RRC Group D Previous Year Paper 48 (Held On: 11 Dec 2018 Shift 2)

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

Take this paper as a timed mock test

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

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CBT

Q1. Which of the following is a finite decimal or terminating decimal?

(a) 1/24
(b) 1/32
(c) 1/96
(d) 1/48

Q2. The LCM of two positive numbers is three times their HCF. If the product of the LCM and the HCF is 867, find the numbers.

(a) 17, 51
(b) 27, 81
(c) 13, 39
(d) 51, 153

Q3. If an object is placed between a concave mirror and F, what will be the type of image formed?

(a) Virtual
(b) Actual
(c) Complete
(d) Incomplete

Q4. If 8 December 2007 was a Saturday, then what was the day on 12 August 2008?

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

Q5. Find the value of $x^2 - y^2$

1. If $x + y = 2$
2. If $x - y = 6$

(a) Only 1 is sufficient
(b) Neither 1 nor 2 is sufficient
(c) Only 2 is sufficient
(d) Both 1 and 2 together are sufficient

Q6. Three of the four options below are related in a particular way. Select the option which is different or mismatched from the others.

(a) Hand
(b) Nose
(c) Heart
(d) Eyes

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Q7. Which of the following statements is not true regarding the effect of increasing temperature on the distribution of molecular motion in a gas?

(a) Most likely speed increases.
(b) The area under the distribution curve remains the same as below the lower temperature.
(c) Distribution becomes widespread.
(d) The fraction of molecules increases with the most possible speed.

Q8. The _____ coast in Kerala is a beautiful backwater lined with coconut trees.

(a) Khambhat
(b) Malabar
(c) Konkan
(d) Coromandel

Q9. Two Indians have won the Ramon Magsaysay Award 2018. One of them is Sonam Wangchuk. What is the name of the second Indian to win the award?

(a) Bharat Watwani
(b) Aruna Roy
(c) Prakash Amte
(d) Rajendra Singh

Q10. The value of 4.5 + 0.45 + 0.045 + 0.0045 is:

(a) 5.0005
(b) 4.99995
(c) 4.995
(d) 4.9995

Q11. (11/13) + (13/11) = ?

(a) 290/143
(b) 24/143
(c) 2
(d) 245/24

Q12. City Montessori School, named in the Guinness Book of World Records for the largest number of students, is one of the most popular schools of

(a) Mirzapur
(b) Allahabad
(c) Lucknow
(d) Kanpur

Q13. The farmer left a cow to walk west. The cow started grazing. After some time, the cow started moving to its right and reached a position that was 90 degrees from its starting position. Which direction is the cow facing now?

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

Q14. The ratio of copper, zinc and nickel in German silver is 4 : 3 : 2. How many kilograms of zinc is added to this metal of 54 kg so that the new ratio becomes 2 : 5 : 1?

(a) 48
(b) 50
(c) 36
(d) 42

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Q15. A tank has two pipes. Pipe M is for filling the tank and pipe N is for emptying the tank. If pipe M takes 45 hours to completely fill the tank and pipe N takes 90 hours to empty the fully filled tank, then how many hours will they take to together fill the half empty tank completely?

(a) 35 hours
(b) 40 hours
(c) 45 hours
(d) 60 hours

Q16. Four couples go to a party. All the women are wearing different colour sarees. All men are wearing different coloured shirts. The colour of a shirt and a saree can be the same. Consider all the statements given below and answer the questions.

Statement:

1. Rama is married to Ramesh who is wearing a red shirt.
2. Purva, who is not Anup's wife, is wearing a blue sari.
3. Anup and Shreya are wearing green clothes.
4. Sandesh's wife Mrunmayi has not worn a yellow sari.
5. Viraj is wearing a yellow shirt.

Question:

Who is Shreya's husband?

(a) Anup
(b) Ramesh
(c) Sandesh
(d) Viraj

Q17. Which of the following procedures would you use to separate ammonium chloride from sodium chloride?

(a) Distillation
(b) Sublimation
(c) Crystallization
(d) Filtration

Q18. What is the molecular formula of isobutane?

(a) C4H8
(b) C4H10
(c) C3H8
(d) C3H6

Q19. $16^3 \div 8^3 \div 2^2 = ?$

(a) 2^5
(b) 2^1
(c) 2^(-1)
(d) 2^2

Q20. Lanthanide and actinide:

(a) s - Block element
(b) f - Block element
(c) d - Block element
(d) p - Block element

Q21. _____ uses regenerated cells for reproduction through the process of budding.

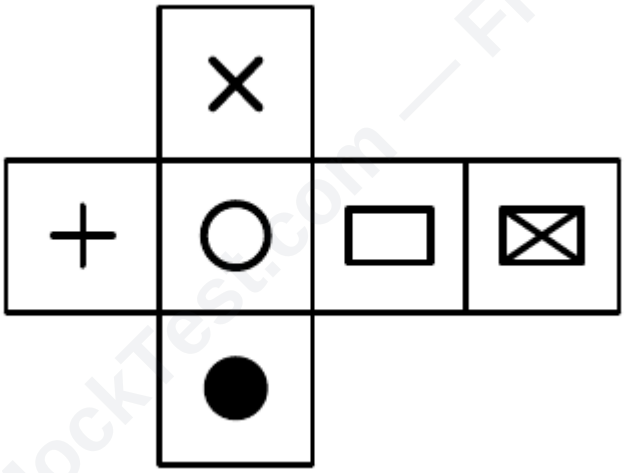
(a) Yeast
(b) Palnaria
(c) Hydra
(d) Amoeba

Q22. 4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B

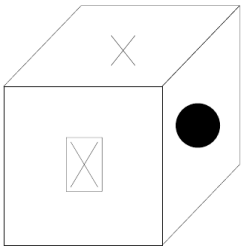
In the above sequence, the 5th term to the right of 15th term from the left is:

(a) 4
(b) 6
(c) B
(d) T

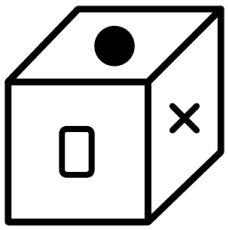
Q23. To make a cube, the given shape is folded from the edges. Identify the option that correctly represents the faces of the cube.



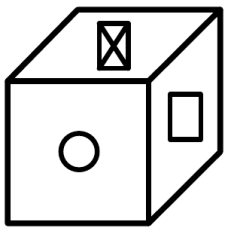
(a)



(b)

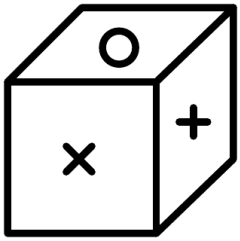


(c)



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(d)



Q24. 91238769AZ

The water image of the above figure is:

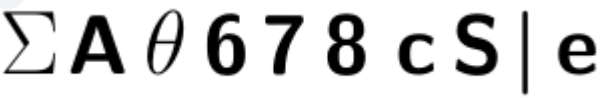
(a)



(b)



(c)



(d)



Q25. A boy clapped near a rock and after 3 seconds he heard an echo. If the speed of the sound is 346 ms^(-1), then how far is the boy from the rock?

(a) 219 meter
(b) 341 meter
(c) 346 meter
(d) 519 meter

Q26. Read the given statements and conclusions carefully and select the conclusions to be logically followed from the statements.

Statement: In a democracy, majority rule.

Conclusion 1: In a democracy, candidates are elected by the majority.

Conclusion 2: Amendment of laws in democracy is done by majority vote in Parliament.

(a) Only conclusion 1 follows
(b) Only conclusion 2 follows
(c) Both 1 and 2 follow
(d) neither 1 nor 2 follows

Q27. At what time between 10 am and 11 am when the clock needles overlap or touch each other?

(a) minutes before 11 o'clock
(b) minutes before 10 o'clock
(c) minutes after 10 o'clock
(d) minutes after 11 o'clock

Q28. What is the basis on which the parts of the flowers are present?

(a) Placenta
(b) Sepal
(c) Fallopian Tube
(d) Thalamus

Q29. Which of the following pair has not same unit?

(a) Speed and velocity
(b) Acceleration and acceleration due to Gravity
(c) Momentum and force
(d) Distance and Displacement

Q30. The ball, moving at a speed of 2 meters per second, directly hits a stationary gate twice its mass. If the coefficient of restitution or coefficient of retention is 0.5, what will be their velocity after hitting:

(a) 1, 1.5
(b) 0, 2
(c) 1, 2
(d) 0, 1

Q31. Which of the following river spreads over the Sapta Indus region and later dries up?

(a) Chenab
(b) Yamuna
(c) Saraswati
(d) Jhelum

Q32. Suraj's sum is four times that of Ravi's sum. Ravi's sum is sixteen times Aditya's sum. What is the ratio of the sums of Aditya and Suraj?

(a) 1 : 64
(b) 1 : 24
(c) 64 : 1
(d) 1 : 16

Q33. Read the given question and decide which of the following statements is correct to answer the question.

Question: Who among P, N, K and J get the highest payment?

Statement:

1. P earns more than K and J.

2. N earns more than K.

(a) Statements 1 and 2 are both correct.
(b) Statements 1 and 2 both are not correct.
(c) Only statement 1 is correct.
(d) Only statement 2 is correct.

Q34. An object of 20 kg mass moves with a speed of 5 ms^(-1), its kinetic energy will be _____.

(a) 250 Pa
(b) 250 N
(c) 250 kg
(d) 250 J

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Q35. If $3x^2 + ax - 12$ is completely divisible by $x - 8$ then the value of a is:

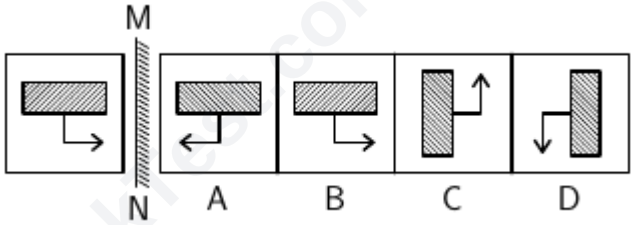
(a) • 24.5
(b) 24.5
(c) 22.5
(d) • 22.5

Q36. What will be the next term in the following series?

152, 148, 156, 152, ___

(a) 158
(b) 160
(c) 156
(d) 162

Q37. Select a mirror image for the following figure.



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

Q38. A and B together can do a work in 7 days and B and C together in 8.75 days and A can do the same work in 10.5 days. How many days will C take to complete double the same amount of work when working alone?

(a) 31
(b) 31.25
(c) 30
(d) 32.5

Q39. Three of the four options below are related in a particular way. Select the option which is different or unique from others.

