RRC Group D Previous Year Paper 18 (Held On: 6 Dec 2018 Shift 1)

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

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CBT

Q1. 6 years ago, a mother's age was 6 times her daughter's age. Three years hence, the daughter will be one-third her mother's age. The current age (in years) of the mother is:

(a) 45
(b) 39
(c) 36
(d) 42

Q2. A product reaches a buyer from the farmer through 3 middlemen with the intermediate profits of 10%, 20% and 30%, respectively. Finally, the seller keeps a profit of 15%. If the farmer has sold the product at Rs. X, then how much more percent did the buyer pay for it?

(a) 100.67%
(b) 93.35%
(c) 97.34%
(d) 86.56%

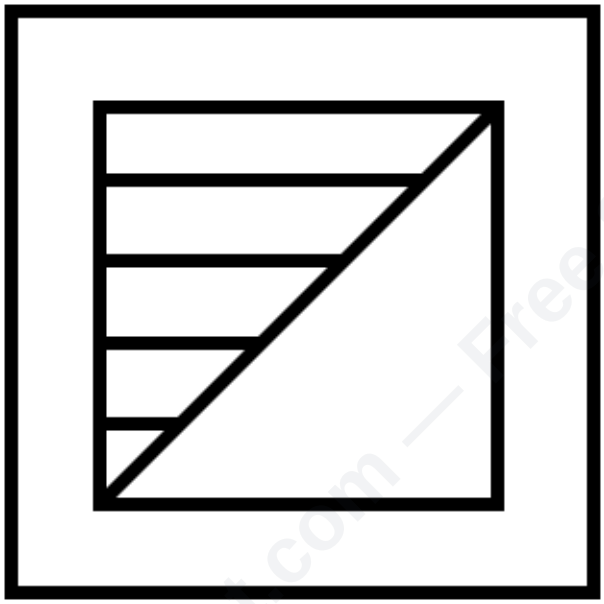
Q3. Elements in the Modern Periodic Table are arranged in _____ periods.

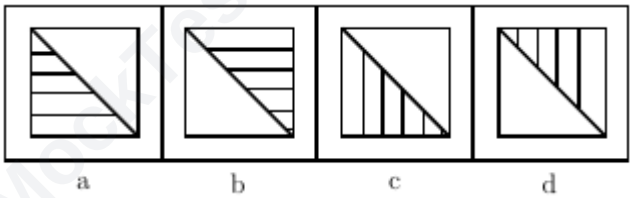
(a) 6
(b) 8
(c) 5
(d) 7

Q4. Plants that have lost their capacity to produce seeds reproduce by the method of _____.

(a) Fission
(b) Vegetative Propagation
(c) Multiple fission
(d) Budding

Q5. Choose the option that closely resembles the mirror image of the given figure. If mirror is placed at right side of the given image.





(a) a
(b) d
(c) c
(d) b

Q6. What are the organisms that eat other organisms called?

(a) Holotrophic organisms
(b) Parasitic organisms
(c) Chemotrophic organisms
(d) Saprotrophic organisms

Q7. Muscle contains special proteins are called _____.

(a) Lipoproteins
(b) Contractile proteins
(c) Glycol-proteins
(d) Nucleoproteins

Q8. Heating of ores in the absence of oxygen is called _____.

(a) Extraction
(b) Calcination
(c) Roasting
(d) Corrosion

Q9. Who inaugurated the first edition of Khelo India School Games (KISG) that was held from 31^(st) January to 8^(th) February 2018 at Indira Gandhi Indoor Stadium?

(a) The Chief Minister of Delhi
(b) The Prime Minister of India
(c) The Sports Minister
(d) The Home Minister

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Q10. The resistors of values 3 Ω, 6 Ω and 15 Ω are connected in parallel. What will be equivalent resistance in the circuit?

(a) 0.8
(b) 1.4
(c) 2.1
(d) 1.7

Q11. The total quantity of motion contained in the same body is called _____.

(a) Pressure
(b) Force
(c) Momentum
(d) Inertia

Q12. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statement:

All vitamins are proteins. All proteins are fruits.

Conclusions:

1. Some vitamins are not fruits
2. Some fruits are vitamins

(a) Either (1) or (2) follow
(b) Only (1) follows
(c) Both (1) & (2) follow
(d) Only (2) follows

Q13. The momentum of an object is 50 kg ms^(-1) and its mass is 10 kg. What is the velocity of the object?

(a) 5 ms^(-2)
(b) 0.5 ms^(-2)
(c) 0.5 ms²
(d) 5 ms^(-1)

Q14. The book ‘My music, My life’ is the autobiography of:

(a) Anushka shankar
(b) Ravi Shankar
(c) Zakir Hussein
(d) Shankar Mahadevan

Q15. Using the given information, answer the question that follows.

Six friends are sitting around a circular table.

1. Soham is sitting adjacent to Nachiket.
2. Tushar is sitting opposite Pranav.
3. Swapnil is sitting equidistant to Soham and Pranav.

Who is sitting opposite Aniket?

(a) Nachiket
(b) Soham
(c) Pranav
(d) Swapnil

Q16. Which state of India is the leading producer of coarse cereals?

(a) Karnataka
(b) Kerala
(c) Tamil Nadu
(d) West Bengal

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Q17. A 173 m long train crosses a 727 m long bridge in 40.5 seconds. What is the speed of the train?

(a) 70 km/h
(b) 85 km/h
(c) 80 km/h
(d) 75 km/h

Q18. _____ is the leading coffee producer state in India.

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

Q19. The potential energy (P.E) of a body at a certain height is 200 J. The kinetic energy possessed by it when it just touches the surface of the earth is (Neglect any air friction):

(a) zero
(b) = P.E.
(c) < P.E.
(d) > P.E.

Q20. The spinal cord originates from _____.

(a) Cerebellum
(b) Medulla
(c) Pons
(d) Cerebrum

Q21. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statement:

Increased use of medicines puts down the innate healing sense of the body.

Conclusions:

I) There is an innate healing sense in the body.

II) Nowadays, we depend more on external medicine and do not allow the body to repair itself on its own.

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

Q22. The Swadesh Darshan Scheme is an initiative of which Ministry?

(a) Finance
(b) HRD
(c) Tourism
(d) Defence

Q23. 3/5^(th) of Sarah’s amount is equal to 6/7^(th) of Priya’s amount. Between them the duo has Rs. 3,570. How much money does priya have?

(a) Rs. 1,540
(b) Rs. 2,100
(c) Rs. 1,470
(d) Rs. 1,400

Q24. _____ meristem is present at the base of the leaves or internodes on twigs.

(a) Calary
(b) Intercalary
(c) Apical

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(d) Lateral

Q25. In a certain code, STAPLE is written as RSZOKD. How is DIGEST written in that code?

(a) CHRDFS
(b) CHDFRS
(c) CHFDRS
(d) CHDRFS

Q26. The ratio of the five angles of a pentagon is 2 : 3 : 4 : 4 : 5. What would be the measure of the greatest angle?

(a) 120°
(b) 125°
(c) 140°
(d) 150°

Q27. Three out of the four options given below are related in a particular way. Choose the option that is different or odd from the others.

(a) Cat
(b) Neigh
(c) Frog
(d) Goat

Q28. The most commonly used indicator in laboratories is _____.

(a) Litmus
(b) Phenolphthalein
(c) universal Indicator
(d) Methyl Orange

Q29. If $3x^2 + ax + 12$ is perfectly divisible by$(x – 3)$,then the value of 'a' is:

(a) -13
(b) -12
(c) -3
(d) -9

Q30. What will be the mass of mercuric oxide if 92.6 g of mercury reacts with 7.4 g of oxygen?

(a) 100 g
(b) 85.2 g
(c) 92.5 g
(d) 7.4 g

Q31. The LCM of 88 and 220 is:

(a) 220
(b) 1100
(c) 440
(d) 880

Q32. Ages of two persons are in the ratio of 5 : 7. 18 years ago, their ages were in the ratio of 8 : 13. Their current ages are:

(a) 45 and 63 years
(b) 50 and 70 years
(c) 40 and 80 years
(d) 45 and 75 years

Q33. Insert mathematical symbols in the place of '?' to get the result of the given equation as 87:

((150 ? 2) ? 2) ? 10 = 87

(a) +, ×, ×

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(b) +, ÷, ÷
(c) -, ×, ÷
(d) ÷, +, +

Q34. How many players were named for Sultan Azlan Shah Cup and Commonwealth Games by the Hockey India?
(a) 11
(b) 25
(c) 33
(d) 22

Q35. P told Q, “Though I am the son of your father, you are NOT my brother”. How is Q related to P?
(a) Sister
(b) father
(c) Daughter
(d) Son

Q36. If PHONE is written as RJQPG, the WATER can be written as _____.
(a) YCVGT
(b) YVCTG
(c) YVCGT
(d) YCVTG

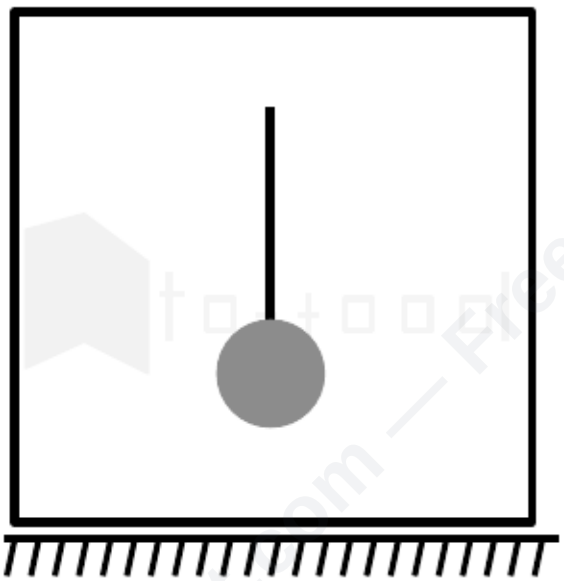
Q37. The time period of a vibrating body is 0.05 s. The frequency of waves it emits will be:
(a) 200 H_z
(b) 20 H_z
(c) 2 H_z
(d) 5 H_z

Q38. $132 \times 16 \div 2^3 + 4 = ?$
(a) 792
(b) 176
(c) 264
(d) 268

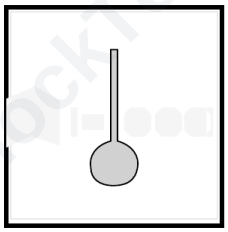
Q39. Let n be the number of different 5-digit numbers divisible by 4, with the digits 4, 5, 6, 7, 8 and 9, no digit being repeated in the numbers. What is the value of n?
(a) 8
(b) 24
(c) 168
(d) 192

Q40. Choose the mirror image of the following figure.

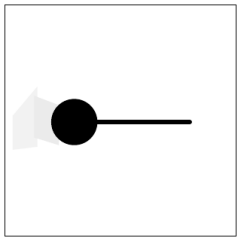
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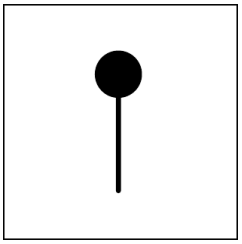
(a)



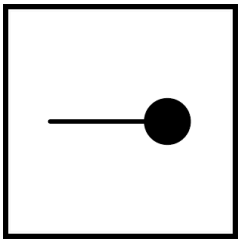
(b)



(c)



(d)



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Q41. Directions: Read the following table carefully and answer the question that Classification of 100 students based on the marks Obtained by them in English and Maths in an Examination.

Mark out of 50	40 and Above	30 and Above	20 and Above	10 and Above	0 and Above
Subject					
English	23	26	70	90	100
Maths	15	36	75	95	100
(Aggregate) Average	19	31	80	93	100

What is the difference between the number of students passed with 20 as cut-off marks in English and those passed with 20 as cut-off marks in aggregate?

(a) 12
(b) 5
(c) 6
(d) 10

Q42. What type of a bank is NABARD?

