RRC Group D Previous Year Paper 26 (Held On: 22 Sept 2018 Shift 3)

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

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CBT

Q1. Who is the recipient of the Prime Minister's Award for outstanding contribution to promotion and development of yoga in 2018?

(a) Tirumalai Krishnamacharya
(b) K. Pattabhi Jois
(c) B. K. S. Iyengar
(d) Vishwas Mandlik

Q2. What is the maximum amount of work done in 10 s by a 20 kW engine?

(a) 20 KJ
(b) 200 KJ
(c) 25 KJ
(d) 2 KJ

Q3. Arjun started a task and left it after working for 2 days. Then, Bharath was called and he completed the task in 9 days, If Arjun alone had worked for 3 days, Bharath alone would have finished the remaining work In 6 days. In how many days can Arjun alone complete the task?

(a) 8 days
(b) 12 days
(c) 5 days
(d) 10 days

Q4. The mean of the 6 smallest numbers from a group is 15 while the mean of all the 14 members of the group taken together is 17. What is the mean of the 8 largest numbers?

(a) 18.25
(b) 17.25
(c) 18.75
(d) 18.50

Q5. The time duration that would elapse between 2:38 p.m. of 11 May 2023 and 2:29 p.m. of 13 May 2024 is:

(a) 368 days 9 minutes
(b) 367 days 9 minutes
(c) 366 days 23 hours 51 minutes
(d) 367 days 23 hours 51 minutes

Q6. Consider the given statement to be true if it seems to be at variance with the commonly known facts and decide which of the conclusions logically follow(s) from the statement.

Statement:

The grass is always greener on the other side of the fence.

Conclusions:

I. Humans are never completely satisfied with where they are in life.

II. Humans see their own flaws more vividly and don't consider the possibility that they may have the greener side.

(a) Only conclusion I follows.
(b) Both conclusions I and II follows.
(c) Only conclusion II follows.
(d) Neither conclusion I nor II follows.

Q7. Who is the first Pakistani to score a double century in ODIs?

(a) Sarfraz Ahamed
(b) Saeed Anwar
(c) Fakhar Zaman
(d) Imam- Ul - Haq

Q8. Which of the following former or current Chief Ministers of India had earlier served as Priest of a temple?

(a) Yogi Adityanath
(b) Vijay Rupani
(c) Mayawati
(d) Manohar Parrikar

Q9. Pemba Island is famous for the cultivation of which of the following?

(a) coffee
(b) Rice
(c) Wheat
(d) Cloves

Q10. The enzyme _____, present in the pancreatic juice, converts proteins to amino acids.

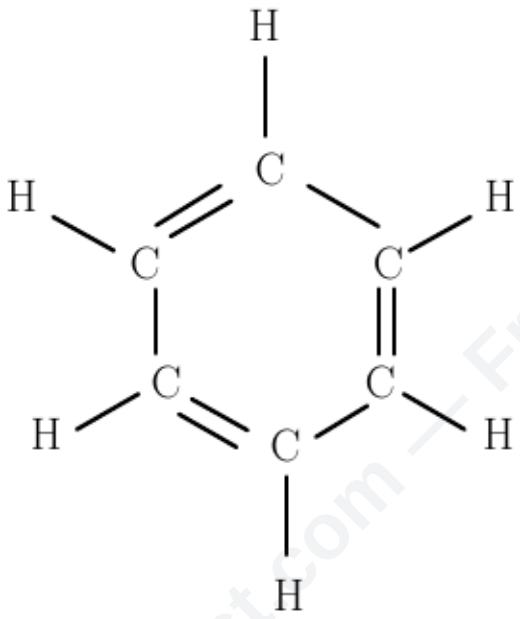
(a) Pepsin
(b) Lipase
(c) Trypsin
(d) Amylase

Q11. Gandhiji launched the Non-Cooperation Movement in a small village called Champaran. In which current Indian state is champaran located?

(a) Maharashtra
(b) West Bengal
(c) Gujarat
(d) Bihar

Q12. What is the name of the compound shown in the below structure?

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(a) Cyclohexane
(b) Benzene
(c) Cycloheptane
(d) Naphthalene

Q13. What will be the acute angle between the hour hand and the minute hand at 6:25 p.m.?
(a) 30°
(b) 40.5°
(c) 42.5°
(d) 35.5°

Q14. The first three terms of a proportion are 3, 5, and 21, respectively. Find its fourth term.
(a) 25
(b) 30
(c) 35
(d) 20

Q15. Linen is related to cloth in the same way as Gold is related to:
(a) Yellow
(b) Metal
(c) Jeweller
(d) Hard

Q16. The angle of depression of the foot of a building from the top of a tower $32\sqrt{3}$ m high is 60°. How far away from the building is the tower?
(a) 32 m
(b) 16 m
(c) $16\sqrt{3}$ m
(d) $32\sqrt{3}$ m

Q17. In ΔABC, D and E are points on AB and AC respectively such that DE is parallel to BC. If AD = 2 cm, BD = 3 cm, then (ar(Δ ADE))/(ar(Δ ABC))is:
(a) 4/9
(b) 16/81
(c) 4/25
(d) 2/5

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Q18. What will be the unit digit in 3^{31} ?

(a) 7
(b) 1
(c) 9
(d) 3

Q19. What is the least number added to 4042 to make it a perfect square?

(a) 64
(b) 41
(c) 58
(d) 54

Q20. Read the given statement(s) and conclusions carefully and select which of the conclusions logically follow(s) from the statement(s)

Statement:

All brooms are plastic.

All plastics are handles.

Conclusions:

1. All brooms are handles.

2. No plastic is a broom.

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

Q21. The _____ consists of relatively unspecialised cell with thin cell well.

(a) phloem
(b) sclerenchyma
(c) parenchyma
(d) collenchyma

Q22. Consider the given statement and decide which of the following assumptions is are implicit in the statement.

Statement:

The headmistress announced, “From now on, every Wednesday, a student from Class XI should come forward to recite poetry in the Assemble”.

Assumptions;

I. The headmistress want children to develop interest in English.

II. The headmistress wants children to get rid of stage fear.

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

Q23. As per RBI Annual Report 2016-17, what is the estimated value of demonetised banknotes received?

(a) Rs. 19.48 lakh crore
(b) Rs. 12.25 lakh crore
(c) Rs. 13.35 lakh crore
(d) Rs. 15.28 lakh crore

Q24. Who won the BCCI Lifetime achievement award for Women at the BCCI Annual Awards held in Bengaluru in March 2017?

(a) Shubhangi Kulkarni
(b) Diana Edulji

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(c) Shanta Rangaswamy
(d) Purnima Rau

Q25. Choose the one that does NOT belong to the group.

(a) Cantaloupe
(b) Lily
(c) Lotus
(d) Jasmine

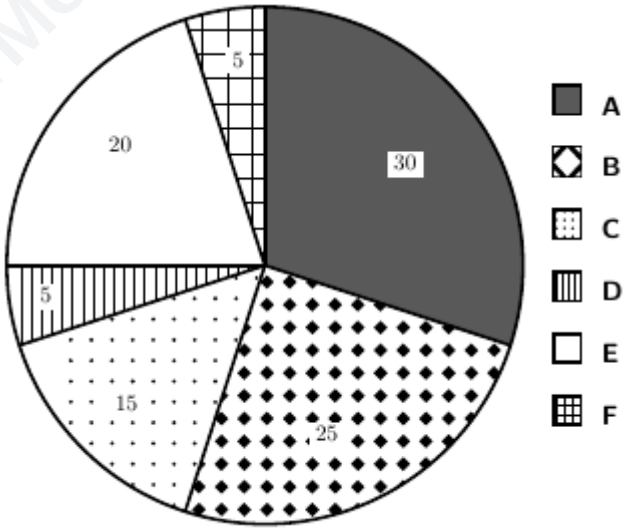
Q26. _____ is not a sexually transmitted disease.

(a) Candidiasis
(b) Syphilis
(c) Gonorrhea
(d) Warts

Q27. If no force is applied to a moving object, then it will stop due to _____.

(a) Tension
(b) Momentum
(c) Impulse
(d) Friction

Q28. The given pie chart shows information about Non-Performing Assest (NPA) processed by the various banks of India till December 2017.



If the total NPAs under all the banks are worth Rs. 300 lakh crores, then NPAs worth how much (in rs. Lakh crores) does Bank B contain till December 2017?

(a) 50
(b) 75
(c) 25
(d) 100

Q29. Find the smallest four-digit number that is divisible by 47.

(a) 1200
(b) 1025
(c) 1360
(d) 1034

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Q30. When washing soda reacts with hydrochloric acid _____ gas is evolved.

(a) Oxygen
(b) Carbon monoxide
(c) Carbon dioxide
(d) Hydrogen

Q31. Find the next term in the following series.

4A, 7B, 12D, 19G,?

(a) 28K
(b) 28P
(c) 26U
(d) 27G

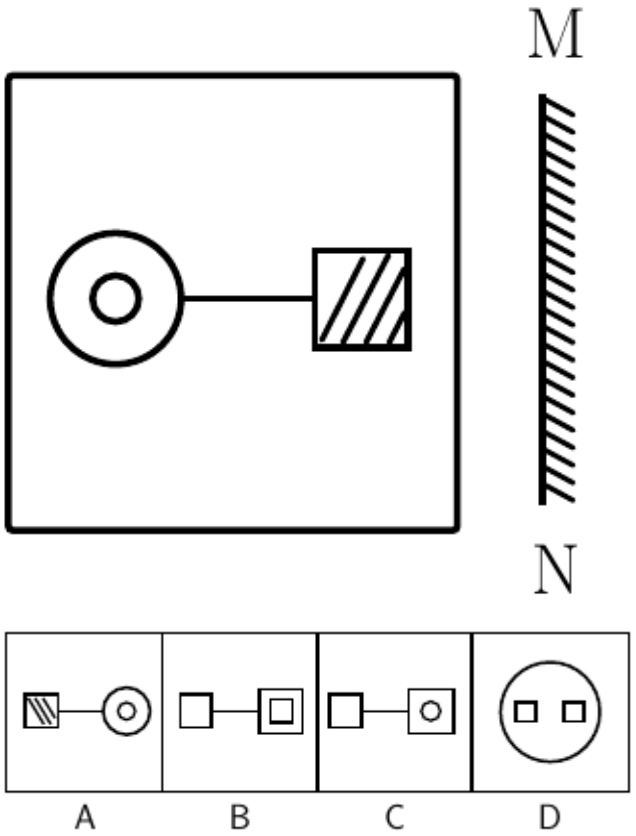
Q32. A square field of area 31684 sq. meters is to be enclosed with wire placed at heights 1, 2, 3, 4 meters above the ground. What length of the wire will be required, if the length required for each wire is 5% greater than the perimeter of the field?

(a) 2099 m
(b) 2309 m
(c) 2990.4 m
(d) 2090 m

Q33. If the speed of a cycle become two times, then the kinetic energy becomes _____.

(a) 2 times
(b) 4 times
(c) 8 times
(d) 16 times

Q34. Choose the mirror image for the following figure when the mirror is kept at the MN line.



(a) C
(b) A

(c) B
(d) D

Q35. Avogadro number is represented by _____.
(a) A_v
(b) AN
(c) N^0
(d) N_A

Q36. _____ is not an actinoid.
(a) Terbium
(b) Fermium
(c) Nobelium
(d) Thorium

Q37. 'Kalamakari', a Painting form recently seen in the news belongs to which Indian state?
(a) Andhra Pradesh
(b) Tamil Nadu
(c) Maharashtra
(d) Rajasthan

Q38. If $x = (\sqrt{3} + 1)/2$; then find the value of $4x^3 + 2x^2 – 8x + 7$.
(a) 10
(b) 4
(c) 8
(d) 6

Q39. An element has an atomic number of 20 with which of the following elements will it show similar chemical properties.
(a) Be(4)
(b) Fe(26)
(c) Sc(21)
(d) B(5)

Q40. Name the company that has adopted the maintenance of Charminar in Hyderabad as part of the Swatch Bhart Mission.
(a) Infosys
(b) NTPC
(c) ONGC
(d) L&T

Q41. _____ is the only non-metal present in Group 1 of the Modern Periodic Table.
(a) Cobalt
(b) Rubidium
(c) Potassium
(d) Hydrogen

Q42. A body of mass 30 kg moves with an initial speed of 20 m/s. If a retarding force of 60 N is applied, how long will the body body take to stop?
(a) -10 s
(b) 10 s
(c) 9 s
(d) 0.10 s

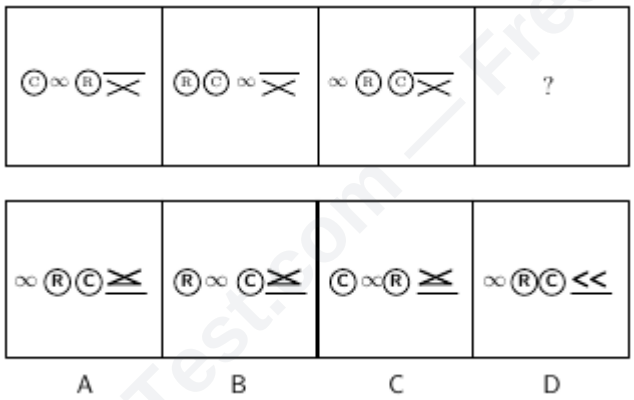
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Q43. What is the next term in the following series?