(a) Gun
(b) Sword
(c) Write
(d) Spade

Q40. In _____, the connective electrons of the elements increase when going from one side to the other.

(a) Class
(b) Line
(c) Period
(d) Group

Q41. India is hosting 'Two Plus Two' conversation with which country in September 2018?

(a) USA
(b) UK
(c) France
(d) Germany

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Q42. From point O, facing west, a person walks 4 km to reach point A, then from there, after walking 4 km to the right reaches point B, then after walking 4 km to the right he reaches point C, turning right, he walks 3 km to reach point D, turning left, he walks 4 km to reach point E, walking 5 km to the right reaches point F, the shortest distance between point B and point F is:

(a) 8√2
(b) 5√2
(c) 4√2
(d) 3√2

Q43. Select the option that is related to the third term in the same way as the second term is related to the first.

Odometer: Distance :: Ammeter: ?

(a) Earthquake
(b) Current
(c) Air
(d) Mass

Q44. Study the following information carefully and answer the following questions.

Dhawan plans to buy a flat at Shyamla Society.

Shyamala Society has placed the following conditions for allotment of flats in its society:

Applicant:

(I). State domicile certificate must be submitted.

(II). Must have done a job of at least 5 years.

(III). If needed, he will be ready to pay the entire amount in 5 years.

(IV). Should not be the owner or co-owner (if spouse) of the residential facility in that city

(V). Should not be below 35 years of age as on 31 December 2016.

In the case of the applicant who fulfils all other criteria except:

A) (I) As mentioned above, should be referred to the chairman of the city council.

B) (II) As mentioned above, prepared to provide Aadhaar card. To be referred to the vice-chairman of the committee

C) (III) As mentioned above, but a freedom fighter or ex-soldier or the first relationship with these should be referred to a member of the committee.

The last date for receipt of applications was 31 December 2016. The conditions of 31 December 2016 are to be met. Based on these criteria, decide whether you have to allot the flat in the following case given on 1 January 2017.

Dhawan is an industrialist and from another state who established his factory in 2000 and has a state residence certificate. He is ready to pay the full amount in 4 years if necessary. He does not have a house in that city but his wife has a flat. His date of birth is 11 November 1970.

(a) Will allot flats.
(b) Send for consideration to the Vice President.
(c) Do not allot flat.
(d) Send to the President for consideration.

Q45. The period between _____ is known as the period of Delhi Sultanate.

(a) 1106 AD and 1326 AD
(b) 1606 AD and 1826 AD
(c) 1206 AD and 1526 AD
(d) 1006 AD and 1326 AD

Q46. Read the given statement (statements) and conclusions carefully. Assuming that the information given in the statement is true, even if it appears to be different from commonly known facts, select the logically inferential conclusions from the statement that are beyond a reasonable doubt.

Statement: All tonics are poisonous substances. All poisonous substances are poison.

Conclusions:

1. All poison are tonics.

2. Some poison are tonics.

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

Q47. Kakarpar Atomic Energy Station is located in the state of _____.
(a) Gujarat
(b) Rajasthan
(c) Maharashtra
(d) Karnataka

Q48. Select the word which is related to the third word in the same way as the second word is from the first word.:
Hockey : Field :: Badminton : ?
(a) Pitch
(b) Court
(c) Arena
(d) Stadium

Q49. The ratio of age of Mohan and Sohan is 5 : 4. If the sum of his present age is 36 years, then what is the present age of Sohan?
(a) 14 years
(b) 15 years
(c) 12 years
(d) 16 years

Q50. Which Indian airport has become the busiest single runway airport in the world?
(a) Amausi Airport
(b) Chhatrapati Shivaji Maharaj International Airport
(c) Indira Gandhi International Airport
(d) Calicut International Airport

Q51. Who among the following is the leader of the Communist Party of India (Marxist)?
(a) Ram Madhav
(b) Yogi Adityanath
(c) Viplav dev
(d) Sitaram Yechury

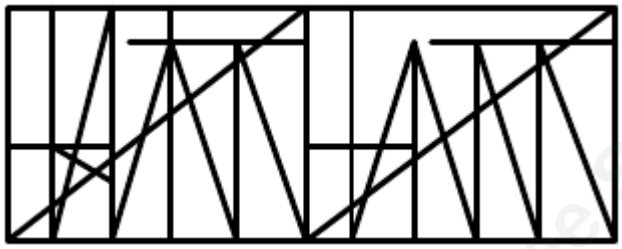
Q52. 63 people can dig a pond in 126 days. How many days can 98 people dig it?
(a) 77
(b) 90
(c) 80
(d) 81

Q53. The speed of a car moves from 5 m/s to 36 m/s. What will be the acceleration?
(a) 1 ms^2
(b) Calculation not possible.
(c) 1.5 ms^(-2)
(d) 0.11 ms^(-2)

Q54. Which is the prestigious civilian award given to MS Dhoni till date?
(a) Bharat Ratna
(b) Padma Vibhushan
(c) Padma Bhushan
(d) Dronachary

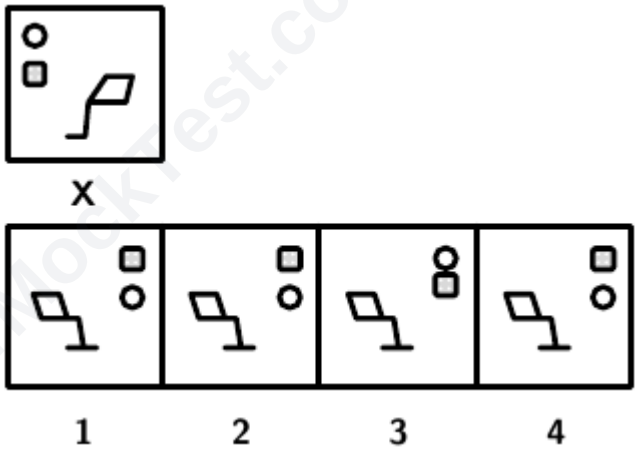
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Q55. How many rows are used to draw the following figure?



(a) 36
(b) 55
(c) 31
(d) 28

Q56. Select the option that looks exactly like the mirror image of the given figure.



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

Q57. Pointing to a woman, Khan said, "She is the daughter of my son's wife." How is the woman related to Khan?
(a) Granddaughter
(b) Cousin
(c) Uncle
(d) Daughter-in Law

Q58. Shiv Sena is the regional political party of which state?
(a) Gujarat
(b) Maharashtra
(c) Andhra Pradesh
(d) Rajasthan

Q59. What will be the value of b, for which the least value of quadratic function $f(x) = x^2 – 4bx + 9$ is -27?
(a) 6 or -6
(b) 3 or -3
(c) 4.5 or -4.5
(d) 4 or -4

Q60. Who is known as the father of DNA fingerprinting in India?
(a) P.S. Rao
(b) Mukesh Sharma
(c) Sir Alec Geoffrey

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(d) Lalji Singh

Q61. Find the next word in the series.

L12O, N14M, P16K, _____.

(a) I18R
(b) R19I
(c) R18I
(d) I19R

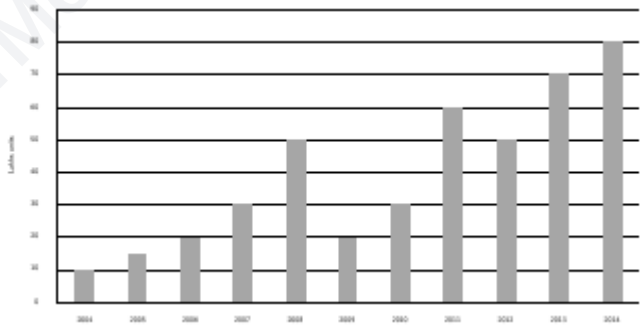
Q62. The value of the conductor force is equal to ε: _____.

(a) ε = Q/t
(b) ε = E/Q
(c) ε = P/Q
(d) ε = W/Q

Q63. Which one of the following does not contain water in alkali crystallization?

(a) Baking soda
(b) Blue vitriol
(c) Washing soda
(d) Gypsum

Q64. The following bar graph shows the information of personal computers sold by the company "XYZ" in the last 10 years.



How many personal computers (In lakhs) did XYZ sell in the year 2006?

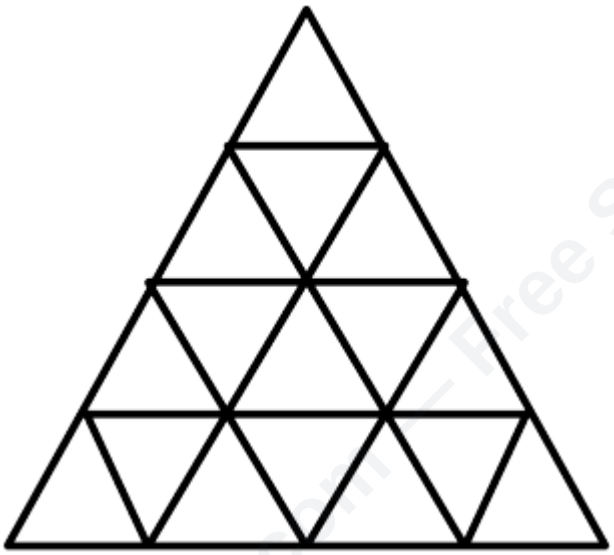
(a) 20
(b) 15
(c) 30
(d) 10

Q65. The length of the base of a triangle is 5/7 of the base of a parallelogram. The area of the triangle and the parallelogram is the same. Find the ratio of the respective heights of the triangle and the parallelogram.

(a) 5 : 3
(b) 7 : 5
(c) 14 : 5
(d) 21 : 10

Q66. Find the minimum number of parallelograms in the given figure.

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(a) 47
(b) 45
(c) 39
(d) 51

Q67. A person received 4 packets in January with an average weight of 300g, and 8 packets in February with an average weight of 400g. What will be the average weight (in g) of all the packets received by the person in both months?
(a) 412.67g
(b) 376.67g
(c) 350g
(d) 366.67g

Q68. In which year did the Right to Information come into force?
(a) 2004
(b) 2005
(c) 2002
(d) 2000

Q69. How many multiples of the number $2^{13} \times 3\text{^}5 \times 5^3 \times 7\text{^}6$ are perfect cubes or complete cubes?
(a) 24
(b) 60
(c) 36
(d) 48

Q70. What is hemophilia?
(a) It is a disease caused by the absence of genes responsible for the factors that cause blood clotting.
(b) It is a disease in which white blood cells become cancerous and eliminate RBCs in blood.
(c) It is a disease that is caused by vitamin deficiency.
(d) It is a disease in which extra hemoglobin is produced.

