RRC Group D Previous Year Paper 31 (Held On: 1 Oct 2018 Shift 2)

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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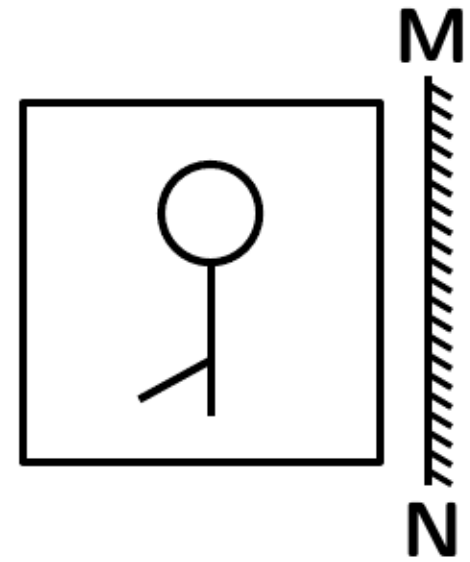
Q1. The constitution of India was framed by a Constitution Assembly set up under the _____ of 1946.

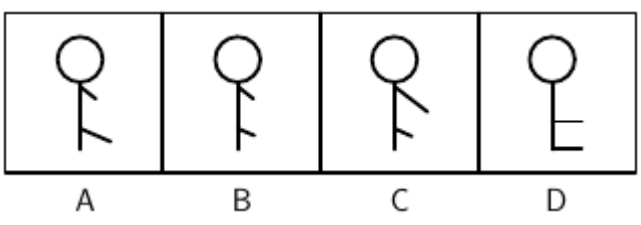
(a) Cabinet Mission Plan
(b) Cabinet Missionary Plan
(c) Cabinet Ministry Plan
(d) Cabinet Ministers Plan

Q2. The classification of elements by which of the following leads to the discovery of new elements?

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

Q3. Find the mirror image of the given figure:





(a) C
(b) D

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(c) B
(d) A

Q4. If an agent does a work W in time t, then power is given by:
(a) Time/work
(b) Time × work
(c) Time - work
(d) Work/time

Q5. In a code language, KEEN in written as PVVM. What is the code of PEAL?
(a) KVZP
(b) KVZO
(c) KVZN
(d) KVZM

Q6. The angle between the incident ray and the reflected ray is 80°. Then what will be the value of the incident angle?
(a) 40°
(b) 90°
(c) 60°
(d) 80°

Q7. Which country has won the 27th Sultan Azlan Shah cup?
(a) Australia
(b) Pakistan
(c) Newzealand
(d) England

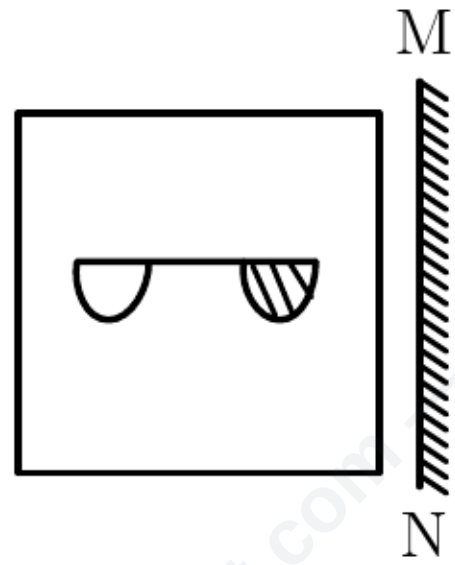
Q8. When an object is moving with a uniform velocity, what is its acceleration?
(a) Non-uniform
(b) Negative
(c) Positive
(d) Zero

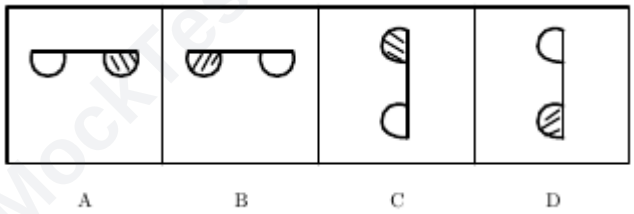
Q9. Which of the following statements is/are true/false about the speed of sound in different media at 25° C?
A. In oxygen gas, the speed of sound is 316 m/min.
B. In water (distilled), the speed of sound is 1498 m/min.
(a) Only B is true
(b) Only A is true
(c) Neither A nor B are true
(d) Both A and B are true

Q10. An object of mass 100 kg is accelerated uniformly from a velocity of 5 ms^(-1) to 15 ms^(-1) in 5 s. Find the magnitude of force exerted on the object.
(a) 200 J
(b) 200 Kg
(c) 200 Pa
(d) 200 N

Q11. Find the mirror image of the given figure if the mirror is placed at line MN:

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

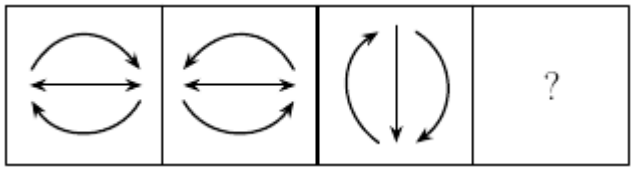
Q12. Pipe A can fill an empty cistern in 4.5 hours. Whereas along with Pipe B, it can fill it in 2.25 hours. If only Pipe A is turned on for half an hour after which Pipe B is also turned on, how long will it take in all to fill the cistern?

(a) 2 hours 30 minutes
(b) 2 hours
(c) 2 hours 20 minutes
(d) 2 hours 15 minutes

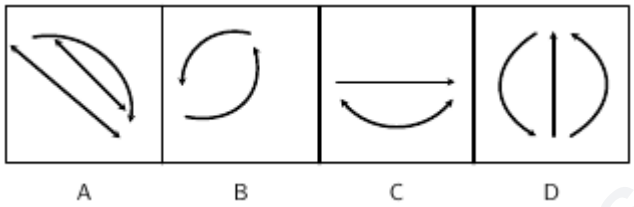
Q13. In the 14th edition of the Mumbai International Film Festival held in 2016, the famous wildlife filmmaker Naresh Bedi was awarded 'V. Shantaram Award under which of the following category?

(a) Best filmmaker
(b) Best short film maker
(c) Life time achievement
(d) Best director

Q14. Choose the correct picture that will fit in the blank space in the following series.



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

Q15. The maximum age for joining National Pension Scheme is _____.

(a) 58
(b) 62
(c) 65
(d) 70

Q16. One solution contains 21 grams of salt in 320 ml of water. Find the concentration of the solution in terms of mass according mass-percentage relation?

(a) 6.15%
(b) 13.05%
(c) 8.84%
(d) 12.57%

Q17. _____ is the common name for Ascaris.

(a) Tape worm
(b) Earthworm
(c) Pinworms
(d) Round worm

Q18. If $a + 1/a = - \sqrt{(3,)}$ find the value of $a^3 + 1/(a^3)$

(a) 0
(b) $-6\sqrt{3}$
(c) $-3\sqrt{3}$
(d) $6\sqrt{3}$

Q19. Each question given below consists of a statement, followed by two arguments numbered I and II. You have to decide which of the argument a 'strong' argument?

Statement:

Should table etiquettes be a part of kindergarten curriculum?

Arguments:

I. Yes, enforcing good etiquette gives children a sense of responsibility.

II. No, etiquettes are meant only for adults not for children

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

Q20. According to the 2017 Global Hunger Index (GHI) Report, India's rank is _____ out of 119 countries.

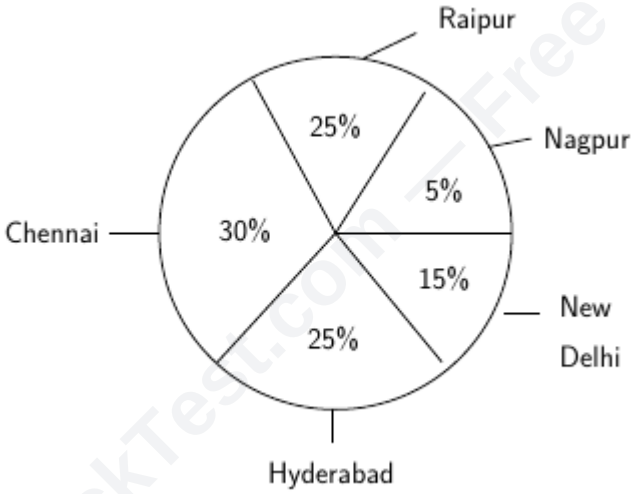
(a) 80
(b) 120
(c) 100
(d) 30

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Q21. 0.295 + 2.95 + 29.5 + 295 = ?

(a) 327.745
(b) 327.746
(c) 327.756
(d) 327.856

Q22. The data below shows the consumption of rice for different states in India for the year 2012



If total rice consumption for the year 2012 is 2 lakh tonnes, then how much rice was consumed by Nagpur?

(a) 20,000 tons
(b) 10,000 tons
(c) 1,0,0000 tons
(d) 50,000 tons

Q23. Pritam's only sister's father's name is Raj. What is the relation of Raj with Pritam's mother?

(a) Cousin
(b) Father
(c) Husband
(d) Friend

Q24. Which of the following substance is used in solar panel?

(a) Gold
(b) Silicon
(c) Copper
(d) Silver

Q25. If $\text{cosec}\theta + \cot\theta = 2.5$, then $\text{cosec}\theta$ = ?

(a) 1.45
(b) 1.35
(c) 1.50
(d) 1.55

Q26. The first Uranium mine of India, the Jaduguda mines, is located in _____.

(a) Rajasthan
(b) Jharkhand
(c) Bihar
(d) Assam

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Q27. Read the following information carefully and answer the question that's given below.

A medical representative plans to visit each of six hospitals A, B, C, D, E and F exactly once during the course of one day. He is setting up his schedule for the day according to the following conditions;

i) He must visit B before D.

ii) He must visit A before B and E

iii) The third hospital he visit must be C

Which of the following must be true of the medical representative's schedule?

(a) He visits A before D
(b) He visits C before A
(c) He visit B before E
(d) He visits D before E

Q28. What day would it be on 21^(st) March 2020?

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

Q29. The kinetic energy of an object of mass m, which moving with a velocity of 5 ms^(-1), is 25 J. What will be its kinetic energy when its velocity is doubled?

(a) 50 N
(b) 100 J
(c) 50 J
(d) 100 N

Q30. Find the next one for the series given below:

Q – 10, O – 12, M – 14, ?

(a) P – 11
(b) I – 18
(c) N – 13
(d) K – 16

Q31. Find the least number which should be multiplied to 63368 to make it a perfect square.

(a) 1
(b) 8
(c) 4
(d) 2

Q32. The height of a right triangular prism is 21 cm and the ratio of the sides of its base is 8 : 15 : 17. If the total area of the three lateral surfaces is 840 cm^2, then what is the volume of the prism in cubic centimetre?

(a) 1300
(b) 1200
(c) 1269
(d) 1260

Q33. _____ was the capital of Pandya dynasty.

(a) Dwarasamudra
(b) Gaya
(c) Kanchipuram
(d) Madurai

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Q34. 1.008 = ?

(a) 12/25
(b) 11/125
(c) 12/125
(d) 13/25

Q35. A toy purchased for Rs. 1125 was sold at a loss of 16%. The selling price of the toy was

(a) Rs. 975
(b) Rs. 945
(c) Rs. 960
(d) Rs. 955

Q36. Two arguments have been given after one statement you have two decide which argument is strong with respect to the given statement.

Statement:

Should North Korea build atomic bomb?

Argument:

I. Yes, It is necessary for the security of the nation.

II. No, It will spoil the zonal balance there.

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

Q37. Who was awarded the Padma-Vibhushan for outstanding contribution in the field of art and music in 2018?

(a) S. P. Balasubramanian
(b) Shankar Mahadevan
(c) A. R. Rahman
(d) Ilaiyaraaja

Q38. 396 - 39.6 - 3.96 - 0.396 = ?

(a) 352.144
(b) 352.044
(c) 352.134
(d) 352.034

Q39. Who among the following was awarded the Padma Shri Award for 2018 in the field of literature and education? He belongs to Maharashtra.

(a) Shri Manas Bihari Verma
(b) Shri Baba Yogendra
(c) Mr. Panatavane Gangadhar Vithobaji
(d) Mr. Vikram Chandra

Q40. Find the odd one out.

(a) Lion
(b) Cheetah
(c) Ostrich
(d) Elephant

Q41. The points scored by 12 persons are as follows

6, 17, 8, 9, 16, 10, 15, 21, 9, 11, 12 and 16

Find the median.

(a) 11.5
(b) 10.4

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(c) 11.6
(d) 12

Q42. A person has divided a total of Rs. 3,70,000 into three parts and deposited them in three banks offering simple interests of 4%, 5% and 6% respectively. At the end of 1^(st) year the interests received from all three banks are the same. How much has he deposited in those three banks?