(a) Commercial Bank focused on Trade & Industry
(b) Private Bank focused on Technological development
(c) Cooperative Bank focused on Social and Urban Development
(d) Development Bank focused on Agricultural and Rural Development

Q43. The Brihadesvara Temple was designed by the famous architect _____.

(a) Sama Varma
(b) Ravi Varma
(c) Rama Varma
(d) Govinda

Q44. A body of mass 100 gm is rotating on a circular path of radius r with constant velocity. The work done in one complete revolution will be:

(a) zero
(b) (100/r) J
(c) 100 r J
(d) (r/100) J

Q45. Read the statements and decide whether the conclusion is true or false.

Statements:

1. Object A is bigger than Q.
2. Object C is bigger than S.

Conclusion:

The object S is smaller than Q.

(a) Cannot say
(b) Probably false
(c) True
(d) False

Q46. Who among the following has released the 'India 2018' book recently?

(a) Sushma Swaraj
(b) Manohar Parrikar
(c) Narendra Modi
(d) Smriti Irani

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Q47. If the direction of applied force and direction, in which an object moves, are perpendicular to each other, then _____.

(a) Positive work is done
(b) No power is released
(c) No energy is released
(d) No work is done

Q48. An object moving with a deceleration of 2.5 ms^(-2)comes to rest after 20 s. What is its initial velocity?

(a) 20 ms¹
(b) 50 ms^(-1)
(c) 0 ms^(-1)
(d) 10 ms^(-1)

Q49. Pillow is related to Rest in the same way as Shoes are related to?

(a) Run
(b) Fly
(c) Swim
(d) Wear

Q50. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s).

Statements:

Due to the rapid increase in the population in developing countries, there is a huge depletion of resources.

Conclusions:

I. The population of developing countries will not continue to increase in future.

II. It will be very difficult for the governments of developing countries to provide its people with a decent quality of life.

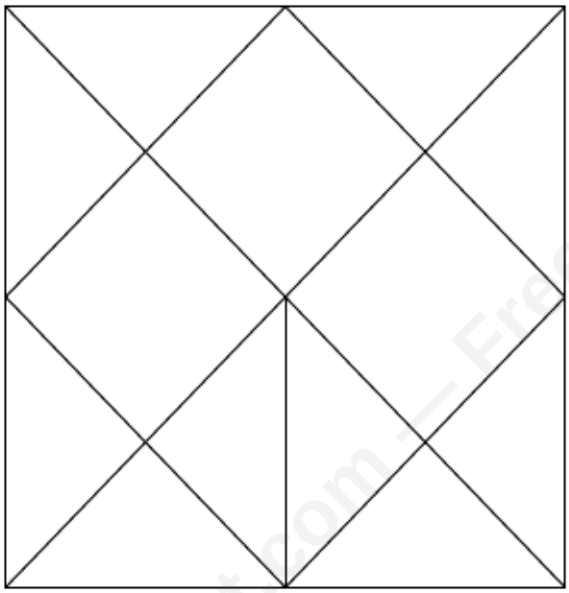
(a) Only conclusion II follows
(b) Neither conclusion I nor II follows
(c) Either conclusion I or II follows
(d) Only conclusion I follows

Q51. 384 ÷ 2^5 × 3 + 8 = ?

(a) 12
(b) 132
(c) 3
(d) 44

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

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(a) 20
(b) 28
(c) 36
(d) 24

Q53. From the given option which of the following is not correctly matched?
(a) Aldehyde:--------OH
(b) Amides: --------CONH2
(c) Amines:--------NH2
(d) Carboxylic Acid::--------COOH

Q54. A sum of money was divided between A and B in the ratio 17 : 25. If B gave Rs. 5 to A, the ratio would change to 3 : 4, what is the sum of money in question?
(a) 196
(b) 203
(c) 217
(d) 210

Q55. What will be the next term in the below series?
C3A1, G7E5, _____?
(a) I8K10
(b) I9K11
(c) K11I9
(d) K10I8

Q56. North-East becomes North, then what would West become?
(a) North-West
(b) South-West
(c) North-East
(d) South-East

Q57. With which of the following sport Sultan Azlan Shah cup is associated?
(a) Kabaddi
(b) Foot ball
(c) Tennis
(d) Hockey

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Q58. Each question given below consists of a statement, followed by two arguments numbered I and II. You have to decide which of the arguments is a 'strong' argument.

Statement:

Should speed driving be imposed heavy penalties?

Arguments:

I. Yes, speed driving is one of the major causes of road deaths as per statistics.

II. No, speed driving helps a person to reach his destination soon.

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

Q59. Who is the Director of the movie “Bahubali-2”, which was released in the year 2017?

(a) Rajkumar Hirani
(b) Rajamouli
(c) K.Vishwanath
(d) Sanjay Leela Bhansali

Q60. A statement is followed by two arguments. Decide which of the arguments is/are strong with respect to the statement.

Statement:

Government should implement price control on medicines and medical devices.

Arguments:

I. Yes, price control in healthcare have the noble intention of enhancing patient welfare for poor and middle-class people.

II. No, health care organisations will end up incurring losses or making less margin.

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

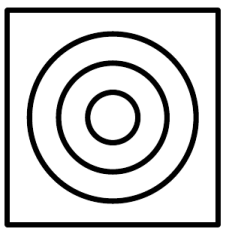
Q61. Which of the numbers given below is rational?

(a) $6\sqrt{49}$
(b) $6\sqrt{81}$
(c) $6\sqrt{64}$
(d) $6\sqrt{36}$

Q62. Choose the Venn diagram that best represents the words:

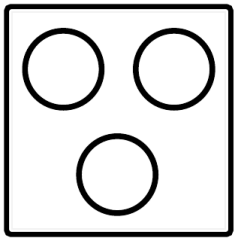
India, Telangana, Hyderabad

(a)

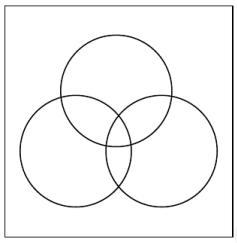


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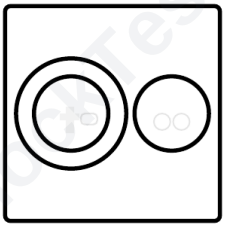
(b)



(c)



(d)



Q63. Which of the following quadrilaterals has four lines of symmetry?

(a) Rhombus
(b) Rectangle
(c) Parallelogram
(d) Square

Q64. In a computer game a builder can build a wall in 10 hours while a destroyer can demolish such a wall completely in 14 hours. Both the builder and the destroyer were initially set to work together on level ground. But after 7 hours the destroyer was taken out. What was the total time (in hours) taken to build the wall?

(a) 35
(b) 17
(c) 24
(d) 15

Q65. Atomic number of an element is _____.

(a) Number of electrons
(b) Total number of protons and neutrons
(c) Total number of electrons and neutrons
(d) Number of neutrons

Q66. Select the option that is related to the third term in the same way as the second term is related to the first term.

Wall : Brick ? Fabric : ?

(a) Brick
(b) Milk
(c) Yarn
(d) Wood

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Q67. Who among the following was elected as the Madhya Pradesh Governor in January 2018?

(a) Mamata Banerjee
(b) Mayawati
(c) Anandiben Patel
(d) Aruna Jayanti

Q68. A Solid spherical metal ball of diameter 72 cm is melted is melted and recast into small solid cones of diameter 6 cm and height 6 cm. Find the number of cones that can be formed using this melted metal.

(a) 3,456 cones
(b) 3,600 cones
(c) 3,568 cones
(d) 3,200 cones

Q69. Leela goes for a long drive towards the South. After some time she takes a 90° left turn and then takes a 45° left turn to enter a by-lane. Which direction is Leela heading towards?

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

Q70. A rectangle with length 14 cm and width 3 cm is rotated along its length by 150°. What is the volume of the shape thus generated? (Use π = 22/7)

(a) 198 cm^3
(b) 220 cm^3
(c) 165 cm^3
(d) 192.5 cm^3

Q71. Four words have been given of which three are alike in some way and one is different. Choose the odd one out.

(a) CHERISH
(b) ABHORRED
(c) DESPISE
(d) LOATHE

Q72. The image formed by controlled rays of reflection that we get by extending the rays backwards:

(a) Convex
(b) Real
(c) Plain
(d) Virtual

Q73. The average marks obtained by a group of 25 students was 29. One student left the group as a result of which the average of the remaining students rose to 29.5 Afterwards, another student came in as a result of which the average marks of the group dropped to 28.8 What is the average of the combined marks obtained by the students who left and the one who joined?

(a) 14
(b) 14.5
(c) 15
(d) 13.5

Q74. Magnitude of displacement from initial position to final position is a _____.

(a) Curved line
(b) Straight line
(c) Semi circle
(d) Circle

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Q75. IPC Section 377, recently in the news deals about which of the following?

(a) Dowry
(b) Divorce
(c) Same sex marriages
(d) Domestic Violence

Q76. Inlet Pipe A can fill can cistern is 35 hours while outlet Pipe B can drain the filled cistern in 40 hours. The two pipes are opened together when the cistern is empty, but the outlet pipe is closed when the cistern is three-fifths full. How many hours did it take in all to fill the cistern?

(a) 185
(b) 182
(c) 184
(d) 180

Q77. Consider the following question and decide which of the statements is sufficient to answer the question.

Find the value of n, if

Statements:

1. AB = A

2. A = [*20c n 9; 2 1], B = [*20c 1 0; 0 1]

(a) Only 1 is sufficient
(b) Only 2 is sufficient
(c) Either 1 or 2 is sufficient
(d) Both 1 and 2 are not sufficient

Q78. A and B can do a piece of work together in 9 days while A alone can do it 15 days. They start working together but B leaves 3 days before the completion of the work. For how many days did A and B work together?

(a) 7.2
(b) 7.5
(c) 8.1
(d) 8

Q79. 35 : 98 ? x : 140. What is the value of x?

(a) 60
(b) 50
(c) 55
(d) 65

Q80. The following table shows the pass percentage of results of four schools in the past four years.

School Name	2012-13	2013-14	2014-15	2015-16
XYZ	78	69	81	92
ABC	61	72	84	96
PQR	81	92	85	97
TUV	92	69	72	95

In which academic year did all the schools have pass percentage as more than 80?

(a) 2012-13
(b) 2014-15
(c) 2015-16
(d) 2013-14

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Q81. Rabindranath Tagore received Nobel prize for Literature in 1913 for _____.

(a) Gora
(b) Gitanjali
(c) The Home and The world
(d) Grain of Sand

Q82. Bahadur Shah, the last Mughal Emperor, was exiled to _____ for fear of another rebellion.

(a) Mysore
(b) Carnatic
(c) Awadh
(d) Burma

Q83. Who is the author of the book "One Indian Girl"?

(a) Amit Chauduri
(b) Chetan Bhagat
(c) Vikram Chandra
(d) Vikram Seth

Q84. Two friends enter a restaurant that has an entrance facing East. They were asked to take right and occupy a two-seater table. Which direction did they turn after entering the restaurant to occupy the seats?

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

Q85. The LCM 76 and 57 is:

(a) 114
(b) 171
(c) 152
(d) 228

Q86. If North becomes North-East then what will North-East become?

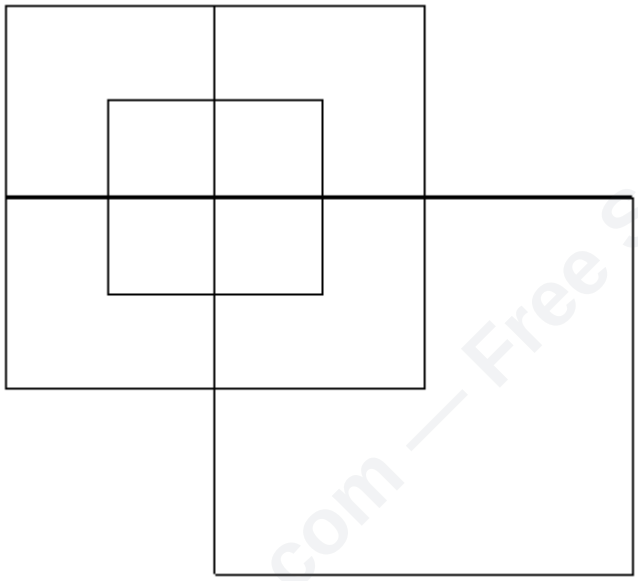
(a) East
(b) West
(c) North
(d) South

Q87. Which of the following devices does not use Integrated Circuits?