Q71. Assuming the given statements to be correct, which option is definitely correct?
1. Some cats have two legs.
2. All men have two legs.
3. All monkeys are men.

(a) All monkeys have two legs.
(b) Some monkeys are not cats.
(c) Some men are cats.
(d) All men have four legs.

Q72. Read the given statement and decide which of the following assumptions are contained in the statement.

Statement:

"Please note that the company will only provide accommodation to outside candidates if selected."

Assumptions:

I. The company plans to select only external candidates.

II. The second company plans to select only local candidates.

(a) Neither assumption I nor II are implicit.
(b) Only assumption I is implicit.
(c) Either assumption I or II is implicit.
(d) Only assumption II is implicit.

Q73. The density of a substance is defined as _____.

(a) Mass per unit volume
(b) Product of mass and acceleration
(c) Weight per unit volume
(d) Thrust unit area

Q74. In August 2018, India and which country signed the 'Second Protocol' amending the Comprehensive Economic Cooperation Agreement (CERA) to promote trade relations between the two?

(a) America
(b) South Korea
(c) Singapore
(d) China

Q75. In a solution made by dissolving 50 grams of sugar in 150 grams of water, the concentration of mass will be _____.

(a) 48.2%
(b) 3%
(c) 25%
(d) 50%

Q76. Which of the following, a major film actor, has been selected for the prestigious award in France called 'Knight of the Order of Arts and Letters'.

(a) Kamal Hassan
(b) Shabana Azmi
(c) Rajinikanth
(d) Anupam Kher

Q77. In which state is the Singareni Mines located?

(a) Odisha
(b) Telangana
(c) Maharashtra
(d) Chhattisgarh

Q78. What is the largest 4 digit number divided by 6, 9, 12, 13, and 15?

(a) 9100
(b) 9360
(c) 9240
(d) 9326

Q79. Who among the former wicket-keepers of India was appointed the new General Manager (GM) of the Board of Controller of Cricket in India (BCCI)?

(a) Saba Karim
(b) Sunil Gavaskar
(c) Ravi Shastri

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(d) MV Sridhar

Q80. Two people are cycling in the same direction respectively, from there a train traveling at the fixed speed passes from the same direction. The train crosses the first in 8 seconds and the second in 8.4 seconds, the first one was cycling at a speed of 9 km/h while the second one was cycling at a speed of 12 km/h. What is the speed of the train in km/h?

(a) 72
(b) 75
(c) 81
(d) 66

Q81. A person starts walking in the direction of the rising sun, he turns at 45° to his left and walks 500 meters after that he turns at 90° to his left and walks for a while. Which direction is he facing now?

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

Q82. The statement is followed by two arguments. State which argument is correct about the statement.

Statement: There are many aspects to a person.

Argument:

1. Yes, everyone responds to a situation that is different from the other
2. No, we are responsible for what we create all around us. What we produce happiness or sorrow is up to us.

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

Q83. Indian cricket captain Virat Kohli married which film actress in 2017?

(a) Kriti Sanon
(b) Anushka Sharma
(c) Kangana Ranaut
(d) Parineeti Chopra

Q84. On body work is done only when: _____.

(a) Forces act on it.
(b) It provides energy boost through a mechanical effect.
(c) Displacement takes place there.
(d) It moves through a certain distance.

Q85. What is the square root of 21904?

(a) 144
(b) 146
(c) 152
(d) 148

Q86. What was India's total medals in the 2018 Commonwealth Games?

(a) 58
(b) 59
(c) 66
(d) 61

Q87. What is the film-on-wheel concept of 'UFO Movies India' called?

(a) E-cinema
(b) E-Talkies
(c) Caravan Talkies

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(d) Caravan Cinema

Q88. The SI unit of potential difference is _____.

(a) Watt
(b) Volt
(c) Coulomb
(d) Jule

Q89. It is Sunday on 30 September 2018. Which of the following year will also be Sunday on 30th September?

(a) 2024
(b) 2029
(c) 2027
(d) 2023

Q90. Find the next alphanumeric in the following series.

11KI9, 16PN14, _____

(a) Q18S19
(b) 21US19
(c) 21VS19
(d) 22US19

Q91. One pascal = ?

(a) 1 N m^(-2)
(b) 1 N m^2
(c) 1 dyne cm^(-2)
(d) 100 atmosphere

Q92. The ratio of the two numbers is 17 : 28. If 6 is added to the smaller number, then the ratio changes to 13 : 20. What is the value of a larger number?

(a) 112
(b) 98
(c) 140
(d) 126

Q93. What is the product produced as a result of thermal decomposition of lead nitrate?

(a) Lead oxide + nitrogen trioxide + nitrogen trioxide
(b) Lead oxide + nitrogen dioxide
(c) Lead oxide + oxygen + nitrogen dioxide
(d) Lead oxide + nitrogen trioxide

Q94. In triangle ABC, point M is on side AB and point N is on side AC such that BMNC becomes a trapezium. The ratio of side MN and side BC is 7 : 9. Calculate the ratio of the area of triangle AMN and the area of trapezium BMNC.

(a) 7 : 9
(b) 49 : 32
(c) 32 : 49
(d) 49 : 81

Q95. Read the given statements and conclusions carefully and choose which of the statements logically follows the conclusions.

Statement: All jaguars are cheetahs, all panthers are cheetahs

Conclusion:

1. All Jaguars are Panthers.

2. Some Jaguars are Panthers.

(a) Both 1 and 2 follow
(b) Neither 1 nor 2 follows

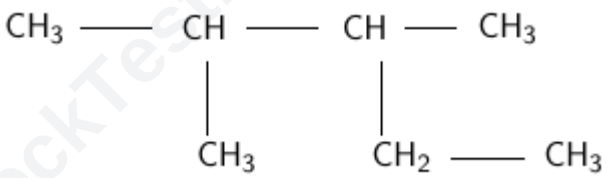
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(c) Only conclusion 1 follows
(d) Only conclusion 2 follows.

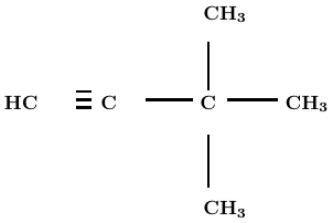
Q96. _____ tissue is the only plant tissue that produces new cells by cell division.
(a) Parenchyma
(b) Xylem
(c) Collenchyma
(d) Meristematic

Q97. The difference between 33% loss and 7% profit on selling an item is Rs 220. What is the cost price of the item?
(a) Rs. 550
(b) Rs. 525
(c) Rs. 600
(d) Rs. 575

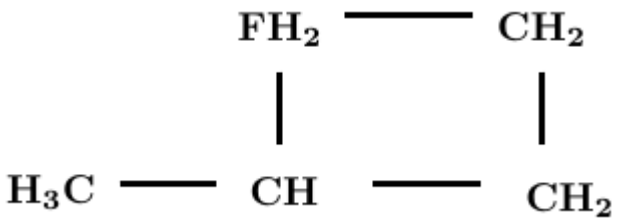
Q98. Which of the following is an unsaturated compound?
(a)



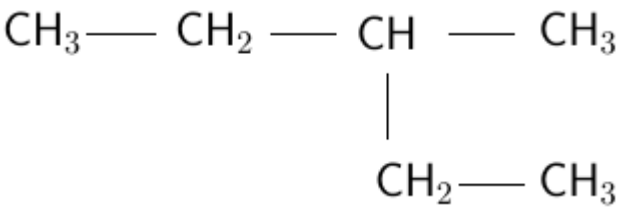
(b)



(c)



(d)



Q99. In which of the following is the body of the plant differentiated into roots, stems and leaves?
(a) Funaria
(b) Chara
(c) Marsilea
(d) Marchantia

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Q100. If A means addition, E means division, I means subtraction, O means multiplication and the remaining letters are replaced with numbers according to their chronological position (used as mathematical notation If the letters formed to retain their number in the series), what will be the result of the following?

88E11A2I4 = ?

(a) 60
(b) 33
(c) 12
(d) 6

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (b) 1/32

Shortcut Trick

A fraction in its simplest form is a terminating decimal if the prime factors of its denominator are only 2 and/or 5.

Check denominators: 24 = $2^3 \times 3$, 32 = 2^5, 96 = 2^5×3, 48 = 2^4×3.

Only 1/32 has a denominator with no prime factors other than 2.

Therefore The correct answer is 1/32.

Alternate Method

Given: Fractions (1) 1/24, (2) 1/32, (3) 1/96, (4) 1/48.

Concept: For a fraction p/q to be a terminating decimal, q must be of the form $2^n \times 5$^m, where n and m are non-negative integers.

=> Option 1: 1/24 → 24 = $2^3 \times 3$ (Contains 3, so non-terminating)

=> Option 2: 1/32 → 32 = 2^5 × 5^0 (Contains only 2, so terminating)

=> Option 3: 1/96 → 96 = 2^5 × 3 (Contains 3, so non-terminating)

=> Option 4: 1/48 → 48 = 2^4 × 3 (Contains 3, so non-terminating)

Therefore The correct answer is 1/32.

Additional Information

Non-terminating Repeating Decimals

If the prime factorization of the denominator contains factors other than 2 or 5, the decimal expansion is non-terminating repeating (recurring).

Simplified Form Requirement

Always ensure the fraction is in its simplest form (p and q are co-prime) before checking the factors of the denominator.

Decimal Value of 1/32

1/32 = 1/2^5 = (1 × 5^5) / (2^5 × 5^5) = 3125 / 100000 = 0.03125.

Q2. Answer: (a) 17, 51

Shortcut Trick

Given: LCM = 3 × HCF and LCM × HCF = 867

=> (3 × HCF) × HCF = 867 => 3 × HCF² = 867

=> HCF² = 289 => HCF = 17

=> LCM = 3 × 17 = 51

Since the numbers are factors of LCM and multiples of HCF, and HCF is 17 while LCM is 51, the numbers are 17 and 51.

Therefore The correct answer is 17, 51.

Alternate Method

Given:

=> Let HCF be h and LCM be L.

=> L = 3h

=> L × h = 867

Formula Used:

=> Product of two numbers = HCF × LCM

Calculations:

=> Substituting L = 3h in the product equation:

=> 3h × h = 867

=> 3h² = 867

=> h² = 867 ÷ 3 = 289

=> h = √289 = 17

=> L = 3 × 17 = 51

=> Since LCM is a multiple of both numbers and HCF is a factor, and the product of numbers equals L × h,

=> The numbers must be 17 and 51 as 17 × 51 = 867 and HCF(17, 51) = 17.