3, 2, 13, 12, 23, 22, _____.

(a) 33
(b) 32
(c) 21
(d) 29

Q44. Select the option figure that will complete the series of question figures.



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

Q45. Echoes are heard due to the phenomenon of _____.

(a) Reflection of sound waves
(b) Resonance
(c) Interference of sound waves
(d) Refraction of sound waves

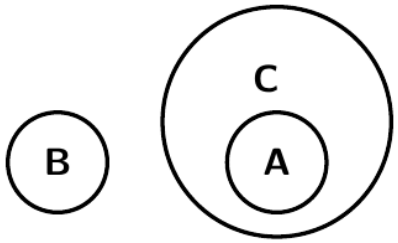
Q46. A _____ is a unisexual flower.

(a) Gulmohar
(b) Hibiscus
(c) Mustard
(d) Papaya

Q47. Which of the following correctly represents the relationship between:

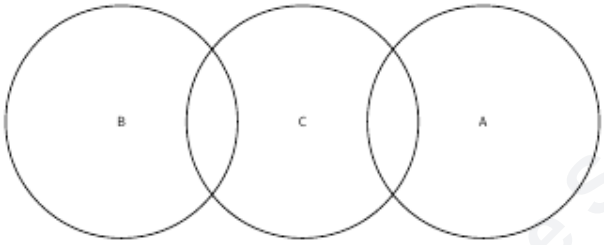
A) Vegetation
B) Jupiter
C) Earth

(a)

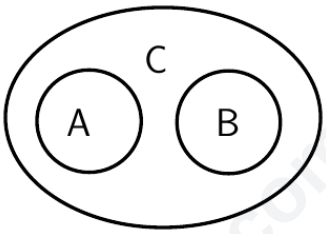


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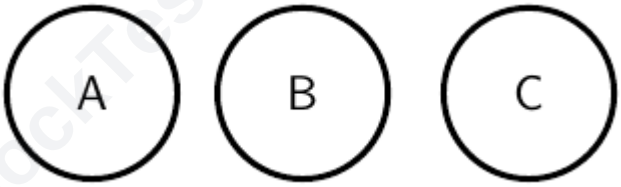
(b)



(c)



(d)



Q48. Who has been awarded “Bharat Gaurav Award” 2017 in Science and Technology category?

(a) Arun K. Tripathi
(b) Anil K. Tripathi
(c) Arun K. Tiwari
(d) Anil K. Tiwari

Q49. Read the given statements(s)and conclusions carefully and select which of the conclusions logically follow(s) from the statements(s).

Statement:

Some pins are sharp.

All Sharp are metals.

Conclusions:

1. All metals are pins.

2. Some metals are sharp.

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

Q50. A molecule of Oxygen has _____.

(a) a double covalent bond
(b) an electrovalent bond
(c) a triple covalent bond
(d) a single covalent bond

Q51. If the sides of a square are increased by 30%, find the % increase in its area.

(a) 79%
(b) 68%
(c) 69%
(d) 65%

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Q52. When phenolphthalein is added to vinegar, the solution become _____.

(a) blue
(b) red
(c) pink
(d) colourless

Q53. If an object moves with a velocity of 60 m/s, how long will it take to travel 480 m.

(a) 7 s
(b) 8 s
(c) 0.8 s
(d) 80 s

Q54. Two football teams, Team A and Team B, Played in a tournament and scored the following number of goals over 4 matches. What is their average score?

Games	Goals by Team A	Goals by Team B
Game 1	2	3
Game 2	1	2
Game 3	1	2
Game 4	4	5

(a) Team A : 2, Team B : 4
(b) Team A : 2, Team B : 3
(c) Team A : 3, Team B : 2
(d) Team A : 1, Team B : 3

Q55. Who among the following is the author of the book 'Indira Gandhi – A Life in Nature'?

(a) Jairam Ramesh
(b) Natwar Singh
(c) Sonia Gandhi
(d) Priyanka Vadra

Q56. Read the given question and decide which of the following statements is/are sufficient to answer the question.

What is the number of students in the class?

Statements:

1) The class contains 10^(th) class students.

2) The class contains 6 girls and 8 boys.

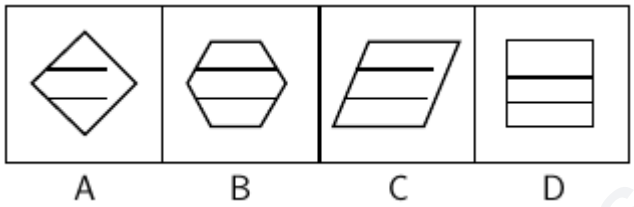
(a) Only 2 is sufficient.
(b) Neither 1 nor 2 is sufficient.
(c) Only 1 is sufficient.
(d) Either 1 or 2 is sufficient.

Q57. A 156.5 m long train, traveling at 57 km/hr, crosses a platform in 39 seconds. What is the length of the platform?

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

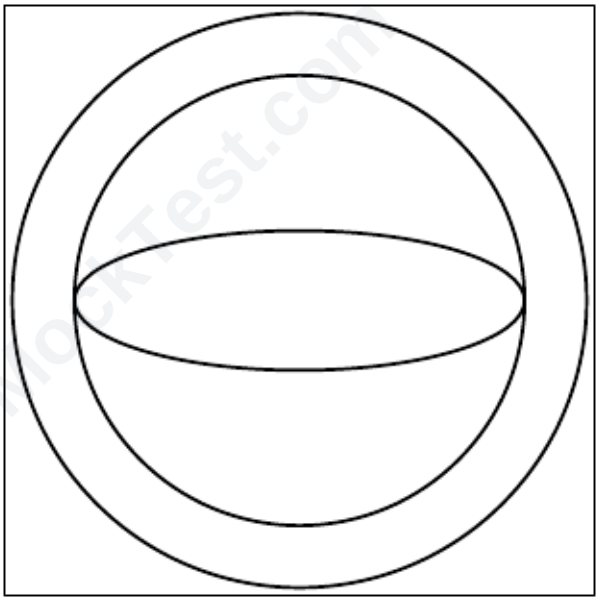
Q58. Find the odd one out.

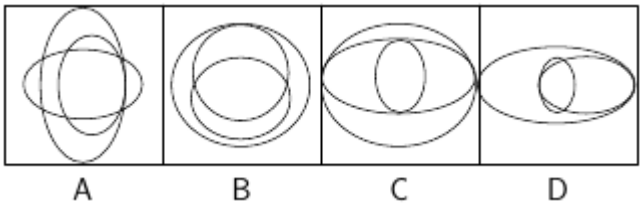
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(a) D
(b) C
(c) B
(d) A

Q59. Which of the option figures bears the closest resemblance to the question figure?





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

Q60. John is facing in the west direction during the morning yoga. He turns 90° clockwise and then 270° anticlockwise. In which direction is he facing now?

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

Q61. Name the director of the blockbuster movie ‘Bahubali’.

(a) Madhur Bhandarkar
(b) S. S. Rajamouli
(c) Prabhu Deva
(d) Karan Johar

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Q62. The rate of change of momentum of a body is directly proportional to the _____.

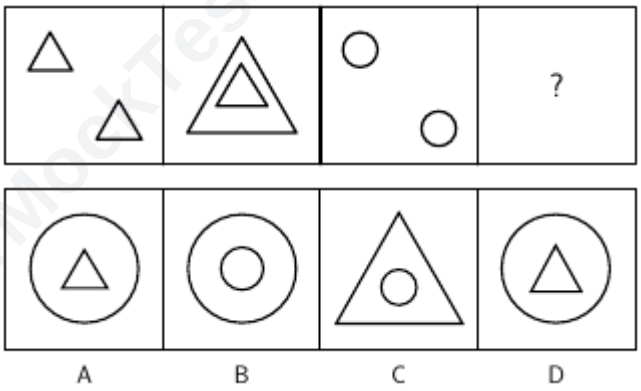
(a) Applied potential energy
(b) Applied force
(c) Applied displacement
(d) applied pressure

Q63. Select the one that does not belong to the below group.

A. aluminium
B. Iron
C. Bakelite
D. Brass

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

Q64. Which answer figure will come next in the given problem figure series?



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

Q65. The element of the Lanthanide series having the atomic number 58 is _____.

(a) Cerium
(b) Lanthanum
(c) Thorium
(d) Strontium

Q66. Which of the following factors does NOT affect the resistance of a conductor?

(a) Pressure
(b) Material
(c) Area of cross section
(d) Length

Q67. Read the statement (s) and conclusions carefully and select which of the conclusions logically follow(s).

Statement:
All flowers are petals.
All petals are soft.
Conclusions:
1. All flowers are soft.
2. Some soft are petal.

(a) Only conclusion 2 follows

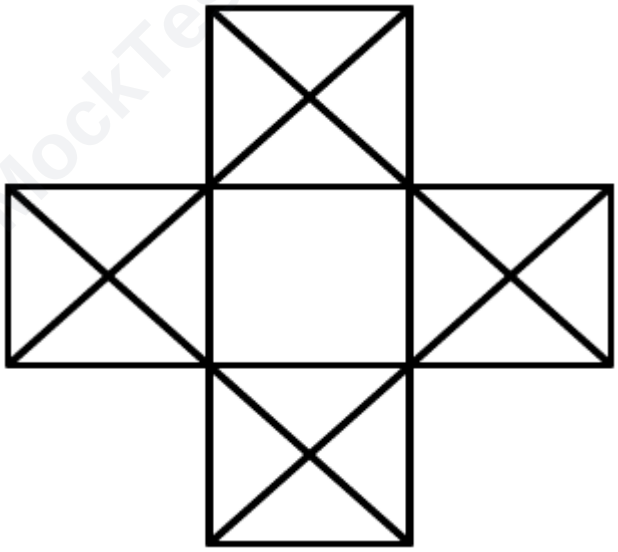
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(b) Neither conclusion follows.
(c) Only conclusion 1 follows
(d) Both conclusions follow.

Q68. Satheesh reads a novel in 6 days. On each day, he reads it for 13/4 hours. How many hours does he take to complete the novel?
(a) 71/2 hours
(b) 101/2 hours
(c) 111/2 hours
(d) 91/2 hours

Q69. Which scheme has been launched by the union government for promoting solar farming?
(a) Krishin urja Suraksha evam Utthaan Mahaabhiyan
(b) Kisan Urja Suraksha evam Utthaan Mahaabhiyan
(c) Kisan Urja Suraksha evam Unnati Mahaabhiyan
(d) Kusum Urja Suraksha evam Utthaan Mahaabhiyan

Q70. How many triangles are there in the following figure?



(a) 32
(b) 40
(c) 44
(d) 42

Q71. Priyamvada's present age is five years more than twice the age of his cousin Ritika. Sixteen years from now Priyamvada's age will be 150% of that of Ritika's. What is Priyamvada's present age (in years)?
(a) 23
(b) 33
(c) 17
(d) 26

Q72. The interest on Rs. 1,250 for 15 years at the rate of 1.6% simple interest per annum will be:
(a) Rs. 350
(b) Rs. 375
(c) Rs. 360
(d) Rs. 300

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Q73. Find the next letter-pair in the following series.

BT, EQ, HN, ?

(a) GC
(b) KZ
(c) KG
(d) KK

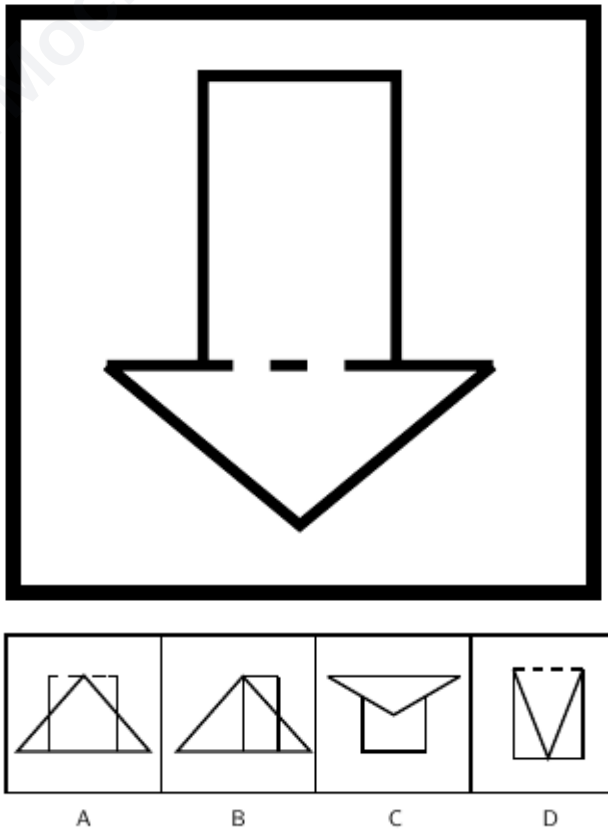
Q74. With reference to retail payments and settlement systems, what is the full form of NPCI?