(a) Rs. 1,50,000, Rs. 1,20,000 Rs. 1,00,000
(b) Rs. 1,00,000, Rs. 2,00,000, Rs. 70,000
(c) Rs. 70,000, Rs. 2,00,000, Rs. 1,50,000
(d) Rs. 1,20,000, Rs. 1,00,000, Rs. 1,50,000

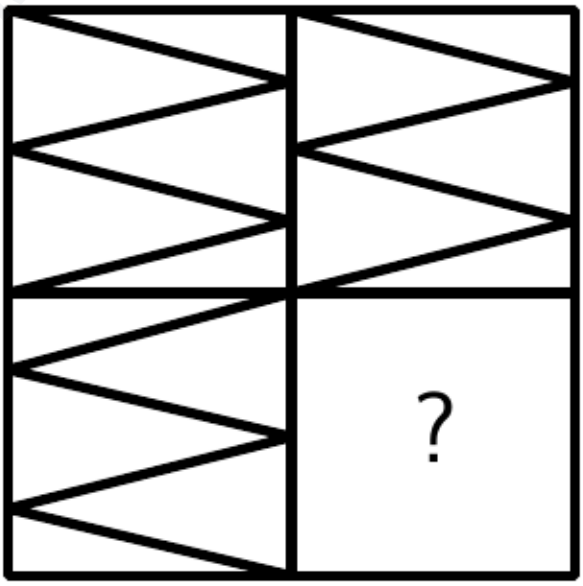
Q43. Nanital lake is situated in the state of _____.

(a) Assam
(b) Himachal Pradesh
(c) Uttarakhand
(d) Uttar Pradesh

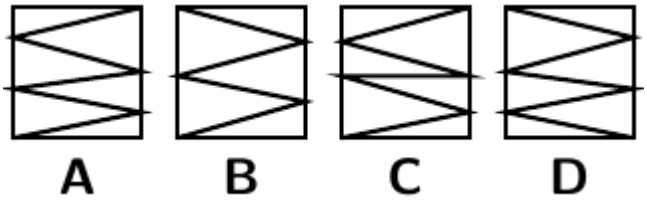
Q44. Who was conferred with the 2017 Hridaynath Mangeshkar Award?

(a) Asha Bhosle
(b) Lata Mangeshkar
(c) Javed Akhtar
(d) Meena Khadikar

Q45.



Choose the correct picture that replaces the (?) symbol above with the below given options:



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

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Q46. The reciprocal of a negative rational number _____.

(a) is a zero
(b) can be either a positive or a negative rational number
(c) is a negative rational number
(d) is a positive rational number

Q47. You are given a question and two statements.Identify of the statements is/are sufficient to answer the question.

Question:

Find the total number of cubes in a bag

Statement:

1) The box contains some blue, yellow and white cubes.

2) The number of blue cubes is twice that of yellow cubes and number of white cubes is 12

(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

Q48. PM Narendra Modi launched the UDAN scheme on 25^(th) April 2017 with a flight between _____ and New Delhi at subsidised rates.

(a) Mumbai
(b) Kashmir
(c) Shimla
(d) Srinagar

Q49. If $8\sec^2 x - 7\tan^2 x = 11$ and $0^0 \leq x \leq 90^0$, then x = ?

(a) 30^0
(b) 45^0
(c) 60^0
(d) 90^0

Q50. Which is the most malleable metal?

(a) Copper
(b) Aluminium
(c) Silver
(d) Gold

Q51. Element X forms an oxide with the formula X2O3. The element X would most likely be in the same group of the periodic table as _____.

(a) magnesium
(b) silicon
(c) aluminium
(d) sodium

Q52. Select the option that has the same relation to the third word as the second word to the first word.

Leg : Dance ? Tail

(a) Wag
(b) Rotate
(c) Balance
(d) Swing

Q53. In a system, if west becomes north-west, then what will north become?

(a) South
(b) North-east
(c) East

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(d) North - west

Q54. Mathura's brother's only sister's mother is Shalaka. How is Mathura related to Shalaka?

(a) Daughter
(b) Aunt
(c) Grandmother
(d) Cousin

Q55. Two inlet pipes, one of which is twice the efficiency of the other. There is also a third outlet pipe which can empty the fully filled tank in 10 hours. When all three pipes are open simultaneously, it takes 2.5 hours to fill the tank completely. How many hours will it take to fill the tank alone with a low efficiency pipe?

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

Q56. If + means ×, × means -, ÷ means + and – means ÷ find the value of : 180 – 20 ÷ 12 + 24 × 5 + 22

(a) 180
(b) 187
(c) 190
(d) 185

Q57. Read the following statements and the conclusions that follow. Decide which of the two conclusions follow from the given statements.

Statements:

All years are dates.

No date is day

Conclusions:

1. Some years are days.

2. No day is a date

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

Q58. Which of the following types of reproduction involves only one parent?

(a) Asexual reproduction
(b) Fragmentation
(c) Binary fission
(d) Sexual reproduction

Q59. ABCDEFGHIJKLMNOPQRSTUVWXYZ

If the alphabets are reversed then the 5^(th) letter to the left of 9^(th) letter from right is?

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

Q60. When seen through a mirror, a clock shows 8:30 as the time. The correct time is _____.

(a) 4:30
(b) 1:30
(c) 7:30
(d) 3:30

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Q61. Two arguments have been given after one statement you have two decide which argument is strong with respect to the given statement.

Statement:

Should there be stray dogs in the colonies?

Arguments:

I. Yes, they are free and non-violent. Sometimes when their population increases, municipality catches them.

II. No, it is proven that they are dangerous.

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

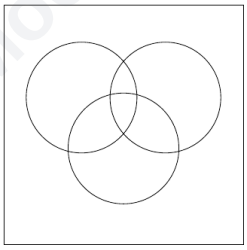
Q62. Who among the following won the 2017 Australian Super Series (Badminton)?

(a) Chen Long
(b) Lin Dan
(c) Srikanth Kidambi
(d) B Sai Praneeth

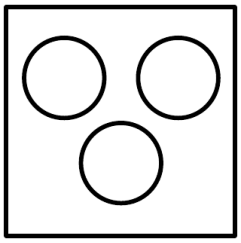
Q63. Choose the correct venn diagram

Books, Toys, Utensil

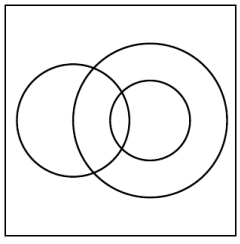
(a)



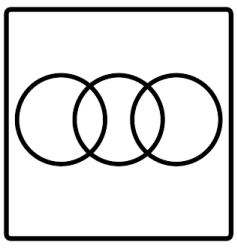
(b)



(c)



(d)

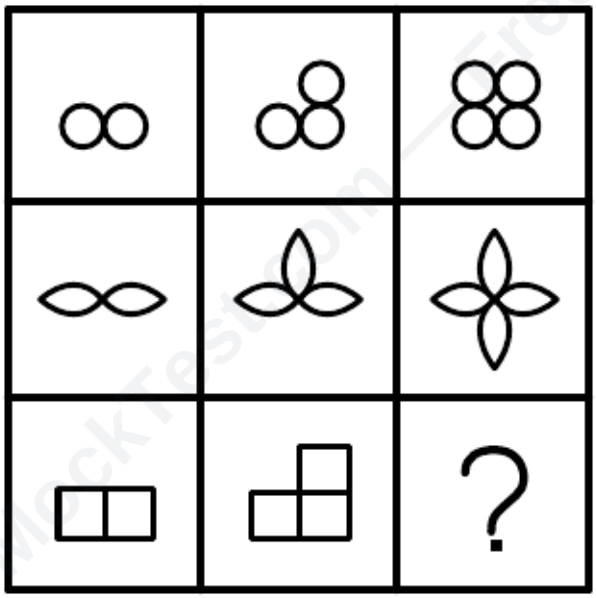


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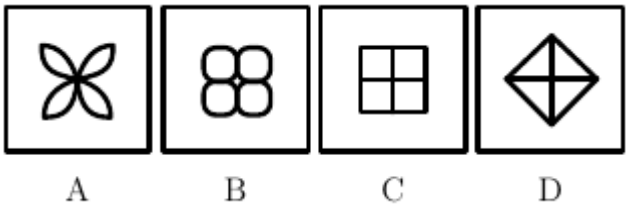
Q64. Arun spends 2/13 th of his salary on the education of his children, Tarun and Varun. He spends Rs. 13,006 on Varun's education, which is 2/3 rd of his total expenditure on education. What is Arun's total salary?

(a) Rs. 84,539
(b) Rs. 126,808.50
(c) Rs. 134,278.50
(d) Rs. 102,346

Q65.

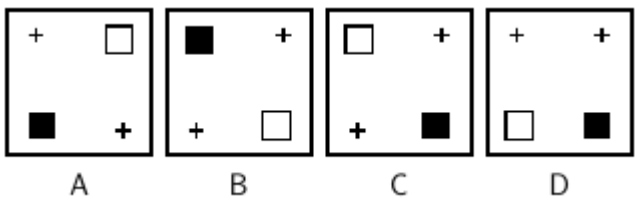


Choose the correct picture that fit the blank place



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

Q66. Out of the four option figures, three are similar in a certain manner. However, one figure is NOT like the other three select the figure which is different from the rest.



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

Q67. Intercalary meristems are found _____.

(a) At the growing tips of stems
(b) At the tips of the leaves
(c) At the growing tips of roots
(d) At the base of the leaves

Q68. Inclusive of a profit of 17% Spoorti sold a pair of footwear for Rs. 2,223. What was the cost price of the pair of shoes?

(a) Rs. 1,900
(b) Rs. 1,870
(c) Rs. 1,880
(d) Rs. 1,905

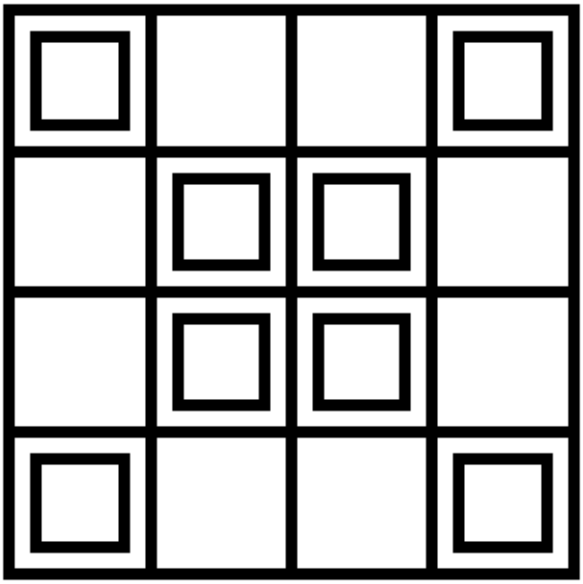
Q69. Which of the following is NOT an example of chemical change?

(a) Changing of water to water vapour
(b) Digestion of food in our body
(c) Rusting of iron
(d) Milk changing to curd

Q70. Electronic configuration of hydrogen resembles that of _____.

(a) Halogens
(b) Alkali metals
(c) Alkaline earth metals
(d) Inert gases

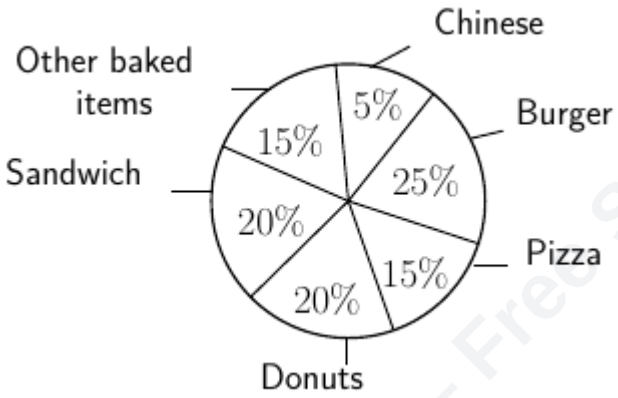
Q71. Count the number of squares in the figure:



(a) 38
(b) 40
(c) 36
(d) 42

Q72. The following pie diagram shows the information on the sales of different types of food items by restaurant XYZ.

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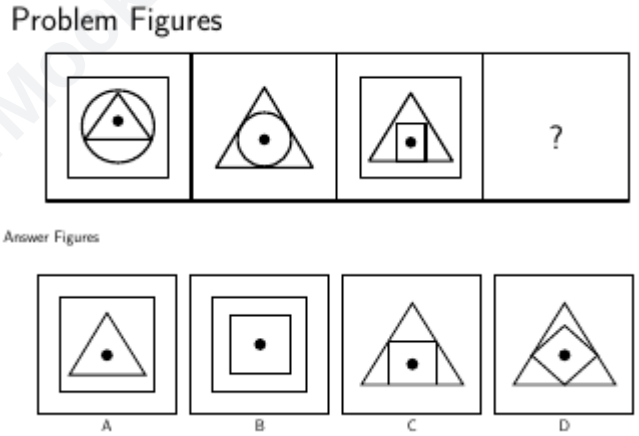


The total revenue made by the restaurant in Nov 2017 was 35 lakh.