Therefore The correct answer is 17, 51.

Additional Information

HCF and LCM Relation

For any two positive integers a and b, a × b = HCF(a, b) × LCM(a, b). Also, HCF is always a factor of LCM.

Co-prime Numbers

If two numbers are co-prime, their HCF is 1 and their LCM is equal to the product of the two numbers.

HCF of Fractions

HCF of fractions = HCF of Numerators ÷ LCM of Denominators.

Q3. Answer: (a) Virtual

The correct answer is Virtual.

Key Points

• When the object is placed between the principal focus (F) and the pole of a concave mirror, an enlarged, virtual and erect image is formed behind the mirror.

• The position of the image is behind the mirror.

• The image will be Enlarged, Virtual, Erect.

Q4. Answer: (a) Tuesday

Given,

8 December 2007 was a Saturday, then what was the day on 12 August 2008.

Here we see the number of odd days from 8 December 2007 to 12th August 2008 are,

Total number of days,

8 ^(th) December 2007 to 31^(th)December = 23 days

January 2008 = 31 days

February 2008 = 29 days

March 2008 = 31 days

April 2008 = 30 days

May 2008 = 31 days

June 2008 = 30 days

July 2008 = 31 days

August 2008 = 12 days

Therefore Total number of days = 23 + 31 + 29 + 31 + 30 + 31 + 30 + 31 + 12 = 248

Therefore Number of odd days = 248 ÷ 7 = 3 odd days

Saturday + 3 odd days = Tuesday

Therefore The 12^(th) August 2008 was Tuesday

Hence, the correct answer is Tuesday.

Q5. Answer: (d) Both 1 and 2 together are sufficient

Shortcut Trick

The expression $x^2 - y^2$ is a standard algebraic identity equivalent to $(x + y)(x - y)$.

To find its value, we directly need the sum $(x + y)$ and the difference $(x - y)$ of the variables.

Statement 1 provides the sum (2) and Statement 2 provides the difference (6).

Value = 2 × 6 = 12, which requires information from both statements.

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

Alternate Method

Given:

Statement 1: $x + y = 2$

Statement 2: $x - y = 6$

Formula Used:

$a^2 - b^2 = (a + b)(a - b)$

Calculations:

=> We need to determine the value of the expression $x^2 - y^2$.

=> From the algebraic identity, $x^2 - y^2 = (x + y) \times (x - y)$.

=> If we use only Statement 1, we know $(x + y) = 2$, but the value of $(x - y)$ remains unknown.

=> If we use only Statement 2, we know $(x - y) = 6$, but the value of $(x + y)$ remains unknown.

=> By combining both statements, we can substitute the values into the identity: $x^2 - y^2 = 2 \times 6 = 12$.

=> Since a specific numerical value is obtained only when both statements are used, they are together sufficient.

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

Additional Information

Difference of Two Squares

The identity $a^2 - b^2 = (a + b)(a - b)$ is a fundamental tool in algebra for simplifying expressions and solving quadratic equations.

Linear Equations in Two Variables

When given $x + y = A$ and $x - y = B$, the individual values can be found using $x = (A + B) \div 2$ and $y = (A - B) \div 2$.

Data Sufficiency Strategy

In Data Sufficiency, always check if the required expression can be formed directly from the given statements before attempting to find individual variable values.

Q6. Answer: (c) Heart

Given,

Hand, Nose, Heart, Eyes

Here we see all the body parts are external except the heart.

The heart is internal body part therefore it is odd or mismatch from others.

Hence, the correct answer is the heart.

Q7. Answer: (d) The fraction of molecules increases with the most possible speed.

The correct answer is The fraction of molecules increases with the most possible speed.

Key Points

• On increasing the temperature, the motion of the gas molecules becomes rapid and hence the value of the most probable velocity also increases.

• As a result, the entire distribution curve becomes flatter, and peak shifts to regions of higher velocities

• As the temperature of the gas increases, the particles gain kinetic energy, and their speed increases.

• The most probable speed is directly proportional to the square root of temperature.

• The area under the distribution curve remains the same as under the lower temperature.

• The total area under the curve is independent of the temperature.

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• The area under the distribution curve represents the total number of molecules.

Q8. Answer: (b) Malabar

The correct answer is Malabar.

Key Points

• The Malabar coast in Kerala is a beautiful backwater lined with coconut trees.

• Backwaters in Kerala are a network of 1500 km of canals both artificial and natural, with 38 rivers and 5 big lakes extending from one end of Kerala.

• Malabar Coast, a name long applied to the southern part of India's western coast, is approximately from the state of Goa southward, which is bordered on the east by the Western Ghats range.

Important Points

Khambhat	**• It is a town in Gujarat's Anand district. - The Gulf of Khambhat, also known as the Gulf of Cambay, is a bay on the Arabian Sea coast of India, bordering the state of Gujarat right north of the city of Mumbai.**
Konkan	• It is also called Aparanta, the coastal plain of western India, lying between the Arabian Sea (west) and the Western Ghats (east).
Coromandel	• The Coromandel Coast is the southern part of India's east coast. - They are commonly used to refer to the whole coastline from Kanyakumari to the Krishna river delta.

Q9. Answer: (a) Bharat Watwani

The correct answer is Bharat Watwani.

Key Points

• Bharat Watwani and Sonam Wangchuk were won the Ramon Magsaysay Award 2018.

• Bharat Vaswani was recognized for his tremendous courage and healing compassion in embracing India's mentally-afflicted destitute.

• Sonam Wangchuck's initiative to harness science and culture creatively for economic progress improved the lives of the Ladakhi youth.

Important Points

• The Ramon Magsaysay Award, Asia’s premier prize, and highest honor celebrate the greatness of spirit and transformative leadership in Asia.

• The Award is presented to them in formal ceremonies in Manila, the Philippines on August 31st, the birth anniversary of the much-esteemed Philippine President whose ideals inspired the Award’s creation in 1957.

Additional Information

• In 2019, Ravish Kumar an Indian Journalist, author, and media personality got this prestigious award.

• Human rights activist, Vinoba Bhave was the 1st Magsaysay Award winner in 1958.

• In the year 2000, Aruna Roy got this award in the field of Community Leadership.

• In the year 2001, Rajendra Singh got this award in the field of Community Leadership.

• In the year 2008, Prakash Amte got this award in the field of Community Leadership.

Q10. Answer: (d) 4.9995

Calculation:

4.5 + 0.45 + 0.045 + 0.0045 = ?

=> 4.9995

Therefore The required value is 4.9995

Q11. Answer: (a) 290/143

Calculation:

(11/13) + (13/11) = ?

=> LCM of 13 and 11 = 143

So, [(11 × 11) + (13 × 13)]/143 = ?

=> [121 + 169)/143 = ?

=> 290/143 = ?

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Therefore The value of ? is 290/143

Q12. Answer: (c) Lucknow

The correct answer is Lucknow.

Key Points

• The largest school in terms of pupils is the City Montessori School in Lucknow, Uttar Pradesh, India, which had 55,547 pupils as of 16 January 2019 across 18 campuses in the city.

Additional Information

• The school was founded by Dr. Jagdish Gandhi and his wife Dr. Bharti Gandhi.

• The pair launched their first campus in 1959 in rented premises with only five students.

• City Montessori School is celebrating its Diamond Jubilee in 2019.

• The school was the recipient of the 2002 UNESCO Prize for Peace Education – the only school ever to have received this award.

Q13. Answer: (a) North

Given,

The farmer left a cow to walk west. The cow started grazing. After some time, the cow started moving to its right and reached a position that was 90 degrees from its starting position.

Therefore

Here we see cow is facing North direction.

Hence, the correct answer is North.

Q14. Answer: (d) 42

Shortcut Trick

Initial Ratio of Cu : Zn : Ni = 4 : 3 : 2 (Sum = 9 units).

9 units = 54 kg => 1 unit = 6 kg.

Since only zinc is added, multiply final ratio 2 : 5 : 1 by 2 to equate Cu and Ni units.

New equivalent ratio = 4 : 10 : 2.

Increase in Zinc = 10 − 3 = 7 units => 7 × 6 kg = 42 kg.

Therefore The correct answer is 42 kg.

Alternate Method

Given:

Total weight of initial mixture = 54 kg

Initial ratio of Cu : Zn : Ni = 4 : 3 : 2

Initial (54 kg)

Cu: 24 kg

Zn: 18 kg

Ni: 12 kg

• x kg Zinc

Final (2:5:1)

Cu: 24 kg

Zn: 18 + x kg

Ni: 12 kg

Cu and Ni amounts remain constant

Calculations:

=> Sum of initial ratio parts = 4 + 3 + 2 = 9 parts

=> Initial Copper = (4 ÷ 9) × 54 = 24 kg

=> Initial Zinc = (3 ÷ 9) × 54 = 18 kg

=> Initial Nickel = (2 ÷ 9) × 54 = 12 kg

=> Let the amount of zinc added be x kg.

=> New amount of Zinc = (18 + x) kg

=> Given the new ratio of Copper : Zinc : Nickel is 2 : 5 : 1

=> Taking proportion of Copper and Zinc: 24 ÷ (18 + x) = 2 ÷ 5

=> 2 × (18 + x) = 24 × 5

=> 36 + 2x = 120

=> 2x = 120 − 36

=> 2x = 84

=> x = 42 kg

Therefore The correct answer is 42 kg.

Additional Information

Ratio Equalization Method

When a pure quantity is added to a mixture, the quantities of other components remain unchanged. Multiplying the new ratio to match the unchanged components gives the direct increase in units.

Proportion Rule

If A : B : C = x : y : z, then A ÷ x = B ÷ y = C ÷ z. This property is used to directly equate two components and solve for the unknown value.

Mixtures & Replacement

When a portion of a mixture is removed, the remaining mixture still retains the same ratio as the original mixture before any pure component is added.

Q15. Answer: (c) 45 hours

Shortcut Trick

Net efficiency = Efficiency of Pipe M − Efficiency of Pipe N

Total Capacity (LCM of 45, 90) = 90 units

Efficiency M = 90 ÷ 45 = 2; Efficiency N = 90 ÷ 90 = 1

Time to fill half tank (45 units) = 45 ÷ (2 − 1) = 45 hours

Therefore The correct answer is 45 hr.

Alternate Method

Pipe	Time (hr)	Total Capacity	Efficiency
Pipe M (Inlet)	45	90 units	+2
Pipe N (Outlet)	90	−1	

Given: Tank is half empty (which means it is also half full).