(a) Mobile phones
(b) Computer
(c) Mechanical Camera
(d) Television

Q88. Count the number of squares in the following figure.

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(a) 9
(b) 15
(c) 11
(d) 8

Q89. What is 'amu' in the context of atoms and molecules?
(a) Avegadro Mass Unit
(b) Atomic Unified Mass Unit
(c) Atomic Mass Unit
(d) Atomic Molecule Unit

Q90. Bleaching powder is produced by the action of chlorine on dry slaked lime. Which of the following is appropriate equation for this?
(a) Ca(OH)2+ 2CI = CaOCI2 + H2O
(b) Ca (OH)2 + CI2= 2CaOCI2+H2O
(c) Ca (OH)2+ CI2 = CaOCI2 + H2O
(d) Ca (OH)2 + CI2= CaOCI2 + 2H2O

Q91. Who is the present Comptroller and Auditor General of India?
(a) Rajiv Mehrishi
(b) Amitabh Kant
(c) Shashikanth Sharma
(d) Mukul Rohatgi

Q92. Who among the following was the prime minister of India when Mandal Commission was constituted?
(a) Manmohan Singh
(b) Atal Bihari Vajpayee
(c) VP Singh
(d) Morarji Desai

Q93. Find the remainder when 1 + a + a^2 + a^3 + …. + a^(2018) is divided by a – 1?
(a) 2018
(b) 2017
(c) 2019
(d) 0

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Q94. If 8^x = 4/x^(- x) then find x.

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

Q95. Which of the following is NOT a Fundamental Right provided in the Indian Constitution?

(a) Right to Property
(b) Right to Education
(c) Right to Freedom
(d) Right to Equality

Q96. We all know from our observation that water can exist in three states of matter.

Statements:

A. Solid, as ice

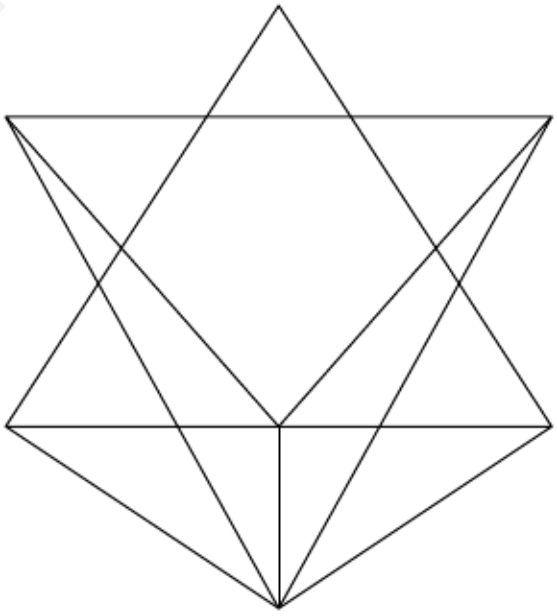
B. Liquid, as petrol and

C. Gas as O2

Which of the following statements is/are true?

(a) Only A is true, B and C are false
(b) A and B are true, C is false
(c) All are false
(d) All are true

Q97. How many triangles are present in the figure given below?



(a) 17
(b) 11
(c) 14
(d) 15

Q98. 5/7 of a number is 2/3. What is the number?

(a) 15/14
(b) 15/7
(c) 7/15
(d) 14/15

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Q99. What is the next term in this series?

22, 18, 40, 48, 58, _____

(a) 90
(b) 70
(c) 78
(d) 68

Q100. There are _____ parallel ranges of the Himalayas.

(a) Three
(b) Two
(c) Five
(d) Four

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) 42

Shortcut Trick

Ratio of Mother : Daughter 6 years ago = 6 : 1 (Difference = 5 units)

Ratio 3 years hence = 3 : 1 (Difference = 2 units). Make difference same: 12 : 2 and 15 : 5.

Difference in units = 15 − 12 = 3 units. Total time gap = 6 + 3 = 9 years.

3 units = 9 years => 1 unit = 3 years. Mother 6 years ago = 12 × 3 = 36 years.

Present age of Mother = 36 + 6 = 42 years.

Therefore The correct answer is 42 years.

Alternate Method

Given: 6 years ago, Mother (M − 6) = 6(D − 6). 3 years hence, (D + 3) = 1/3 × (M + 3).

Calculations:

=> M − 6 = 6D − 36 => M − 6D = −30 --- (i)

=> 3D + 9 = M + 3 => M − 3D = 6 --- (ii)

=> Subtracting (i) from (ii): (M − 3D) − (M − 6D) = 6 − (−30)

=> 3D = 36 => Daughter's current age = 12 years.

=> Putting D = 12 in (ii): M − 3(12) = 6

=> M − 36 = 6 => M = 42

Therefore The correct answer is 42 years.

Additional Information

Age Ratio Constant Difference

The age difference between two people remains constant throughout their lives. Always equate the difference in ratio parts to simplify calculations.

Linear Equations in Ages

When solving via variables, let current ages be x and y. Then 'n' years ago is (x−n) and 'n' years hence is (x+n).

Q2. Answer: (c) 97.34%

Shortcut Trick

Net multiplier = (1 + 10÷100) × (1 + 20÷100) × (1 + 30÷100) × (1 + 15÷100)

Net multiplier = 1.1 × 1.2 × 1.3 × 1.15 = 1.9734

Increase % = (Net multiplier − 1) × 100

Increase % = (1.9734 − 1) × 100 = 97.34%

Therefore The correct answer is 97.34%.

Alternate Method

Given → Initial Price = Rs. X; Middlemen profits = 10%, 20%, 30%; Seller profit = 15%.

Formulas: Final Price = Initial Price × (100+P1)% × (100+P2)% ... × (100+P_n)% | Increase% = (Final − Initial) ÷ Initial × 100

=> Let the Initial price (Farmer's sale price) be 100 units.

=> After 1st middleman (10% profit): 100 × 1.10 = 110.

=> After 2nd middleman (20% profit): 110 × 1.20 = 132.

=> After 3rd middleman (30% profit): 132 × 1.30 = 171.6.

=> Final price paid by Buyer (Seller's 15% profit): 171.6 × 1.15 = 197.34 units.

=> Percentage increase paid by buyer = (197.34 − 100) ÷ 100 × 100 = 97.34%.

Therefore The correct answer is 97.34%.

Additional Information

Successive Percentage Changes

When multiple profits are applied one after another, it follows the Successive compounding rule: Final = Initial × (1 + r1) × (1 + r2)...

Marked Price vs Final Price

In supply chain problems, each entity's Selling Price (SP) becomes the next entity's Cost Price (CP).

Q3. Answer: (d) 7

The correct answer is option 4 i.e 7

• Elements are arranged in order of their increasing atomic numbers.

• The vertical columns are known as groups and horizontal columns are known as periods.

• There are 18 groups and 7 periods in the modern periodic table.

• Period 1 has only two elements (hydrogen and helium).

• Periods 2 and 3 have 8 elements.

• Periods 4 and 5 have 18 elements.

• Periods 6 and 7 have 32 elements.

Q4. Answer: (b) Vegetative Propagation

The correct answer is option 2 i.e Vegetative Propagation.

• Plants that have lost their capacity to produce seeds reproduce by the method of Vegetative Propagation.

• It is considered to be an asexual method of plant propagation

• Plants like banana, jasmine and rose that have lost their capacity to produce seeds can be easily propagated by vegetative propagation.

• Fission is the splitting of a cell into two or more cells.

Fission can be of two types, namely, binary fission and multiple fission.

• Budding is a form of asexual reproduction in which a new individual develops from some generative anatomical point of the parent organism.

Q5. Answer: (d) b

The mirror image of the given figure is,

Hence, option 4 is the correct answer.

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Q6. Answer: (a) Holotrophic organisms

The correct answer is Holotrophic organisms.

Key Points

• Holotrophic organisms are those organisms that obtain their nutrition by ingesting or consuming other organisms or organic matter.

• This mode of nutrition is known as holozoic nutrition, where food is ingested, digested, absorbed, and assimilated.

• Examples include humans, animals, amoeba, and many other organisms that depend on other living organisms for food.

• Statement-wise Analysis:

• Holotrophic organisms – Feed by eating other organisms. Correct.

• Parasitic organisms – Live on or inside a host and derive nutrition, but not by directly ingesting whole organisms. Incorrect.

• Chemotrophic organisms – Obtain energy from chemical reactions, not by consuming organisms. Incorrect.

• Saprotrophic organisms – Feed on dead and decaying organic matter. Incorrect.

• Hence, the correct answer is Holotrophic organisms.

Additional Information

• Autotrophic Nutrition: Organisms like plants prepare their own food using photosynthesis.

• Heterotrophic Nutrition: Organisms depend on others for food; includes holozoic, parasitic, and saprophytic types.

• Parasitic Mode: Example: tapeworm, which derives nutrients from a host organism.

• Saprotrophic Mode: Example: fungi, which decompose dead organic matter.

• Chemotrophs: Common in bacteria that obtain energy from oxidation of chemicals like nitrogen or sulfur compounds.

Important Points

• Holozoic Process Steps: Ingestion → Digestion → Absorption → Assimilation → Egestion.

• This type of nutrition is mainly found in higher organisms including most animals.

Q7. Answer: (b) Contractile proteins

The correct answer is option 2 i.e Contractile proteins

Explanation:

• Muscle contains special proteins called Contractile proteins.

Contractile proteins:

• These are those proteins that mediate the sliding of contractile fibers (contraction) of a cell's cytoskeleton, and of cardiac and skeletal muscle.

• Contractile proteins are arranged into regular strands that account for the typical appearance of the sarcomere.

Additional Information

Lipoprotein:

• It is a heterogeneous particle-containing both lipids and proteins, which allows the transport of lipids through aqueous environments.

Polyethylene glycol protein:

• It is a biologically inert, non-immunogenic chemical that confers greater water solubility to proteins, labeling tags, and crosslinkers with which it is incorporated as a constituent chemical group.

Nucleoprotein:

• It is a conjugated protein consisting of a protein linked to a nucleic acid, either DNA or RNA.

Q8. Answer: (b) Calcination

The correct answer is option 2 i.e Calcination.

Process	Description
Calcination	• It is the process of heating the ore below its melting point absence of air to remove volatile impurities. - It is the process of converting ore into an oxide by heating it strongly. - In calcination, ores are heated strongly in the absence of air(Oxygen) to convert Metal Carbonates into Metal Oxides and Carbon Di Oxide.
Roasting	• It is the process in which the ore is heated below its melting point in the presence of air to oxidise the impurities.
Corrosion	• It is the process that converts a refined metal into a more chemically stable form.

Q9. Answer: (b) The Prime Minister of India

• The Prime Minister of India Narendra Modi inaugurated the first edition of Khelo India School Games (KISG) that was held from 31st January to 8th February 2018 at Indira Gandhi Indoor Stadium in New Delhi.

• The second edition of Khelo India Youth Games was held in Pune.

• Students from colleges and universities competed in the games.

• The Khelo India games are organised by the Ministry of Youth Affairs & Sports.

• 3rd edition of the Khelo India Youth Games will be held at Guwahati from January 18-30, 2020. The Games will see a participation of more than 10,000 athletes and officials. It will be conducted in partnership with IOA, SGFI, and Assam as a host state.

Q10. Answer: (d) 1.7

The correct answer is option 4 i.e 1.7

Resistance:

• It is defined as the measure of the opposition to current flow in an electrical circuit.

• It is measured in ohms.