How much revenue was made by the restaurant XYZ on the sale of all other baked items in Nov 2017?

(a) 5.25 lakh
(b) 5 lakh
(c) 2 lakh
(d) 2.75 lakh

Q73. Find the next figure for the given series:



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

Q74. An object is thrown vertically upward and it reaches a maximum height 'h' from the ground During its flight, on reaching 3/4 of height 'h', the object will acquire:

(a) Less P.E and more K.E
(b) same P.E and K.E
(c) more P.E and less K.E.
(d) only K.E

Q75. An unfertilised human egg contains _____.

(a) XY chromosome
(b) One Y chromosome
(c) One X chromosome
(d) XX chromosome

Q76. Pressure = _____.

(a) Thrust × Area
(b) Area/Thrust
(c) Thrust/Area

(d) Area + Thrust

Q77. Choose which one is NOT true for base?

(a) Turns blue litmus red
(b) Turns red litmus blue
(c) Furnishes OH^- in aqueous medium/molten state
(d) Bitter in taste

Q78. The LPG Panchayat, organized by the Ministry of Petroleum and Natural Gas under the Pradhan Mantri Ujjawala Yojana was hosted by _____.

(a) Manohar Parikar
(b) Narendra Modi
(c) Manmohan Singh
(d) Ram Nath Kovind

Q79. Fill the blank number in the series from given options:

6, 18, 54, 162,?

(a) 486
(b) 490
(c) 485
(d) 400

Q80. Minena and Mashuka work together to complete a task in 9 days. Mashuka starts working alone and quits on completion of 2/5 of the work. Minena then completes the task alone. In this way, it takes 19.5 days to complete. If Mashuka works faster than Minena, how many days will Minena take to complete the task alone?

(a) 25.5
(b) 22.5
(c) 25
(d) 24

Q81. Presently, scientists are talking of _____ states of matter.

(a) 5
(b) 3
(c) 2
(d) 4

Q82. Which of the following organizations was founded by Rabindranath Tagore?

(a) Viswa Bharti
(b) Rabindra School
(c) Sevagram Vidyalaya
(d) Gyandham Vidyalaya

Q83. Which among the following ranked 5^(th) on the list of 'Top 10 Landmarks' in the world by TripAdvisor Travellers' Choice Awards?

(a) Qutub Minar
(b) Red Fort
(c) Gol Gumbaz
(d) Taj Mahal

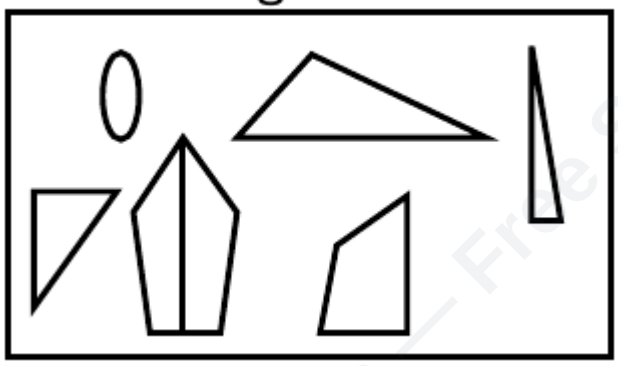
Q84. The following are red vascular connective tissue:

(a) Red blood cells
(b) Blood
(c) White blood cells
(d) Plasma

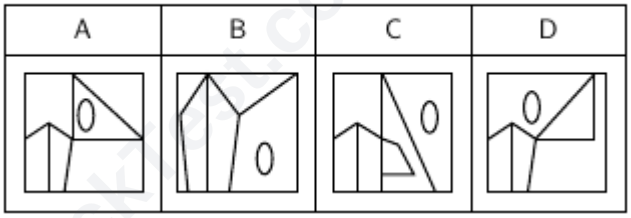
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Q85. Which of the answer figures is formed from the shapes given the problem figure?

Problem Figure:



Answer Figures



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

Q86. What happens if you fill a glass completely with water and ice and the ice completely melts?

(a) Water level will remain the same
(b) All ice will sit at the bottom
(c) Water level will decrease with ice melting
(d) Water will flow out

Q87. On which of the following principles does a rocket in space work?

(a) Principle of Conservation of Mass
(b) Principle of Conservation of Speed
(c) Principle of Conservation of Momentum
(d) Principle of Conservation of Energy

Q88. Simplify: ((1 - 1)/10)((1 - 1)/11)((1 - 1)/12) - ((1 - 1)/99)((1 - 1)/100) = ?

(a) 9/100
(b) 9999/10000
(c) 1/10000
(d) 0

Q89. A sum of Rs. 2,000 invested at 9.25% simple interest per annum for 4 years will yield an interest of.

(a) Rs. 1,110
(b) Rs. 925
(c) Rs. 555
(d) Rs. 740

Q90. _____ was NOT a part of the proposed draft of the 'National Water Framework Bill of 2016'?

(a) Aachman Yukt Dhara
(b) Aviral Dhara
(c) Nirmal Dhara

(d) Swachh Kinara

Q91. The group of seven students took an exam. After the examination, another student joined the group. By including the marks of the new student, the average marks of the group increased to 2. How many more marks did this student get compared to the average marks of the initial seven students?

(a) 18
(b) 14
(c) 20
(d) 16

Q92. The potential difference between the terminals of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is increased to 165 V?

(a) 12 A
(b) 24 A
(c) 10 A
(d) 11 A

Q93. A train crosses a 155-m-long platform in 16 seconds and a 195-m-long platform in 18 seconds. The speed of the train is:

(a) 66 km/h
(b) 75 km/h
(c) 69 km/h
(d) 72 km/h

Q94. A can do work in 6 days. B takes 8 days to complete the work. C takes the time equal to the time taken by A and B to work together to complete that task. If B and C work together, how much time will they take to complete the work?

(a) 13/5 days
(b) 14/5 days
(c) 12/5 days
(d) 11/5 days

Q95. Name the cricketer who holds the record for scoring the quickest 8,000 runs in one-day international cricket as of 15-Jun-2017.

(a) Virat Kohli
(b) MS Dhoni
(c) R Ashwin
(d) Shikhar Dhawan

Q96. Mass/Volume = ?

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

Q97. Each side of the square park is 25 m. And there are 2.2, m wide two paths passing its center. What is the total cost of laying gravel on the paths at a cost of 1 Rs/dm²?

(a) Rs. 105.16
(b) Rs. 110
(c) Rs. 11,000
(d) Rs. 10,516

Q98. Simplify: $(3.6 + 6.4)(3.6 – 6.4) – (3.6 – 6.4)^2$ = ?

(a) 29.6
(b) 32.6
(c) 32.68
(d) -35.84

Q99. Which city is the second capital of Himachal Pradesh?

(a) Kullu
(b) Manali
(c) Mandi
(d) Dharamshala

Q100. Two arguments have been given after one statement you have to decide which argument is strong with respect to the given statement.

Statement:

The rural poor farmers should be subsidized on fertilizers.

Argument:

I. Yes, This improves the income of food donor of the nation.

II. No, It is a waste of public Money.

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

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (a) Cabinet Mission Plan

The correct answer is option 1 i.e Cabinet Mission Plan.

• The constitution of India was framed by a Constitution Assembly set up under the Cabinet Mission Plan of 1946.

• The Cabinet Mission came to India to discuss the transfer of power from the British Government to the Indian leadership with a view to preserving the peace and democracy of India.

• The Cabinet Mission Plan was a declaration issued by the Cabinet Mission and the Viceroy, Lord Wavell, on May 16, 1946, which included recommendations on India 's constitutional future after the inability of Indian political parties and members to find an agreement.

• The Cabinet Mission members were: Lord Pethick-Lawrence, President of the Board of Trade, Secretary of State for India, Sir Stafford Cripps and A.V. Alexander, First Lord of Admiralty.

• In September 1945, the newly elected Labor Government in Britain announced its intention to set up a Constituent Assembly for India to establish the Constitution of India; the Cabinet Mission was sent to India in March 1946 to do so.

Q2. Answer: (a) Mendeleev

The correct answer is option 1 i.e Mendeleev.

• Dimitri Mendeleev is actually known as the "father of the periodic table". We have our current periodic table due to his classification efforts.

• Mendeleev began his research in the 1800s when chemists learned about only 63 elements.

• Mendeleev first noticed the chemical properties of all 63 elements.
• Dobereiner's attempt to identify the elements is usually seen as the first recorded attempt.
• He defined and grouped elements with similar properties into three groups.

Q3. Answer: (d) A

The mirror image of the given figure is,

Hence, option 4 is the correct answer.

Q4. Answer: (d) Work/time

The correct answer is option 4 i.e Work/time.

• If an agent does a work W in time t, then power is given by Work/time.
• Power is the amount of transmitted or converted energy per unit time.
• The unit of power in the International System of Units is the watt, equivalent to one joule per second. Power is sometimes termed activity in older works.
• It is a scalar quantity.
• The dimension of power is $L^2MT^{(-3)}$.
• 1 horsepower = 746 watts.

Q5. Answer: (b) KVZO

The pattern followed is,

Similarly,

Hence, “KVZO” is the correct answer.

Q6. Answer: (a) 40°

The correct answer is option 1, i.e. 40°.

According to the law of reflection when a ray of light reflects off a surface than the angle of incidence is equal to the angle of reflection.

• Now, Angle of incidence(i) = Angle of reflection(v)
• According to the question, Angle between the incident ray and reflected ray is 80°.
• From the diagram, i + v = 80°
• So, 2i = 80°
• Then, the incident angle = 40°

Q7. Answer: (a) Australia

The correct answer is option 1 i.e Australia.

• Australia has won the 27th Sultan Azlan Shah Cup.
• The 2018 Sultan Azlan Shah Cup was Sultan Azlan Shah Cup's 27th Edition.
• It was held March 3-10, 2018 in Ipoh, Perak, Malaysia.
• In this year's cup, the number of teams was the same as last year 's competition where six teams competed.
• Australia clinched its 10th tournament title after defeating England 2–1 in the final match.
• Gonzalo Peillat was the top goalscorer of this tournament.
• India got the 5th position in this tournament.

Q8. Answer: (d) Zero

The correct answer is option 4 i.e Zero.

CONCEPT:

• Velocity (v): The rate of change of displacement is called velocity.
• Uniform velocity: The motion in which a body is moving with a constant velocity (no acceleration) is called uniform velocity motion.
• Acceleration (a): The 'Rate of velocity change is called acceleration.
• When velocity either increases or decreases over time or changes its direction, acceleration is produced which is positive if it increases and negative if it decreases, and this also depends on the direction of reference that we have taken positively.
• Therefore, as in this case velocity is constant, its direction and magnitude are constant. There is no acceleration there.

$a = (v2 - v1)/(t2 - t1)$

If the change in time is infinitesimally small then we have the differential operator representation:

Acceleration (a) = dv/dt

=> dv = change in velocity

=> dt = change in time

EXPLANATION:

Now at constant velocity: zero acceleration

• When an object is moving with a uniform velocity, its acceleration is Zero. So option 4 is correct.

Q9. Answer: (c) Neither A nor B are true

The correct option is Neither A nor B are true

Concept:

• Speed of Sound in a Medium: The speed of sound depends on the properties of the medium through which it travels its temperature and elasticity.

• The Sound wave is a type of longitudinal mechanical wave which propagates only through a medium by vibrating the molecules of its particle.

• Solid having molecules compact together. So usually, the speed of sound is more in Solids compared to liquids and more in liquid than gases.

Explanation:

Speed of sound in different media at 25 ºC		
State	Medium	Speed of sound (m/s)
Solid	Solids Aluminium	6420
Nickel	6040	
Steel	5960	
Iron	5950	
Brass	4700	
Glass (Flint)	3980	
liquid	Liquids Water (Sea)	1531
Water (distilled)	1498	
Ethanol 1207	1207	
Methanol	1103	
gas	Gases Hydrogen	1284
Helium	965	
Air	346	
Oxygen	316	
Sulfur dioxide	213	

https://ncert.nic.in/ncerts/l/iesc112.pdf

• Sound speed is the distance a sound wave travels per unit of time, as it propagates across an elastic medium.

• Here we see the unit is m/s (meter per second) and NOT in m/min (meter per minute)

Therefore both the statement are false.