=> Work to be done = Total Capacity ÷ 2

=> Work = 90 ÷ 2 = 45 units

=> Combined Efficiency of (M + N) = 2 − 1 = 1 unit/hr

=> Time taken = Work ÷ Combined Efficiency

=> Time taken = 45 ÷ 1 = 45 hours

Therefore The correct answer is 45 hr.

Additional Information

Inlet and Outlet Pipes

Efficiency of an Inlet pipe is always positive, while the efficiency of an Outlet pipe (leak) is considered negative.

Time and Work Relation

Time taken = Total Work ÷ Net Efficiency. If net efficiency is positive, the tank fills; if negative, the tank empties.

Q16. Answer: (a) Anup

Given,

Four couples go to a party. All the women are wearing different colour sarees. All men are wearing different coloured shirts. The colour of a shirt and a saree can be the same. Consider all the statements given below and answer the questions.

Statement:

1. Rama is married to Ramesh who is wearing a red shirt.
2. Purva, who is not Anup's wife, is wearing a blue sari.
3. Anup and Shreya are wearing green clothes.
4. Sandesh's wife Mrunmayi has not worn a yellow sari.
5. Vijay is wearing a yellow shirt.

Here we see Anup is Shreya's husband.

Hence, the correct answer is Anup.

Q17. Answer: (b) Sublimation

The correct answer is Sublimation.

Key Points

• Sublimation is the conversion between the solid and the gaseous phases of matter, with no intermediate liquid stage.

• Example: Snow and ice changing into water vapor in the air without first melting into water.

Important Points

Distillation	**• Distillation is a procedure by which two mixed liquids with different boiling points can be separated. - It is an important separation process in chemistry, industry, and food science. - Distillation involves boiling a liquid, then condensing the gas and collecting the liquid elsewhere. - A liquid is boiled in the "distilling flask", then the vapors travel to another section of the apparatus where they come into contact with a cool surface.**
Crystallization	• It is a process by which a chemical is converted from a liquid solution into a solid crystalline state. - Crystallization acts as both separation and purification steps. - The crystallization process consists of two major events: - Nucleation. - Crystal Growth.
Filtration	• Filtration is the process of separating suspended solid matter from a liquid. - The liquid which has passed through the filter is called the filtrate. The filter may be paper, cloth, cotton-wool, asbestos, slag- or glass-wool, unglazed earthenware, sand, or other porous material.

Additional Information

• The opposite of sublimation is "deposition", where water vapor changes directly into the ice—such as snowflakes and frost.

Q18. Answer: (b) C4H10

The correct answer is C4H10.

Key Points

• Compounds with different physical properties were found to have the same elemental composition and molecular weight. Such compounds were called isomers.

• The below table shows the number of constitutional isomers for each of the acyclic alkanes C_nH_(2n+2), where n=1-10.

• The molecular formula of isobutane C4H10.

Additional Information

• If the number of carbon atoms increases, the number of possible constitutional isomers increases rapidly.

Acyclic Alkane	Number of Carbons	Number of Isomers
methane	1	1
ethane	2	1
propane	3	1
butane	4	2
pentane	5	3
hexane	6	5
heptane	7	9
octane	8	18
nonane	9	35
decane	10	75

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Q19. Answer: (b) 2^1

Given:

$16^3 \div 8^3 \div 2^2 = ?$

Concept used:

x^a ÷ x^b = x^((a - b))

x^a × x^b = x^((a + b))

Calculation:

=> $(2^4)^3 \div (2^3)^3 \div 2^2 = ?$

=> $2^{12} \div 2^9 \div 2^2 = ?$

=> $2^3 \div 2^2 = ?$

=> $2^1 = ?$

Therefore The value of ? is 2^1

Q20. Answer: (b) f - Block element

The correct answer is the f - Block element.

Key Points

• There are thirty total elements in the lanthanides and actinides. They are often called the "inner transition metals".

• Lanthanides:

• The lanthanides are the elements with atomic numbers from 57 to 71.

• These 15 metals (along with scandium and yttrium) are often called the rare earth elements.

• They are all silvery-white metals that are often found in the same ores.

• They are called the lanthanides because they exhibit similar chemical properties to lanthanum, the first element in the group.

• Actinides:

• Actinides are the 15 elements with atomic numbers from 89 to 103.

• They are named after the first element in the series, actinium.

• The actinides group includes mostly man-made elements with only a few exceptions such as uranium and thorium.

• The actinides are most known for the elements uranium and plutonium which are used in nuclear reactors and nuclear bombs.

Additional Information

• The actinide americium is used in smoke detectors.

• Both actinides and lanthanides are highly reactive with elements from the halogen group.

• All of the lanthanides have at least one stable isotope except for promethium.

• None of the actinides have a stable isotope. They are all radioactive.

Q21. Answer: (c) Hydra

The correct answer is Hydra.

Key Points

• Organisms such as hydra use regenerative cells for reproduction in the process of budding.

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

• Hydra and Yeast both use Budding for reproduction.

• But Hydra uses its regenerated cells, it will regeneration upon being cut into pieces, but the yeast will not survive and will simply die.

Additional Information

• Yeast is single-celled microorganisms that are classified, along with moulds and mushrooms, as members of the Kingdom Fungi.

• It is called Saccharomyces cerevisiae, which needs food, warmth, and moisture to thrive.

• It converts its food—sugar and starch—through fermentation, into carbon dioxide and alcohol. It's the carbon dioxide that makes baked goods rise.

• Planarian flatworms are well known for their amazing regenerative capacity that live in freshwater.

• It depends on the presence of stem cells called neoblasts.

• Amoebae are eukaryotes protozoans of the rhizopodan order Amoebida.

• It is found on decaying bottom vegetation of freshwater streams and ponds.

• Amoeba can be both fungi, animals, and algae.

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Q22. Answer: (c) B

Given,

4 W X Z 8 Q P O J 6 G T M V E U H 5 3 B

Therefore

Here we see B is the 5th term to the right of 15th term from the left.

Hence, the correct answer is B.

Q23. Answer: (d) [figure]

The opposite faces of the cube are,

As Two opposite faces are never seen together or adjacent to each other:

In Option Figure 1 :- Dark circle and cross are opposite faces but here they are seen together which is wrong.

In Option Figure 2 :- Dark circle and cross are opposite faces but here they are seen together which is wrong.

In Option Figures 4 none of the opposite faces are seen together nor they are adjacent to each other.

Thus option figure 4 can be formed by folding the dice.

Therefore The correct representation is

Hence, the correct answer is option 4).

Q24. Answer: (b) [figure]

Important Points

• The reflection of an object into the water is its water image.

• It appears by inverting an object vertically i.e. upside down.

• The water image of the figure looks like the mirror image of the figure in case the mirror is horizontally at the bottom of the figure.

Given, 91238769AZ

In the water image, the left and right part of the figure remains the same and the top and bottom part of the figure changes.

Therefore

Hence the correct answer is

.

Q25. Answer: (d) 519 meter

The correct answer is 519 meters.

Speed of Sound = 346 ms^(-1) (A)

Time is taken to echo the be heard = 3 second

• Let’s consider the distance between the boy and rock = d

Now, In order to echo to be heard the sound had to 1^(st) travel to the rock and then come back.

• This means the sound has to cover distance= 2d

According to the question, Time is taken to travel 2d distance = 3 s

So, Time to travel distance d = 3/2 sec (B)

Now, Distance = Speed × Time

= 346 ms^(-1) ×3/2 s [From (A) and (B)]

= 519 m

So, the distance between the boy and the rock(d) = 519 m

Q26. Answer: (c) Both 1 and 2 follow

The correct answer is Both 1 and 2 follow.

Key Points

• The consociational theory challenges the two paradigmatic notions that democracy should be equated with majority rule and that democracy is not a viable form of government in deeply divided societies.

• The essence of democracy is majority rule, the making of binding decisions by a vote of more than one-half of all persons who participate in an election.

• Articles of the Indian Constitution can be amended by a simple majority in the Parliament (Second Schedule, Article 100(3), 105, 11, 124, 135, 81, 137).

• It is not less than two-thirds of the members of each House present and voting and a majority of the total membership of each House.

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Q27. Answer: (a) minutes before 11 o'clock

The correct answer is minutes before 11 o'clock.

At 10 o'clock the hour hand is at 10 and the minute hand is at 12.

Therefore The minute and hour hand of a clock overlap somewhere between 10 and 11.

That is minutes before 11 o'clock.

Hence the correct answer is minutes before 11 o'clock.

Q28. Answer: (d) Thalamus

The correct answer is Thalamus.

Key Points

• A flower is the sexual reproductive organ in plants it consists of four basic parts:

• Sepal - is the outer part of the flower (often green and leaf-like) that encloses a developing bud. It is a defensive organ that encloses and protects the developing reproductive structures.

• Petal - is the part of a flower that is often conspicuously coloured.

• Stamen - is the pollen-producing part of a flower, usually with a slender filament supporting the anther.

• Pistil - is the female reproductive part that consists of stigma, style and ovary.

• Thalamus -

• It is also known as the receptacle.

• It is usually the slightly swollen part of the pedicel or stalk of the flower.

• It is the basis on which all the floral parts are present.

Additional Information

• Placenta - In a flower, placenta is the connection between the ovules in an ovary. While, in human reproduction placenta is a structure that develops in the uterus to provide nutrients to the developing fetus.

• Fallopian Tube - is a part of human reproductive system which connects the ovary to the uterus.

Q29. Answer: (c) Momentum and force

The correct answer is Momentum and force.

Important Points

• Option (a), Speed = Distance / time = ms^(-1)

Velocity = Displacement / time = ms^(-1)

Thus both have the same unit.

• Option (b), Gravity (g) = ms^(-2)

Acceleration due to gravity = ms^(-2)

Thus, both have the same unit.

• Optiion (c), Momentum = Mass * Velocity = Kg * ms^(-1) = Kgms^(-1)

Force = Mass * Acceleration = Kg * ms^(-2) = Kgms^(-2)

Thus the unit of Momentum and force is not the same.

• Option (d), Distance = m(meter)

Displacement = m(meter)

Thus both have the same unit.

Q30. Answer: (d) 0, 1

The correct answer is 0,1.