(a) National Payment Consortium of India
(b) National Payments corporation of India
(c) National Piracy Council of India
(d) National Protection Council India

Q75. Two horses cover the same distance at the rate of 10 km/hr and 15 km/hr, respectively. The distance traveled when one takes 12 minutes longer than the other is:

(a) 2 km
(b) 4 km
(c) 6 km
(d) 8 km

Q76. Which pattern will the given transparent sheet resemble when it is folded at the dotted line?



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

Q77. In animal cells, _____ epithelium forms the inner lining of the kidney to provide mechanical support.

(a) Glandular
(b) Cuboidal
(c) Columnar

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(d) Squamous

Q78. Where is the Kandaleru Dam located?

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

Q79. If, in a certain code language, LET is coded as12520, then how will WIN be coded in the same language?

(a) 23915
(b) 21914
(c) 23914
(d) 24915

Q80. Tejal has a 40% stake and Ashank has a 60% stake in a partnership firm. On average, if Tejal makes a Rs. 10,00,000 profit a year, how much does Ashank make?

(a) Rs. 24 lakh
(b) Rs. 15 lakh
(c) Rs. 25 lakh
(d) Rs. 30 lakh

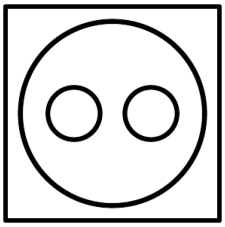
Q81. The initial ratio of sugar and flour in the dough was 4 : 7 With 22 kg of the dough. Justine added more flour to make the sugar to flour ratio 2 : 5. How much flour did Justine later added?

(a) 4 kg
(b) 6 kg
(c) 8 kg
(d) 2 kg

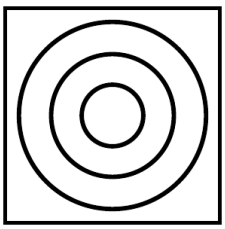
Q82. Choose the most suitable Venn diagram for the following words. Jk

Metal, Platinum, Oxygen

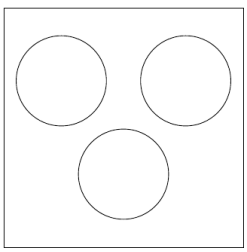
(a)



(b)

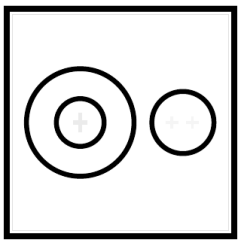


(c)



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(d)



Q83. How much less is 28.8 km than 42.3 km.

(a) 13.5 km
(b) 1.354 km
(c) 1.25 km
(d) 12.5 km

Q84. Which of the following numbers is irrational?

(a) √16
(b) 6√1
(c) 4√4
(d) cbrt8

Q85. The loudness of the Sound produced by a radio increases by _____.

(a) increasing the frequency
(b) increasing the amplitude
(c) increasing the wavelength
(d) increasing the pitch

Q86. Given is a statement followed by two assumptions numbered I and II. Consider the statement and the following assumptions and decide which of the assumptions and decide which of the assumptions is/are implicit in the statement.

Statement:

The safety, quality and nutritional value of the food we eat is of fundamental importance to our health and well-being.

Assumptions:

I. Food safety encompasses not only the prevention of gastro-intestinal illnesses caused by bacteria and viruses, but also the avoidance of harm form chemical contamination and the ingestion of unwanted physical contaminants.

II. Monitoring and enforcement of food safety requirements should be carried out by a rangeof professionally qualified officers.

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

Q87. 92 – [71 + {4 – (5 – (4 – 2))}] = ?

(a) 12
(b) 21
(c) 15
(d) 20

Q88. As of 2018, who is the CEO of NITI Aayog?

(a) Amitabh Kant
(b) Narendra Modi
(c) Arvind Panagariya
(d) Arvind Subramanian

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Q89. Find the energy possessed by a stationary object at a height of 6 m and with a mass of 50 kg. (g = 10m/s²)

(a) 3000 J
(b) 3 × 10^4 J
(c) 300 J
(d) 30 J

Q90. In December 2017, with which country did India sign a pact for socio-economic development of Rakhine State?

(a) Japan
(b) China
(c) Maldives
(d) Myanmar

Q91. Srinivas is four times as old as his daughter. Five years ago, Srinivas was nine times as old as his daughter was at that time. His daughters present age is:

(a) 10 years
(b) 8 years
(c) 6 years
(d) 5 years

Q92. _____ have similar chemical properties but different atomic masses.

(a) Isomers
(b) Isotopes
(c) Actinides
(d) Isobars

Q93. In which year was the regulation passed to ban the practice of Sati?

(a) 1840
(b) 1852
(c) 1837
(d) 1829

Q94. Name the country which won the 2017 Women's Hockey asia Cup title?

(a) Nepal
(b) India
(c) Bangladesh
(d) Pakistan

Q95. Consider the given statement(s) and decide which of the given assumption(s) is/are implicit in the statement.

Statement:

Students should be encouraged to participate in debates.

Assumptions:

I. They will learn convincing skills.

II. Their communication skills will be enhanced.

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

Q96. Who among the following has been awarded Crystal award on 22^(nd) January 2018 at WEF, World Economic forum Annual Summit held at Davos?

(a) Sundar Pichai
(b) Raghuram Rajan
(c) Shah Rukh Khan
(d) Narendra Modi

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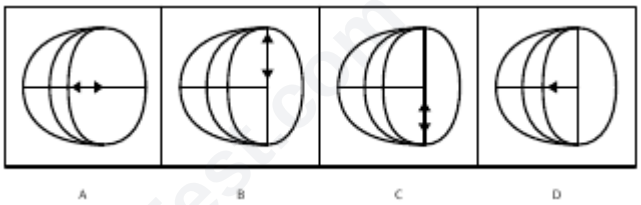
Q97. Based on the arithmetic reasoning, find the number that is different from other options in the given list of numbers.

(a) 125
(b) 100
(c) 343
(d) 216

Q98. Which of the following statements regarding a rectangle is correct?

(a) Its diagonals are equal and divide each other equally at the right angle.
(b) Its diagonals are perpendicular to each other
(c) Its diagonals are equal and divide each other equally.
(d) It diagonals divide each other equally at the right angle.

Q99. Find the odd one out.



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

Q100. The mean of 100 observations is 50. If one observation which was 60 is replaced by 160, the resulting mean will be:

(a) 50.5
(b) 51
(c) 52
(d) 51.5

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) Vishwas Mandlik

• Vishwas Mandlik was the recipient of the Prime Minister’s Award for outstanding contribution to promotion and development of yoga in 2018.
• He was the founder of the "Yoga Vidya Dham".
• He has written many books and presented research papers in different International Yoga Conferences.
• 2019 Prime Minister's Award for outstanding contribution for promotion and development of Yoga-Antonietta Rozzi of Italy, Japan

Yoga Niketan, Swami Rajarshi Muni of Life Mission, Gujarat, and Bihar School of Yoga, Munger.

• Tirumalai Krishnamacharya was also an Indian yoga teacher in the 20th century.

• K. Pattabhi Jois developed and popularized the vinyāsa style of yoga known as Ashtanga Yoga.

• B. K. S. Iyengar was an eminent yoga teacher. He regularly taught and popularized Hatha Yoga.

Q2. Answer: (b) 200 KJ

CONCEPT:

• Work: When a force is applied on a body and there is a displacement of the body in the direction of force then the work is said to be done by the force.

Work (W) = Force (F) × Displacement (S)

• The SI unit of work is Joule. 1 Joule (J) = 1 Nm

• Power: The rate of work done is power.

Power (P) = work (W) / time (t) (P = W / t = J / s)

CALCULATION:

Given that:

Time (t) = 10 seconds and Power (P) = 20KW = 20,000 Watts.

Work done (W) = Power (P) × Time (t) = 20,000 × 10 = 2,00,000 J = 200 KJ

• Hence, the amount of work done is 200 KJ. So option 2 is correct.

Q3. Answer: (c) 5 days

Shortcut Trick

Compare the two cases of work distribution:

Case 1: Arjun (2 days) + Bharath (9 days) = Total Work

Case 2: Arjun (3 days) + Bharath (6 days) = Total Work

Difference: 1 extra day of Arjun reduces 3 days of Bharath work.

Therefore Work of 1 day of Arjun = Work of 3 days of Bharath. Efficiency Ratio (A:B) = 3 : 1.

Total work = (2 × 3) + (9 × 1) = 6 + 9 = 15 units. Arjun alone = 15 ÷ 3 = 5 days.

Therefore The correct answer is 5 days.

Alternate Method

Person	Days (Case 1)	Days (Case 2)	Efficiency Ratio
Arjun (A)	2	3	A × 1 = B × 3 A/B = 3/1
Bharath (B)	9	6	

Let efficiency of Arjun be A and Bharath be B.

=> Total Work (TW) = 2A + 9B = 3A + 6B

=> 9B − 6B = 3A − 2A

=> 3B = 1A

=> A/B = 3/1 (Efficiency of Arjun = 3, Efficiency of Bharath = 1)

=> Total Work = (2 × 3) + (9 × 1) = 6 + 9 = 15 units

=> Days taken by Arjun alone = Total Work ÷ Efficiency of Arjun

=> Days = 15 ÷ 3 = 5 days

Therefore The correct answer is 5 days.

Additional Information

Work-Efficiency Relationship

Total Work = Efficiency × Time. Efficiency is inversely proportional to the time taken to complete a task.

Work Equality Method

When the same task is performed by different combinations of people, equate the linear equations to find the ratio of their efficiencies.

Q4. Answer: (d) 18.50

Shortcut Trick

Total mean of 14 numbers is 17.

Mean of 6 numbers is 15, so deviation is 15 − 17 = −2 per number.

Total deviation for 6 numbers = 6 × (−2) = −12.

To balance the total deviation to zero, the remaining 8 numbers must provide a deviation of +12.

Average deviation for 8 largest numbers = +12 ÷ 8 = 1.5.

Required Mean = 17 + 1.5 = 18.5.

Therefore The correct answer is 18.50.

Alternate Method

Given:

Number of smallest members (n1) = 6, Mean (x1) = 15

Total members (N) = 14, Total Mean (X) = 17

Remaining members (n2) = 14 − 6 = 8

Formula used:

Total Sum = Mean × Number of items

Calculations:

=> Sum of all 14 members = 14 × 17

=> Sum of all 14 members = 238

=> Sum of 6 smallest numbers = 6 × 15 = 90

=> Sum of 8 largest numbers = Total Sum − Sum of 6 smallest

=> Sum of 8 largest numbers = 238 − 90 = 148

=> Mean of 8 largest numbers = 148 ÷ 8

=> Mean of 8 largest numbers = 18.5

Therefore The correct answer is 18.50.

Additional Information

Weighted Average Formula

The combined mean of two groups is given by X = (n1x1 + n2x2) ÷ (n1 + n2), where n is the number of items and x is the mean.

Properties of Arithmetic Mean

The sum of the deviations of a set of values from their arithmetic mean is always zero (Σ(x − X) = 0).

Effect of Constant on Mean

If every number in a dataset is increased or decreased by a constant value 'k', the mean also increases or decreases by the same constant 'k'.

Q5. Answer: (d) 367 days 23 hours 51 minutes

Given:

Day	11 May 2023	13 May 2024
Time	2:38 pm	2:29 pm

Concept:

Firstly we have to calculate the number of days and then the time followed by it.

For Calculate Number of Days, we have to find the exact days i.e., from 11 May 2023 to 12 May 2024 (as Time period for 13^(th) May 2024 is less than 24 hours)

Number of Days in normal year = 365 days

Number of days in leap year = 366 days (and the extra day falls on February)

Calculation:

Number of Days = 11 May 2023 to 12 May 2024 = 367 days (As 2024 is a leap year)

Time = 12^(th) May 2024 (2:38 pm) to 13^(th) May 2024 (2:29 pm)

The difference in Time = 23 hours 51 minutes

Therefore Required Answer = 367 days 23 hours 51 minutes

While calculating the number of Days, we use 365 days instead of 366 days (as they considered the year is not completed).

While calculating the time duration, Many of the candidates subtracted bigger value to smaller i.e, 38 minutes - 29 minutes (which is incorrect). We have to find the time difference from 38 minutes to 60 minutes first (i.e, 22 minutes) and then added these 22 minutes in 29 minutes of the next hour. (22 + 29 = 51 minutes).

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Q6. Answer: (a) Only conclusion I follows.

Conclusion 1: This follows, the proverb given in the statement, means the same as given in conclusion. Humans always do not consider their possibilities and they are not satisfied in their life.