Q10. Answer: (d) 200 N

CONCEPT:

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

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

There are three equations of motion:

V = u + at

$V^2 = u^2 + 2aS$

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

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

CALCULATION:

Given that:

mass of the object (m) = 100 kg.

Time taken (t) = 5 sec.

=> Initial velocity = 5 m/s.

=> Final velocity = 15 m/s.

Use V = u + at

15 = 5 + a × 5

So a = 2 m/s^2

Force = m a = 100 × 2 = 200 N

Q11. Answer: (b) B

The mirror image of the given figure if the mirror is placed at line MN is,

Hence, option 2 is the correct answer.

Q12. Answer: (a) 2 hours 30 minutes

Shortcut Trick

Efficiency of Pipe A = 1/4.5 = 1/4.5 per hour.

Combined Efficiency (A + B) = 1/2.25 = 2/4.5 per hour.

Efficiency of Pipe B = (A + B) − A = 2/4.5 − 1/4.5 = 1/4.5 per hour.

Work done by Pipe A in 0.5 hr = 0.5 × (1/4.5) = 1/9. Remaining work = 8/9.

Time taken by (A + B) for remaining work = (8/9) ÷ (2/4.5) = (8/9) × (4.5/2) = 2 hours.

Total time = 0.5 + 2 = 2.5 hours = 2 hr 30 min.

Therefore The correct answer is 2 hr 30 min.

Alternate Method

Person	Days	Total Work	Efficiency
Pipe A	4.5 hr	4.5 units	1 unit/hr
Pipe A + B	2.25 hr	2 units/hr	

=> Efficiency of B = Efficiency of (A + B) − Efficiency of A = 2 − 1 = 1 unit/hr.

=> Work done by Pipe A in first 0.5 hour = 1 unit/hr × 0.5 hr = 0.5 units.

=> Remaining Work = 4.5 − 0.5 = 4 units.

=> Time for (A + B) to complete Remaining Work = 4 units ÷ 2 units/hr = 2 hours.

=> Total Time taken = Initial 0.5 hr + Subsequent 2 hr = 2.5 hours.

=> 2.5 hours = 2 hours + 0.5 × 60 min = 2 hr 30 min.

Therefore The correct answer is 2 hr 30 min.

Additional Information

Pipes and Cisterns Efficiency

If an inlet pipe fills a tank in X hours, its efficiency is 1/X per hour. Outlet pipes have negative efficiency.

Total Work Formula

Total Work = Efficiency × Time. In cistern problems, the volume of the tank represents the Total Work.

Partial Work Execution

Remaining Work = Total Work − Work already completed. Time taken for remaining part = Remaining Work ÷ Combined Efficiency.

Q13. Answer: (c) Life time achievement

The correct answer is option 3 i.e Lifetime achievement.

• In the 14th edition of the 2016 Mumbai International Festival, veteran wildlife filmmaker Naresh Bedi was awarded the V Shantaram Life Time Achievement Award.

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• He has been honored for his outstanding contributions to wildlife filmmaking and is recognized for filming many moments of rare wildlife.

• Bedi's film 'Cherub of the Mist' based on the life of two red pandas was the opening film of this edition of MIFF.

• Bedi is the first Asian to receive the Wildscreen Panda Award award and the first Indian to receive a British Academy Film Award nomination.

• The Lifetime Achievement Award was instituted in memory of veteran filmmaker V Shantaram, who previously headed the Films division.

Q14. Answer: (c) D

The pattern followed is,

The arrow in the straight line is pointing towards different directions.

In the first image it is pointing towards west, in the second one towards east, in the third one towards south and in the fourth image it must point towards north.

The figure which will come next in the pattern is,

Hence, option 3 is the correct answer.

Q15. Answer: (d) 70

The correct answer is 70 years.

Key Points

• The maximum age for joining the National Pension Scheme is 70 years.

• Subscribers who join NPS after age 70 will have the option of exiting normally from NPS after 3 years.

• This initiative would allow a broader segment of society, particularly senior citizens, to reap NPS benefits and prepare their daily income.

• The entire corpus will be paid to the candidate in case of unfortunate death of the subscriber during his stay in NPS.

Q16. Answer: (a) 6.15%

Shortcut Trick

Mass of Solute (salt) = 21 g

Mass of Solvent (water) = 320 g (since density of water ≈ 1 g/ml)

Mass of Solution = 21 + 320 = 341 g

Concentration % = (21 ÷ 341) × 100 ≈ 6.15%

Therefore The correct answer is 6.15%.

Alternate Method

Given:

Mass of Salt (solute) = 21 g

Volume of Water (solvent) = 320 ml

Density of water = 1 g/ml => Mass of water = 320 g

Formula Used:

Mass percentage = [Mass of solute ÷ (Mass of solute + Mass of solvent)] × 100

Calculations:

=> Total mass of solution = Mass of salt + Mass of water

=> Total mass = 21 g + 320 g = 341 g

=> Concentration = (21 ÷ 341) × 100

=> Concentration = 2100 ÷ 341

=> Concentration ≈ 6.1583...

Therefore The correct answer is 6.15%.

Additional Information

Mass by Volume Percentage

It is defined as the mass of solute dissolved in 100 ml of solution. Formula: (Mass of solute ÷ Volume of solution) × 100.

Saturated Solution

A solution in which no more solute can be dissolved at a specific temperature is called a saturated solution.

Solubility

The amount of solute present in the saturated solution at a given temperature is called its solubility.

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Q17. Answer: (d) Round worm

The correct answer is Option 4 i.e Roundworm.

• Roundworm is the common name for Ascaris.

• Ascaris is a genus of parasitic nematode worms known as the "small intestinal roundworms," a kind of parasitic worm.

• One species, Ascaris lumbricoides, affects humans and causes ascariasis to the disease.

• Ascaris lumbricoides is the "large roundworm" of humans, growing up to 35 cm (14 in.) in length.

Worms	Common Name
Tapeworm	Cestoda
Earthworm	Lumbricus Terrestris
Pinworms	Enterobiasis

Q18. Answer: (a) 0

Shortcut Trick

For any expression a + 1/a = k, the cube relationship is $a^3 + 1/a^3 = k^3 - 3k$.

Given $k = -\sqrt{3}$.

Value = $(-\sqrt{3})^3 - 3(-\sqrt{3}) \Rightarrow -3\sqrt{3} + 3\sqrt{3} = 0$.

Therefore The correct answer is 0.

Alternate Method

Given: $a + 1/a = -\sqrt{3}$

Formula Used: $(x + y)^3 = x^3 + y^3 + 3xy(x + y)$

Calculations:

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

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

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

Substituting the value of (a + 1/a):

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

$\Rightarrow a^3 + 1/a^3 - 3\sqrt{3} = -3\sqrt{3}$

$\Rightarrow a^3 + 1/a^3 = -3\sqrt{3} + 3\sqrt{3}$

$\Rightarrow a^3 + 1/a^3 = 0$

Therefore The correct answer is 0.

Additional Information

Special Case for Power 6

If $a + 1/a = \sqrt{3}$ or $-\sqrt{3}$, then $a^2 + 1/a^2 = 1$, which leads to a^6 + 1 = 0 or a^6 = −1.

Square Identity

If $a + 1/a = k$, then the squared value is given by $a^2 + 1/a^2 = k^2 - 2$.

Negative Reciprocal Cube

If $a - 1/a = k$, then the cube difference is given by $a^3 - 1/a^3 = k^3 + 3k$.

Q19. Answer: (d) Only argument I is strong

Argument 1: This is strong, because good etiquette gives children a sense of responsibility.

Argument 2: This does not follow, because there is nothing mentioned about adults in the statement.

Hence, “only argument 1” is strong.

Q20. Answer: (c) 100

The correct answer is option 3 i.e 100.

• According to the 2017 Global Hunger Index (GHI) Report, India's rank is 100^(th) out of 119 countries.

• The report published by the International Food Policy Research Institute (IFPRI), based in Washington.

• In 2017, three positions slipped in comparison to GHI's 97th rank in 2016.

• GHI is a multidimensional measure that describes a regional, national, and global state of hunger situation.

• It is published annually since 2006 by the International Institute for Research on Food Policy (IFPRI).

• It ranks countries on a scale of 0 to 100 points, determined by taking four predictor parameters into consideration. Zero means

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the best (no hunger) score and the worst is 100.

In News

• India's rank has dropped to 101st position among 116 countries in the Global Hunger Index (GHI) 2021.

Q21. Answer: (a) 327.745

=> 0.295 + 2.95 + 29.5 + 295 = ?

=> 327.745 = ?

Using options,

0.295 + 2.95 + 29.5 + 295

Here the last digit of each number is 5 and the total number of 5's at the end in the equation is 5

Therefore Options must end with 5

Therefore Only option 1 ends with 5 i.e. 327.745

Q22. Answer: (b) 10,000 tons

Total consumption of rice in 2012 = 2,00,000 tons

Consumption of rice in Nagpur = 2,00,000 × 5/100 = 10,000 tons

Q23. Answer: (c) Husband

Drawing the diagram,

Raj is the husband of Pratim's mother.

Hence, "husband" is the correct answer.

Q24. Answer: (b) Silicon

Silicon is used in solar panels.

Key Points

• It is the second most abundant material on Earth (after oxygen) and the most commonly used semiconductor in computer chips.

• Silicon is a mettaloid.

• Crystalline silicon cells are made of silicon atoms connected to one another to form a crystal lattice.

• This lattice provides an ordered framework that makes it more effective to convert light into electricity.

• Solar silicon-based cells currently offer a combination of high efficiency, low cost, and long service life.

Q25. Answer: (a) 1.45

Shortcut Trick

If $\text{cosec}\theta + \cot\theta = x$, then $\text{cosec}\theta - \cot\theta = 1/x$.

Given $x = 2.5 = 5/2$, then $1/x = 2/5 = 0.4$.

Adding both equations: $2\,\text{cosec}\theta = x + 1/x = 2.5 + 0.4 = 2.9$.

=> $\text{cosec}\theta = 2.9 \div 2 = 1.45$.

Therefore The correct answer is 1.45.

Alternate Method

Given: $\text{cosec}\theta + \cot\theta = 2.5$ --- (1)

Formula Used: $\text{cosec}^2\theta - \cot^2\theta = 1 \Rightarrow (\text{cosec}\theta + \cot\theta)(\text{cosec}\theta - \cot\theta) = 1$

=> $2.5 \times (\text{cosec}\theta - \cot\theta) = 1$

=> $\text{cosec}\theta - \cot\theta = 1 / 2.5 = 0.4$ --- (2)

Adding Equation (1) and Equation (2):

=> $(\text{cosec}\theta + \cot\theta) + (\text{cosec}\theta - \cot\theta) = 2.5 + 0.4$

=> $2\,\text{cosec}\theta = 2.9$

=> $\text{cosec}\theta = 2.9 / 2$

=> $\text{cosec}\theta = 1.45$

Therefore The correct answer is 1.45.

Additional Information

Trigonometric Identity (Cosecant-Cotangent)

The fundamental identity is $1 + \cot^2\theta = \text{cosec}^2\theta$, which implies $\text{cosec}^2\theta - \cot^2\theta = 1$.

Secant-Tangent Property

Similarly, if $\sec\theta + \tan\theta = k$, then $\sec\theta - \tan\theta = 1/k$ because $\sec^2\theta - \tan^2\theta = 1$.

Value of cotθ

By subtracting the equations instead of adding, 2 cotθ = x − 1/x, allowing for the calculation of cotθ directly.

Q26. Answer: (b) Jharkhand

The correct answer is Jharkhand.

• The first Uranium mine of India, the Jaduguda mines, is located in Jharkhand.

• The Jaduguda Mine is a uranium mine situated in Jaduguda village, in Jharkhand Indian state's Purbi Singhbhum district.

• It started operation in 1967 and became India's first uranium mine.

• The deposits were found at that mine in 1951.

• India possesses only two functional uranium mines as of March 2012, including this Jaduguda Mine.

• The Jaduguda mine provides up to 25 percent of the raw materials required to power the nuclear reactors in India.

Q27. Answer: (a) He visits A before D

According to the given information,

The third hospital he visit must be C

He must visit B before D. He must visit A before B and E. (This implies A visit before B, E and D)

'He visits A before D' is true.

Hence, option 1 is the correct answer.

Confusion Points

He must visit A before B and E- This line Does not give any information between the position of B and E hence option 3 is not Correct.

Q28. Answer: (a) Saturday

The logic followed here is:

We need to find the day on 21st March 2020.

400 years = 0 odd days

300 years = 1 0dd days

200 years = 3 odd days

100 years = 5 0dd days

Codes for the days of weeks:-

Sunday – 0

Monday – 1

Tuesday – 2

Wednesday – 3

Thursday – 4

Friday – 5

Saturday – 6

6 represents Saturday.

Hence, the correct answer is "Saturday".