Key Points

• Formula for speed after impact

• v_a =[m_au_a + m_bu_b+ m_bC_R(u_b- u_a)]/(m_a + m_b) {1}

• v_b =[m_au_a + m_bu_b+ m_aC_R(u_a– u_b)]/(m_a + m_b) {2}

• Where,

• v_a = Velocity of a after impact

• v_b = Velocity of b after impact

• u_a = Velocity of a before impact

• u_b = Velocity of b before impact

• C_R = Coefficient of restitution

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• M_a = mass of object a
• M_b = Mass of object b
• Let us consider,
• Object a = ball and object b = gate
• Now given in question:
• u_(a =) 2m/s
• u_b= 0 m/s
• Let, M_(b =)x the m_b = 2x
• C_R = 0.5
• Now putting the values in equation {1}
• v_(a)= [2x + 2x * 0 + 2x * 0.5(0 - 2)]/ x + 2x
• = [2x – x * 2]/3x
• = [2x – 2x]/3x
• = 0/3x m/s
• = 0 m/s
• v_b = [2x + 2x * 0 + x * 0.5(2 - 0)]/ (x + 2x)
• = [2x + 0 + x]/3x
• = 3x/3x
• = 1 m/s
• So, after impact speed of
• Ball = v_a = 0 m/s
• Gate = v_b = 1 m/s
• Thus the answer is 0, 1.

Q31. Answer: (c) Saraswati

The correct answer is Saraswati.

Key Points

• The Saraswati River is one of the rivers mentioned in the Rig Veda and later Vedic and post-Vedic texts.

• Saraswati is the name of a river originating in the Aravalli mountain range in Rajasthan, passing through Sidhpur and Patan before submerging in the Rann of Kutch desert.

Important Points

• Sapta Sindhu is the seven rivers that are considered the most sacred ones in India: Indus, Jhelum, Chenab, Ravi, Sutlej, Beas.

• Chenab River, a river of the Indian subcontinent in northwestern India and northeastern and eastern Pakistan.

• The Chenab is formed by the confluence of two streams, Chandra and Bhaga.

• The Yamuna rises on the slopes of the Bandarpunch massif in the Great Himalayas near Yamnotri (Jamnotri) in western Uttarakhand.

• It is the second-largest tributary river of the Ganga and the longest tributary in India.

• Jhelum River, a river of northwestern India and northern and eastern Pakistan.

• the source of this river is Pir Panjal Range and falls into the Chenab River.

Q32. Answer: (a) 1 : 64

Shortcut Trick

Assume Aditya's sum is 1 unit.

Ravi's sum → 16 × 1 = 16 units.

Suraj's sum → 4 × 16 = 64 units.

Ratio of Aditya to Suraj → 1 : 64.

Therefore The correct answer is 1 : 64.

Alternate Method

Given:

Suraj (S) = 4 × Ravi (R)

Ravi (R) = 16 × Aditya (A)

Calculations:

=> Let Aditya's sum (A) = x

=> Ravi's sum (R) = 16x
=> Suraj's sum (S) = 4 × (16x) = 64x
=> Ratio required = Aditya : Suraj
=> Ratio = x : 64x
=> Ratio = 1 : 64
Therefore The correct answer is 1 : 64.
Additional Information
Compound Ratio
If A:B = a:b and B:C = c:d, then A:C is calculated by multiplying the ratios (a/b × c/d).
Ratio Normalization
To combine ratios like A:B and B:C, make the common term (B) equal in both ratios by multiplying with suitable constants.

Q33. Answer: (b) Statements 1 and 2 both are not correct.

Given,
Question: Who among P, N, K and J get the highest payment?
Statement:
1. P earns more than K and J.
P > K, P > J.
2. N earns more than K.
N > K.
From both statement, the order of payment from highest to lowest is,
P > N > K > J ; P > N > J > K
or
N > P > K > J ; N > P > J > K
Here we see we don't know who gets the highest payment.
Therefore Both statements are not correct.
Hence, the correct answer is Statements 1 and 2 both are not correct.

Q34. Answer: (d) 250 J

The correct answer is 250 J.
• Given, mass (m) = 20 kg, velocity (v) = 5 ms^(-1).
Kinetic energy = (½)mv²
So, the kinetic energy of the object is (½)?20?52 = 250 J.
Key Points
• It is the energy of an object's mass in motion.
• When an objects' mass doubles, its kinetic energy also doubles.
• When an objects' speed doubles, its kinetic energy quadruples.
• When a pendulum goes uphill (top point), it loses kinetic energy.

Q35. Answer: (d) • 22.5

Shortcut Trick
By the Factor Theorem, if (x − 8) divides the polynomial, then substituting x = 8 must result in zero.
3(8)² + 8a − 12 = 0
192 + 8a − 12 = 0
180 + 8a = 0 => a = −180 ÷ 8
a = −22.5
Therefore The correct answer is −22.5.
Alternate Method
Given:
Polynomial f(x) = 3x² + ax − 12
Divisor = x − 8
Formula Used:
According to the Remainder Theorem, if a polynomial f(x) is divided by (x − k), the remainder is f(k). If it is completely divisible, the

remainder is 0.
Calculations:
=> x − 8 = 0
=> x = 8
=> f(8) = 3(8)² + a(8) − 12 = 0
=> 3(64) + 8a − 12 = 0
=> 192 + 8a − 12 = 0
=> 180 + 8a = 0
=> 8a = −180
=> a = −180 ÷ 8
=> a = −22.5
Therefore The correct answer is −22.5.
Additional Information
Remainder Theorem
When a polynomial p(x) is divided by a linear divisor (ax − b), the remainder is always p(b/a).
Factor Theorem
A polynomial p(x) has a factor (x − k) if and only if p(k) = 0, which is a specific case of the remainder theorem.
Synthetic Division
A shorthand method of polynomial division, especially when the divisor is a linear factor like (x − k).
Quadratic Identity
For a quadratic equation ax² + bx + c = 0, the sum of roots is −b/a and the product of roots is c/a.

Q36. Answer: (b) 160

Shortcut Trick
Identify the alternating pattern: −4, +8, −4, +8.
The sequence follows a repeating logic of subtracting 4 and adding 8.
Last term is 152, so the next operation is +8.
152 + 8 = 160.
Therefore The correct answer is 160.
Alternate Method
Given Series: 152, 148, 156, 152, ?
152
−4
→
148
+8
→
156
−4
→
152
+8
→
160
The series follows an arithmetic operation pattern where 4 is subtracted and 8 is added alternately.
=> 152 − 4 = 148
=> 148 + 8 = 156
=> 156 − 4 = 152
=> 152 + 8 = 160
Therefore The correct answer is 160.
Additional Information
Mixed Series

A series where two or more different operations (like addition and subtraction) are applied alternately to find the next term.

Alternate Series Pattern

Sometimes a series consists of two independent sequences at alternate positions (1st, 3rd, 5th terms and 2nd, 4th, 6th terms).

Common Differences

Always calculate the gap between consecutive terms first to identify if the pattern involves constant or changing increments.

Q37. Answer: (b) A

Given,

In the mirror image, the top and bottom part of the figure remains unchanged and left and right part of the figure changes.

Therefore

Hence, the correct answer is A.

Additional InformationIn a mirror image Left changes to right and the right changes to left vice-versa.

When placement of mirror not given, By default we will assume it in Vertical direction.

The Letter adjacent to the mirror after the mirror image will adjacent to it just with the left change to right and right change to left vice-versa.

The starting letter of the word will be at last after the mirror image drawn with left changes to right and right changes to left.

Q38. Answer: (c) 30

Shortcut Trick

Let Total Work be LCM of 7, 8.75 (35/4), and 10.5 (21/2) = 105 units.

Efficiency of (A + B) = 105 ÷ 7 = 15; Efficiency of A = 105 ÷ 10.5 = 10.

=> Efficiency of B = 15 − 10 = 5.

Efficiency of (B + C) = 105 ÷ 8.75 = 12 => Efficiency of C = 12 − 5 = 7.

Time for Double Work by C = (105 × 2) ÷ 7 = 30 days.

Therefore The correct answer is 30 days.

Alternate Method

Given: Time taken by (A + B) = 7 days, (B + C) = 8.75 days, and A = 10.5 days.

Formula Used: Total Work = Efficiency × Time; Efficiency = Work ÷ Time.

Person	Days	Total Work	Efficiency
A + B	7	105	15
B + C	8.75	12	
A	10.5	10	

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

=> Efficiency of B = 15 − 10 = 5 units/day.

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

=> Efficiency of C = 12 − 5 = 7 units/day.

=> Double Work = 105 × 2 = 210 units.

=> Time taken by C = 210 ÷ 7 = 30 days.

Therefore The correct answer is 30 days.

Additional Information

Combined Efficiency

When multiple people work together, their individual efficiencies (work done per unit time) are added to find the total work rate.

Work-Efficiency Relation

Time taken to complete a specific piece of work is inversely proportional to efficiency: Time = Work ÷ Efficiency.

LCM Method for Work

Using the LCM of time periods as the total work unit simplifies calculations by converting fractions into whole number efficiencies.

Q39. Answer: (c) Write

Given,

Gun, Sword, Write, Spade

Here we see all are tools except Write.

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Write is a process in which one can communicate.

Hence the correct answer is Write.

Q40. Answer: (c) Period

The correct answer is Period.

Key Points

• All elements can be classified into one of three classes: metals, metalloids, or nonmetals.

• Elements in each class share certain basic properties. From left to right across each period of the periodic table, elements change from metals to metalloids to nonmetals.

Important Points

• Ionization energy increases on going from left to right and from down to top.

• Electron affinity increases on going from left to right and from down to top.

• The atomic radius increases from right to left and top to bottom

• The atomic radius decreases moving from left to right in the Modern Periodic Table.

• No of valance electron increases as we go left to right in a period.

Additional Information

• A group is a vertical column of the periodic table, based on the organization of the outer shell electrons.

• There are a total of 18 groups.

• Elements with similar chemical properties appear at regular intervals, within the vertical columns.

• A period is a horizontal row of the periodic table.

• There are seven periods in the periodic table, with each one beginning at the far left.

• A new period begins when a new principal energy level begins filling with electrons.

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

• Periods 2 and 3 have 8 elements.

• Periods 4 and 5 have 18 elements.

• Periods 6 and 7 have 32 elements.

• Group can be used to characterize an element:

• Group 1: alkali metals, or lithium family

• Group 2: alkaline earth metals, or beryllium family

• Group 3: the scandium family

• Group 15: the pnictogens, or nitrogen family

• Group 16: the chalcogens, or oxygen family

• Group 17: the halogens, or fluorine family

• Group 18: the helium/neon family. These included the Nobel gases for the first six periods

Q41. Answer: (a) USA

The correct answer is the USA.