Conclusion 2: This does not follow as anything related to the conclusion is not given in the statement.

Hence, “only conclusion 1” follows.

Q7. Answer: (c) Fakhar Zaman

• Fakhar Zaman is the first Pakistani cricket player to score a double century in ODIs.

• He made 210 runs off 156 balls against Zimbabwe in the fourth ODI at Bulawayo in 2018. He became the sixth international batsman to make double-hundreds in ODIs.

• Batsmen who have scored double centuries in ODI- Rohit Sharma, Martin Guptill, Virendra Sehwag, Chris Gayle, Sachin Tendulkar, Fakhar Zaman.

• Rohit Sharma is the only player to score three double-centuries in ODI.

Q8. Answer: (a) Yogi Adityanath

• Yogi Adityanath had earlier served as Priest of a temple.

• He is the current Chief Minister of Uttar Pradesh.

• He is the head priest of the Gorakhnath Math which is a Hindu temple in Gorakhpur.

• He became a disciple of Mahant Avaidyanath at the age of 21 after renouncing his family in 1993. After the death of Avaidyanath, Adityanath became the head priest.

• Vijay Rupani is the chief minister of Gujarat.

• Mayawati is the former Chief Minister of Uttar Pradesh.

• Late Manohar Parrikar served as Chief Minister of Goa. He was also the Minister of Defense.

Q9. Answer: (d) Cloves

Pemba Island is famous for the cultivation of cloves.

• This island is part of the Zanzibar Archipelago of Tanzania (coast of East Africa). It is in the Indian Ocean.

• Clove is the dried unopened flower buds of Syzygium aromaticum. Indonesia, Zanzibar, and Madagascar are the major producers of cloves.

• Clove is a tropical plant and it requires a warm humid climate. However, Cloves are best suited in deep black loam soil with high humus content found in the forest region.

• When a coffee plant is planted, it starts to produce flowers in three to four years. The cherries appear from these flowers. When the cherries ripe, it changes color from green to red and they are harvested. They are best grown in deep sandy loam. They are primarily produced in Brazil, Vietnam, Colombia, Indonesia, etc.

• Rice is one of the most cultivated crops in India as well as in Asian countries. It is a staple diet of a major part of India. It is grown successfully in humid to sub-humid regions under a subtropical and temperate climate.

• Wheat is one of the world's most commonly consumed cereal grains. Loam soil is the best for wheat cultivation.

Q10. Answer: (c) Trypsin

• The enzyme Trypsin is present in the pancreatic juice, converts proteins to amino acids.

• It helps in the digestion of proteins. Trypsin breaks down proteins in the small intestine and hence continuing the process of digestion. Please note that it is produced by the pancreas in an inactive form called trypsinogen.

• Pepsin is also an enzyme in gastric juice that digests proteins. Glands in the mucous-membrane which line the stomach make and store an inactive protein known as pepsinogen. When pepsinogen is released into the stomach and mixed with gastric juice, it is converted into pepsin.

• Pepsin partially degrades proteins into smaller units called peptides.

• Lipase is also an enzyme that helps in absorbing fats. This enzyme is also released by Pancreas.

• Amylase is also an enzyme that catalyzes the hydrolysis of starch into sugars such as glucose and maltose. It made by your pancreas and by glands in and around our mouth and throat. It helps to digest carbohydrates.

Q11. Answer: (d) Bihar

• Gandhiji launched the Champaran Satyagraha in a small village called Champaran. It is in Bihar.

• The Champaran Satyagraha of 1917 was the first Satyagraha movement led by Gandhi.

• The satyagraha made as the farmers were forced to grow indigo without any payment for it.

• Gandhiji reached Champaran at the request of Rajkumar Shukla, where he started an effort to free the farmers suffering from the Tinkathia system.

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• Gandhiji received the support of two persons Rajendra Prasad and Anugraha Narayan Sinha during this movement.

Q12. Answer: (b) Benzene

• This is a structure of Benzene (C6H6).

• It is an organic chemical compound. It is found in crude oil and is a major part of gasoline.

• It is a widely used industrial chemical. Benzene is used in making plastics,synthetic fibers, rubber lubricants, dyes, drugs, pesticides, etc.

• Cyclohexane (C6H12) is an alicyclic hydrocarbon comprising a ring of six carbon atoms. It is widely used as a raw material in the manufacture of nylon.

• Cycloheptane (C7H14) is also a cycloalkane and a colorless liquid. It is used to make other chemicals.

• Naphthalene (C10 H 8) is a polycyclic aromatic hydrocarbon. It is obtained from either coal tar or petroleum distillation. It has been used in mothballs and moth flakes.

Q13. Answer: (c) 42.5°

Distance between hour hand and minute is = 5 min

As we know,

60 min = 360°

=> 1 min = 6°

=> 5 min = 5 × 6° = 30°

Therefore Required angle = 30° + 25/2 = 30° + 12.5° = 42.5°

Q14. Answer: (c) 35

Shortcut Trick

In a proportion a : b :: c : d, the product of extremes equals the product of means.

Fourth term (d) = (Second term × Third term) ÷ First term

=> d = (5 × 21) ÷ 3 = 5 × 7 = 35

Therefore The correct answer is 35.

Alternate Method

Given: First three terms are 3, 5, and 21.

Formula Used: If a, b, c, d are in proportion, then a/b = c/d.

Calculations:

Let the fourth term be x.

=> 3 : 5 :: 21 : x

=> 3/5 = 21/x

=> 3 × x = 21 × 5

=> x = (21 × 5) / 3

=> x = 7 × 5

=> x = 35

Therefore The correct answer is 35.

Additional Information

Mean Proportional

The mean proportional between two numbers a and b is √(a × b).

Third Proportional

If a, b, c are in continued proportion (a:b = b:c), then the third proportional c = b^2/a.

Properties of Proportion

Invertendo (b/a = d/c), Alternando (a/c = b/d), and Componendo & Dividendo ((a+b)/(a−b) = (c+d)/(c−d)).

Q15. Answer: (b) Metal

Linen is a type of cloth woven from flax.

Similarly,

Gold is type of metal

Hence, “Metal” is the correct answer.

Q16. Answer: (a) 32 m

Shortcut Trick

In a 30°−60°−90° triangle, the ratio of sides opposite to these angles is 1 : √3 : 2.

The side opposite to 60° (height of tower) is 32√3 m.

=> √3 units = 32√3 m

=> 1 unit (distance from building) = 32 m.

Therefore The correct answer is 32 m.

Alternate Method

Given:

Height of the tower (AB) = 32√3 m

Angle of depression = 60° => Angle of elevation from foot of building (C) to top of tower (A) = 60°.

Formula Used:

tan θ = Perpendicular ÷ Base

Calculations:

Let the distance between the tower and the building be x.

In ΔABC:

=> tan 60° = AB ÷ BC

=> √3 = 32√3 ÷ x

=> x = (32√3) ÷ √3

=> x = 32 m

Therefore The correct answer is 32 m.

Additional Information

Angle of Depression

The angle formed by the line of sight with the horizontal when the object is below the horizontal level. It is numerically equal to the angle of elevation.

Trigonometric Ratios

For 30°, tan 30° = 1/√3. For 45°, tan 45° = 1. For 60°, tan 60° = √3.

Q17. Answer: (c) 4/25

Shortcut Trick

Since DE is parallel to BC, triangle ADE is similar to triangle ABC.

The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides:

Corresponding sides ratio = AD ÷ AB = AD ÷ (AD + BD) = 2 ÷ (2 + 3) = 2/5

Ratio of areas = (AD ÷ AB)² = (2/5)² = 4/25

Therefore The correct answer is 4/25.

Alternate Method

Given:

In ΔABC, D and E are points on AB and AC respectively such that DE || BC.

AD = 2 cm

BD = 3 cm

Formula Used:

If two triangles are similar, the ratio of their areas is equal to the square of the ratio of their corresponding sides:

ar(ΔADE) ÷ ar(ΔABC) = (AD ÷ AB)²

Calculations:

=> AB = AD + BD

=> AB = 2 + 3 = 5 cm

=> In ΔADE and ΔABC:

=> angle ADE = angle ABC (Corresponding angles as DE || BC)

=> angle AED = angle ACB (Corresponding angles as DE || BC)

=> Therefore ΔADE ~ ΔABC (By AA similarity criterion)

=> By the property of similar triangles:

=> ar(ΔADE) ÷ ar(ΔABC) = (AD ÷ AB)²

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=> ar(ΔADE) ÷ ar(ΔABC) = (2 ÷ 5)²

=> ar(ΔADE) ÷ ar(ΔABC) = 4/25

Explanation of Options:

• Option (1) 4/9 is incorrect because it represents the ratio (AD ÷ BD)² = (2 ÷ 3)² = 4/9, which incorrectly uses the segment BD instead of the full side AB.

• Option (2) 16/81 is incorrect because it represents an incorrect higher power of the ratio.

• Option (3) 4/25 is the correct ratio of the areas of the two similar triangles.

• Option (4) 2/5 is incorrect because it is the ratio of the corresponding sides (AD ÷ AB), not the ratio of their areas (which must be squared).

Therefore The correct answer is 4/25.

Additional Information

Basic Proportionality Theorem (Thales Theorem)

If a line is drawn parallel to one side of a triangle intersecting the other two sides, then it divides the two sides in the same ratio. Thus, AD ÷ BD = AE ÷ EC.

Area of Similar Triangles Theorem

The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides, altitudes, medians, or perimeters.

AA Similarity Criterion

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar.

Q18. Answer: (a) 7

Shortcut Trick

The unit digit of base 3 repeats every 4 powers (3, 9, 7, 1).

Divide the exponent 31 by the cyclicity of 4.

31 ÷ 4 => Remainder = 3.

The unit digit of 3^{31} = Unit digit of 3^3 = 27.

Therefore The correct answer is 7.

Alternate Method

Given: Base = 3, Exponent = 31

The unit digit of powers of 3 follows a cyclic pattern:

Step-by-step calculation:

=> Identify Cyclicity: 3^1=3, 3^2=9, 3^3=27, 3^4=81. The unit digits are 3, 9, 7, 1.

=> Length of Cycle = 4.

=> Divide Exponent by 4: 31 ÷ 4 = 7 with Remainder 3.

=> Determine Unit Digit: Since remainder is 3, the unit digit is the 3^(rd) value in the cycle.

=> Unit digit = 3^3 = 27 → 7.

Therefore The correct answer is 7.

Additional Information

Cyclicity of Digits

Digits 2, 3, 7, and 8 have a cyclicity of 4. To find their unit digit, divide the power by 4 and check the remainder.

Digits with Cyclicity 1

The unit digits of numbers ending in 0, 1, 5, or 6 never change, regardless of the power (e.g., 5^n always ends in 5).

Power of 4 and 9

These have a cyclicity of 2. For 4: 4^(odd) ends in 4, 4^(even) ends in 6. For 9: 9^(odd) ends in 9, 9^(even) ends in 1.

Zero Remainder Rule

If the remainder is 0 when dividing the power by cyclicity, use the cyclicity value itself as the power (e.g., if power ÷ 4 has remainder 0, calculate Base^4).

Q19. Answer: (d) 54

Shortcut Trick

Identify the nearest square greater than 4042.

We know 602 = 3600 and 702 = 4900. Try 632 = 3969 and 642 = 4096.

Number to be added = 4096 − 4042 = 54.

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Therefore The correct answer is 54.

Alternate Method

Given: Number = 4042

Formula Used: (Next Integer)2 − Given Number

=> Using the long division method for square root of 4042:

=> 6 × 6 = 36. Remainder is 4. Bring down 42. New dividend is 442.

=> Double 6 is 12. 123 × 3 = 369. (442 − 369 = 73 remainder).

=> Since 632 < 4042, the next perfect square is 642.

=> 642 = 64 × 64 = 4096.

=> Least number to be added = 4096 − 4042 = 54.

Therefore The correct answer is 54.

Additional Information

Perfect Square Properties

A perfect square never ends in 2, 3, 7, or 8. Digit sum of a perfect square is always 1, 4, 7, or 9.

Finding Number to Subtract

To find the least number to subtract to make a perfect square, simply calculate the remainder using the long division method.

Q20. Answer: (c) Only conclusion 1 follows.

Drawing the Venn diagram,

Conclusion 1: All brooms are handles → True (This is definitely true)

Conclusion 2: No plastic is a broom → False (This is definitely false)

Hence, “only conclusion 1” follows.

Q21. Answer: (c) parenchyma

• The parenchyma consists of relatively unspecialised cell with thin cell well.

• Parenchyma tissues are a type of permanent tissue and are loosely packed. It provides support to plants and helps in the storage of food. As cells are loosely packed, large air cavities are present which gives buoyancy to the plants to help them float.

• Phloem is conducting tissues. It transports food from leaves to other parts of the plant. The four elements of phloem are - sieve tubes, companion cells, phloem fibres and the phloem parenchyma. Phloem cells are living cells except for phloem fibres.