Alternate Method

Month codes:

January → 0

February → 3

March → 3

April → 6

May → 1

June → 4

July → 6

August → 2

September → 5

October → 0

November → 3

December → 5

Code for Days:
Sunday → 0 (or) 7
Monday → 1
Tuesday → 2
Wednesday → 3
Thursday → 4
Friday → 5
Saturday → 6
Code for Centuries:
1600 → 6
1700 → 4
1800 → 2
1900 → 0
2000 → 6
2100 → 4
2200 → 2
2300 → 0
For,
21 March 2020,
Date = 21
Code for March = 3
Code for Century = 6
2020 = 2000 + 20
For, 2000 it is 6
For,
20 it is 20
And,
20/ 4 = 5
Adding all these = 21 + 3 + 6 + 20 + 5 = 55
55 / 7 = 6 (here we consider the remainder)
6 is the code for Saturday.
21 March, 2020 is Saturday.
Hence, “Saturday” is the correct answer.

Q29. Answer: (b) 100 J

The correct answer is 100 J.
Let the mass be m
=> v = 5m/s
=> K.E = 25 J
=> K.E = 1/2 mv^2 = 25 J
=> K.E = 1/2 m (5)^2
= 25 x 2 = 25m = 2 kg
Now if the velocity becomes 2 times then the velocity is 2 x 5 = 10 m/s
Now new K.E = 1/2 x 2 x 10^2 = 100 J

Q30. Answer: (d) K – 16

The pattern followed is,
Hence, “K – 16” is the correct answer.

Q31. Answer: (d) 2

Shortcut Trick
Perform Prime Factorisation of 63368 to find the unpaired factor.
63368 = 2^3 × 7921 = 2^3 × 89^2.

Here, the factors are 2 × 2 × 2 × 89 × 89.
The number 2 is unpaired, so we must multiply by 2 to make it a perfect square.
Therefore The correct answer is 2.
Alternate Method
Given: The number is 63368.
Method: To make a number a perfect square, every prime factor in its factorisation must have an even exponent.
=> 63368 = 2 × 2 × 2 × 89 × 89
=> 63368 = $(2^2) \times 2^1 \times (89^2)$
=> To make all powers even, we need one more 2.
=> Required number to multiply = 2.
Therefore The correct answer is 2.
Additional Information
Perfect Square Property
A number is a perfect square if all its prime factors occur in pairs (even exponents).
Unit Digit Rule
A perfect square never ends with the digits 2, 3, 7, or 8. Since 63368 ends in 8, it is not a perfect square.
Multiplication vs Division
The least number to multiply or divide to make a perfect square is always the product of all unpaired prime factors.

Q32. Answer: (d) 1260

Shortcut Trick
Perimeter × Height = Lateral Surface Area
(8x + 15x + 17x) × 21 = 840
40x = 840 ÷ 21 => 40x = 40 => x = 1
Base Sides are 8 cm, 15 cm, 17 cm (Right-angled triangle triplet)
Volume = Base Area × Height = (1/2 × 8 × 15) × 21 = 60 × 21 = 1260 cm^3
Therefore The correct answer is 1260 cm^3.
Alternate Method
Given:
Height of prism (h) = 21 cm
Ratio of base sides = 8 : 15 : 17
Lateral Surface Area (LSA) = 840 cm^2
Let the sides of the base be 8x, 15x, and 17x.
Since $8^2 + 15^2 = 64 + 225 = 289 = 17^2$, the base is a right-angled triangle.
Formula Used:
Lateral Surface Area = Perimeter of base × Height
Volume = Area of base × Height
Calculations:
=> LSA = (8x + 15x + 17x) × 21
=> 840 = 40x × 21
=> 840 = 840x
=> x = 1
=> Base sides are 8 cm, 15 cm, and 17 cm.
=> Base Area = 1/2 × Base × Perpendicular = 1/2 × 8 × 15 = 60 cm^2
=> Volume = Base Area × Height = 60 × 21
=> Volume = 1260 cm^3
Therefore The correct answer is 1260 cm^3.
Additional Information
Total Surface Area of Prism
TSA = Lateral Surface Area + 2 × Base Area
Pythagorean Triplets
Common triplets like (3, 4, 5), (5, 12, 13), and (8, 15, 17) help identify right-angled bases quickly.

Prism vs Pyramid

Volume of Prism = Area × h, while Volume of Pyramid = 1/3 × Area × h.

Q33. Answer: (d) Madurai

Madurai was the capital of the Pandya dynasty.

• The Pandya kingdom was a Tamil kingdom in south India.

• Madurai was the capital of the Pandyan dynasty until the middle of the 14th century and Korkai was also the capital and port city of Pandya.

• The third capital was Tenkasi until the end of the 16th century.

• The Pandyas revived under Kadungon (590 – 620 CE) towards the end of the 6th century, helped to disestablish the Kalabhras in south India.

Q34. Answer: (b) 11/125

=> 1.008 = ?

=> 1008/1000 = ?

=> 126/125 = ?

11/125

Q35. Answer: (b) Rs. 945

Shortcut Trick

Using the multiplier method: Selling Price (SP) = Cost Price (CP) × (100 − Loss%) ÷ 100.

SP = 1125 × (100 − 16) ÷ 100.

SP = 1125 × 84 ÷ 100.

SP = 1125 × 0.84 = 945.

Therefore The correct answer is Rs. 945.

Alternate Method

Given: Cost Price (CP) = Rs. 1125, Loss Percentage = 16%.

Formula: Loss = (Loss% ÷ 100) × CP | SP = CP − Loss

=> Loss Amount = (16 ÷ 100) × 1125

=> Loss Amount = 0.16 × 1125 = 180

=> Selling Price (SP) = 1125 − 180

=> Selling Price (SP) = 945

Therefore The correct answer is Rs. 945.

Additional Information

Cost Price & Selling Price

The price at which an article is purchased is called its Cost Price (CP), and the price at which it is sold is its Selling Price (SP).

Loss Calculation

When CP > SP, the seller incurs a Loss. Loss = CP − SP. Loss% is always calculated on the Cost Price.

Q36. Answer: (c) Neither I nor II is strong.

Argument 1: This is not strong, as atom bombs are not safe for the country.

Argument 2: This is also not strong, because nothing is mentioned about Zone equilibrium or balances in the statement.

Hence, “neither argument 1 nor argument 2” is strong.

Q37. Answer: (d) Ilaiyaraaja

The correct answer is option 4 i.e Ilaiyaraaja.

• Ilaiyaraaja was awarded the Padma-Vibhushan in 2018 for his outstanding contribution in the field of art and music.

• Ilaiyaraaja is an Indian film music composer, singer, lyricist, instrumentalist, orchestra player, conductor-arranger, and lyricist who works primarily in Tamil and other languages, including Telugu, Kannada, Malayalam, Marathi, Hindi, and English.

• He was awarded the Padma Bhushan, India's third-highest civilian honor in 2010 and the Padma Vibhushan, India's second-largest civilian honor in 2018.

• Ilaiyaraaja is the recipient of five National Film Awards - three for Best Music Direction and two for Best Background Score.

• In 2012, Ilaiyaraaja was awarded the highest Indian music award, Sangeet Akademi Award for his creative and experimental works in the field of music.

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Q38. Answer: (b) 352.044

=> 396 - 39.6 - 3.96 - 0.396 = ?

=> 396 – 43.956 = ?

=> 352.044 = ?

Q39. Answer: (c) Mr. Panatavane Gangadhar Vithobaji

• Shri Pantavane Gangadhar Vithobaji was awarded the Padma Shri Award for 2018 in the field of literature and education.

• He was a writer, critic, and Ambedkarite thinker of the Maharashtra state of Indian Marathi language.

• He is one of the founders of the Dalit literary movement in Maharashtra.

• Pantwane embraced Buddhism in the hands of Babasaheb Ambedkar at Devbhoomi in Nagpur on 14 October 1956 with an attendance of 6,00,000 Ambedkarites.

• Pantwane had written 16 books in Marathi and edited 10 books. He was also a journalist founder named 'Asmitadarsh'.

Q40. Answer: (c) Ostrich

Lion, Cheetah and Elephant are wild animals.

Whereas,

Ostrich is a bird.

Hence, "ostrich" is the odd one.

Q41. Answer: (a) 11.5

Shortcut Trick

Arrange the 12 observations in ascending order:

6, 8, 9, 9, 10, 11, 12, 15, 16, 16, 17, 21

Since the number of terms (N = 12) is even, the median is the average of the two middle terms (6^(th) and 7^(th) terms).

Median = (11 + 12) ÷ 2 = 11.5

Therefore The correct answer is 11.5.

Alternate Method

Given:

Observations: 6, 17, 8, 9, 16, 10, 15, 21, 9, 11, 12, 16

Total number of observations (N) = 12

Formula Used:

When N is even:

Median = [(N/2)^(th) term + (N/2 + 1)^(th) term] ÷ 2

Calculations:

Arrange the given data in ascending order:

=> 6, 8, 9, 9, 10, 11, 12, 15, 16, 16, 17, 21

Here, the number of observations N = 12 (which is an even number).

=> Median = [(12/2)^(th) term + (12/2 + 1)^(th) term] ÷ 2

=> Median = [6^(th) term + 7^(th) term] ÷ 2

From the sorted data:

=> 6^(th) term = 11

=> 7^(th) term = 12

=> Median = (11 + 12) ÷ 2

=> Median = 23 ÷ 2 = 11.5

Option Analysis:

=> Option (1) 11.5: This is the correct median calculated by taking the average of the two middle terms (11 and 12).

=> Option (2) 10.4: Incorrect. This value does not correspond to any central tendency measure of this dataset.

=> Option (3) 11.6: Incorrect. This is a calculation error (e.g., dividing 23.2 by 2 instead of 23).

=> Option (4) 12: Incorrect. This is only the 7^(th) term, not the average of the 6^(th) and 7^(th) terms.

Therefore The correct answer is 11.5.

Additional Information

Median for Odd Number of Terms

If the number of observations N is odd, the median is the exact middle term, which is the ((N + 1)/2)^(th) term after arranging the

data in ascending or descending order.

Mean (Arithmetic Average)

The mean is calculated by dividing the sum of all observations by the total number of observations: Mean = (Σ x_i) ÷ N.

Mode

The mode is the value that appears most frequently in a data set. For this dataset, the modes are 9 and 16 (each appearing twice).

Empirical Relationship

For moderately skewed distributions, the relationship between mean, median, and mode is given by: Mode = 3 × Median − 2 × Mean.

Q42. Answer: (a) Rs. 1,50,000, Rs. 1,20,000 Rs. 1,00,000

Shortcut Trick

If Simple Interest is the same for different parts, the Principal ratio is P1 : P2 : P3 = 1/R1 : 1/R2 : 1/R3.

Ratio = 1/4 : 1/5 : 1/6 => Multiply by LCM(4, 5, 6) = 60.

New Ratio = 15 : 12 : 10 => Total ratio units = 15 + 12 + 10 = 37 units.

37 units = Rs. 3,70,000 => 1 unit = Rs. 10,000.

Principals = 15 × 10,000, 12 × 10,000 and 10 × 10,000.

Therefore The correct answer is Rs. 1,50,000, Rs. 1,20,000 and Rs. 1,00,000.

Alternate Method

Given:

Total Amount = Rs. 3,70,000

Rates: R1 = 4%, R2 = 5%, R3 = 6% | Time: T = 1 year

Formula Used:

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

Calculations:

=> Let the three parts be P1, P2, and P3.

=> SI1 = (P1 × 4 × 1)/100, SI2 = (P2 × 5 × 1)/100, SI3 = (P3 × 6 × 1)/100.

=> Since interests are equal: 4P1/100 = 5P2/100 = 6P3/100

=> 4P1 = 5P2 = 6P3

=> Divide by LCM(4, 5, 6) = 60: (4P1)/60 = (5P2)/60 = (6P3)/60

=> P1/15 = P2/12 = P3/10

=> Sum of parts = 15k + 12k + 10k = 37k

=> 37k = 3,70,000 => k = 10,000

=> P1 = 15 × 10,000 = Rs. 1,50,000

=> P2 = 12 × 10,000 = Rs. 1,20,000

=> P3 = 10 × 10,000 = Rs. 1,00,000

Therefore The correct answer is Rs. 1,50,000, Rs. 1,20,000 and Rs. 1,00,000.

Additional Information

Ratio of Principals (Amount is equal)

If the Total Amount (Principal + Interest) is equal after T1, T2, and T3 years at R1, R2, and R3 rates, the ratio is: P1 : P2 : P3 = 1/(100 + R1T1) : 1/(100 + R2T2) : 1/(100 + R3T3).

Relationship between SI and Time

For a fixed Principal and Rate, Simple Interest is directly proportional to Time. If time doubles, interest also doubles.