Key Points

• The first edition (2018) of the 2+2 dialogue between India-US held in New Delhi.

• In the inaugural meeting, Minister of External Affairs (MEA) Sushma Swaraj and Defence Minister Nirmala Sitharaman hosted US Secretary of State Michael R. Pompeo and US Secretary of Defence James Mattis.

Additional Information

• The third India-Australia Secretary-level 2+2 dialogue was held on 9 December 2019 in New Delhi.

• The Indian side was led by Defense Secretary Ajay Kumar and Foreign Secretary Vijay Gokhale, while its counterpart delegation was led by Australia’s Defense Secretary Greg Moriarty and Foreign Secretary Frances Adamson.

Hint

• The 2+2 dialogue is the second-highest level of engagement between both countries after summit-level engagement between the Prime Minister and the US President.

• 2+2 dialogue is aimed to enhance strategic coordination between both countries and maintaining peace and stability in the Indo-Pacific region.

Q42. Answer: (a) 8√2

The shortest distance between point B and point F is -

After final arrangement:

Therefore By Pythagoras theorem,

$BF^2 = BX^2 + XF^2$

Therefore $BF2 = 8^2 + 8^2$

Therefore $BF2 = 64 + 64 = 128 = 8\sqrt{2}$

Therefore The shortest distance between B and F is $8\sqrt{2}$.

Hence, the correct answer is $8\sqrt{2}$.

Q43. Answer: (b) Current

The logic followed here is:

• Odometer used to measure the Distance.

Similarly,

• Ammeter used to measure the current.

Hence, the correct answer is Current.

Q44. Answer: (c) Do not allot flat.

Given,

Dhawan plans to buy a flat at Shyamla Society.

Shyamala Society has placed the following conditions for allotment of flats in its society:

Applicant:

(I). State domicile certificate must be submitted.

(II). Must have done a job of at least 5 years.

(III). If needed, he will be ready to pay the entire amount in 5 years.

(IV). Should not be the owner or co-owner (if spouse) of the residential facility in that city

(V). Should not be below 35 years of age as on 31 December 2016.

Information about Dhawan,

Dhawan is an industrialist and from another state who established his factory in 2000 and has a state residence certificate. He is ready to pay the full amount in 4 years if necessary. He does not have a house in that city but his wife has a flat. His date of birth is 11 November 1970.

Here we see Dhawan's wife has a flat in that city.

Therefore, the Shyamala Society will not allot flat to Dhawan as his wife has a flat in the same city.

Hence, the correct answer is Do not allot flat.

Q45. Answer: (c) 1206 AD and 1526 AD

The correct answer is 1206 AD and 1526 AD.

Key Points

• Delhi Sultanate, five short-lived dynasties, based in Delhi, from 1206 to 1526 AD, when it fell to the Mughal Empire.

• During this period of over three hundred years, five dynasties ruled in Delhi.

1. The Slave dynasty (1206-90)

2. Khilji dynasty (1290-1320)

3. Tughlaq dynasty (1320-1413)

4. Sayyid dynasty (1414-51)

5. Lodhi Dynasty (1451-1526)

Additional Information

• Qutub-ud-din Aibak, a slave of Muhammad Ghori, who became the ruler after the death of his master, founded the Slave Dynasty.

• He was a great builder who built the majestic 238 feet high stone tower known as Qutub Minar in Delhi.

• The next important king of the Slave dynasty was Shams-ud-din Iltutmush, who himself was a slave of Qutub-ud-din Aibak.

• Razia Begum, the capable daughter of Iltutmush, was the first and the only Muslim lady who ever adorned the throne of Delhi.

• Balban consolidated the administrative set up of the empire and completed the work started by Iltutmush.

• Jalal-ud-din Khilji on the throne and this marked the beginning of the Khilji dynasty.

• Ala-ud-din Khilji, a nephew of Jalal-ud-din Khilji hatched a conspiracy and got Sultan Jalal-ud-din killed and proclaimed himself as the Sultan in 1296.

• Ghyasuddin Tughlaq, who was the Governor of Punjab during the reign of Ala-ud-din Khilji, ascended the throne in 1320 A.D. and founded the Tughlaq dynasty.

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• Muhammad-Bin-Tughlaq succeeded his father and extended the kingdom beyond India, into Central Asia.
• He first shifted his capital from Delhi to Devagiri in Deccan.
• He died in 1351 A.D. and his cousin, Feroz Tughlaq succeeded him.
• Sayyid dynasty was founded by Khizar Khan.
• Bahlūl Lodī was the founder of the Lodhi dynasty.
• Ibrahim Khan Lodhi was the last ruler of the Lodi dynasty when he was defeated and killed at the Battle of Panipat by Babur's invading army, giving way to the emergence of the Mughal Empire in India.

Q46. Answer: (b) Only 2 follows

Concept:

1) We have to check the conclusions are 100% match with the statement. If the conclusion is 100% match with the given statement then the conclusion is true. If there is a 1% chance of not following the statement then the conclusion is considered to be false.

2) The possibility case can be considered to be "false" in "definite case".

3) In Possibility case, either "can" or "possible" word must be present.

Explanation

Given,

Statement: All tonics are poisonous substances. All poisonous substances are poison.

Conclusions:

1. All poison are tonics.

2. Some poison are tonics.

The least possible Venn diagram for the given statements is as follows,

Conclusions:

1. All poison are tonics → False (It is possible but not definite)

2. Some poison are tonics → True (From Venn diagram we see some poison are tonics)

Hence, the correct answer is Only 2 follows.

Additional Information

Q47. Answer: (a) Gujarat

The correct answer is Gujarat.

Key Points

• The Kakrapar Atomic Power Station (KAPS) is located near Surat in the state of Gujarat.
• KAPS currently operates two PHWRs, the first of which (Unit-1) began commercial operations on 6 May 1993.

Important Points

• Nuclear power plants in India:

Power Station	State
Kaiga	Karnataka
Kudankulam	Tamil Nadu
Madras (Kalpakkam)	Tamil Nadu
Narora	Uttar Pradesh
Tarapur	Maharashtra

• Kudankulam Nuclear Power Plant is the largest atomic energy station in India.
• Its capacity is 2,000MW.
• Tarapur Atomic Power Station is the first nuclear power plant in India.
• This plant is situated in Boisar, Maharastra in Oct-1969.
• India's and Asia's first nuclear reactor was the Apsara research reactor at Mumbai.

Q48. Answer: (b) Court

Given,

Hockey : Field :: Badminton : ?

Here we see the game Hockey is played on the rectangular ground which we called field.

Similarly, the game Badminton is played on court.

Hence, the correct answer is Court.

Additional Information

Sports	Field related to sports
Tennis, Volleyball, Basketball	Court
Road running, Race walking	Track
Wrestling	Arena
Football, Baseball, Cricket	Stadium

Q49. Answer: (d) 16 years

Shortcut Trick

Total ratio units of Mohan and Sohan = 5 + 4 = 9 units.

Given total present age = 36 years.

Value of 1 unit = 36 ÷ 9 = 4 years.

Sohan present age (4 units) = 4 × 4 = 16 years.

Therefore The correct answer is 16 years.

Alternate Method

Given:

Ratio of ages of Mohan and Sohan = 5 : 4

Sum of their ages = 36 years

Formula Used:

Age of Person = (Individual Ratio ÷ Sum of Ratios) × Total Age

Calculations:

=> Let age of Mohan be 5x and Sohan be 4x.

=> 5x + 4x = 36

=> 9x = 36

=> x = 36 ÷ 9 = 4

=> Present age of Sohan = 4x = 4 × 4 = 16 years.

Therefore The correct answer is 16 years.

Additional Information

Ratio & Proportion Basics

If a quantity is divided in ratio a:b, then parts are [a/(a+b)] × Total and [b/(a+b)] × Total.

Age Difference Property

The difference between the ages of two persons remains constant regardless of the number of years passed or before.

Q50. Answer: (b) Chhatrapati Shivaji Maharaj International Airport

The correct answer is Chhatrapati Shivaji Maharaj International Airport.

• Chhatrapati Shivaji Maharaj International airport sets a record with 980 flights in 24 hours.

• On January 20, 2018, this airport created a new world record for single-runway operations by handling 980 arrivals and take-offs in 24 hours.

Important Points

• List of some airports in India:

Airport	Location
Amausi Airport (Chaudhary Charan Singh International Airport)	Lucknow, Uttar Pradesh
Indira Gandhi International Airport (largest airport)	New Delhi
Calicut International Airport (Kozhikode International Airport)	Kerala
Kushok Bakula Rimpochee Airport	Leh
Agatti Airport	Lakshadweep

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Kempegowda International Airport	Bengaluru
Rajiv Gandhi International Airport	Hyderabad
Veer Savarkar International Airport	Port Blair, Andaman & Nicobar Islands

• India has a total of 34 operational International Airports.

Q51. Answer: (d) Sitaram Yechury

The correct answer is Sitaram Yechury.

• The Communist Party of India (Marxist) (CPIM) is a communist national political party in India.
• The CPI(M) was formed in Calcutta in 1964.
• General Secretary: Sitaram Yechury
• Lok Sabha leader: P.R. Natarajan
• Rajya Sabha leader: Elamaram Kareem
• the party was often referred to by different names such as 'Left Communist Party' or 'Communist Party of India (Left)'.
• Kerala is the communist state in India.

Important Points

• Ram Madhav is the National General Secretary of the Bharatiya Janata Party.
• His written book is 'Uneasy Neighbours: India and China After 50 Years of the War'.
• Yogi Adityanath is Chief Minister of Uttar Pradesh.
• Viplav dev is Chief Minister of Tripura.

Q52. Answer: (d) 81

Shortcut Trick

Apply the M1D1 = M2D2 rule for Inversely Proportional work.

63 × 126 = 98 × D2

D2 = (63 × 126) ÷ 98 = 9 × 9 = 81

Therefore The correct answer is 81 days.

Alternate Method

Given:

Initial people (M1) = 63

Initial days (D1) = 126

New people (M2) = 98

Formula Used:

Total Work = Men × Days (M1 × D1 = M2 × D2)

Calculations:

=> Total Work = 63 × 126

=> 63 × 126 = 98 × D2

=> D2 = (63 × 126) ÷ 98

=> D2 = (9 × 7 × 126) ÷ (14 × 7)

=> D2 = (9 × 126) ÷ 14

=> D2 = 9 × 9

=> D2 = 81

Therefore The correct answer is 81 days.

Additional Information

Chain Rule Formula

The general formula is (M1 × D1 × H1) ÷ W1 = (M2 × D2 × H2) ÷ W2, where M is men, D is days, H is hours, and W is work.