Let Equivalent Resistance in parallel be R_e

So, 1/R_e =1/R1 + 1/R2 + 1/R3

1/R_e =1/3 + 1/6 + 1/15

1/R_e = 0.5667

R_e = 1.7647

Therefore, Equivalent Resistance in parallel R = 1.7

Q11. Answer: (c) Momentum

CONCEPT:

Linear Momentum:

• The linear momentum of a body is the quantity of motion contained in the body.

• It is measured in terms of the force required to stop the body in unit time.

• It is also measured as the product of the mass of the body and its velocity i.e.,

Momentum = mass × velocity.

EXPLANATION:

• Momentum is the total quantity of motion contained in the same body. Therefore option 3 is correct.

• The pressure is the perpendicular force applied to the surface of objects per unit area. Therefore option 1 is incorrect.

• Force is defined as pushing or pulling of an object, due to which the motion of the body will be changed. It is equal to the product of mass and acceleration. Therefore option 2 is incorrect.

• The inherent property of all the bodies by virtue of which they cannot change their state of rest or uniform motion along a straight line by their own is called inertia. Therefore option 1 is incorrect.

Q12. Answer: (d) Only (2) follows

Drawing Venn diagram according to the given information,

Conclusion 1: Some vitamins are not fruits → False (This is definitely false)

Conclusion 2: Some fruits are vitamins → True (This is definitely true)

Hence, “only conclusion 2” follow.

Q13. Answer: (d) 5 ms^(-1)

CONCEPT:

Momentum:

• The total quantity of motion contained in the same body is called momentum.

• The quantity of motion possessed by a body depends upon the mass and velocity of a body.

• It is the product of the mass and velocity of an object i.e.,

p = m × v

CALCULATION:

Given - mass (m) = 10 kg and momentum (p) = 50 kg ms-1

As we know that momentum (p) is

=> p = m × v

=> v = p/m = 50/10 = 5 ms^(-1)

Q14. Answer: (b) Ravi Shankar

• "My music, My life" is the autobiography of Ravi Shankar.

• In this book, he has described his transformation from a young travelling dancer to a Grammy Award-winning.

• This autobiography includes the history of Indian classical music and a manual on how to play the sitar.

• This book is about music as both a lifestyle and an art.

• Ravi Shankar is the legendary sitarist and composer.

• He is also an honorary member of the American Academy of Arts and Letters and is a member of the United Nations International Rostrum of Composers.

Q15. Answer: (b) Soham

Arranging the given people according to the given information,

Soham is sitting adjacent to Nachiket

Tushar is sitting opposite Pranav and Swapnil is sitting equidistant to Soham and Pranav

Soham is sitting opposite Aniket.

Hence, “soham” is the correct answer.

Q16. Answer: (a) Karnataka

• Karnataka is the leading producer of coarse cereals.

• Coarse cereals are used in food, fodder, fuel, etc.

• Jowar (Sorghum), Bajra (Pearl Millet), Maize, Ragi (Finger Millet) etc are the examples of Coarse cereals, a broad sub-group of several short-duration Kharif crops.

• In India, the coarse cereals are mainly grown in poor agroclimatic regions, particularly rainfed areas of the country.

• These crops are also called dryland crops as they are grown in areas with high temperature and less sensitive to soil deficiencies so can be easily grown in an inferior alluvial or loamy soil.

• Major Export Destinations for Cereal Crops (2018-19): Saudi Arab, United Arab Emirates, Kenya and Nepal.

Q17. Answer: (c) 80 km/h

Shortcut Trick

Total Distance = Length of Train + Length of Bridge

Total Distance = 173 + 727 = 900 m

Speed (m/s) = 900 ÷ 40.5 = 200/9 m/s

Speed (km/h) = (200/9) × (18/5) = 40 × 2 = 80 km/h

Therefore The correct answer is 80 km/h.

Alternate Method

Given:

Length of train (L1) = 173 m

Length of bridge (L2) = 727 m

Time taken (T) = 40.5 seconds

Formula Used:

Speed = Distance ÷ Time

Distance = L1 + L2

Conversion: 1 m/s = 18/5 km/h

Calculations:

=> Total Distance = 173 m + 727 m = 900 m

=> Speed in m/s = 900 ÷ 40.5

=> Speed in m/s = 9000 ÷ 405 = 200/9 m/s

=> Speed in km/h = (200/9) × (18/5)

=> Speed in km/h = (200/5) × (18/9) = 40 × 2

=> Speed in km/h = 80 km/h

Therefore The correct answer is 80 km/h.

Additional Information

Unit Conversion

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

Relative Speed

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

Train crossing objects

When a train crosses a pole or man, distance = Length of train. When it crosses a platform or bridge, distance = Length of train + Length of object.

Q18. Answer: (a) Karnataka

• The leading coffee producer state in India is Karnataka.

• It accounts for nearly 71 per cent of the total production of coffee.

• Chikmagalur, Kodagu and Hassan districts of Karnataka are major coffee producer regions of the state.

• Coffee is also produced in Kerala, Tamil Nadu, Andhra Pradesh and Odisha.

• Coffee can be cultivated on lots of soils but the ideal types are fertile volcanic red earth or deep sandy loam.

Q19. Answer: (b) = P.E.

CONCEPT:

• Law of the Conservation of energy: "Energy can neither be created nor be destroyed. It just gets transfers in one form to another*.*"

• Total energy (TE): The sum of the potential energy (PE) and kinetic energy (KE) is called total energy.

TE = KE + PE

• Potential Energy: The stored energy of a body by the virtue of its position is called potential energy.

• Example: A rock sitting at the edge of a cliff has potential energy.

PE = m g h

Where m is mass, g is the acceleration due to gravity and h is the height

• Kinetic Energy: The energy possessed by the body by virtue of being in motion is called kinetic energy.

KE = 1/2 m V^2 where V is the velocity of the body.

• Example: A ball thrown would have kinetic energy.

EXPLANATION:

• According to the energy conservation principle, the sum of the kinetic energy and potential energy of the body always remains constant.

• As the body comes down the height of the body decreases and hence the potential energy decreases. If the potential energy decreases the kinetic energy will increase.

• As soon as the body touches the ground, all the initial potential energy of the particle gets converted into kinetic energy.

• The potential energy (P.E) of a body at a certain height is 200 J. The kinetic energy possessed by it when it just touches the surface of the earth is the same as the Potential Energy (= P.E.). So the option 2 is correct.

Q20. Answer: (b) Medulla

The correct answer is option 2 i.e Medulla

Spinal Cord:

• The spinal cord originates from Medulla.

• The spinal cord is a long, fragile tube-like structure that begins at the end of the brain stem and continues down almost to the bottom of the spine.

• The spinal cord is made up of nerves which supply information to think about.

• The brain and spinal cord constitute the central nervous system. They receive information from all parts of the body and integrate it.

Q21. Answer: (c) Only conclusion I follows.

Conclusion 1: It is given in the statement that “Increased use of medicines puts down the innate healing sense of the body”.

So, it is true that there is an innate healing sense in the body.

Conclusion 2: Information about use of external medicine is not given in the statement.

So, this doesn’t follow

Hence, “only conclusion 1” follow.

Q22. Answer: (c) Tourism

The correct answer is option 3 i.e Tourism

• Swadesh Darshan Scheme is a scheme of Ministry of Tourism under Government of India.

• The Scheme was launched by the Union Ministry of Tourism in 2014-15.

• The scheme is an integrated development of theme-based tourist circuits for development of tourism infrastructure.

• Under the scheme, 13 thematic circuits have been identified, for development namely: North-East India Circuit, Buddhist Circuit, Himalayan Circuit, Coastal Circuit, Krishna Circuit, Desert Circuit, Tribal Circuit, Eco Circuit, Wildlife Circuit, Rural Circuit, Spiritual Circuit, Ramayana Circuit and Heritage Circuit.

Q23. Answer: (c) Rs. 1,470

Shortcut Trick

Ratio of Sarah : Priya = (6/7) ÷ (3/5) = 10 : 7.

Total ratio parts = 10 + 7 = 17 units.

Value of 17 units = Rs. 3,570 => 1 unit = Rs. 210.

Priya's share = 7 units × 210 = Rs. 1,470.

Therefore The correct answer is Rs. 1,470.

Alternate Method

Given:

3/5 × Sarah (S) = 6/7 × Priya (P)

Total Amount (S + P) = Rs. 3,570

Calculations:

=> S/P = (6/7) × (5/3)

=> S/P = (2 × 5) / 7 = 10/7

=> Let Sarah's amount be 10x and Priya's amount be 7x.

=> 10x + 7x = 3,570

=> 17x = 3,570

=> x = 3,570 ÷ 17 = 210

=> Priya's amount = 7 × 210 = 1,470

Therefore The correct answer is Rs. 1,470.

Additional Information

Ratio and Proportion

If a × A = b × B, then the ratio A : B is given by b : a. This inverse relationship is fundamental in solving partnership and sharing problems.

Unitary Method in Ratios

To find an individual share, divide the total quantity by the sum of the ratio parts and multiply by the specific person's ratio part.

Fraction Comparison

When fractions are involved in equality (m/n of A = x/y of B), always cross-multiply to find the integer ratio of the variables.

Q24. Answer: (b) Intercalary

• Meristem is the region of cells that has the capability of division and causes growth in plants.

• The meristem that is seen at the base of the leaves or internodes on twigs, known as Intercalary meristem.

• It helps in increasing the length of the internode and usually seen in monocotyledonous plants.

• The meristem that seen at the growing tips of stems and roots and increases the length of the stem and the root is known as Apical meristem.

• Lateral meristem is present on the lateral side of the stem and root of a plant. It helps in increasing the thickness of the plants.

Q25. Answer: (c) CHFDRS

The pattern followed is,

Similarly,

Hence, "CHFDRS" is the correct answer.

Q26. Answer: (d) 150°

Shortcut Trick

Sum of internal angles of a pentagon = (5 − 2) × 180° = 540°.

Total ratio parts = 2 + 3 + 4 + 4 + 5 = 18 units.
18 units = 540° → 1 unit = 30°.
Greatest angle = 5 units = 5 × 30° = 150°.
Therefore The correct answer is 150°.
Alternate Method
Given: Ratio of angles = 2 : 3 : 4 : 4 : 5. Shape is a pentagon.
Formula Used: Sum of interior angles of a polygon = (n − 2) × 180°, where n is the number of sides.
=> Let the angles be 2x, 3x, 4x, 4x, and 5x.
=> Sum of angles = 2x + 3x + 4x + 4x + 5x = 18x.
=> For a pentagon (n = 5), Sum = (5 − 2) × 180° = 3 × 180° = 540°.
=> 18x = 540°
=> x = 540° ÷ 18 = 30°.
=> Greatest angle = 5x = 5 × 30° = 150°.
Therefore The correct answer is 150°.
Additional Information
Sum of Exterior Angles
The sum of the exterior angles of any convex polygon is always 360°.
Regular Pentagon
In a regular pentagon, all angles are equal, and each interior angle measures 540° ÷ 5 = 108°.
Polygon Diagonals
The number of diagonals in a polygon with n sides is given by the formula n(n − 3) ÷ 2.

Q27. Answer: (b) Neigh

Cat, Frog and Goat are different kinds of animal species.
Whereas,
Neigh is a unique sound made by a Horse.
Hence, “neigh” is odd one out.

Q28. Answer: (a) Litmus

• Litmus is the most commonly used indicator in laboratories.
• Litmus indicator solution turns red in acidic solutions and blue in alkaline solutions.
• It turns purple in neutral solutions.
• Phenolphthalein is used in acid-base titrations.
• It dissociates in water to form pink anions.
• When phenolphthalein is mixed with an acid, the solution remains clear.
• When phenolphthalein is mixed with an alkali, the concentration of the anions becomes enough for their pink colour to be observable.