• Sclerenchyma is also permanent tissue. It makes the plant hard and stiff. This tissue is present in stems, in the veins of leaves, and in the hard covering of seeds and nuts. Please note that the cells are dead.

• Collenchyma are also permanent tissue. It allows the bending of plants without breakage. These tissues are found in leaf stalks below the epidermis. Please note that cells are living.

Q22. Answer: (a) Only II is implicit

Assumption 1: This is not implicit, because headmistress did not mention anything about interest in English.

Assumption 2: This is implicit, because speaking in the assembly will reduce stage fear.

Hence, “only assumption 2” is implicit.

Q23. Answer: (d) Rs. 15.28 lakh crore

• As per the RBI Annual Report 2016-17, the estimated value of demonetized banknotes received was Rs. 15.28 lakh crore as of June 2017.

• This amount is 99 percent of the Rs 15.44-lakh-crore scrapped currency notes.

• On November 8, 2016, the Government of India decided that the denominations of Rs. 500 and Rs. 1000 would cease to be legal tender with effect from November 9, 2016. The 86 percent of the circulation money stood not eligible for legal tender on that day.

• This move of demonetization was to stem the circulation of black money, fake currency and to choke terror funding and corruption.

• The value of banknotes in circulation declined by 20.2 percent at end-March 2017. The volume of banknotes increased by 11.1 percent, primarily due to a higher infusion of banknotes of a lower denomination in circulation.

Q24. Answer: (c) Shanta Rangaswamy

• Shanta Rangaswamy won the BCCI Lifetime achievement award for Women at the BCCI Annual Awards held in Bengaluru in March 2017.

• She had also been a captain of the Women Cricket Team of India.

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• Shubhangi Kulkarni also used to play cricket. She was the secretary of the Women's Cricket Association of India before merger with BCCI.

• Diana Edulji used to play Test Cricket. She is a recipient of Padma Shri.

• Purnima Rau was also a cricket player in the Indian Women's team.

• BCCI Lifetime achievement award for Women 2018-Anjum Chopra.

• The award consists of Citation, trophy and cheque for Rs. 25 lakhs.

Q25. Answer: (a) Cantaloupe

Lily, Lotus and Jasmine are flowers.

Whereas,

Cantaloupe is a fruit.

Hence, “cantaloupe” does not belong to the group.

Q26. Answer: (a) Candidiasis

• Candidiasis is not a sexually transmitted disease.

• It is a fungal infection that affects the mouth and throat. It is generally an allergic reaction to a yeast called Candida albicans.

• Syphilis- It is a bacterial infection that starts as a painless sore on the genitals, rectum or mouth. It can be sexually transmitted to another person on sexual contact.

• Gonorrhea- It is a bacterial infection that can cause infertility. It can be transmitted through sexual contact.

• Warts are caused by various strains of human papillomavirus. Different strains may cause warts in different parts of the body. It can be transmitted through sexual contact.

Q27. Answer: (d) Friction

CONCEPT:

• Friction: The property of a surface that opposes the relative motion between two surfaces is called friction.

Friction (f) = μ N

Where μ is the coefficient of friction and N is the normal force

EXPLANATION:

1. Tension: It is the force which is transmitted through a rope or wire when pulled by forces acting from opposite sides. In other words, it is simply the force exerted by a string when it is subjected to pull.

2. Momentum: It is the strength contained in the object due to its motion. It is the product of the mass of an object and the velocity with which it is moving.

3. Impulse: It is the product of force and time. One can also say that it is the change in momentum.

4. If no force is applied to a moving object, then it will stop due to Friction. So option 4 is correct.

• As per the first law of motion-" an object will remain at rest or in uniform motion in a straight line unless acted upon by an external force".

• So, if no force is applied to a moving object, it should remain in motion as per the first law of motion. But, it is stopped due to friction.

Q28. Answer: (b) 75

Total NPAs under all the banks are = Rs. 300 lakh crores,

Therefore NPA’s of B = 300 × 25/100 = 75 lakh crores.

Q29. Answer: (d) 1034

Shortcut Trick

Smallest four-digit number = 1000.

Divide 1000 by 47 → 1000 ÷ 47 = 21 with remainder 13.

To find the next multiple: 1000 + (47 − 13) = 1034.

Therefore The correct answer is 1034.

Alternate Method

Given: Divisor = 47, Target = Smallest 4-digit number.

Formula Used: Required Number = Dividend + (Divisor − Remainder)

=> Smallest 4-digit number = 1000

=> Perform division: 1000 ÷ 47

=> 47 × 21 = 987

=> 47 × 22 = 1034
=> Remainder when 1000 is divided by 47 is 13.
=> Required number = 1000 + (47 − 13)
=> Required number = 1000 + 34 = 1034
Therefore The correct answer is 1034.
Additional Information
Divisibility Rule for 47
To check divisibility by 47, multiply the last digit by 14 and add it to the remaining number. Repeat until a multiple of 47 is found.
Smallest/Largest n-digit Numbers
Smallest n-digit number is 10^(n−1) and largest n-digit number is (10^n − 1).
Division Algorithm
Dividend = (Divisor × Quotient) + Remainder. For perfect divisibility, Remainder must be 0.

Q30. Answer: (c) Carbon dioxide

• When washing soda reacts with hydrochloric acid, Carbon dioxide gas is evolved.
• Washing soda- It is sodium carbonate. The chemical formula is Na2CO3. It is a natural cleaner and cleaning booster.
• Sodium carbonate, when added to water, helps to remove magnesium and calcium ions, and increases detergent efficiency.
• The following chemical reaction takes place as per the statement:-
• Na2CO3+ 2HCl → 2NaCl + CO2 + H2O

Q31. Answer: (a) 28K

The pattern followed is,
Hence, “28K” is the correct answer.

Q32. Answer: (c) 2990.4 m

Shortcut Trick
Side of square = √31684 = 178 m
Perimeter = 4 × 178 = 712 m
Total wire needed for 4 rounds = 4 × (1.05 × 712)
Total wire = 4 × 747.6 = 2990.4 m
Therefore The correct answer is 2990.4 m.
Alternate Method
Given:
Area of square field = 31684 m^2
Number of wire rounds = 4 (at heights 1m, 2m, 3m, 4m)
Extra length per round = 5% of perimeter
Calculations:
=> Side (a) = √Area = √31684
=> Side (a) = 178 m
=> Perimeter = 4 × a = 4 × 178 = 712 m
=> Length of one wire round = 105% of 712 = 1.05 × 712 = 747.6 m
=> Total length for 4 rounds = 4 × 747.6 = 2990.4 m
Therefore The correct answer is 2990.4 m.
Additional Information
Square Properties
For a square with side 'a', Area = a^2 and Perimeter = 4a. The diagonal is given by a√2.
Fencing Concept
Fencing length is always based on the perimeter of the field. Total wire = Number of rounds × (Perimeter + Extra allowance).
Percentage Increase
To increase a value by x%, multiply the original value by (1 + x/100).

Q33. Answer: (b) 4 times

CONCEPT:

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

$KE = 1/2mv^2$

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

EXPLANATION:

• $KE = 1/2mv'^2 = 1/2m(2v)^2 = 2mv^2$

• As the kinetic energy is directly proportional to the square of the velocity. So if the velocity becomes twice, the kinetic energy would be four times (square of twice gives four).

• Since we have a cycle that will not change, so there is no change in mass.

Q34. Answer: (b) A

The mirror image for the following figure when the mirror is kept at the MN line is,

Hence, option 2 is the correct answer.

Q35. Answer: (d) N_A

• Avogadro number is represented by NA.

• It is an absolute number. It represents the number of units in one mole of any substance.

• It is equal to $6.02214076 \times 10^{23}$.

• Now, the units can be anything-electrons, atoms, ions, or molecules.

• Avogadro's law states that equal volumes of different gases contain an equal number of molecules under the same conditions of temperature and pressure. It can be derived from the ideal gas equation.

• If V is the volume of the gas and n denotes the amount of gaseous substance (moles), V/n would be constant. It means that the ideal gas constant is the same value for all gases.

Q36. Answer: (a) Terbium

The correct answer is Option 1, i.e Terbium.

• Actinide series of periodic tables contains 15 elements with atomic numbers from 89 to 103.

• The general symbol of these elements is An.

• Terbium is not an actinoid. Its atomic number is 65 and its atomic symbol is Tb.

• Actinoid elements are radioactive and very poisonous. Every actinoid isotope also undergoes radioactive decay.

• These are the elements in the series - Actinium (Ac), Thorium (Th), Protactinium (Pa), Uranium (U), Neptunium (Np), Plutonium (Pu), Americium (Am), Curium (Cm), Berkelium (Bk), Californium (Cf), Einsteinium (Es), Fermium (Fm), Mendelevium (Md), Nobelium (No), and Lawrencium (Lr).

Q37. Answer: (a) Andhra Pradesh

• 'Kalamkari', a Painting form belongs to Andhra Pradesh.

• It is a 3000-year-old art form practiced in Andhra Pradesh and Telangana.

• It refers to the ancient style of hand painting, done with a tamarind pen using natural dyes. It is primarily done on cotton or silk fabric.

• The art primarily uses earthy colors like indigo, mustard, rust, black, and green.

• There are 23 steps to complete this painting which include dyeing, bleaching, hand painting, block-printing, starching, cleaning, and more.

• There are a variety of motifs drawn in this painting-flowers, peacock, paisleys to divine characters of Hindu epics like Mahabharata and Ramayana.

• However, nowadays, this art can be seen as Kalamkari sarees also.

Q38. Answer: (a) 10

Shortcut Trick

Convert the radical value into a quadratic equation: $2x - 1 = \sqrt{3} \Rightarrow 4x^2 - 4x - 2 = 0 \Rightarrow 2x^2 - 2x - 1 = 0$.

Express the target polynomial in terms of this quadratic factor: $4x^3 + 2x^2 - 8x + 7 = (2x + 3)(2x^2 - 2x - 1) + 10$.

Substitute the value of the quadratic factor (0) into the expression: $(2x + 3) \times 0 + 10 = 10$.

Therefore The correct answer is 10.

Alternate Method

Given: $x = (\sqrt{3} + 1) / 2$

Method: Reducing high-degree polynomial using characteristic equation.

=> $2x = \sqrt{3} + 1$

=> $2x - 1 = \sqrt{3}$

Squaring both sides:

=> $(2x - 1)^2 = (\sqrt{3})^2$

=> $4x^2 - 4x + 1 = 3$

=> $4x^2 - 4x - 2 = 0$

=> $2x^2 - 2x - 1 = 0$

Now, rewrite the given expression $4x^3 + 2x^2 - 8x + 7$:

=> $2x(2x^2 - 2x - 1) + 4x^2 + 2x + 2x^2 - 8x + 7$

=> $2x(0) + 6x^2 - 6x + 7$

=> $3(2x^2 - 2x - 1) + 3 + 7$

=> $3(0) + 10$

=> 10

Therefore The correct answer is 10.

Additional Information

Conjugate Roots Theorem

If a quadratic equation with rational coefficients has one root as $a + \sqrt{b}$, then the other root must be its conjugate $a - \sqrt{b}$.

Polynomial Division

For any polynomial P(x) and divisor D(x), $P(x) = D(x) \times Q(x) + R(x)$. If $D(x) = 0$ for a given value of x, then P(x) equals the remainder R(x).

Algebraic Identity

Standard identity: $(a - b)^2 = a^2 - 2ab + b^2$ is used to remove square roots from linear radical expressions.

Q39. Answer: (a) Be(4)

- An element has an atomic number of 20. Beryllium would show similar chemical properties as the element.
- Calcium has atomic number 20. Beryllium has atomic number 4.
- Two different elements are likely to have similar chemical properties when they have the same number of valence electrons.
- Beryllium has 2 valence electrons and calcium also has 2 valence electrons.
- The vertical columns on the periodic table which are called groups have similar chemical behavior.
- Beryllium and calcium are in the second group of the periodic table.

Q40. Answer: (b) NTPC

- NTPC had adopted the maintenance of Charminar in Hyderabad as part of the Swachh Bharat Mission in 2018.
- NTPC Ltd and the Greater Hyderabad Municipal Corporation had signed a memorandum of understanding for implementation of development and beautification works under the Charminar Pedestrianization Project in Hyderabad.
- As per the MoU, the work included providing battery-operated vehicles for visitors, bollards to prevent traffic, Swachh Auto Tippers for carting garbage, mechanical sweeping vehicles and litter picking machines, decorative and halogen lighting of four arches, construction of public utilities, toilets and drinking water ATM kiosks.
- Charminar was constructed by Muhammad Quli Qutb Shahi in 1591 AD. It lies near the bank of the river Musi.
- It is believed that he made it construct to celebrate the end of a deadly plague.