Effective Rate of Interest

In Simple Interest, the effective rate for 't' years is simply R × t%. This is used to find total interest quickly when the principal is known.

Q43. Answer: (c) Uttarakhand

The correct answer is option 3 i.e Uttarakhand.

• Nanital lake is situated in the state of Uttarakhand.

• This has a form in the shape of a kidney or a crescent and an outfall at the south-east end.

• Nainital is the most prominent hill-station in the Kumaon district.

• It is famous for its Naini Lake located in the center of the town, as well as several other nearby lakes.

• It is one of the four lakes in Kumaon Hills; the other three are the Sattal Lake, the Bhimtal Lake, and the Naukuchiyatal Lake.

• The National Institute of Hydrology (NIH) of Roorkee, which prepared a plan for the restoration of the lake at an estimated cost of Rs 50 crore, sponsored by the Ministry of Environment and Forests, Government of India, is now also guiding the restoration actions.

Q44. Answer: (c) Javed Akhtar

The correct answer is option 3 i.e Javed Akhtar.

• Javed Akhtar was conferred with the 2017 Hridaynath Mangeshkar Award.

• He was awarded the 2017 Hridaynath Mangeshkar Award at the Mumbai event that marked the 80th anniversary of veteran music composer Hridaynath Mangeshkar and the 28th anniversary of Hridayesh Arts.

• The award was established in 2011 in honour of music composer and singer Hridaynath Mangeskar by Mumbai-based socio-cultural organization Hridayesh Art.

• It congratulates and honours successful individuals from various walks of life, around the world.

• This brings with it a Rs 2 lakh monetary reward and a memento.

• Hridaynath Mangeshkar is the only son of noted musician Deenanath Mangeshkar and the younger brother of the legends of Indian music Lata Mangeshkar and Asha Bhosle.

• He is popularly known in the music and film field as Balasaheb.

Q45. Answer: (c) C

The picture that replaces the (?) symbol is,

Hence, option 3 is the correct answer.

Q46. Answer: (c) is a negative rational number

Shortcut Trick

For any rational number x, its reciprocal is 1/x.

The sign of a number does not change when taking its reciprocal.

If $x < 0$, then $1/x < 0$.

Therefore The correct answer is is a negative rational number.

Alternate Method

Given: A negative rational number.

Definition: A rational number is of the form p/q, where $q \neq 0$.

=> Let the negative rational number be $-a/b$ (where $a, b > 0$).

=> Reciprocal of $(-a/b) = 1 / (-a/b)$

=> Result = $-b/a$

=> Since b and a are positive integers, $-b/a$ is still a negative rational number.

Therefore The correct answer is is a negative rational number.

Additional Information

Multiplicative Inverse

The reciprocal is also known as the multiplicative inverse. The product of a number and its reciprocal is always 1.

Reciprocal of Zero

The number 0 is the only rational number that does not have a reciprocal because 1/0 is undefined.

Reciprocal of 1 and -1

The reciprocal of 1 is 1, and the reciprocal of −1 is −1. These are the only numbers that are their own reciprocals.

Q47. Answer: (d) Both 1 and 2 are not sufficient

According to the given information,

Statement 1: Only about colours of the cubes are mentioned in this statement.

Statement 2: Number of white cubes is given and it is also mentioned that 'the number of blue cubes is twice that of yellow cubes' but the number of cubes of neither of the colours is given.

Hence, "both 1 and 2" are not sufficient.

Q48. Answer: (c) Shimla

The correct answer is option 3 i.e Shimla.

• PM Narendra Modi launched the UDAN scheme on 25th April 2017 with a flight between Shimla and New Delhi at subsidised rates.

• UDAN (Ude Desh ka Aam Naagrik) is the State Government of India's Regional Airport Growth and Regional Connectivity Scheme (RCS).

• With the aim of "letting the country's common citizen fly" aimed at making air travel affordable and widespread, promoting inclusive national economic development, job growth and the development of air transport infrastructure across all regions and states.

• Out of a total of 486 airports, 406 participated in our own airports at the start of the program, 27 were well-served airports out of 97 non-RCS airports and 12 were operational airports out of 18 underserved participating national operational airports (November 2016) with daily scheduled fixed-wing flights.

• The UDAN Scheme is a key component of the National Civil Aviation Policy (NCAP) of Prime Narendra Modi which was published by the Civil Aviation Ministry (India) on 15 June 2016.

Q49. Answer: (c) 60^0

Shortcut Trick

Use the identity $\sec^2 x = 1 + \tan^2 x$.

$8(1 + \tan^2 x) - 7\tan^2 x = 11$

$8 + 8\tan^2 x - 7\tan^2 x = 11$

$8 + \tan^2 x = 11 \Rightarrow \tan^2 x = 3 \Rightarrow \tan x = \sqrt{3}$.

For $\tan x = \sqrt{3}$, the value of x is 60°.

Therefore The correct answer is 60°.

Alternate Method

Given: $8\sec^2 x - 7\tan^2 x = 11$

Formula Used: $\sec^2 x - \tan^2 x = 1 \Rightarrow \sec^2 x = 1 + \tan^2 x$

$\Rightarrow 8(1 + \tan^2 x) - 7\tan^2 x = 11$

$\Rightarrow 8 + 8\tan^2 x - 7\tan^2 x = 11$

$\Rightarrow 8 + \tan^2 x = 11$

$\Rightarrow \tan^2 x = 11 - 8$

$\Rightarrow \tan^2 x = 3$

$\Rightarrow \tan x = \sqrt{3}$

$\Rightarrow x = \tan^{(-1)}(\sqrt{3}) = 60°$

Therefore The correct answer is 60°.

Additional Information

Trigonometric Identities

Fundamental relations: $\sin^2 x + \cos^2 x = 1$, $1 + \tan^2 x = \sec^2 x$, and $1 + \cot^2 x = \operatorname{cosec}^2 x$.

Specific Angles for Tan

Important values: $\tan 0° = 0$, $\tan 30° = 1/\sqrt{3}$, $\tan 45° = 1$, $\tan 60° = \sqrt{3}$, $\tan 90° = \infty$.

Q50. Answer: (d) Gold

The correct answer is option 4 i.e Gold.

• Gold is the most malleable metal.

• Malleability is a physical property of metals that decide their hammering, pressing or rolling ability without breaking into thin sheets.

• In other words, deforming under compression is the product of metal, and takes on a new shape.

• Items made from these metals may also show malevolence, like gold leaf, lithium foil, and shot from the indium.

• Gold is a transitional element of group 11 in a periodic table with atomic number 79 and atomic mass 196.996. This is a reddish yellow alloy and is also a strong heat and electricity conductor.

Q51. Answer: (c) aluminium

The correct answer is option 3 i.e aluminium.

• Element X forms an oxide with the formula X2O3. The element X would most likely be in the same group of the periodic table as aluminium.

• Element X can be aluminium, gallium, indium and thallium, which is part of 3 Mendeleev's periodic table groups and has valency 3.

• Aluminium (Al), also engraved aluminium, chemical element, the lightweight, silver-white metal of the main group 13 of the periodic table.

• It is the most abundant metallic element in Earth's crust and the most widely used non-ferrous metal.

• It does not appear in metallic form in nature because of its chemical action, but its derivatives are found to a greater or lesser degree in nearly all minerals, plants and wildlife.

Q52. Answer: (d) Swing

Dance is to move rhythmically with the help of legs.

Similarly,

Swing is the movement of the tails in animals.

Hence, “swing” is the correct answer.

Q53. Answer: (b) North-east

Drawing the diagram according to the given information,

If west becomes, north – west, then there a movement of one position clock – wise.

North becomes north – east.

Hence, “north – east” is the correct answer.

Q54. Answer: (a) Daughter

Drawing the family tree,

Mathura is the daughter of Shalaka.

Hence, “daughter” is the correct answer.

Q55. Answer: (d) 6

Shortcut Trick

Let efficiencies of inlets be 2x and x, and outlet be 1/10.

Net efficiency = 3x − 1/10 = 1/2.5 = 2/5.

3x = 2/5 + 1/10 = 5/10 = 1/2 => x = 1/6.

Time for low efficiency pipe = 1 / (1/6) = 6 hours.

Therefore The correct answer is 6 hours.

Alternate Method

Pipe / Group	Time (Hours)	Total Work (LCM)	Efficiency
Outlet Pipe (C)	10	10 units	−1 unit/hr
All Together (A+B+C)	2.5	10 units	4 units/hr

Given: Efficiency of Pipe A is twice of Pipe B. Let Efficiency of Pipe B = x, then Efficiency of Pipe A = 2x.

=> Efficiency (A + B + C) = Efficiency (A) + Efficiency (B) + Efficiency (C)

=> 4 = 2x + x + (−1)

=> 4 + 1 = 3x

=> 5 = 3x

=> x = 5/3 units/hr (Efficiency of low efficiency pipe)

=> Time taken by Pipe B = Total Work ÷ Efficiency of B

=> Time = 10 ÷ (5/3) = (10 × 3) ÷ 5

=> Time = 30 ÷ 5 = 6 hours.

Therefore The correct answer is 6 hours.

Additional Information

Pipes and Cisterns Efficiency

Efficiency is inversely proportional to the time taken. If pipe A is n times as fast as pipe B, then the ratio of time taken is 1:n.

Inlet and Outlet Logic

Inlet pipes add to the work (positive efficiency), while outlet pipes remove work (negative efficiency). Net work = Σ(Inlet efficiencies) − Σ(Outlet efficiencies).

Q56. Answer: (b) 187

By decoding given information,

•	×	÷	•
Means			

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×	•	•	÷

Given equation: 180 – 20 ÷ 12 + 24 × 5 + 22

After changing symbol: 180 ÷ 20 + 12 × 24 - 5 × 22

Using BODMAS rule,

9 + 12 × 24 – 5 × 22

9 + 288 – 110

297 – 110

187

Hence, “187” is the correct answer.

Q57. Answer: (c) Only conclusion 2 follows

Drawing the Venn diagram,

Conclusion 1: Some years are days → False (This is definitely false)

Conclusion 2: No day is a date → True (This is definitely true)

Hence, “only conclusion 2” follows.

Q58. Answer: (a) Asexual reproduction

The asexual reproduction type of reproduction involves only one parent.

• This results in inheritance being genetically identical to each other.

• In this way, all prokaryotes and other eukaryotes replicate. There are a variety of different asexual reproduction methods.

• It includes fragmentation, Binary fission, and budding binaries.

• Reproduction is the biological process by which new individual organisms "offspring" are produced from their "parents".

• Sexual reproduction involves two parents.

Q59. Answer: (c) N

Reversing the given alphabets,

ZYXWVUTSRQPONMLKJIHGFEDCBA

9^(th) letter from the right is ‘I’

ZYXWVUTSRQPONMLKJIHGFEDCAB

Fifth letter from the left of ‘I’ is ‘N’

ZYXWVUTSRQPONMLKJIHGFEDCAB

Hence, “N” is the correct answer.

Q60. Answer: (d) 3:30

The correct time is,

Alternate Short trick:

Whenever you need to find the mirror time from actual or actual time from mirror time then just subtract the given time from 11: 60

Here Actual time = 11: 60 – 8: 30 = 3: 30

Hence, “3: 30” is the correct answer.

Q61. Answer: (b) Both I and II are strong

Argument 1: This is strong, because when the population of these dogs increases, the municipality people will take them away.

Argument 2: This is also strong, because they are dangerous.

Hence, “both 1 and 2” are strong.

Q62. Answer: (c) Srikanth Kidambi

The correct answer is option 3 i.e Srikanth Kidambi.

• Srikanth Kidambi won the 2017 Australian Super Series (Badminton).

• He is an Indian badminton player who trains in Hyderabad, at the Gopichand Badminton Academy.

• In April 2018 he became the world's best men singles badminton player.

• In 2018, Kidambi received the Padma Shri, India 's fourth-highest civilian award And Award Arjuna in 2015.

• He went on to win Australian Super Series defeating Chinese Chen Long in the final 22–20, 21–16, setting an Indian record for reaching three consecutive Super Series finals.

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Q63. Answer: (b) [figure]

Books, Toys and Utensil are represented separately.

The correct Venn diagram is,

Hence, option 2 is the correct answer.

Q64. Answer: (b) Rs. 126,808.50

Shortcut Trick

Total Education Expenditure (E) × 2/3 = 13,006

=> E = 13,006 × 3/2 = 19,509

Total Salary × 2/13 = 19,509

=> Total Salary = (19,509 × 13) ÷ 2 = 253,617 ÷ 2 = 126,808.50

Therefore The correct answer is Rs. 126,808.50.

Alternate Method

Given:

Expenditure on Varun's education = Rs. 13,006

Fraction of education spend on Varun = 2/3 of Total Education Expenditure

Fraction of Salary spent on Total Education = 2/13

Calculations:

Let the Total Salary be S.