Q29. Answer: (a) -13

Shortcut Trick
If a polynomial f(x) is divisible by (x − k), then f(k) = 0.
Substitute x = 3 into the expression $3x^2 + ax + 12$.
$3(3)^2 + a(3) + 12 = 0$
$27 + 3a + 12 = 0$ => $3a = -39$ => $a = -13$.
Therefore The correct answer is -13.
Alternate Method
Given: Polynomial $P(x) = 3x^2 + ax + 12$ is divisible by (x − 3).
Formula Used: According to the Remainder Theorem, if P(x) is divisible by (x − c), then P(c) must be zero.
=> For (x − 3), c = 3.
=> $P(3) = 3(3)^2 + a(3) + 12 = 0$
=> $3(9) + 3a + 12 = 0$
=> $27 + 3a + 12 = 0$
=> $39 + 3a = 0$

=> 3a = −39

=> a = −39 ÷ 3

=> a = −13

Therefore The correct answer is -13.

Additional Information

Factor Theorem

A polynomial f(x) has a factor (x − a) if and only if f(a) = 0. This is a special case of the Remainder Theorem where the remainder is zero.

Quadratic Roots Relation

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

Remainder Theorem

When a polynomial f(x) is divided by (ax − b), the remainder is f(b/a).

Q30. Answer: (a) 100 g

• The law of conservation of mass states that the mass in an isolated system is neither created nor destroyed by chemical reactions.

• According to the law of conservation of mass, the mass of the products in a chemical reaction must equal the mass of the reactants.

• Since, Mercuric Oxide = HgO = 92.6 g + 7.4 g = 100 g.

• The density of Mercury oxide is 11.14 g/cm^3.

• The molar mass is 216.59 g/mol.

• The melting point is 500° C.

Q31. Answer: (c) 440

Shortcut Trick

Identify the highest common factor (HCF) first: 88 and 220 are both multiples of 44.

88 = 44 × 2

220 = 44 × 5

LCM = HCF × remaining factors = 44 × 2 × 5 = 440.

Therefore The correct answer is 440.

Alternate Method

Given: Numbers are 88 and 220.

Formula: LCM × HCF = Product of two numbers

Step 1: Prime Factorization of the numbers:

=> $88 = 2 \times 2 \times 2 \times 11 = 2^3 \times 11^1$

=> $220 = 2 \times 2 \times 5 \times 11 = 2^2 \times 5^1 \times 11^1$

Step 2: LCM is the product of the highest powers of all prime factors involved:

=> $LCM = 2^3 \times 5^1 \times 11^1$

=> LCM = 8 × 5 × 11

=> LCM = 40 × 11 = 440

Therefore The correct answer is 440.

Additional Information

Definition of LCM

The Least Common Multiple (LCM) is the smallest positive integer that is divisible by both numbers without leaving a remainder.

HCF and LCM Relationship

For any two numbers a and b, the property LCM(a, b) × HCF(a, b) = a × b always holds true.

HCF Calculation

The Highest Common Factor (HCF) is the product of the lowest powers of common prime factors. For 88 and 220, HCF = $2^2 \times 11 = 44$.

Q32. Answer: (b) 50 and 70 years

Shortcut Trick

Current ratio = 5 : 7 (Difference = 2) | Ratio 18 years ago = 8 : 13 (Difference = 5).

To equalize differences, multiply (5 : 7) by 5 and (8 : 13) by 2.
New ratios: Current (25 : 35) and Past (16 : 26).
Difference in units = 25 − 16 = 9 units. Given 9 units = 18 years => 1 unit = 2 years.
Current ages = 25 × 2 and 35 × 2 = 50 and 70 years.
Therefore The correct answer is 50 and 70 years.
Alternate Method
Given: Ratio of current ages = 5 : 7 | Ratio 18 years ago = 8 : 13.
Formula Used: Age ratio equation.
=> Let the current ages be 5x and 7x.
=> According to the question: (5x − 18) / (7x − 18) = 8 / 13
=> 13 × (5x − 18) = 8 × (7x − 18)
=> 65x − 234 = 56x − 144
=> 65x − 56x = 234 − 144
=> 9x = 90
=> x = 10
=> Person 1 current age = 5 × 10 = 50 years.
=> Person 2 current age = 7 × 10 = 70 years.
Therefore The correct answer is 50 and 70 years.
Additional Information
Ratio Difference Property
When the same value is added or subtracted from both terms of a ratio, the absolute difference between the ages remains constant over time.
Cross-Multiplication Method
For two ratios a:b and c:d with a change of k, use the formula x = k(d−c) / (ad−bc) to find the multiplier x for the first ratio.
Future/Past Age Calculation
If current age is A, then age after 'n' years = A + n, and age 'n' years ago = A − n.

Q33. Answer: (d) ÷, +, +

Verifying the equation by placing the given options and using BODMAS rule,
→ 1) +, ×, ×
((150 + 2) × 2) × 10 = 87
(152 × 2) × 10 = 87
302 × 2 is not equal to 87
→ 2) +, ÷, ÷
((150 + 2) ÷ 2) ÷ 10 = 87
((152 ÷ 2)) ÷ 10 = 87
76 ÷ 10 is not equal to 87
→ 3) -, ×, ÷
((150 - 2) × 2) ÷ 10 = 87
(148 × 2) ÷ 10 = 87
296 ÷ 10 is not equal to 87
→ 4) ÷, +, +
((150 ÷ 2) + 2) + 10 = 87
(75 + 2) + 10 = 87
77 + 10 = 87
87 = 87
Hence, option 4 is the correct answer.

Q34. Answer: (c) 33

- One of the annual international men's fields hockey tournament is the Sultan Azlan Shah Cup.
- In 2019 Sultan Azlan Shah Cup, India lost to Korea by 4-2 in the shoot-out to finish second best in the big final.
- In 2018, Hockey India named 33 players for a national camp ahead of the Sultan Azlan Shah Cup and Commonwealth Games.

Q35. Answer: (a) Sister

Drawing the family tree,

Q is the sister of P.

Hence, “sister” is the correct answer.

Q36. Answer: (a) YCVGT

The pattern followed is,

Similarly,

Hence, “YCVGT” is the correct answer.

Q37. Answer: (b) 20 H_z

CONCEPT:

• Wave: It can be defined as the transport of energy without the transport of matter.

• The properties of waves are:

• Wavelength (λ): The distance between two crests or troughs of a wave is known as wavelength. One wavelength equals the distance between two consecutive crests.

• Frequency (f): The number of oscillations or the number of waves passes a given point in one sec. Its SI unit is Hertz.

• Time period (T): The time taken by the wave to complete one cycle.

• The relation between velocity, wavelength and frequency and time period of a wave is

=> f = 1/T = v/λ

[where f = frequency, T = time period, v = velocity of wave, λ = wavelenght]

CALCULATION:

Given - Frequency (f) = 0.05 s

• The relationship between time period and frequency is given as:

=> f = 1/T

=> f = 1/0.05= 20 Hz

Q38. Answer: (d) 268

=> 132 × 16 ÷ 23 + 4

=> 132 × 16/8 + 4

=> 132 × 2 + 4

=> 264 + 4

=> 268

Q39. Answer: (c) 168

Shortcut Trick

For a number to be divisible by 4, its last two digits must form a number divisible by 4.

Possible last two digit pairs from {4, 5, 6, 7, 8, 9} are: 48, 56, 64, 68, 76, 84, 96 (Total 7 cases).

Since it is a 5-digit number and no digit is repeated, the remaining 3 places can be filled by the remaining 4 digits in ^4P3 ways.

Calculation: 7 × (4 × 3 × 2) = 7 × 24 = 168.

Therefore The correct answer is 168.

Alternate Method

Given Digits: {4, 5, 6, 7, 8, 9} (Total 6 digits)

Condition: 5-digit number, divisible by 4, no repetition.

Step 1: Identifying pairs for the last two digits

The last two digits must be one of the following to satisfy divisibility by 4:

=> Ending in 4: 64, 84 (2 pairs)

=> Ending in 6: 56, 76, 96 (3 pairs)

=> Ending in 8: 48, 68 (2 pairs)

=> Total pairs = 2 + 3 + 2 = 7 pairs.

Step 2: Filling the remaining positions

Total digits available = 6. After using 2 digits for the last two places, remaining digits = 4.

=> 1^(st) digit can be filled in 4 ways.

=> 2^(nd) digit can be filled in 3 ways.

=> 3^(rd) digit can be filled in 2 ways.

Step 3: Calculating Total n

=> n = 4 × 3 × 2 × 7

=> n = 24 × 7

=> n = 168

Therefore The correct answer is 168.

Additional Information

Divisibility Rule of 4

A number is divisible by 4 if its last two digits are divisible by 4 or if the last two digits are 00.

Permutation Formula

The number of ways to arrange r items out of n distinct items is given by ${}^{n}P_r = n! / (n-r)!$.

Fundamental Principle of Counting

If one event can occur in m ways and a second event can occur in n ways, then the total number of ways the two events can occur in sequence is m × n.

Q40. Answer: (c) [figure]

The mirror image of the given image is,

Hence, option 3 is the correct answer.

Q41. Answer: (d) 10

Given,

From the table,

The number of students passed with 20 as cut-off marks in English = 70

Those passed with 20 as cut-off marks in aggregate = 80

The difference between the number of students passed with 20 as cut-off marks in English and those passed with 20 as cut-off marks in aggregate = (Those passed with 20 as cut-off marks in aggregate - The number of students passed with 20 as cut-off marks in English)

=> (80 – 70) = 10

Q42. Answer: (d) Development Bank focused on Agricultural and Rural Development

- The full form of NABARD is the National Bank for Agriculture and Rural Development.
- NABARD is one type of Development Bank focused on Agricultural and Rural Development.
- NABARD came into existence on 12 July 1982.
- NABARD is now fully owned by the Government of India.
- Shri Shaji K V assumed charge as Chairman of NABARD on 7th December 2022

Q43. Answer: (a) Sama Varma

- The Brihadesvara Temple was designed by the famous architect Sama Varma.
- It is situated at Thanjavur, Tamil Nadu which was also the ancient capital of the Chola kings.
- Rajaraja Chola I constructed the Brihadisvara Temple.
- It is also a World Heritage Site, declared by UNESCO in 1987.

Q44. Answer: (a) zero

CONCEPT:

- Circular Motion: The movement of an object along a circumference of a circle or rotation along a circular path is called circular motion.
- Uniform circular motion: The circular motion in which the speed of the particle remains constant is called uniform circular motion. In a uniform circular motion, force supplies the centripetal acceleration.
- The kinetic energy and the speed of the body remain constant.

If the Force F acts on a body and it gets displaced by a displacement of S, the work done in that case is given by:

Work done (W) = FS Cos θ

- Centripetal Force: It is a force required to move a body uniformly in a circle. This force acts along the radius and towards the center of the circle.

Centripetal Force (F) = fracmv²r

• The centripetal force required for circular motion along the surface of the road, towards the center of the turn. The Static friction between tire and road provides the necessary centripetal force.

CALCULATION:

It is given that,

Mass = 100 gm, radius = r

• Now, here, please note that the movement is uniform circular in motion. The angle between centripetal force and displacement is 90°. The force and displacement are perpendicular to each other

=> cos 90° = 0

Work done (W) = FS Cos 90° = 0 J

• So, no matter what is the mass, radius, or velocity, the work done would be zero.

• Hence, the work done in one complete revolution is Zero Joule. So option 1 is correct.

Q45. Answer: (a) Cannot say

According to the given information,

A > Q,

C > S

Comparison between Object S and Object Q is not possible, because the information is insufficient.

Hence, Conclusion cannot be determined.

Q46. Answer: (d) Smriti Irani

• Smt. Smriti Zubin Irani (Union Minister at Ministry of Women and Child Development and Ministry of Textiles) released the 'India 2018' book.

• It is published by the "Publications Division".

• It is an annual Government publication on its policies and development programmes written in Hindi, English and also available online.

• This book is an exhaustive publication that includes all the aspects of our nation's development from rural to urban. It also contains information about industry, science and technology, human resources development, art and culture, polity, economy, health, defence, education and mass communication.

Q47. Answer: (d) No work is done

The correct answer is option 4 i.e No work is done

Force: It is defined as the push/pull which is required to change the state of the object.