Q41. Answer: (d) Hydrogen

- Hydrogen is the only non-metal present in Group 1 of the Modern Periodic Table.
- The vertical columns in periodic table is called a group and horizontal row is called period.
- There are 18 groups and 7 periods in modern periodic table.
- The elements in one group share similar chemical properties because they have same number of valence electrons.
- Group 1 contains alkali metals with the exception of hydrogen. The alkali metals are lithium, sodium, potassium, rubidium, cesium, and francium.
- Since hydrogen shares the same electronic configuration as with other elements of group 1, it is placed there.
- Cobalt atomic number-27 and symbol Co. It is in group 9.
- Rubidium atomic number-37 and symbol Rb. It is in group 1.
- Potassium atomic number-19 and symbol K. It is in group 1.

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Q42. Answer: (b) 10 s

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)

• Retardation: The force acting in the opposite direction to the motion of a body is called the retarding force. This force produces negative acceleration for the body which is called retardation or deacceleration.

Retardation (a) = Force/Mass

The equation of motion is given below:

V = u + a t

Where V is final velocity,C is initial velocity, a is acceleration and t is time

CALCULATION:

Given that:

Mass (m) = 30 kg, Initial velocity (u) = 20 m/s

Force (F) = - 60 N

Acceleration (a) = F/m = - 60/30 = - 2 m/s2

Final velocity (V) = 0 m/s

• We know that body is stopped, it means the final velocity is 0.

V = u + a t

0 = 20 + (-2)t

2t = 20

Time taken (t) = 10 seconds. So option 2 is correct.

Q43. Answer: (a) 33

The pattern followed is,

Hence, “33” is the correct answer

Q44. Answer: (c) C

The pattern followed is,

The given figure consists of four symbols.

The first three symbols are moving by one place towards their right and the fourth symbol is constant.

The figure which will come next in the pattern is,

Hence, option 3 is the correct answer.

Q45. Answer: (a) Reflection of sound waves

CONCEPT:

• Echo: If we shout or clap near a suitable reflecting object such as a tall building or a mountain, we will hear the same sound again a little later. This sound which we hear is called an echo.

• Echoes are heard due to the phenomenon of Reflection of sound waves.

• To hear the echo clearly, the reflecting object must be more than 17.2 m from the sound source for the echo to be heard by a person standing at the source.

EXPLANATION:

• Echoes are heard due to the phenomenon of reflection of sound. So option 1 is correct.

• In the case of resonance, interference, and refraction of sound there is no echo. So options 2, 3, and 4 are wrong.

• SONAR (sound navigation ranging) uses the principle of reflection of soundwaves and submarine can detect objects nearby or distant.

• Echolocation is widely used by bats and whales.

• Bats cannot see but they send out waves from the mouth or nose and perceives the echo to know to the approximate distance of the object.

• Most mammals like whales produce high-frequency sound or sonar clicks. Whales can recognize the size of the object and the distance almost instantly when they receive echo.

• The velocity of sound in dry air is approximately 343 m/s at a temperature of 25 °C.

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Q46. Answer: (d) Papaya

• A Papaya is a unisexual flower.

• A unisexual flower would either have stamens or carpels. But it can never possess both together.

• Stamen is the male fertilizing organ of a flower and carpel is the female fertilizing organ of a flower.

• Simply, we can say that it can either be male flower or female flower.

• Coconut flowers, Watermelon, Cucumber, Maize, etc are some examples of unisexual flower.

• Gulmohar is widely grown as a street tree or an ornamental tree because it is very colorful. It is also known as royal poinciana.

• Hibiscus are large colorful flowers. The flowers and leaves can be made into teas and liquid extracts that can help treat a variety of conditions.

• Mustard plant is yellow in color and can produce seed in as few as 60 days. The seeds of mustard plants are widely used in spices.

Q47. Answer: (a) [figure]

Jupiter and earth are planets.

Vegetation is found mainly on earth.

The correct Venn diagram representation is,Hence, option 1 is the correct answer.

Hence, option 1 is the correct answer.

Q48. Answer: (b) Anil K. Tripathi

• Anil K.Tripathi had been awarded “Bharat Gaurav Award” 2017 in Science and Technology category.

• He is a Director at Institute of Science & Professor, School of Biotechnology, Banaras Hindu University.

• He won the award in 2017 as recognition for his meritorious achievements, outstanding performance and individual excellence throughout his life.

• In 2012, Sanskriti Yuva Sanstha started “Bharat Gaurav Award” as a felicitation program for people from all our World who achieve a landmark in their working area and made India proud.

• First ‘Bharat Gaurav Award' Ceremony was held in 2012 at Hotel Hilton ,New Jersey,USA.

Q49. Answer: (b) Only conclusion 2 follows.

Drawing the Venn diagram,

Conclusion 1: All metals are pins → False (This is definitely false)

Conclusion 2: Some metals are sharp → True (This is definitely true)

Hence, “only conclusion 2” follows.

Q50. Answer: (a) a double covalent bond

The correct answer a double covalent bond.

Key Points

• A molecule of Oxygen has a double covalent bond.

• A covalent bond is a chemical bond in which atoms share electron pairs. There is a balance of attractive and repulsive forces between atoms.

• In a double covalent bond, two pairs of electrons are shared between the atoms.

• As in the case of Oxygen (Atomic number 8), it has six valence electrons. Each O atom of the oxygen molecule shares 2 electrons to form two covalent bonds. This way, both oxygen atoms complete their octet and achieve stable structures.

• Three pairs of electrons are shared between the two combining atoms in a triple covalent bond.

• In an electrovalent bond, one atom loses an electron to form a positive ion and the other atom gains the electron to form a negative ion. And since these ions are oppositely charged, these are held by electrostatic attraction forming an electrovalent bond.

Q51. Answer: (c) 69%

Shortcut Trick

Net percentage change in area of a square = x + x + (x × x)/100

Given increase in side (x) = 30%

=> Net increase = 30 + 30 + (30 × 30)/100

=> 60 + 9 = 69%

Therefore The correct answer is 69%.

Alternate Method

Given: Increase in side = 30%

Formula Used: Area of square = side²
=> Let original side = 10 units
=> Original Area = 10² = 100 sq. units
=> New side = 10 + 30% of 10 = 13 units
=> New Area = 13² = 169 sq. units
=> Increase in area = 169 − 100 = 69 units
=> % Increase = (69/100) × 100 = 69%
Therefore The correct answer is 69%.
Additional Information
Successive Percentage Change
For two successive changes a% and b%, the effective change is (a + b + ab/100)%.
Area of 2D Figures
If dimensions of a rectangle are changed by x% and y%, area changes by (x + y + xy/100)%.
Square Properties
Area = (side)² or (diagonal)²/2. All sides are equal and all angles are 90°.

Q52. Answer: (d) colourless

• When phenolphthalein is added to vinegar, the solution becomes colourless.
• Phenolphthalein- C20H14O4.
• It is used as an indicator in acid-base titrations.
• When ph is put in a basic solution, it turns pink and when it is put in acidic solution, it turns colorless.
• Hence, it remains colourless below pH 8.5 and attains a pink to deep red hue above pH 9.0.
• Vinegar is nothing but an aqueous solution of acetic acid (CH3COOH).
• That is why the solution would remain colorless as ph shows no change in acidic solutions.

Q53. Answer: (b) 8 s

Shortcut Trick
Time = Distance ÷ Velocity
Time = 480 ÷ 60 = 8 seconds.
Therefore The correct answer is 8 s.
Alternate Method
Given:
Velocity (v) = 60 m/s
Distance (d) = 480 m
Formula Used:
Time (t) = Distance (d) / Velocity (v)
Calculations:
=> t = 480 ÷ 60
=> t = 8 seconds
Therefore The correct answer is 8 s.
Additional Information
Constant Velocity
When an object moves with constant velocity, the acceleration is zero, and the distance covered is directly proportional to time.
Unit Conversion
To convert km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.
Average Speed
Average speed is calculated as Total Distance ÷ Total Time taken for the entire journey.

Q54. Answer: (b) Team A : 2, Team B : 3

Shortcut Trick
Notice that Team B scored exactly 1 goal more than Team A in every single match.
Shortcut: Average B = Average A + 1.
Calculate Average A: (2 + 1 + 1 + 4) ÷ 4 = 8 ÷ 4 = 2.

Therefore, Average B = 2 + 1 = 3.

Therefore The correct answer is Team A : 2, Team B : 3.

Alternate Method

Given:

Goals of Team A: 2, 1, 1, 4

Goals of Team B: 3, 2, 2, 5

Total Games: 4

Formula Used:

Average Score = Sum of Goals ÷ Total Number of Games

Calculations:

=> Total Goals for Team A = 2 + 1 + 1 + 4 = 8

=> Average Score of Team A = 8 ÷ 4 = 2

=> Total Goals for Team B = 3 + 2 + 2 + 5 = 12

=> Average Score of Team B = 12 ÷ 4 = 3

Therefore The correct answer is Team A : 2, Team B : 3.

Additional Information

Arithmetic Mean

The most common type of average, calculated by adding all numbers in a data set and then dividing by the count of those numbers.

Effect of Constant Addition

If every value in a data set is increased by a constant k, the new average will be the old average plus k.

Range of Data

The difference between the maximum and minimum values in a set. For Team A, Range = 4 − 1 = 3; for Team B, Range = 5 − 2 = 3.

Q55. Answer: (a) Jairam Ramesh

• Jairam Ramesh is the author of the book ‘Indira Gandhi – A Life in Nature'.

• It was published in 2017 and Simon & Schuster India was the publisher.

• This book includes the personal, political, and environmental history of Indira Gandhi. Jairam has talked about how her views on the environment remained steadfast even as her political and economic stances changed and she took significant decisions particularly regarding forests and wildlife.

• Jairam Ramesh is a Member of Parliament representing Karnataka state in the Rajya Sabha.

• Other books by him - Old History, New Geography: Bifurcating Andhra Pradesh (2016), To the Brink and Back: India's 1991 Story (2015), Legislating for Justice: The 2013 Land Acquisition Law (2015), Green Signals: Ecology, Growth and Democracy in India (2015), etc.

• Books by Natwar Singh - One Life is enough, Treasured Epistles, Profiles and Letters, etc.

• Books by Sonia Gandhi - Rajiv, Rajiv's World, etc.

• Book by Priyanka Vadra - Ranthambhore: The Tiger's Realm

Q56. Answer: (a) Only 2 is sufficient.

Statement 1: Number of students is not given in this statement.

Statement 2: This is sufficient, because it is mentioned that there are 6 girls and 8 boys in the class.

Hence, “only 2” is sufficient.

Q57. Answer: (d) 461 m

Shortcut Trick

Total distance (Train + Platform) = Speed × Time

Convert speed to m/s: 57 × (5/18) = 15.833 m/s

Total distance = 15.833 × 39 = 617.5 m

Platform length = 617.5 − 156.5 = 461 m

Therefore The correct answer is 461 m.

Alternate Method

Given: Length of train (L_T) = 156.5 m, Speed (S) = 57 km/hr, Time (t) = 39 seconds.

Formula Used: Distance = Speed × Time; 1 km/hr = 5/18 m/s.

=> Speed in m/s = 57 × (5/18) = 285/18 = 15.8333... m/s

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

=> (156.5 + L_P) = (285/18) × 39

=> 156.5 + L_P = (285 × 13) / 6

=> 156.5 + L_P = 3705 / 6

=> 156.5 + L_P = 617.5

=> L_P = 617.5 − 156.5

=> L_P = 461 m

Therefore The correct answer is 461 m.

Additional Information

Unit Conversion

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

Relative Speed

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

Crossing Objects

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

Q58. Answer: (c) B

In all the figures, except in figure B the outer figure has four sides.

Whereas,

In figure B the outer figure has 6 sides.

Hence, figure “B” is the odd one.

Q59. Answer: (a) C

The given figure has two circles on the outer layer and a sphere immersed inside them.

Similarly,

Figure C also has two circles and a sphere immersed in it.

Figure C resembles the given figure.

Hence, option 1 is the correct answer.

Q60. Answer: (a) East

Drawing diagram according to the given information,

He is facing ‘east’ now.

Hence, “east” is the correct answer.

Q61. Answer: (b) S. S. Rajamouli

• S. S. Rajamouli is the director of the blockbuster movie ‘Bahubali’.

• Baahubali: The Beginning was made in 2015 and it was shot in both Telugu and Tamil.

• The film was made on a budget of Rs. 180 crore and it was the most expensive movie at that time.

• It is the highest-grossing South Indian film and it is the third highest-grossing Indian film worldwide.

• It also won the National Film Award for Best Special Effects and Best Feature Film.

• In 2017, the director came with the sequel named "Baahubali 2: The Conclusion". This movie became the second highest-grossing Indian film worldwide.

• The first position is held by Aamir Khan's Dangal.

Q62. Answer: (b) Applied force

CONCEPT:

• Momentum: The product of the mass and velocity of an object is called momentum. It is denoted by P.

Momentum (P) = Mass (m) × Velocity (v)

• Newton’s Second law of motion: The rate of change of momentum of any object is directly proportional to the applied force on the body.