Total Expenditure on Education = (2/13) × S

Expenditure on Varun's education = (2/3) × [(2/13) × S]

=> 13,006 = (4/39) × S

=> S = (13,006 × 39) ÷ 4

=> S = 507,234 ÷ 4

=> S = 126,808.50

Therefore The correct answer is Rs. 126,808.50.

Additional Information

Fractional Multiplication

To find a part of a part, multiply the fractions together: (a/b) × (c/d) of Total.

Percentage Conversion

To convert a fraction to percentage, multiply by 100. Example: 2/13 ≈ 15.38%.

Reverse Calculation

If Value V = (a/b) of X, then X = V × (b/a).

Q65. Answer: (d) C

The pattern followed is,

In the first column, figures are of two parts.

In the second column, figures are of three parts.

And,

In the third column, figures are of four parts.

The correct picture which will fit in the blank space is,

Hence, option 4 is the correct answer.

Q66. Answer: (a) D

The pattern followed is,

There are two '+' symbols which are diagonally opposite to each other and there are two square symbols diagonally opposite to each other, among which one is painted.

All follow the same pattern, except figure D.

Hence, figure D is different from the rest.

Q67. Answer: (d) At the base of the leaves

The correct answer is option 4 i.e At the base of the leaves.

• Intercalary meristems are found at the base of the leaves.

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• It helps in the elongation and growth of plants in nodes and internodes (stems and leaves) and also allows the stem and leaves (grasses) to grow longitudinally.

• The intercalary meristems are present in monocots at the base of the primordium leaf.

• It allows the petiole to extend their leaves above the surface of the water.

• This increase in petiole length is caused by the intercalary meristem activity.

Q68. Answer: (a) Rs. 1,900

Shortcut Trick

Profit = 17%, so Selling Price (SP) = 117% of Cost Price (CP).

Given SP = Rs. 2,223.

Using unitary method: 117 units = 2,223.

1 unit = 2,223 ÷ 117 = 19.

CP (100 units) = 19 × 100 = Rs. 1,900.

Therefore The correct answer is Rs. 1,900.

Alternate Method

Given → Selling Price (SP) = Rs. 2,223, Profit Percentage (P%) = 17%.

Formulas: CP = SP × 100 ÷ (100 + P%)

=> Let the Cost Price be x.

=> SP = x + (17 ÷ 100) × x = 1.17x.

=> 2,223 = 1.17x.

=> x = 2,223 ÷ 1.17.

=> x = 1,900.

Therefore The correct answer is Rs. 1,900.

Additional Information

Cost Price & Selling Price Relationship

When there is a profit, SP is always greater than CP. Formula: SP = CP + Profit.

Profit Percentage

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

Q69. Answer: (a) Changing of water to water vapour

The correct answer is option 1 i.e Changing of water to water vapour.

Key Points

• Changing water to water vapour is NOT an example of chemical change.

• Boiling water is an example of a physical transition and not a chemical change, because the water vapour still has the same molecular structure as liquid water (H2O).

• If the bubbles were caused by a molecule's decomposition into a gas (such as H2O regardless of H2and O2), it would be a chemical transition to boil.

• Chemical changes are also called chemical reactions.

• Reactants are called the "ingredients" of a reaction, and the end results are called products.

Q70. Answer: (b) Alkali metals

The correct answer is option 2 i.e Alkali metals.

• The electronic configuration of hydrogen resembles that of Alkali metals.

• Hydrogen is similar to both alkali metals and to halogens.

• This is because alkaline-like hydrogen metals donate their outer electron to form compounds such as oxides, halides & sulfides.

• It also shares the electron of its with another atom of hydrogen to form a diatomic molecule.

• Hydrogen has one $1s^1$ electronic configuration.

• The electronic configuration is identical to the external electronic configuration ns^1 of alkali metals belonging to the first group of the periodic table, and like halogens (with electronic configuration ns^2np^5) it is one electron short of the corresponding noble gas configuration, helium $1s^2$.

Q71. Answer: (a) 38

The number of squares in the given figure is,

Hence, “38” is the correct answer.

Q72. Answer: (a) 5.25 lakh

Total revenue made by the restaurant XYZ in Nov 2017 = 35 lakh

Total revenue collects by other baked items in Nov 2017 = 35 × 15/100 = 5.25 lakh

Q73. Answer: (c) A

The pattern followed is,

In the first figure there are three geometrical figures, one inside the other, in the second figure there are two figures, one inside the other and the inner shape becomes the outer shape in this figure.

Similarly,

In the third figure there are three geometrical figures, one inside the other and in the fourth one there will be two figures and the inner shape becomes the outer shape in this figure.

The figure which will come next in the pattern is,

Hence, option 3 is the correct answer.

Q74. Answer: (c) more P.E and less K.E.

The correct answer is option 3, i.e. more P.E and less K.E.

• When an object is thrown vertically upward then the velocity will decrease continuously and hence K.E. will also decrease.

• To compensate for decreasing K.E., P.E. will increase.

• At the maximum height of 'h', velocity will be zero and hence K.E. energy will be zero and P.E. will be maximum.

• At 3/4^(th) of 'h',

• As P.E. increasing with height, it will be more than K.E.

Q75. Answer: (c) One X chromosome

An unfertilised human egg contains one X chromosome.

• The unfertilised egg is a haploid female gamete. It has chromosome X.

• The gametes are the haploid cells which the meiotic division produces.

• The egg is the female gamete produced by oogenesis. The gametes are haploid and only comprise one set of chromosomes.

• Therefore, the egg cell comprises the 22 autosomes and a chromosome X.

• Since the female somatic cell contains two X chromosomes, only one X chromosome can appear in the gamete.

Q76. Answer: (c) Thrust/Area

The correct naswer is option 3 i.e Pressure = Thrust/Area.

• The pressure is classified as force per area of the area. (P = F/A)

• If force F is applied to the surface of area A, the pressure P is defined as:

• This pressure is always perpendicular to the surface of the object in fluids.

• It is this friction applied to an object submerged in water that creates a power of thrust.

• This pressure that causes the object to be pushed is the reason that some objects are floating in the water.

• It is also the reason why objects weigh less in the water.

Q77. Answer: (a) Turns blue litmus red

Option 1 is the correct answer.

• The main purpose of litmus is to test whether the solution is acidic or basic.

• Blue litmus paper turns red under acidic conditions and red litmus paper turns blue under basic or alkaline conditions, with a change in colour occurring over the pH range 4.5–8.3 at 25 ° C (77° F).

• Wet litmus paper may also be used to test for water-soluble gases, which cause acidity or alkalinity; the gas dissolves in the water and the resulting solution stains the litmus paper. For example, ammonia gas, which is alkaline, turns red litmus paper blue.

• Red litmus contains a mild diprotic acid. When introduced to a simple compound, hydrogen ions react with the added base. The conjugate base formed by litmus acid has a blue colour so that the wet red litmus paper turns blue in alkaline.

Q78. Answer: (d) Ram Nath Kovind

The correct answer is option 4 i.e Ram Nath Kovind.

• The LPG Panchayat, organized by the Ministry of Petroleum and Natural Gas under the Pradhan Mantri Ujjawala Yojana was hosted by Ram Nath Kovind.

• Pradhan Mantri Ujjwala Yojana (PMUY) was initiated by Indian Prime Minister Narendra Modi on 1 May 2016 to administer 50 million LPG connections to Below Poverty Line (BPL) residents.

• A budgetary allowance of 80 billion (USD 1.1 billion) has been made for the program.

• In the first year of its launch, the distribution of connections amounted to 22 million compared to the target of 15 million.

• At the 107th Indian Science Congress held in Bengaluru in January 2020, Narendra Modi claimed that technology has enabled India to "recognise 8 crore [80 million] people still use coal or wood for cooking" and also to "understand how many new distribution centers need to be established by means of technology."

Q79. Answer: (a) 486

The pattern followed is,

6 × 3 = 18

18 × 3 = 54

54 × 3 = 162

162 × 3 = 486

Hence, “486” is the correct answer.

Q80. Answer: (b) 22.5

Shortcut Trick

Combined rate 1/9. Let total work be 45 units (LCM of 9 and 15 approx). Combined efficiency = 5.

Work parts: Mashuka = 2/5 × 45 = 18, Minena = 3/5 × 45 = 27. Total time = 19.5 days.

Check options for Minena: If Minena (slower) = 22.5 days, her efficiency = 45/22.5 = 2.

Then Mashuka efficiency = 5 − 2 = 3. Time = (18/3) + (27/2) = 6 + 13.5 = 19.5 days (Satisfied).

Therefore The correct answer is 22.5 days.

Alternate Method

Person	Days to Complete	Total Work	Efficiency
Minena (A)	x	1 (Unit Work)	1/x
Mashuka (B)	y	1/y	

Given: Together they take 9 days. Mashuka (B) does 2/5 work, Minena (A) does 3/5 work. Total time = 19.5 days.

=> 1/x + 1/y = 1/9 --- (Eq. 1)

=> (2/5)y + (3/5)x = 19.5

=> 2y + 3x = 19.5 × 5 = 97.5 --- (Eq. 2)

=> From Eq. 1: y = 9x / (x − 9)

=> Substitute in Eq. 2: 2[9x / (x − 9)] + 3x = 97.5

=> 18x + 3x(x − 9) = 97.5(x − 9)

=> 18x + 3x² − 27x = 97.5x − 877.5

=> 3x² − 106.5x + 877.5 = 0

=> x² − 35.5x + 292.5 = 0

=> Solving quadratic: (x − 22.5)(x − 13) = 0

=> x = 22.5 or x = 13. Since Minena is slower, x must be larger. If x = 22.5, y = 15. (Satisfies Mashuka faster).

Therefore The correct answer is 22.5 days.

Additional Information

Combined Work Formula

If two people take A and B days respectively, time taken together is (A × B) / (A + B).

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken. If Mashuka is faster, her time taken (y) must be less than Minena's time (x).

Partial Work Completion

Time taken to complete a fraction 'k' of work is k × (Total days taken for 100% work).

Q81. Answer: (a) 5

Presently, scientists are talking of 5 states of matter.

• Four natural states of matter exist solids, liquids, gases, and plasma. The fifth state is condensate from the man-made Bose-Einstein.

• Particles are packed tightly together in a solid so that they don't move much.

• The particles are looser packed in a liquid than in a solid and can float around each other, giving the liquid an infinite form.

• The particles have much space between them in gas and have high kinetic energy.

• Plasma is composed of extremely charged particles with very high kinetic energy.

• Scientists developed the Bose-Einstein condensate (BEC), in 1995. Using a mixture of lasers and magnets, the scientists at the Joint Institute for Lab Astrophysics (JILA) in Boulder, Colorado, Eric Cornell and Carl Weiman cooled a sample of rubidium to an absolute zero within a few degrees.

Q82. Answer: (a) Viswa Bharti

Vishwa Bharati Society was established by Rabindranath Tagore.

• Vishwa Bharati University is a public research central university and institute of national importance located in Santiniketan, West Bengal, India.

• It was founded by Rabindranath Tagore, who called it Visva-Bharati, which means the world's dialogue with India.

• Soon after independence in 1951, the college became a university and came to be known as Visva-Bharati University.

• The National Institutional Ranking Framework (NIRF) ranked Vishwabharati University 31 among Indian universities.

• According to the ranking of Best Global Universities 2020, produced by US News and World Report, Visva-Bharati is ranked 4th among Indian universities.

Q83. Answer: (d) Taj Mahal

The correct answer is option 4 i.e Taj Mahal

• Taj Mahal ranked 5th on the list of 'Top 10 Landmarks' in the world by TripAdvisor Travellers' Choice Awards.

• It has emerged as the 5th most popular landmark in the world and 2nd in Asia, according to the online travel portal TripAdvisor's Travelers Choice Awards for Landmarks.

• Around the world, Angkor Wat in Cambodia, Sheik Zayed Grand Mosque Center in Abu Dhabi, Mezquita Cathedral of Cordoba in Spain, and St Peter's Basilica in Italy, had the first four ranks.

• Whereas the top 10 landmarks in Asia were crowned by Angkor Wat, followed by the Taj Mahal in second place.

• Besides this, the Taj Mahal also placed first in the list of famous landmarks in India, followed by AmberFort, Jaipur, Swaminarayan Akshardham, New Delhi, etc.

Q84. Answer: (b) Blood

• Red vascular connective tissue is blood.

• Vascular connective tissue is the tissue responsible for transport in the animal's body.

• Blood and lymph is the final form of connective tissue (red vascular connective tissue).

• Blood is made up of erythrocytes (red blood cells), leukocytes (white blood cells) and platelets.

• Blood is present in blood vessels (arteries, veins, capillaries).