Work: It is the amount of force required to move an object.

Work = Force × Displacement

• If the direction of applied force and direction, in which an object moves, are perpendicular to each other, then the work is done = 0 i.e no work is done.

• Work is done only when a certain force is applied on an object and the object moves a certain distance on the direction of the applied force. Hence work done is zero when the direction is perpendicular.

Q48. Answer: (b) 50 ms^(-1)

The correct answer is 50 ms-1.

Explanation:

In the equation of motion v = u + at, ‘u’ represents the initial velocity of the body under consideration. ‘v’ represents final velocity, ‘a’ represents the acceleration, and ‘t’ represents the total time taken. This is the equation of motion.

=> t = 20 s

=> It is stated that the body comes to rest: V = 0 ms-1

=> v = u + at

=> 0 = u + (-2.5) x 20 [deceleration = - 2.5]

=> u = 50 ms^(-1)

=> The initial velocity = 50 ms-1 as given in the question.

Q49. Answer: (a) Run

Pillow is used when we take rest.

Similarly,

Shoes are used for running.

Hence, “run” is the correct answer.

Q50. Answer: (a) Only conclusion II follows

Conclusion 1: It is not given about the population increase in the future.

Conclusion 2: It is given that there is a huge depletion of resources, So we can conclude that it will be difficult for the government to provide resources.

Hence, Only conclusion II follows

Q51. Answer: (d) 44

Given,

=> 384 ÷ 25 × 3 + 8 = ?

=> (384/32) × 3 + 8 = ?

=> 12 × 3 + 8 = ?

=> 36 + 8 = ?

=> 44

Q52. Answer: (d) 24

The number of triangles in the given figure are,

Hence, “24” is the correct answer.

Q53. Answer: (a) Aldehyde:--------OH

The correct answer is option 1 i.e Aldehyde:--------OH

• The -OH functional group is the hydroxyl group. OH is alcohol consisting of an oxygen atom bonded to a hydrogen atom.

• An amide functional group consists of a carbonyl group bonded to a nitrogen.

• In amides, two hydrogen atoms are bonded to the nitrogen (-CONH2).

• Amines are compounds and functional groups that contain a basic nitrogen atom with a lone pair.

• NH2 belongs to this group.

• Carboxylic acid is a homologous series in which the compounds contain a functional group called the carboxyl group (-COOH).

Q54. Answer: (d) 210

Shortcut Trick

Initial total ratio units = 17 + 25 = 42 units.

The total sum of money remains constant as the money is only transferred between A and B.

Initial ratio: 17 : 25 (Total = 42) | New ratio: 3 : 4 (Total = 7).

Equate totals: New ratio becomes (3 : 4) × 6 = 18 : 24 (Total = 42).

Change in A's share: 18 − 17 = 1 unit. Given 1 unit = Rs. 5.

Total sum = 42 units = 42 × 5 = Rs. 210.

Therefore The correct answer is Rs. 210.

Alternate Method

Given: Initial ratio A : B = 17 : 25. New ratio after transfer of Rs. 5 = 3 : 4.

=> Let the initial amounts be 17x and 25x.

=> According to the question: (17x + 5) / (25x − 5) = 3 / 4

=> 4 × (17x + 5) = 3 × (25x − 5)

=> 68x + 20 = 75x − 15

=> 75x − 68x = 20 + 15

=> 7x = 35

=> x = 5

=> Total sum = 17x + 25x = 42x

=> Total sum = 42 × 5 = 210

Therefore The correct answer is Rs. 210.

Additional Information

Concept of Constant Total

When a value is transferred from one entity to another within a system, the total sum remains unchanged. This property is used to equate ratios by making their sum equal.

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Ratio Scaling

To compare two ratios with a common base, multiply each term of the ratio by a factor such that the sum or the common element aligns across both sets.

Cross Multiplication Method

Used for ratio change problems: (Initial Ratio 1 × Final Ratio 2) − (Initial Ratio 2 × Final Ratio 1) corresponds to the value change effect.

Q55. Answer: (c) K11I9

The pattern followed is,

Hence, “K11I9” is the correct answer.

Q56. Answer: (b) South-West

Drawing the diagram,

The direction is shifted 45° anti - clockwise.

If north – east becomes north, then west would become South – West.

Hence, “south – west” is the correct answer.

Q57. Answer: (d) Hockey

The correct answer is option 4 i.e Hockey

Sultan Azlan Shah Cup:

• The Sultan Azlan Shah Cup is an annual international men's hockey tournament.

• It began in 1983 as a biennial contest.

• The tournament became an annual event after 1998.

2019 Sultan Azlan Shah Cup:

• Host country: Malaysia.

• The 2019 Sultan Azlan Shah Cup was the 28th edition of the Sultan Azlan Shah Cup, which was held in Ipoh, Malaysia.

• South Korea won the tournament for the third time after defeating India.

Q58. Answer: (c) Only argument I is strong

Argument 1: This is strong because speed driving is one of the major causes of road deaths as per statistics.

Argument 2: This is not strong because, speed driving is the cause of accidents.

Hence, “only argument 1” is strong.

Q59. Answer: (b) Rajamouli

The correct answer is option 2 i.e Rajamouli

Baahubali 2:

• The Conclusion is a 2017 Indian epic action film directed by S. S. Rajamouli and written by his father K. V. Vijayendra Prasad.

• He has garnered various honours including 3 National Film Awards, 4 Filmfare Awards South, 5 state Nandi Awards, the IIFA Award, 2 SIIMA Awards, the Star World India, "Entertainer of The Year" in 2012, and the "CNN-News18 Indian of the Year in Entertainment" for 2015.

• In 2016, he was honoured with the Padma Shri for his contributions towards the field of Art.

Q60. Answer: (b) Only I is strong

Argument 1: This is strong because, price control in health care will be helpful for the middle-class people

Argument 2: This is not strong because, price control does not mean that there will be losses for health care organisations.

Q61. Answer: (c) 6√64

The solution is in Hindi. Read it online.

Q62. Answer: (a) [figure]

India is a country.

Telangana is a state in India.

And,

Hyderabad is the capital of Telangana.

Telangana is a state in India.

The correct Venn diagram representation is,

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Hence, option 1 is the correct answer.

Q63. Answer: (d) Square

Shortcut Trick

For any regular polygon, the number of lines of symmetry is always equal to the number of its sides (n).

A Square is a regular quadrilateral because all its sides are equal and all its angles are 90°.

=> Number of sides in a square = 4

=> Number of lines of symmetry = 4

Therefore The correct answer is Square.

Alternate Method

Given: Four types of quadrilaterals: Rhombus, Rectangle, Parallelogram, and Square.

A line of symmetry is an imaginary line that passes through the center of a shape and divides it into two identical halves that are mirror images of each other.

Analyzing each option:

=> Parallelogram: Generally has 0 lines of symmetry.

=> Rectangle: Has 2 lines of symmetry (lines joining the midpoints of opposite sides).

=> Rhombus: Has 2 lines of symmetry (the two diagonals).

=> Square: Has 4 lines of symmetry (2 lines joining midpoints of opposite sides + 2 diagonals).

Therefore The correct answer is Square.

Additional Information

Symmetry in Regular Polygons

An equilateral triangle has 3 lines, a square has 4, a regular pentagon has 5, and a regular hexagon has 6 lines of symmetry.

Rotational Symmetry

A square has rotational symmetry of order 4, meaning it looks the same at 90°, 180°, 270°, and 360° rotations.

Circle Symmetry

A circle is the most symmetrical shape, possessing an infinite number of lines of symmetry passing through its center.

Q64. Answer: (d) 15

Shortcut Trick

Net work done in 1 hour = 1/10 − 1/14 = 4/140 = 1/35 of the wall.

Work done in 7 hours = 7 × (1/35) = 1/5 of the wall.

Remaining work = 1 − 1/5 = 4/5 of the wall.

Time for builder to finish remaining work = (4/5) × 10 = 8 hours.

Total time = 7 + 8 = 15 hours.

Therefore The correct answer is 15 hours.

Alternate Method

Given: Builder time = 10 hours, Destroyer time = 14 hours. Combined work for 7 hours.

Person	Days	Total Work	Efficiency
Builder (+)	10	70	7
Destroyer (−)	14	−5	

=> Net efficiency when both work = 7 − 5 = 2 units/hour.

=> Work completed in 7 hours = 7 × 2 = 14 units.

=> Remaining work = 70 − 14 = 56 units.

=> Time taken by Builder alone to finish = 56 ÷ 7 = 8 hours.

=> Total time = Initial 7 hours + 8 hours = 15 hours.

Therefore The correct answer is 15 hours.

Additional Information

Negative Work Concept

In problems involving destroyers or leakages, the efficiency is taken as negative because they undo the work being done.

Pipes and Cisterns Analogy

This problem is identical to an inlet pipe (builder) and an outlet pipe (destroyer) filling a tank.

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Efficiency Formula

Total Work = Efficiency × Time. If work is constant, Efficiency is inversely proportional to Time.

Q65. Answer: (a) Number of electrons

The correct answer is option 1 i.e Number of electrons.

• The total number of electrons present in an atom represents the atomic number of a particular atom.

• The number of electrons = number of protons.

• Atomic Number = Number of Protons = Number of Electrons.

• The atomic number uniquely identifies a chemical element.

Atomic number is most preferably counted on the number of protons, Since no such option is available we can go with the best possible option.

i.e. the number of electrons in a neutral atom.

Q66. Answer: (c) Yarn

Wall is constructed with the help of bricks.

Similarly,

Fabric is made of yarn.

Hence, “yarn” is the correct answer.

Q67. Answer: (c) Anandiben Patel

The correct answer is option 3 i.e Anandiben Patel.

• Anandiben Patel was elected as the Madhya Pradesh Governor in January 2018.

• She is the current Governor of Uttar Pradesh and former Chief Minister of Gujarat.

• She was the first woman Chief Minister of Gujarat.

• This is the first time that UP got a woman Governor since it’s inception in 1950. Sarojini Naidu was the first Governor in 1947 but of the United Provinces.

• Lalji Tandon is the 22nd and current Governor of Madhya Pradesh.

Additional Information

• Madhya Pradesh:

• Number of Districts - 52.

• Lok Sabha seats - 29.

• Rajya Sabha seats - 11.

Dams - Bansagar Dam (Sone river), Bheemgarh dam (Wainganga river), Gandhi Sagar Dam (Chambal River), Indira Sagar Dam (Narmada River) and Omkareshwar Dam (Narmada River).

• Registered GI: Chanderi Fabric, Leather Toys of Indore, Bell Metal Ware of Datia and Tikamgarh, Ratlami Sev.

• Governor: Mangubhai C. Patel (2022)

Q68. Answer: (a) 3,456 cones

Shortcut Trick

Number of cones = Volume of Sphere ÷ Volume of one Cone

Number = [4/3 × π × R^3] ÷ [1/3 × π × r^2h]

Number = [4 × 36 × 36 × 36] ÷ [3 × 3 × 6] = 4 × 12 × 12 × 6

Number = 48 × 72 = 3456

Therefore The correct answer is 3,456 cones.

Alternate Method

Given:

Diameter of Spherical ball = 72 cm => Radius (R) = 36 cm

Diameter of Cone = 6 cm => Radius (r) = 3 cm

Height of Cone (h) = 6 cm

Formula Used:

Volume of Sphere = 4/3 × π × R^3

Volume of Cone = 1/3 × π × r^2h

Calculations:

=> Let the number of cones be n.

=> n × (1/3 × π × r²h) = 4/3 × π × R³

=> n × (1/3 × π × 3 × 3 × 6) = 4/3 × π × 36 × 36 × 36

=> n × (3 × 3 × 6) = 4 × 36 × 36 × 36

=> n = (4 × 36 × 36 × 36) ÷ (3 × 3 × 6)

=> n = 4 × 12 × 12 × 6

=> n = 3456

Therefore The correct answer is 3,456 cones.

Additional Information

Volume Invariance

When one solid is melted and recast into another, the total volume remains constant. Volume before melting = Volume after recasting.

