and w is the weight per item).

Calculations:

=> Let the weight of one bag be x kg.

=> From Statement 1: (1/3) × x = 8

=> x = 8 × 3 = 24 kg.

=> Total weight = 10 × x

=> Total weight = 10 × 24 = 240 kg.

=> Statement 2 provides no numerical data and is redundant for solving the weight calculation.

Therefore The correct answer is Statement 1 alone is sufficient.

Additional Information

Data Sufficiency

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It involves determining if the given statements provide enough data to reach a unique numerical answer, rather than just calculating the answer itself.

Unitary Method

A technique where you find the value of a single unit (or part of a unit) first and then multiply by the desired number of units: Total = Unit Value × Quantity.

Redundant Data

Information that describes qualitative aspects (like the content of bags being rice) but does not contribute to the quantitative solution of the problem.

Q94. Answer: (c) 12

Shortcut Trick

For finding the L.C.M. of fractions, we use the direct formula:

L.C.M. of Fractions = L.C.M. of Numerators ÷ H.C.F. of Denominators

Numerators: 1, 2, 4, 6 → L.C.M. = 12

Denominators: 2, 5, 7, 17 → H.C.F. = 1 (all are prime or co-prime)

Therefore L.C.M. = 12 ÷ 1 = 12

Therefore The correct answer is 12.

Alternate Method

Given fractions: 1/2, 2/5, 4/7, and 6/17

Formula Used: L.C.M. of (a/b, c/d, e/f) = [L.C.M. of (a, c, e)] / [H.C.F. of (b, d, f)]

Step 1: Find L.C.M. of Numerators (1, 2, 4, 6)

=> Multiples of 1: 1, 2, ..., 12

=> Multiples of 2: 2, 4, 6, 8, 10, 12

=> Multiples of 4: 4, 8, 12

=> Multiples of 6: 6, 12

=> L.C.M. (1, 2, 4, 6) = 12

Step 2: Find H.C.F. of Denominators (2, 5, 7, 17)

=> Since 2, 5, 7, and 17 are all prime numbers, they have no common factors other than 1.

=> H.C.F. (2, 5, 7, 17) = 1

Step 3: Calculate final L.C.M.

=> L.C.M. = 12 / 1 = 12

Therefore The correct answer is 12.

Additional Information

H.C.F. of Fractions

To find the Highest Common Factor of fractions, the formula is: H.C.F. = H.C.F. of Numerators ÷ L.C.M. of Denominators.

Co-prime Numbers

If the set of numbers consists of prime numbers or co-prime numbers, their H.C.F. is always 1 and their L.C.M. is the product of the numbers.

Relationship Property

For any two numbers A and B: A × B = L.C.M.(A, B) × H.C.F.(A, B).

Q95. Answer: (b) 34

We can count the triangle in the given figure in the following manner,

Hence, there are “34” triangles in the given figure.

Q96. Answer: (d) D

The pattern followed here is as follows,

The figure is rotating in a clockwise direction after shifting.

Similarly,

Hence, “option figure D” is the correct answer.

Q97. Answer: (c) Indian Navy

- Shubhangi Swaroop, a cadet from Uttar Pradesh, became the first woman pilot in the Indian Navy.
- She is among the 328 cadets who passed out from the Indian Naval Academy's first batch of female officers.

• The first female officer was inducted in the force in 1991.

Q98. Answer: (b) Cinnabar

• Cinnabar is an ore of Hg (Mercury) and its Latin name is Hydrargyrum.

• It is the most important ore of mercury having a chemical composition of HgS (mercury sulphide).

• It is used as a pigment in jewelry and ornaments due to its bright red color and it is also not as poisonous as other forms of mercury.

• The atomic number of Mercury is 80.

Q99. Answer: (d) Amitabh Bachchan

• Amitabh Bachchan won the Indian Film Personality of the Year at the 48th edition of the International Film Festival of India.

• The award is presented to an Indian film veteran for their outstanding Contribution in Indian Film Industry through their film craft.

• This Award consists of a Silver Peacock Medal, a certificate and a Cash Prize of Rs. 10 Lakhs.

Q100. Answer: (d) 1,96,024 km²

Gujarat is in the western part of India and covers an area of 196,024 km².

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