Force (F) = (Δ P)/(Δ t)

Where Δ P = Change in momentum and Δ t = change in time taken

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EXPLANATION:

• According to Newton's second law of motion, the rate of change of momentum of a body is directly proportional to the Applied force. So option 2 is correct.

Q63. Answer: (d) C

• Bakelite is a kind of synthetic plastic whereas other are metals and alloys. Hence, Bakelite does not belong to the group.

• Bakelite is obtained by the polymerization of phenol and formaldehyde.

• Chemical Formula of Bakelite-(C6H6O-CH2OH)_n.

• Leo Baekeland created Bakelite. He has also invented Velox photographic paper.

• Bakelite is a thermosetting resin and it can be molded very easily. It shows high resistance to electricity and heat, hence it was used for all non-conducting parts of radios and other electrical devices.

• Atomic number of Aluminium- 13. Symbol-Al.

• Atomic number of Iron- 26. Symbol-Fe.

• Brass is an alloy of copper and zinc.

Q64. Answer: (b) B

The pattern followed is,

In the first figure there are two triangles and in the second figure there is a triangle inside the triangle.

Similarly,

There are two circles in the third figure and in the fourth figure there must be a circle inside a circle.

The pattern followed is,

Hence, option 2 is the correct answer.

Q65. Answer: (a) Cerium

• The element of the Lanthanide series having the atomic number 58 is Cerium.

• This series has 14 elements from atomic number 57 to 71. They are also called "rare earth elements".

• Lanthanides and Actinides are the only elements that fill the f-orbitals.

• The elements of Lanthanide series are very difficult to extract. The isolation of an individual element may involve hundreds of fractional crystallizations.

• These elements are used as alloys to impart strength and hardness to metals.

• The elements are- lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.

• Thorium is a weak radioactive element. Symbol -Th and Atomic number -90.

Q66. Answer: (a) Pressure

CONCEPT:

• Resistance: The property of any conductor that opposes the flow of electric current through it is called resistance.

• It is denoted by R and the SI unit is the ohm (Ω).

• Superconductors are said to have zero resistance.

• One can control Voltage and Current by altering the resistance of the circuit.

The resistance (R) is given by:

$R = \rho L/A$

where ρ is resistivity, L is the length and A is the area of the cross-section.

EXPLANATION:

1. The resistance of a conductor does not depend on Pressure. So option 1 is correct.

2. Conductors show less resistance and Insulators show very high resistance. So it depends on the material.

3. It is inversely proportional to the cross-sectional area of the wire.

4. The r esistance is directly proportional to the length of the wire and resistivity of the material used in making the wire.

Q67. Answer: (d) Both conclusions follow.

Drawing the Venn diagram,

Conclusion 1: All flowers are soft → True (This is definitely true)

Conclusion 2: Some soft are petal → True (This is definitely true)

Hence, “both conclusions” follow.

Q68. Answer: (b) 101/2 hours

Shortcut Trick

Total hours = Number of days × Daily reading hours

Daily reading hours = 1 3/4 = 7/4 hours.

Total hours = 6 × 7/4 = 42/4 = 10 1/2 hours.

Therefore The correct answer is 10 1/2 hr.

Alternate Method

Given:

Total days taken to read the novel = 6 days

Time spent reading per day = 1 3/4 hours

Formula Used:

Total Time = Number of Days × Time per Day

Calculations:

=> Convert mixed fraction to improper fraction: 1 3/4 = (1 × 4 + 3) / 4 = 7/4 hours

=> Total hours = 6 × 7/4

=> Total hours = (6 × 7) / 4 = 42 / 4

=> Simplify the fraction: 42 / 4 = 21 / 2

=> Convert back to mixed fraction: 21 / 2 = 10 1/2 hours

Therefore The correct answer is 10 1/2 hr.

Additional Information

Mixed Fraction Conversion

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

Total Work Calculation

Total quantity = Unit rate × Number of units. In time-based problems, Total Time = Daily Rate × Number of Days.

Q69. Answer: (b) Kisan Urja Suraksha evam Utthaan Mahaabhiyan

• Kisan Urja Suraksha evam Utthaan Mahaabhiyan (KUSUM) has been launched by the union government for promoting solar farming.

• It was approved by the Cabinet Committee on Economic Affairs, chaired by Hon'ble Prime Minister Shri Narendra Modi in 2019.

• The objective of the scheme is to provide financial and water security to farmers.

• There are three components of the scheme :-

• 10,000 MW of Decentralized Ground Mounted Grid Connected Renewable Power Plants.

• Installation of 17.50 lakh standalone Solar Powered Agriculture Pumps.

• Solarisation of 10 Lakh Grid-connected Solar Powered Agriculture Pumps.

• The scheme aims to add a solar capacity of 25,750 MW by 2022.

Q70. Answer: (b) 40

The number of triangles in the given figure is,

Hence, “40” is the correct answer.

Q71. Answer: (c) 17

Let Ritika's present age be "x".

Priyamvada's present age is five years more than twice the age of his cousin Ritika.

Therefore Priyamvada's present age = 2x + 5

After 16 years,

Ritika's age will be "x + 16"

and Priyamvada's age will be "2x + 5 + 16" i.e. 2x + 21.

Priyamvada's age will be 150% of that of Ritika's age.

From the above condition,

2x + 21 = 150% of (x + 16)

(2x + 21) × 100 = 150 × (x + 16)

Therefore 200x + 2100 = 150x + 2400

Therefore 200x - 150x = 2400 - 2100

Therefore 50x = 300

Therefore x = 6

Hence, Ritika's present age is 6 years.

Whereas, Priyamvada's present age will be,

(2 × 6) + 5 = 17

Hence, 17 is the correct answer.

Q72. Answer: (d) Rs. 300

Shortcut Trick

Find the effective interest rate: 1.6% × 15 = 24%.

Calculate 24% of the Principal (Rs. 1250).

Interest = 0.24 × 1250 = Rs. 300.

Therefore The correct answer is Rs. 300.

Alternate Method

Given:

Principal (P) = Rs. 1250

Time (T) = 15 years

Rate (R) = 1.6% per annum

Formula Used:

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

Calculations:

=> SI = (1250 × 1.6 × 15) ÷ 100

=> SI = (1250 × 24) ÷ 100

=> SI = 12.5 × 24

=> SI = Rs. 300

Therefore The correct answer is Rs. 300.

Additional Information

Simple Interest Concept

Simple interest is calculated only on the principal amount of a loan or deposit. It does not account for interest earned in previous periods.

Total Amount Formula

The total amount (A) after T years is the sum of the principal and the interest: A = P + SI or A = P(1 + RT/100).

Rate and Time Conversion

Ensure the rate (R) and time (T) are in consistent units. If time is in months, convert to years by dividing by 12.

Q73. Answer: (d) KK

The pattern followed is,

Hence, “KK” is the correct answer.

Q74. Answer: (b) National Payments corporation of India

The correct answer is National Payments Corporation of India.

Important Points

• NPCI-National Payments Corporation of India.

• It is an umbrella organization for operating retail payments and settlement systems in India.

• It is an initiative of the RBI and Indian Banks’ Association under the provisions of the Payment and Settlement Systems Act, 2007. It is registered under section 8 of the Companies Act 2013.

• It intends to provide infrastructure to the entire Banking system in India for physical as well as electronic payment and settlement systems.

• The ten core promoter banks are State Bank of India, Punjab National Bank, Canara Bank, Bank of Baroda, Union Bank of India, Bank of India, ICICI Bank, HDFC Bank, Citibank N. A. and HSBC.

• MD and CEO-Dilip Asbe.

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Q75. Answer: (c) 6 km

Shortcut Trick

Speed Ratio (S1 : S2) = 10 : 15 = 2 : 3.

Since distance is constant, Time Ratio (T1 : T2) = 3 : 2.

Difference in time units = 3 − 2 = 1 unit → 12 minutes.

Total time for first horse = 3 × 12 = 36 minutes = 36/60 hours = 0.6 hours.

Distance = Speed × Time = 10 × 0.6 = 6 km.

Therefore The correct answer is 6 km.

Alternate Method

Given:

Speed of first horse (S1) = 10 km/hr

Speed of second horse (S2) = 15 km/hr

Time difference (Δt) = 12 minutes = 12/60 hours = 1/5 hours

Formula Used:

Distance (D) = [(S1 × S2) / (S2 − S1)] × Δt

Calculations:

=> D = [(10 × 15) / (15 − 10)] × (12/60)

=> D = [150 / 5] × (1/5)

=> D = 30 × (1/5)

=> D = 6 km

Therefore The correct answer is 6 km.

Additional Information

Inverse Proportion of Time and Speed

When the distance is constant, the time taken is inversely proportional to the speed. If speeds are in ratio a:b, time taken will be in ratio b:a.

Average Speed for Same Distance

If an object covers the same distance at two different speeds S1 and S2, the Average Speed is given by (2 × S1 × S2) / (S1 + S2).

Relative Speed

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

Q76. Answer: (a) C

Important Points

• Do not get tensed by the complexity of the figures.

• Carefully understand the structure of the given question figure.

• The embedded figure may not be of exact size. It may be small or big.

• Sometimes the rotation or reflection of the figures may be confusing.

• So think wisely before selecting the answer.

When the sheet is folded at the dotted line it resembles,

Hence, option 1 is the correct answer.

Q77. Answer: (b) Cuboidal

Key Points

• In animal cells, Cuboidal epithelium forms the inner lining of the kidney to provide mechanical support.

• Cuboidal epithelium is a single layer thick and made of cube-shaped cells. This tissue is found lining parts of the body such as the kidney tubules and walls of the respiratory bronchioles.

• Glandular epithelium-It is a type of epithelial tissue that covers the exocrine and endocrine glands.

• Columnar epithelium- These tissues are made of a single layer of long epithelial cells in regions where absorption and secretion are important. They also form the lining of the stomach and intestines.

• Squamous epithelium- It is a single layer of flat cells. These are in contact with the basal lamina of the epithelium. The tissues are permeable and occur where small molecules need to pass through membranes via diffusion.

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Q78. Answer: (d) Andhra Pradesh

• Kandaleru Dam is located in Andhra Pradesh.

• It is built on the Kandaleru River in Rapur Mandal, Nellore district.

• It is primarily built for irrigation purposes. This dam was a part of the Telugu Ganga project which basically supplies drinking water to Chennai city from the Srisailam reservoir on Krishna River.

• Other dams in Andhra Pradesh - Nagarjuna Sagar Dam, Srisailam Dam, etc.

• Dams in Kerala - Idukki Dam, Mullaperiyar Dam, Kakkayam Dam, etc.

• Dams in Tamil Nadu - Mettur Dam, Sholayar Dam, etc.

• Dams in Karnataka - Tungabhadra Dam, Almatti Dam, etc.

Q79. Answer: (c) 23914

The pattern followed is,

For LET,

The place value for L is 12

The place value for E is 5

The place value for T is 20

So,

Let is coded as 12520

Similarly,

For WIN,

The place value for W is 23

The place value for I is 9

The place value for N is 14

WIN is coded as 23914

Hence, “23914” is the correct answer.

Q80. Answer: (b) Rs. 15 lakh

Shortcut Trick

Profit ratio is same as investment stake ratio.

Ratio of Tejal : Ashank = 40% : 60% = 2 : 3.

If 2 units = Rs. 10,00,000 (Tejal's profit), then 1 unit = Rs. 5,00,000.

Ashank's profit = 3 units = 3 × Rs. 5,00,000 = Rs. 15,00,000.

Therefore The correct answer is Rs. 15 lakh.

Alternate Method

Given: Tejal's stake = 40%, Ashank's stake = 60%, Tejal's profit = Rs. 10,00,000.

Formula Used: Profit Share = (Individual Stake / Total Stake) × Total Profit

=> Let the total profit of the firm be P.

=> 40% of P = Rs. 10,00,000

=> (40/100) × P = 10,00,000

=> P = (10,00,000 × 100) ÷ 40

=> P = Rs. 25,00,000

=> Ashank's profit = 60% of P

=> Ashank's profit = (60/100) × 25,00,000

=> Ashank's profit = 0.6 × 25,00,000 = Rs. 15,00,000

Therefore The correct answer is Rs. 15 lakh.

Additional Information

Partnership Profit Distribution

In a partnership, profit is shared in the ratio of Investment × Time Period. If the time is constant, the ratio is simply based on the capital stake.

Active vs Sleeping Partner

An active partner manages the business and may receive an additional salary or commission before the remaining profit is shared according to the investment ratio.

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Q81. Answer: (b) 6 kg

Shortcut Trick

Initial Ratio (Sugar : Flour) = 4 : 7 (Total parts = 11)

New Ratio = 2 : 5 → Multiply by 2 to keep Sugar constant → 4 : 10

Initial dough = 22 kg => 11 parts = 22 kg => 1 part = 2 kg

Increase in Flour = 10 − 7 = 3 parts

Flour added = 3 × 2 kg = 6 kg

Therefore The correct answer is 6 kg.