Surface Area of Sphere

The total surface area of a solid sphere is given by the formula $4\pi R^2$.

Slant Height of Cone

The slant height (l) of a cone is calculated using the Pythagorean theorem: $l = \sqrt{(r^2 + h^2)}$.

Q69. Answer: (c) North-East

Drawing diagram according to the given information,

Hence, North - East is the correct answer.

Q70. Answer: (c) 165 cm³

Shortcut Trick

When a rectangle is rotated along its length, it forms a cylinder where the width becomes the radius.

Rotation Angle = 150°. Total Angle = 360°.

Volume = (Angle/360°) × πr²h

Volume = (150/360) × (22/7) × 3 × 3 × 14 = 5/12 × 22 × 18 = 165 cm³.

Therefore The correct answer is 165 cm³.

Alternate Method

Given: Length (h) = 14 cm, Width (r) = 3 cm, Rotation Angle (θ) = 150°.

Formula Used: Volume of partial cylinder = (θ/360°) × πr²h

=> Volume = (150/360) × (22/7) × (3)² × 14

=> Volume = (5/12) × (22/7) × 9 × 14

=> Volume = (5/12) × 22 × 9 × 2

=> Volume = (5/12) × 396

=> Volume = 5 × 33 = 165 cm³

Therefore The correct answer is 165 cm³.

Additional Information

Volume of Cylinder

A full rotation (360°) of a rectangle around its side results in a cylinder with Volume = πr²h.

Sectoral Volume

For any rotation less than 360°, the volume is proportional to the angle: V = (Actual Angle / 360°) × Total Volume.

Axis of Rotation

If rotated along length, radius = width and height = length. If rotated along width, radius = length and height = width.

Q71. Answer: (a) CHERISH

ABHORRED, DESPISE, LOATHE are synonyms to each other, but CHERISH is a antonym.

Hence, CHERISH is the odd one out.

Note: For this question, discrepancy is found in question/answer. So, This, question is ignored for all candidates.

Q72. Answer: (d) Virtual

- The image formed by controlled rays of reflection that we get by extending the rays backward is Virtual.
- The convex mirror always forms a virtual image, erect and a smaller image.

Additional Information

Real and Virtual Image

Real Image	Virtual Image
The image is formed by the real intersection of light.	The image is formed by the virtual intersection of Light.
The image formed is usually inverted.	The image formed is usually erect and laterally inverted.
The image can be obtained on the screen.	The image cannot be obtained on the screen
Examples are images formed by a concave mirror and convex lens at certain positions of the image	Examples are images formed by plane mirrors, simple magnifying glass, concave lenses, and convex mirrors.

Q73. Answer: (b) 14.5

Shortcut Trick

Marks of student who left = 29 − (24 × 0.5) = 17

Marks of student who joined = 28.8 − (24 × 0.7) = 12

Average marks = (17 + 12) ÷ 2 = 14.5

Therefore The correct answer is 14.5.

Alternate Method

Given:

Initial students = 25 | Initial Average = 29

Remaining students = 24 | New Average = 29.5

Final students = 25 | Final Average = 28.8

Formula Used:

Total Sum = Average × Total Number of Students

Calculations:

=> Total marks of 25 students = 25 × 29 = 725

=> Total marks after 1 student leaves (24 students) = 24 × 29.5 = 708

=> Marks of the student who left (L) = 725 − 708 = 17

=> Total marks after another student joins (25 students) = 25 × 28.8 = 720

=> Marks of the student who joined (J) = 720 − 708 = 12

=> Average of L and J = (17 + 12) ÷ 2

=> Average = 29 ÷ 2 = 14.5

Therefore The correct answer is 14.5.

Additional Information

Average Calculation

The average is defined as the sum of all observations divided by the total number of observations. Average = ∑x ÷ n.

Inclusion/Exclusion Rule

When a person joins, New Member = New Average + (Old Count × Change in Average). When a person leaves, Left Member = Old Average − (New Count × Change in Average).

Net Deviation Method

In any group, the sum of deviations from the average is always zero. This property is used to find missing values when the average changes.

Q74. Answer: (b) Straight line

The correct answer is option 2 i.e Straight Line

• The magnitude of the displacement from the initial position to the final position is a straight line.

• Displacement: It is the distance between an object's initial position and its final position.

• It is usually measured or defined along a straight line.

• Displacement is a vector quantity and thus has both magnitude and direction.

• The magnitude of displacement is equal to the linear distance between initial and final positions along the straight line joining two positions i.e. the shortest distance between initial and final positions.

• This value may or may not be equal to the distance along the actual path of motion.

Q75. Answer: (c) Same sex marriages

The correct answer is option 3 i.e Same-sex marriages

• Section 377 of the Indian Penal Code (IPC) is an act that criminalises homosexuality and was introduced in the year 1861 during the British rule of India.

• Section 377 refers to 'unnatural offences' and says whoever voluntarily has carnal intercourse against the order of nature with any man, woman or animal, shall be punished with imprisonment for life, or with imprisonment of either description for a term which may extend to 10 years, and shall also be liable to pay a fine.

Why in news:

• The Supreme Court of India on September 6, 2018, decriminalised Section 377 of the IPC and allowed gay sex among consenting adults in private.

• The SC ruled that consensual adult gay sex is not a crime affirming that sexual orientation is natural and people have no voluntary control over it.

Q76. Answer: (b) 182

Shortcut Trick

Let Total Capacity = LCM(35, 40) = 280 units.

Efficiency: A = +8, B = −7. Combined (A−B) = +1.

Time to fill 3/5th (168 units) together = 168 ÷ 1 = 168 hours.

Time to fill remaining 2/5th (112 units) by A alone = 112 ÷ 8 = 14 hours.

Total Time = 168 + 14 = 182 hours.

Therefore The correct answer is 182 hours.

Alternate Method

Pipe	Time (hrs)	Total Work	Efficiency
Inlet A	35	280	+8
Outlet B	40	−7	

Given: Pipe A fills in 35 hours, Pipe B empties in 40 hours.

Step 1: Calculate partial volume to be filled by both pipes.

=> 3/5 of 280 = 168 units.

Step 2: Calculate time taken by A and B together for 168 units.

=> Net efficiency = 8 − 7 = 1 unit/hr.=> Time1 = 168 ÷ 1 = 168 hours.

Step 3: Calculate remaining volume to be filled by A alone.

=> Remaining = 280 − 168 = 112 units.=> Time2 = 112 ÷ 8 = 14 hours.

Step 4: Total time calculation.

=> Total Time = 168 + 14 = 182 hours.

Therefore The correct answer is 182 hours.

Additional Information

Inlet and Outlet Pipes

Inlet pipe efficiency is taken as positive (+), while outlet/leak pipe efficiency is taken as negative (−).

Net Work Rate

When pipes operate together, the net efficiency is the algebraic sum of individual efficiencies: Net E = E_A + E_B.

Time Calculation

Time taken to complete a specific portion of work = (Portion of Total Work) ÷ (Combined Efficiency of active pipes).

Q77. Answer: (d) Both 1 and 2 are not sufficient

Concept:

Multiplication of matrices:

• The number of columns of the 1st matrix must equal the number of rows of the 2nd matrix.

• The result will have the same number of rows as the 1st matrix, and the same number of columns as the 2nd matrix.

• To multiply an m × n matrix by an n × p matrix, the n must be the same, and the result is an m × p matrix.

Calculation:

From statement 1:

AB = A

We cannot find anything from this statement.

From statement 2:

A = [*20c n 9; 2 1], B = [*20c 1 0; 0 1]

We cannot find anything from this statement.

Combining statement 1 and 2:

AB = [*20c (n× 1+9×0) (n×0+9×1); (2×1+1×0) (2×0+1×1)]

AB = [*20c n 9; 2 1]

Also, A = [*20c n 9; 2 1]

Therefore We cannot find the value of n from both statements together.

Q78. Answer: (a) 7.2

Shortcut Trick

Total Work = LCM(9, 15) = 45 units.

Efficiency of (A + B) = 45 ÷ 9 = 5 units/day; Efficiency of A = 45 ÷ 15 = 3 units/day.

Efficiency of B = 5 − 3 = 2 units/day.

In the last 3 days, A worked alone: 3 × 3 = 9 units. Remaining work for (A + B) = 45 − 9 = 36 units.

Days they worked together = 36 ÷ 5 = 7.2 days.

Therefore The correct answer is 7.2 days.

Alternate Method

Given: (A + B) completes work in 9 days, A alone in 15 days. B leaves 3 days before completion.

Person	Days	Total Work	Efficiency
A + B	9	45	5
A	15	3	

=> Efficiency of B = Efficiency of (A + B) − Efficiency of A

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

=> Let the total time taken to complete the work be 'x' days.

=> A worked for x days and B worked for (x − 3) days.

=> Work done by A + Work done by B = Total Work

=> (3 × x) + (2 × (x − 3)) = 45

=> 3x + 2x − 6 = 45

=> 5x = 51 => x = 10.2 days

=> Days A and B worked together = x − 3 = 10.2 − 3 = 7.2 days

Therefore The correct answer is 7.2 days.

Additional Information

Efficiency Concept

Efficiency is inversely proportional to the time taken. If a person completes work in D days, efficiency = 1/D.

Leaving Before Completion

When a person leaves 'n' days before completion, add their 'n' days of work to the total work and divide by total efficiency.

Work and Wages

Wages are distributed in the ratio of the actual work done by each person or their efficiency ratio if they work for the same duration.

Q79. Answer: (b) 50

The pattern followed is,

98 ÷ 35 = 2.8

Similarly,

140 ÷ 2.8 = 50

Hence, “50” is the correct answer.

Q80. Answer: (c) 2015-16

From the Table,

In 2015-2016

Percentage in 2015-2016 year = (92, 96 ,97, 95)

In this year pass percentage in all the schools is more than 80.

Therefore The academic year in which all the schools have pass percentage as more than 80 is 2015-2016.

Q81. Answer: (b) Gitanjali

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

• Rabindra Nath Tagore received Nobel prize for Literature in 1913 for his book Gitanjali.

• He was the first Indian to receive the Nobel prize.

• Alfred B. Nobel, the Swedish chemist, and engineer who invented dynamite established the Nobel Prizes. These are awarded annually in six areas i.e peace, literature, physics, chemistry, physiology or medicine, and economic science.

Indians who won the Nobel prize:

Name	Field
C. V. Raman	Physics
Har Gobind Khorana	Medicine/Physiology
Mother Teresa	Peace
Subrahmanyan Chandrasekhar	Physics
Amartya Sen	Economics
Venkatraman Ramakrishnan	Chemistry
Kailash Satyarthi	Peace
Abhijit Banerjee	Economic

Winners of 2019 Nobel prize:

Winners	Field
i) Peter Handke	Literature
i) Akira Yoshino ii) M. Stanley Whittingham iii) John. B Goodenough	Chemistry
I) Jim Peebles ii) Didier Queloz iii) Michel Mayor	Physics
i) Michael Kremer ii) Abhijit Banerjee iii) Esther Duflo	Economics
i) Abiy Ahmed	Peace

Q82. Answer: (d) Burma

The correct answer is option 4 i.e Burma

• Bahadur Shah, the last Mughal Emperor was exiled to Burma (Rangoon) for fear of another rebellion against the British army.

• The revolt of 1857 started from Meerut on 10th May 1857 and reached Delhi with the slogan "Maro Firangi Ko".

• On 11th May 1857, the soldiers captured Delhi and announced Bahadur Shah Zafar as their leader and he was named as "Shahenshah-i-Hindustan".

• British Army within a month again captured Delhi and Bahadur Shah Zafar was deported to Burma jail.

Q83. Answer: (b) Chetan Bhagat

The correct answer is Option 2.

Key Points

• "One Indian Girl" is written by Chetan Bhagat.

• This book was released in 2016.