• Connective tissue is a ubiquitous component of all major tissues and structures of the body (50% of all proteins in the body are connective tissue), including blood, vascular tissue, muscle, tendon, ligaments, fascia, bone, joint, intervertebral disc, and skin

Q85. Answer: (c) B

The shapes from the problem figure can be used to create the below figure:

Hence, the figure in option B is the correct answer.

Q86. Answer: (a) Water level will remain the same

The correct answer is Option 1.

Key Points

If you fill a glass completely with water and ice and the ice melts completely, the water level will remain unchanged.

• According to Archimedes' theory, the floating material displaces air, which means that as the ice melts, there will be no difference in the water table, because the dissolved ice will have the same volume as it used to be.

• A dynamic body displaces a volume of water equal to its own weight.

Q87. Answer: (c) Principle of Conservation of Momentum

Concept:

• Momentum: The product of mass and velocity is called momentum or linear momentum.

• It is denoted by P and unit is kg? m/s

• Momentum (P) = Mass (m) × velocity (V)

• Conservation of linear momentum: When there is no net external force on a system, then the total linear momentum of the system remains constant. This is called the conservation of linear momentum.

Explanation:

In the case of a rocket, we will take the rocket and its fuel as a system. There is no net force on this system, so the total momentum will be conserved.

• Thus the rockets work on the law of conservation of linear momentum is correct.

• The increased forward momentum of the rocket is equal but opposite in sign to the momentum of the ejected exhaust gases.

Q88. Answer: (d) 0

((1 - 1)/10)((1 - 1)/11)((1 - 1)/12) - ((1 - 1)/99)((1 - 1)/100) = ?

=> (0/10)(0/11)(0/12) - (0/99)(0/100) = ?

=> 0 – 0 = ?

=> 0 = ?

Note: This is an exam question in which error was found we have given the solution according to the question.

Q89. Answer: (d) Rs. 740

Shortcut Trick

Total Simple Interest percentage = Rate × Time

Effective Rate = 9.25% × 4 = 37%

Interest = 37% of Rs. 2,000 = Rs. 740

Therefore The correct answer is Rs. 740.

Alternate Method

Given values:

Principal (P) = Rs. 2,000

Rate of Interest (R) = 9.25% per annum

Time (T) = 4 years

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

=> SI = (2,000 × 9.25 × 4) ÷ 100

=> SI = 20 × 9.25 × 4

=> SI = 20 × 37

=> SI = 740

Therefore The correct answer is Rs. 740.

Additional Information

Total Amount

The total amount (A) at the end of the term is the sum of the principal and interest: A = P + SI.

Simple Interest Property

Simple interest remains constant for every year as it is always calculated on the original Principal amount.

Interest Rate Conversion

If the time is given in months, divide by 12 to convert it to years before applying the standard SI formula.

Q90. Answer: (a) Aachman Yukt Dhara

The correct answer is option 1 i.e Aachman Yukt Dhara.

• Aachman Yukt Dhara was NOT a part of the proposed draft of the 'National Water Framework Bill of 2016'.

• The draft National Water Framework Bill 2016 was drawn up by a committee headed by Dr. Mihir Shah.

• The Committee was set up by the Ministry of Water Resources, River Development, and Ganga Rejuvenation.

• The aim behind this bill was to conserve, manage, protect, and regulate the use of water.

• Pursuant to the Constitution of India, water falls under the domain of the State Subject and, hence, the consent of States is necessary if the bill is to be enforced as an act.

Q91. Answer: (d) 16

Shortcut Trick

To find the extra marks a new member contributes compared to the initial average, use the deviation formula:

Extra Marks = (Total members after inclusion) × (Increase in average)

Total members = 7 + 1 = 8 students

Increase in average = 2

Difference = 8 × 2 = 16

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Therefore The correct answer is 16.

Alternate Method

Given:

Initial group size = 7 students

Increase in average marks = 2

New group size = 8 students

Formula: Average = Sum of observations ÷ Total number of observations

=> Let the initial average of 7 students be x.

=> Total marks of the initial 7 students = 7 × x = 7x.

=> When the new student joins, total students = 8.

=> New average = x + 2.

=> Total marks of 8 students = 8 × (x + 2) = 8x + 16.

=> Marks of the new student = (Total marks of 8 students) − (Total marks of 7 students)

=> Marks of the new student = (8x + 16) − 7x = x + 16.

=> Difference = (Marks of new student) − (Initial average)

=> Difference = (x + 16) − x = 16.

Therefore The correct answer is 16.

Additional Information

Effect of Adding a Value on Average

If a new value is added and the average increases, the new value must be greater than the old average. New value = Old Average + (New Count × Average Increase).

Effect of Removing a Value

If a value is removed and the average increases, the removed value was less than the original average. Removed value = Old Average − (Remaining Count × Average Increase).

Uniform Change in Observations

If every observation in a set is increased by a constant value k, the new average of the set also increases by exactly k.

Q92. Answer: (d) 11 A

The correct answer is option 4 i.e 11 A.

The potential difference of the heater = 60 V

=> Current I = 4 A

=> Resistance =?

=> According to ohm's law,

=> V = IR

=> R = V/I

=> R = 60/4 = 15 Ohms

Now if the potential is increased to 165 V

=> I = ?

=> V = IR

=> I = V/R

= 165/15 =11 A

Q93. Answer: (d) 72 km/h

Shortcut Trick

Difference in platform lengths = 195 − 155 = 40 m

Difference in time taken = 18 − 16 = 2 seconds

Speed of train = 40 / 2 = 20 m/s

Convert to km/h = 20 × (18 / 5) = 72 km/h

Therefore The correct answer is 72 km/h.

Alternate Method

Given:

Length of Platform 1 (L1) = 155 m, Time (t1) = 16 s

Length of Platform 2 (L2) = 195 m, Time (t2) = 18 s

Formula Used:

Speed = (Length of Train + Length of Platform) ÷ Time

Calculations:

=> Let Length of Train be L

=> Speed = (L + 155) / 16 = (L + 195) / 18

=> 18 × (L + 155) = 16 × (L + 195)

=> 9 × (L + 155) = 8 × (L + 195)

=> 9L + 1395 = 8L + 1560

=> L = 1560 − 1395 = 165 m

=> Speed = (165 + 155) / 16 = 320 / 16 = 20 m/s

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

Therefore The correct answer is 72 km/h.

Additional Information

Unit Conversion

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

Relative Speed

When two objects move in the same direction, relative speed is (S1 − S2). In opposite directions, it is (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.

Q94. Answer: (c) 12/5 days

Shortcut Trick

Time taken by A and B together = (6 × 8) ÷ (6 + 8) = 48 ÷ 14 = 24/7 days.

Given: Time for C = Time for (A + B) = 24/7 days.

Combined efficiency of B and C (where B is 1/8 and C is 7/24) = 3/24 + 7/24 = 10/24 = 5/12.

Time taken by B and C = 12/5 days.

Therefore The correct answer is 12/5 days.

Alternate Method

Given: Time taken by A = 6 days, Time taken by B = 8 days.

Person	Days	Total Work	Efficiency
A	6	24	4
B	8	3	

=> Efficiency of (A + B) = 4 + 3 = 7 units/day.

=> Time taken by (A + B) = 24/7 days.

=> Since C takes same time as (A+B), Time for C = 24/7 days.

=> Efficiency of C = Total Work ÷ Time = 24 ÷ (24/7) = 7 units/day.

=> Total efficiency of (B + C) = Efficiency of B + Efficiency of C = 3 + 7 = 10 units/day.

=> Time taken by (B + C) = Total Work ÷ Combined Efficiency = 24 ÷ 10 = 12/5 days.

Therefore The correct answer is 12/5 days.

Additional Information

Combined Efficiency Rule

If person X completes work in x days and Y in y days, their combined efficiency is (1/x + 1/y) and time taken is (xy)/(x+y).

Work and Time Relationship

Time taken to complete a task is inversely proportional to the efficiency. Efficiency = Total Work ÷ Time.

LCM Method

Taking the Least Common Multiple (LCM) of individual days as the total work simplifies calculations by providing integer efficiency values.

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Q95. Answer: (a) Virat Kohli

The correct answer is option 1 i.e Virat Kohli.

• The cricketer Virat Kohli who holds the record for scoring the quickest 8,000 runs in one-day international cricket as of 15-Jun-2017.

• He became the fastest cricketer to score 8000 runs in ODIs during his gallant, undefeated 96 run against Bangladesh in the ICC Champions Trophy semifinals at Edgbaston cricket ground, Birmingham.

• He crossed the 8000-run mark in his 175th outing to go ahead of South African cricketer AB de Villiers, who had taken 182 innings to reach the milestone.

• Sourav Ganguly (200 innings) and Sachin Tendulkar (210 innings) are now third and fourth on the list.

• As of October 2019, Kohli scored 27 Test and 43 ODI centuries, making him the second most effective ODI cricket centurion after Sachin Tendulkar[322].

Q96. Answer: (d) Density

The correct answer is option 4 i.e Mass/Volume = Density

• The symbol used for density is the ρ (lower case of the Greek letter rho).

• The density of the material varies depending on temperature and pressure.

• This variation is typically small for solids and liquids, but much higher for gases. Increasing the pressure on the object reduces the volume of the object and thus increases its density.

• Increasing the temperature of the material (with a few exceptions) decreases its density by increasing its thickness.

• In most materials, the heating of the bottom of the fluid results in the convection of the heat from the bottom to the top due to a decrease in the density of the heated fluid.

• This causes it to rise relative to more dense non-heated material.

Q97. Answer: (d) Rs. 10,516

Shortcut Trick

Area of two paths = w(L + B − w) where w is path width and L, B are square sides.

Area = 2.2 × (25 + 25 − 2.2) = 2.2 × 47.8 = 105.16 m².

Convert area to dm²: 1 m² = 100 dm² => 105.16 × 100 = 10516 dm².

Total cost = 10516 × Rs. 1 = Rs. 10,516.

Therefore The correct answer is Rs. 10,516.

Alternate Method

Given: Side of square park (a) = 25 m, Width of path (w) = 2.2 m, Cost = Rs. 1/dm².

=> Area of Path 1 (Horizontal) = length × width = 25 × 2.2 = 55 m²

=> Area of Path 2 (Vertical) = length × width = 25 × 2.2 = 55 m²

=> Common Intersection Area = width × width = 2.2 × 2.2 = 4.84 m²

=> Total Path Area = (55 + 55) − 4.84 = 105.16 m²

=> Conversion: 1 m = 10 dm Therefore 1 m² = 100 dm²

=> Total Area in dm² = 105.16 × 100 = 10,516 dm²

=> Total Cost = Area in dm² × Rate = 10,516 × 1 = Rs. 10,516

Therefore The correct answer is Rs. 10,516.

Additional Information

Path area formulas

For paths outside a rectangle: Area = 2w(L + B + 2w). For paths inside a rectangle: Area = 2w(L + B − 2w).

Unit conversion

1 meter = 10 decimeters (dm). Therefore, 1 square meter = 10^2 = 100 square decimeters (dm²).

Central cross paths

When paths intersect at the center, always subtract the square of the width (w^2) once as it is counted twice in the calculation.

Q98. Answer: (d) -35.84

=> (3.6 + 6.4) (3.6 – 6.4) – (3.6 – 6.4)² = ?

=> 10 × (-2.8) – (-2.8)² = ?

=> -28 – 7.84 = ?

=> -35.84 = ?

Follow BODMAS rule to solve this question, as per the order given below:

Step-1: Parts of an equation enclosed in 'Brackets' must be solved first, and in the bracket,

Step-2: Any mathematical 'Of' or 'Exponent' must be solved next,

Step-3: Next, the parts of the equation that contain 'Division' and 'Multiplication' are calculated,

Step-4: Last but not least, the parts of the equation that contain 'Addition' and 'Subtraction' should be calculated.

Q99. Answer: (d) Dharamshala

The correct answer is option 4 i.e Dharamshala.

• Dharamshala is the second capital of Himachal Pradesh.

• On 19 January 2017, Chief Minister Virbhadra Singh declared Dharamshala the second capital of the state of Himachal Pradesh, making Himachal Pradesh the third state of India with two capitals after Jammu and Kashmir and Maharashtra.

• Dharamshala was chosen as one of the 100 Indian cities to be developed as a smart city under the flagship of PM Narendra Modi's Smart Cities Mission.

• Dharamshala is the headquarters of the Kangra district of Himachal Pradesh.

• The district of Kangra was part of the British province of Punjab. The administrative headquarters of the district were originally in Kangra but moved to Dharamshala in 1855.

• Shimla is the capital city of Himachal Pradesh.

Q100. Answer: (c) Only argument I is strong.

Argument 1: This is strong, because providing subsidised fertilizers will increase the income of the farmers.

Argument 2: This is not strong, because nothing is mentioned about people's money in the statement.

Hence, "only argument 1" is strong.

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