Alternate Method

Given: Initial dough = 22 kg, Initial Ratio = 4 : 7, Final Ratio = 2 : 5

Calculations:

=> Sugar in initial dough = (4/11) × 22 = 8 kg

=> Flour in initial dough = (7/11) × 22 = 14 kg

=> Let additional flour added be x kg.

=> New ratio of Sugar to Flour = 8 / (14 + x) = 2 / 5

=> 8 × 5 = 2 × (14 + x)

=> 40 = 28 + 2x

=> 2x = 12

=> x = 6 kg

Therefore The correct answer is 6 kg.

Additional Information

Constant Quantity Concept

When one component is added to a mixture, the quantity of the other component remains unchanged. Equating this constant component in both ratios simplifies the calculation.

Ratio Balancing

To balance ratios, multiply the terms of one or both ratios by a common factor so that the parts representing the unchanged quantity become equal.

Mixture Replacement

If a part of the mixture is replaced by a pure component, the total quantity remains the same, but the internal ratio changes significantly.

Q82. Answer: (d) [figure]

Platinum is a metal.

And,

Oxygen is a colourless, odourless gas.

The correct Venn diagram representation is,

Hence, option 4 is the correct answer.

Q83. Answer: (a) 13.5 km

Shortcut Trick

To find how much less one value is than another, perform direct subtraction.

Difference = 42.3 km − 28.8 km

Difference = 13.5 km

Therefore The correct answer is 13.5 km.

Alternate Method

Given:

First distance = 42.3 km

Second distance = 28.8 km

Formula Used:

Difference = Larger Value − Smaller Value

Calculations:

=> Required value = 42.3 km − 28.8 km

=> Aligning decimals: 42.3 − 28.8

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=> 13.5 km

Therefore The correct answer is 13.5 km.

Additional Information

Decimal Subtraction

Always align the decimal points vertically before performing subtraction or addition of decimal numbers.

Unit Consistency

Ensure both quantities are in the same unit (e.g., both in km or both in m) before comparing or subtracting them.

Q84. Answer: (c) 4√4

Shortcut Trick

An irrational number is a number that cannot be expressed as a simple fraction p/q.

√16 = 4 (Rational)

^6√1 = 1 (Rational)

$^3\sqrt{8}$ = 2 (Rational)

^4√4 = √(√4) = √2 ≈ 1.414... (Irrational)

Therefore The correct answer is √2.

Alternate Method

Given: Four numerical expressions to identify the irrational one.

Concept: A number is rational if it is a perfect n^(th) root of an integer; otherwise, it is irrational if it results in a non-terminating, non-recurring decimal.

=> Option 1: √16 = √(4^2) = 4

=> Option 2: ^6√1 = ^6√(1^6) = 1

=> Option 3: ^4√4 = ^4√(2^2) = 2^(2/4) = 2^(1/2) = √2

=> Since √2 is a well-known irrational number, ^4√4 is irrational.

=> Option 4: $^3\sqrt{8}$ = $^3\sqrt{(2^3)}$ = 2

Therefore The correct answer is ^4√4.

Additional Information

Definition of Irrational Numbers

Numbers that cannot be written in the form p/q, where p and q are integers and q ≠ 0. Their decimal expansions are non-terminating and non-recurring.

Properties of Surds

A radical $^n\sqrt{x}$ is irrational if x is not a perfect n^(th) power of a rational number.

Common Irrational Constants

Examples include π (pi), e (Euler's number), and square roots of non-perfect squares like √2, √3, and √5.

Q85. Answer: (b) increasing the amplitude

CONCEPT:

• Sound: The sound is a longitudinal wave in which the particles of the medium through which the sound is transported vibrate parallel to the direction that the sound wave moves.

• Loudness: The phenomenon of sound waves that depend on the amplitude and energy of the sound wave is called Loudness.

• When the amplitude of the sound is large, then the sound wave is considered to be loud.

1. Frequency: The number of wave cycles happening per second is called frequency.

2. Amplitude: The maximum amount of displacement of the medium particles from its mean position is called the amplitude of the wave.

3. Wavelength: The distance between two adjacent maxima or two adjacent minima of a wave is called wavelength of that wave. It is denoted by λ.

4. Pitch: The response of the ear to the frequency of sound is called the pitch of the sound.

EXPLANATION:

• Sound is a wave and a high amplitude wave carries a large amount of energy. It means a low amplitude wave carries a small amount of energy.

• The loudness of a sound wave is directly proportional to the square of the amplitude of that wave.

• The loudness of the sound produced by a radio increases by increasing the amplitude. So option 2 is correct.

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Q86. Answer: (d) Only assumption I is implicit.

Assumption 1: This is implicit, because safety, quality and nutritional value of the food we eat is of fundamental importance to our health and well-being.

Assumption 2: This is not implicit because, nothing is mentioned about monitoring in the given statement.

Hence, “only conclusion 1” is implicit.

Q87. Answer: (d) 20

92 – [71 + {4 – (5 – (4 – 2))}]

=> 92 – [71 + {4 – (5 – 2)}]

=> 92 – [71 + {4 – 3}]

=> 92 – [71 + 1]

=> 92 – 72

=> 20

Q88. Answer: (a) Amitabh Kant

• Sh. Amitabh Kant is the former CEO of NITI Aayog.

• NITI-National Institution for Transforming India

• He has also written a book-"Branding India – An Incredible Story".

• NITI Aayog is a policy think tank of the Government of India which replaced Planning Commission of India. It was established with the aim at achieving sustainable development goals with cooperative federalism by fostering the involvement of State Governments in the economy policies.

• One of the objectives of NITI Aayog is to develop mechanisms to formulate credible plans at the village level and aggregate these progressively at higher levels of government.

Important Points

• Chairman - PM Narendra Modi

• Suman Bery is the current vice-chairperson of the NITI Aayog.

• Currently, Parameswaran Iyer is the CEO of NITI Aayog appointed in June 2022.

Q89. Answer: (a) 3000 J

CONCEPT:

• Potential energy: The energy of any object due to its position with respect to a reference point is called potential energy. It is denoted by PE.

Potential energy is given by:

PE = m g h.

Here, PE is the Potential Energy, m is the mass, g is the acceleration due to gravity, and h is the height at which the object is placed

CALCULATION:

Given that:

Mass (m) = 50 Kg

Height (h) = 6 m

PE = 50 x 10 x 6

PE = 3000 J

PE = 3 kJ

• Kinetic energy: The energy due to the motion of the object is called kinetic energy.

Kinetic energy (KE) = 1/2 (mv2)

Where m is mass and v is velocity.

• Since the object is stationary (at rest) so the velocity is zero. Hence the kinetic energy of the object will be zero.

• Only the potential energy of the object will be there at the height.

Q90. Answer: (d) Myanmar

• India signed a pact with Myanmar for the socio-economic development of Rakhine State in Dec 2017.

• At that time, hundreds of thousands of mainly Muslim Rohingyas had fled from Rakhine(a predominantly Buddhist region) to Bangladesh.

• The memorandum of understanding was signed between S. Jaishankar and U. Soe Aung.

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• It was intended to help Myanmar achieve its objective of restoration of normalcy in Rakhine State and enable the return of displaced persons.

• The GoI proposed to take up a project to build prefabricated housing in Rakhine State.

• Myanmar Capital - Naypyitaw

• Currency - Burmese kyat

Q91. Answer: (b) 8 years

Let the present age of Srinivas's daughter is "x",

Hence, Srinivas's present age is "4x",

5 years ago,

Srinivas's daughter's age was "x - 5",

and Srinivas's age was "4x - 5".

According to the given condition,

Srinivas was nine times as old as his daughter was at that time.

Therefore 9 (x - 5) = 4x - 5

Therefore 9x - 45 = 4x - 5

Therefore 9x - 4x = 40

Therefore 5x = 40

Therefore x = 8

Hence, Srinivas's daughter's present age is '8' years.

Q92. Answer: (b) Isotopes

The correct answer is Option 2, i.e Isotopes.

• Isotopes have similar chemical properties but different atomic masses.

• Isotope of an element has a different number of neutrons but have the same number of protons.

• For instance, isotopes of Hydrogen are Protium, Deuterium and Tritium.

• Isomers - They share the same formula but a different arrangement of atoms in the molecule which make them, possess different properties. The atomic number and atomic mass are equal but the energy states are different.

• Actinides - It is the third group in the periodic table. These are the elements from atomic numbers 89 to 103.These have properties of both the d-block and the f-block elements, but they are also radioactive.

• Isobars -They have the same mass number but a different atomic numbers (number of protons).

Q93. Answer: (d) 1829

• The regulation was passed on 1829 to ban the practice of Sati.

• The Sati was practiced primarily by Hindu communities where a widow was supposed to be burn with her dead husband either voluntarily or non voluntarily.

• Raja Rammohan Roy raised his voice against this cruel practice and spread awareness among people to discontinue it. He is also known as the pioneer of women’s rights in India.

• Lord William Bentinck passed the Bengal Sati Regulation in all jurisdictions of British India.

• However, it is believed that many mughal emperors such as Humayun, Akbar, Aurangzeb, etc tried to abolish Sati.

Q94. Answer: (b) India

• India won the 2017 Women’s Hockey Asia Cup title. It was the ninth edition of the cup.

• The winner of this tournament was to qualified for the 2018 World Cup in England and India qualified for it.

• The team was led by Skipper Rani Rampal.

• The final was played at Kakamigahara in Japan. India defeated China by 5-4 goals in penalty shootout.

• That win made India two times champion of Women’s Asia Cup title. The first time was in 2004.

Q95. Answer: (c) Both I and II are implicit

Assumption 1: This is implicit, because participation in the debate improves convincing skills.

Assumption 2: This is implicit, because participation in the debate improves communication skills.

Hence, “both 1 and 2” are implicit.

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Q96. Answer: (c) Shah Rukh Khan

• Shah Rukh Khan has been awarded Crystal award on 22nd January 2018 at WEF, World Economic forum Annual Summit held at Davos.
• He was awarded for his leadership in championing children's and women's rights in India
• The theme of the event was-"Creating a Shared Future in a Fractured World".
• Cate Blanchett was also awarded for her leadership in raising awareness of the refugee crisis.
• Elton John was also awarded for his leadership in the fight against HIV/AIDS.
• Theaster Gates, Jin Xing, Deepika Padukone, and Lynette Wallworth are named as 2020 Crystal Award.
• Deepika Padukone is named for her leadership in raising mental health awareness.

Q97. Answer: (b) 100

125, 343 and 216 are the cubes of 5, 7 and 6.
Whereas,
100 is the square of 10
Hence, "100" is different from other options.

Q98. Answer: (c) Its diagonals are equal and divide each other equally.

Shortcut Trick
A Rectangle is a special type of Parallelogram where all interior angles are 90°.
By the properties of a Parallelogram, the diagonals always bisect each other.
In a Rectangle, the diagonals are also equal in length due to the 90° angles.
However, diagonals are perpendicular only in a Rhombus or a Square.
Therefore The correct answer is Its diagonals are equal and divide each other equally.
Alternate Method
Given: A rectangle ABCD with diagonals AC and BD intersecting at E.
Property Used: Congruence of triangles and properties of parallelograms.
In ΔABC and ΔDCB:
=> AB = DC (Opposite sides of a rectangle are equal)
=> angle ABC = angle DCB = 90°
=> BC = BC (Common side)
=> ΔABC ~= ΔDCB (By SAS congruence rule)
=> AC = BD (By CPCT - Diagonals are equal)
=> Since a rectangle is a parallelogram, its diagonals bisect each other.
=> AE = EC and BE = ED.
Therefore The correct answer is Its diagonals are equal and divide each other equally.

Q99. Answer: (a) D

In all the figures, except figure D there are two arrows marks pointing towards different sides.
Whereas,
In figure D there is only one arrow mark.
Hence, "D" is the odd one.

Q100. Answer: (b) 51

Shortcut Trick
Net increase in sum = New value − Old value = 160 − 60 = 100
Net increase in mean = Net increase in sum ÷ Total observations = 100 ÷ 100 = 1
New Mean = Old Mean + Increase in mean = 50 + 1 = 51
Therefore The correct answer is 51.
Alternate Method
Given:
Number of observations (n) = 100
Original Mean = 50
Old observation = 60 | New observation = 160

Formula Used:

Mean = Sum of observations ÷ Number of observations

Calculations:

=> Original Sum = Mean × n

=> Original Sum = 50 × 100 = 5000

=> New Sum = Original Sum − Old observation + New observation

=> New Sum = 5000 − 60 + 160

=> New Sum = 5100

=> New Mean = 5100 ÷ 100

=> New Mean = 51

Therefore The correct answer is 51.

Additional Information

Effect of Change on Mean

If every observation in a data set is increased or decreased by a constant value k, the mean also increases or decreases by the same constant k.

Correction of Incorrect Entry

Correct Mean = [(Incorrect Mean × n) − (Incorrect Value) + (Correct Value)] ÷ n.

Arithmetic Mean Property

The sum of the deviations of observations from their arithmetic mean is always zero: ∑(x_i − Mean) = 0.

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