Some famous books written by authors are:

Author	Books
Chetan Bhagat	Five Point Someone, Two States, What Young India Wants

Amit Chaudhuri	Friend of my Youth, Odysseus Abroad
Vikram Chandra	Sacred Games, Red Earth, and Pouring
Vikram Seth	Two Lives, The Golden Gate

Q84. Answer: (d) North

According to given information:

They turned towards north after entering the restaurant.

Hence, North is the correct answer.

Q85. Answer: (d) 228

Shortcut Trick

Numbers are 76 and 57. Both are multiples of 19.

76 = 19 × 4 and 57 = 19 × 3.

LCM = 19 × 4 × 3 = 19 × 12 = 228.

Therefore The correct answer is 228.

Alternate Method

Given: Numbers 76 and 57.

Formula Used: LCM × HCF = Product of two numbers.

Calculations:

=> Prime factorization of 76: $2 \times 2 \times 19 = 2^2 \times 19^1$

=> Prime factorization of 57: $3 \times 19 = 3^1 \times 19^1$

=> LCM = Product of highest powers of all prime factors involved.

=> LCM = $2^2 \times 3^1 \times 19^1$

=> LCM = 4 × 3 × 19

=> LCM = 12 × 19 = 228

Therefore The correct answer is 228.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is divisible by both 'a' and 'b'.

HCF (Highest Common Factor)

The largest positive integer that divides each of the integers without leaving a remainder.

Relation Formula

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

Q86. Answer: (a) East

Drawing the diagram,

The direction is shifted 45° clockwise.

If north will become north-east, north east will become east.

Hence, “east” is the correct answer.

Q87. Answer: (c) Mechanical Camera

The correct answer is option 3 i.e Mechanical Camera

• Integrated Circuit or IC: It is an Electronic Component made up of a combination of transistors, diode, resistor, capacitors in a tiny semiconductor chip.

• Integrated Circuit Electronic Components are of small size and very lightweight.

• They produce excellent results at low power.

• Integrated circuits can be found in almost every electronic device like Computers, Television, Mobile Phones, laptops, Microwaves etc.

• One of the major applications in computing.

Q88. Answer: (c) 11

The number of squares in the given figure are,

Hence, “11” is the correct answer.

Q89. Answer: (c) Atomic Mass Unit

The correct answer is option 3 i.e Atomic Mass Unit.

• Atomic Mass Unit is the full form of "amu".

• One Atomic Mass Unit: It is defined as the mass equal to one-twelfth the mass of one carbon- 12 atom.

• And 1 amu = 1.66056 × 10^(-24) g

Mass of an atom of hydrogen = 1.6736 × 10^(-24) g

Thus, in terms of amu, the mass of hydrogen atom = (1.6736 × 10^(-24)) / (1.66056 × 10^(-24)) = 1.0078 amu

Q90. Answer: (c) Ca (OH)2+ Cl2 = CaOCl2 + H2O

The correct answer is option 3 i.e Ca (OH)2+ Cl2 = CaOCl2 + H2O

• The Chlorine which is produced on passing electricity through brine solution further reacts with slaked lime [Ca(OH)2] to produce bleaching powder.

• The reaction is as given below:

Ca (OH)2 + Cl2 = CaOCl2 + H2O

• Bleaching powder is also known as Calcium Oxychloride (CaOCl2).

Uses of Bleaching powder:

• It is used to bleach washed clothes in the industry.

• Used as a disinfectant.

• Used as an oxidizing agent in many chemical industries.

Q91. Answer: (a) Rajiv Mehrishi

Option 1 is correct

• Rajiv Mehrishi is the present Comptroller and Auditor General of India.

• He was appointed as the 13th CAG of India on 25th September 2017.

• Comptroller and Auditor General of India is described in Article 148 of the Indian Constitution.

• Shashikanth Sharma was the former CAG of India appointed in July 2014.

• Mukul Rohatgi was the 14th Attorney General of India appointed from June 19, 2014, to June 18, 2017.

Some important Officeholders of India in the present

Departments	CEO/Chairman
NITI Aayog	Suman Bery (vice-chairman)
National Highway Authority of India	Sukhbir Singh Sandhu (chairman)
UIDAI	Pankaj Kumar

Additional Information

• The former Lt. Governor of UT of Jammu Kashmir G. C. Murmu is the current CAG of India. (2022)

Q92. Answer: (d) Morarji Desai

The correct answer is option 4 i.e Morarji Desai

• Morarji Desai Government appointed the Second Backward Classes Commission under the chairmanship of B P Mandal in the year 1979 to investigate the conditions of the educationally and socially backward classes.

• The commission submitted its report in 1980.

• The commission recommended the 27% reservation for jobs.

• V P Singh Government declared reservation of 27% government jobs for the OBCs after 10 years.

Q93. Answer: (c) 2019

Shortcut Trick

According to the Remainder Theorem, when a polynomial f(a) is divided by (a − 1), the remainder is f(1).

Given polynomial: f(a) = 1 + a + a^2 + a^3 + … + a^(2018)

Substitute a = 1: Remainder = 1 + 1 + 1^2 + 1^3 + … + 1^(2018)

Number of terms = 2018 (from a^1 to a^(2018)) + 1 (the first term '1') = 2019.

Remainder = 1 × 2019 = 2019.

Therefore The correct answer is 2019.
Alternate Method
Given: Expression = 1 + a + a^2 + a^3 + … + a^(2018), Divisor = a − 1
Formula Used: Sum of Geometric Progression (GP) $S_n = a(r^n - 1) / (r - 1)$
=> In the given series: First term (A) = 1, Common ratio (r) = a, Number of terms (n) = 2019
=> Sum = 1(a^(2019) − 1) / (a − 1)
=> Let f(a) = (a^(2019) − 1) / (a − 1)
=> To find the remainder when divided by (a − 1), we look at the polynomial structure.
=> Alternatively, applying Remainder Theorem directly to the sum f(a):
=> f(a) = 1 + a^1 + a^2 + ... + a^(2018)
=> Remainder = f(1)
=> Remainder = 1 + (1) + $(1)^2$ + ... + (1)^(2018)
=> Remainder = 1 + 1 + 1 + ... (2019 times)
=> Remainder = 2019
Therefore The correct answer is 2019.
Additional Information
Remainder Theorem
If a polynomial p(x) is divided by (x − k), then the remainder is equal to p(k).
Factor Theorem
If p(k) = 0 for a polynomial p(x), then (x − k) is a factor of that polynomial.
Sum of GP Series
For a series 1 + r + r^2 + ... + r^(n−1), the sum is given by $(r^n - 1)/(r - 1)$.

Q94. Answer: (c) 1/2

Shortcut Trick
Rewrite the equation: 8^x = 4 × x^x → (8/x)^x = 4.
Apply the Substitution Method using the provided options.
Test x = 1/2: (8 ÷ 1/2)^(1/2) = (16)^(1/2).
√16 = 4, which matches the RHS.
Since the condition is satisfied, x = 1/2 is the correct value.
Therefore The correct answer is 1/2.
Alternate Method
Given:
8^x = 4 ÷ x^(−x)
Formula Used:
Negative Exponent: a^(−n) = $1/a^n$
Power of a Quotient: $(a/b)^n = a^n ÷ b^n$
Calculation:
=> 8^x = 4 ÷ (1 ÷ x^x)
=> 8^x = 4 × x^x
=> 8^x ÷ x^x = 4
=> (8 ÷ x)^x = 4
=> Let x = 1/2:
=> (8 ÷ 1/2)^(1/2) = (16)^(1/2)
=> √16 = 4
=> 4 = 4 (LHS = RHS)
Therefore The correct answer is 1/2.
Additional Information
Laws of Exponents
For any non-zero base, the negative exponent law states that a^(−n) = $1/a^n$, which flips the base to its reciprocal.
Fractional Exponents
An exponent in the form of 1/n represents the n-th root of the base, such as a^(1/2) = √a and a^(1/3) = ∛a.

Same Exponent Property

If two different bases have the same exponent, they can be combined under a single bracket: a^x × b^x = (a × b)^x and a^x ÷ b^x = (a ÷ b)^x.

Q95. Answer: (a) Right to Property

The correct answer is option 1 i.e Right to Property

• Right to Property is not a Fundamental Right provided in the Indian Constitution.

• Right to Property was removed from the Fundamental Rights in 1978 under the 44th Constitutional Amendment Act and it was placed in the new Article 300A as an ordinary legal right.

Some important articles of the Indian Constitution.

Fundamental Rights	Articles associated with them
Right to Equality before the law	Article 14
Right to Freedom	Article 19 - Article 22
Right to Education	Article 21 A
Right against Exploitation	Article 23 - Article 24
Right to Freedom of Religion	Article 25 - Article 28

Q96. Answer: (a) Only A is true, B and C are false

The correct answer is Only A is true, B and C are false.

Key Points

• Water can exist in three states of matter as solid, liquid, and gas.

Solid water:

• When water freezes, its molecules move farther apart, making ice less dense than water.

• Hence, ice is lighter than the same volume of water, and so ice will float in water. Water freezes at 0°C, 32° F.

• Ice, snow, and frost are examples of water in the solid-state. Liquid water freezes at 0 degrees Celsius.

• Celsius is a scale that measures temperature.

• It is possible to solidify water without allowing it to crystallize.

• This has been demonstrated in laboratory conditions decades ago, using metal plates chilled with dry ice or liquid nitrogen and slamming them together to trap a falling water drop between.

Liquid water:

• It is the most familiar form of water which we use in drinking, bathing, washing clothes, etc.

• Clouds, snow, and rain are all made up of some form of water. A cloud is comprised of tiny water droplets and/or ice crystals, a snowflake is an aggregate of many ice crystals, and rain is just liquid water.

• The equation for the formation of liquid water is: $2H_2(g)+O_2(g) \rightarrow 2H_2O(l)$ 2 H 2 (g) + O 2 (g) → 2 H 2 O (l).

Gaseous water:

• Water vapors and steam are the gaseous forms of liquid.

• Steam is formed at 100°C, 212°F.

• Water existing as gas is called water vapor.

• When referring to the amount of moisture in the air, we are actually referring to the amount of water vapor.

Q97. Answer: (a) 17

The triangles in the given figure are

Hence, “17” is the correct answer.

Q98. Answer: (d) 14/15

Shortcut Trick

Multiply the result by the reciprocal of the fraction.

Number = 2/3 × 7/5

Number = (2 × 7) / (3 × 5) = 14/15

Therefore The correct answer is 14/15.

Alternate Method

Given:

Fraction of the number = 5/7

Resulting value = 2/3

Calculations:

Let the unknown number be x.

=> (5/7) × x = 2/3

=> x = (2/3) ÷ (5/7)

=> x = (2/3) × (7/5)

=> x = 14/15

Therefore The correct answer is 14/15.

Additional Information

Reciprocal of a Fraction

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

Fraction Multiplication

Multiply numerators together and denominators together: (a/b) × (c/d) = (a × c) / (b × d).

Product of Means and Extremes

In an equation like a/b = c/x, cross-multiplication gives a × x = b × c.

Q99. Answer: (c) 78

The pattern followed is,

Hence,"78" isthe correct answer.

Q100. Answer: (a) Three

The correct answer is option 1 i.e Three

Key Points

The three parallel ranges of Himalayas are:

Himadri (Great or Inner Himalayas)

• It is the most continuous range with an average height of 6000 meters.

• It remains covered with snow throughout the year.

Himachal (Lesser Himalayas)

• It lies to the south of Himadri.

• The average height of these mountains is between 3,700 to 4,500 meters.

• Famous ranges are: Pir Panjal range, Dhaula Dhar and Mahabharat ranges.

• Famous valleys like Kangra, Kullu, and Kashmir are situated in this valley.

Shivalik (Outer Himalayas)

• These are outermost ranges of Himalayas and have an average height between 900 to 1100 meters.

• These ranges are mainly composed of unconsolidated rock material, so these ranges are prone to earthquakes and landslides.

• The longitudinal valleys lying between lesser Himalayas and Shiwaliks are called 'Duns' like Dehra Dun, Kotli Dun, and Patlin Dun, etc.

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