Inverse Proportion

In Time and Work, the number of people is inversely proportional to the time taken to complete the constant work.

Work and Efficiency

Efficiency = Total Work ÷ Time. If people increase, total efficiency increases, reducing the total time.

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Q53. Answer: (b) Calculation not possible.

The correct answer is Calculation not possible.

• Given,

• Initial speed (u) = 5 ms^(-1)

• Final speed (v) = 36 ms^(-1)

• Now, the equation of motion

• v = u + at

• v = final speed,

• u = initial speed,

• a = acceleration and

• t = time

• = a = (v – u)/t

• So in order to find acceleration, we need initial speed, final speed and time. But in question time is not given. So acceleration cannot be calculated.

Q54. Answer: (c) Padma Bhushan

The correct answer is Padma Bhushan.

Key Points

• Former Indian cricket team captain MS Dhoni has been given the country's third-highest civilian honor.

• MS Dhoni received the prestigious Padma Bhushan from President Ramnath Kovind.

• Dhoni is the only captain in world cricket to win all three ICC trophies - 2007 World T20, 2011 World Cup, and 2013 Champions Trophy.

• Dhoni is the co-owner of the Chennai FC Indian Super League team.

• He has the record of the highest ODI score by a wicketkeeper, which is 183.

• Apart from CSK, the Pune team has bought Dhoni for IPL.

Important Points

• People who received the Padma Bhushan award in 2018:

Name	Field
Pankaj Advani	Sports- Billiards/Snooker
Philipose Mar Chrysostom	Others-Spiritualism
Ramachandran Nagaswamy	Others-Archaeology
Laxman Pai	Art-Painting
Arvind Parikh	Art-Music
Sharda Sinha	Art-Music

• Padma Vibhushan Winners 2018:

Name	Field
Illaiyaraja	Art-Music
Ghulam Mustafa Khan	Art-Music
Parameswaran	Literature and Education

Q55. Answer: (c) 31

Given,

The number of lines used to draw the above figure is,

Horizontal lines = 6

Slant lines = 12

Vertical lines = 13

Therefore Total lines = 31

Hence the correct answer is 31.

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Q56. Answer: (c) 3

Given,

In the mirror image, the top and bottom part of the figure remains unchanged and the left and right part of the figure interchanges.

Therefore

Hence, the correct answer is 3.

Q57. Answer: (a) Granddaughter

Given,

Pointing to a woman, Khan said, "She is the daughter of my brother's son's wife."

The family tree is as follows,

Here we see the woman is the granddaughter of Khan.

Hence, the correct answer is the Granddaughter.

Q58. Answer: (b) Maharashtra

The correct answer is Maharashtra.

• Shiv Sena, is a right-wing Marathi regional political party in India founded in 1966 by cartoonist Bal Thackeray.

• Uddhav Thackeray is the youngest child of Bal Thackeray.

• Eknath Shinde is the current CM of Maharashtra.

Additional Information

• Saamana is a Marathi newspaper launched in 1988 by Bal Thackeray who was also the editor of the newspaper.

• Its student wing is called Bharatiya Vidyarthi Sena.

• Its women wing is called Shiv Sena Mahila Aghadi.

Q59. Answer: (b) 3 or -3

Shortcut Trick

The least value of a quadratic function $x^2 + px + q$ occurs at its vertex and is given by $q - (p/2)^2$.

In the given function $f(x) = x^2 - 4bx + 9$, we have $p = -4b$ and $q = 9$.

Applying the trick: $9 - (-4b/2)^2 = -27$

$\Rightarrow 9 - 4b^2 = -27 \Rightarrow 4b^2 = 36 \Rightarrow b^2 = 9 \Rightarrow b = \pm 3$

Therefore The correct answer is 3 or -3.

Alternate Method

Given: Quadratic function $f(x) = x^2 - 4bx + 9$ and its minimum value is -27.

Formula: For a quadratic equation $ax^2 + bx + c$ (where $a > 0$), the minimum value is given by $(4ac - b^2) / 4a$.

$\Rightarrow$ Here, $a = 1$, the coefficient of x is $-4b$, and $c = 9$.

$\Rightarrow$ Minimum value $= [4 \times 1 \times 9 - (-4b)^2] / (4 \times 1) = -27$

$\Rightarrow (36 - 16b^2) / 4 = -27$

$\Rightarrow 9 - 4b^2 = -27$

$\Rightarrow -4b^2 = -27 - 9$

$\Rightarrow -4b^2 = -36$

$\Rightarrow b^2 = 9$

$\Rightarrow b = \sqrt{9} = \pm 3$

Therefore The correct answer is 3 or -3.

Additional Information

Vertex of a Parabola

The vertex of the quadratic function $f(x) = ax^2 + bx + c$ is located at $x = -b/2a$. If $a > 0$, the function has a minimum; if $a < 0$, it has a maximum.

Discriminant and Extremum

The extremum value (least or greatest) can also be expressed as $-D/4a$, where D is the discriminant $(b^2 - 4ac)$.

Perfect Square Method

A quadratic can be written in the form $a(x - h)^2 + k$, where (h, k) is the vertex and k represents the minimum or maximum value.

Q60. Answer: (d) Lalji Singh

The correct answer is Lalji Singh.

• Lalji Singh, widely regarded as the father of DNA fingerprinting in India.

• He is a former director of Hyderabad-based Centre for Cellular and Molecular Biology (CCMB).

• DNA fingerprinting was invented in 1984 by Professor Sir Alec Jeffreys after he realized you could detect variations in human DNA, in the form of these minisatellites.

Important Points

• Watson and Crick Propose the Double Helix structure of DNA with the two strands connected by hydrogen bonds.

• DNA is a long molecule that contains our unique genetic code.

• It holds the instructions for making all the proteins in our bodies and the function of living things.

• In the cell nucleus, the DNA (deoxyribonucleic acid) molecule is packaged into thread-like structures called chromosomes.

• A chromosome (microscopic structure) is made up of DNA tightly coiled many times around proteins called histones that support its structure.

• A chromosome has two arms - a p arm (short arm) and a q arm (long arm), joined in the location of the centromere.

• The information in DNA (double helix structure) is stored as a code made up of four chemical bases: adenine (A), guanine (G), cytosine (C), and thymine (T).

• DNA has two base pairs, A-T and G-C, attached to a sugar-phosphate backbone.

Additional Information

• Gregor Mendel is known as the Father of modern genetics.

• Mendel's laws of inheritance include the law of dominance, the law of segregation, and the law of independent assortment.

• Hargovind Khorana got the Nobel Prize in Physiology or Medicine in 1968 for his interpretation of the genetic code and its function in protein synthesis.

Q61. Answer: (c) R18I

Given, L12O, N14M, P16K, _____.

The pattern followed here is,

Here we see the letters follow a particular pattern and the positional value of the first letter is written at the centre.

Hence, the correct answer is R18I.

Q62. Answer: (d) ε = W/Q

The correct answer is ε = W/Q.

• Electromotive force (EMF) is equal to the terminal potential difference when no current flows.

• EMF and terminal potential difference (V) are both measured in volts, however, they are not the same thing.

• EMF (ε) is the amount of energy (E) provided by the battery to each coulomb of charge (Q) passing through.

• The potential is kept high on the positive terminal and low on the negative terminal to maintain the potential difference between the two terminals.

• The emf is equal to the work done (dW) on the charge per unit charge (ε=dW/dq) when there is no current flowing.

Since the unit for work is the joule and the unit for a charge is the coulomb, the unit for emf is the volt (1V = 1J/C).

Q63. Answer: (a) Baking soda

The correct answer is Baking soda.

• Baking soda does not contain water of crystallization.

• The water of crystallization means having a fixed number of molecules present in one formula of a unit of salt.

• e.g Blue vitriol (CuSO4.5H20)

• The chemical formula of baking soda is NaHCO3.

• Its formula does not show any association with water molecules.

• Baking soda is commercially manufactured on a large scale by the ammonia-soda Solvay process, named after Ernest Solvay, a Belgian industrial chemist.

• Nahcolite is naturally occurring sodium bicarbonate, and is extracted by "solution mining".

Important Points

• The other three options contain water of crystallization.

• Blue vitriol (CuSO4.5H20)

• Washing soda (Na2CO3 .1OH2O)

• Gypsum (CaSO4.2H20)

• Baking soda is white amorphous powder whereas blue vitriol, and washing soda are salts.

Q64. Answer: (a) 20

CONCEPT:

Here we need to look at the graph and find the value in y-axis corresponding to the year asked represented on the x-axis.

SOLUTION:

From the given bar graph we can say that,

Year on x-axis corresponds with value 20 on y-axis.

Therefore No. of units sold in 2006 is 20 lakhs.

Q65. Answer: (c) 14 : 5

Shortcut Trick

Area of Triangle = 1/2 × Base × Height

Area of Parallelogram = Base × Height

Given: Area_T = Area_P and Base_T = (5/7) × Base_P

1/2 × (5/7)B_P × H_T = B_P × H_P => H_T / H_P = (2 × 7) / 5 = 14/5

Therefore The correct answer is 14 : 5.

Alternate Method

Given:

Base of triangle (b1) = 5/7 × Base of parallelogram (b2)

Area of triangle (A1) = Area of parallelogram (A2)

Formula Used:

Area of triangle = 1/2 × base × height

Area of parallelogram = base × height

Calculations:

=> Let base of parallelogram (b2) = 7 units

=> Base of triangle (b1) = 5/7 × 7 = 5 units

=> Area_(Triangle) = 1/2 × b1 × h1

=> Area_(Parallelogram) = b2 × h2

=> 1/2 × 5 × h1 = 7 × h2

=> 5 × h1 = 14 × h2

=> h1 / h2 = 14 / 5

Therefore The correct answer is 14 : 5.

Additional Information

Area of Geometric Shapes

Area of a Rhombus = 1/2 × d1 × d2 where d1, d2 are diagonals. Area of a Trapezium = 1/2 × (sum of parallel sides) × height.

Properties of Parallelogram

Opposite sides are equal and parallel. Diagonals bisect each other but are not necessarily equal unless it is a Rectangle.

Heron's Formula

Area of triangle = √(s(s−a)(s−b)(s−c)) where s is the semi-perimeter (a+b+c)/2.

Q66. Answer: (b) 45

The pattern followed here is:

Parallelograms in Equilateral Triangles:

Formula:

Number of Parallelograms =(n(n-1)(n+1)(n+2))/8

Given figure:

Used formula:

Here n = 4;

Parallelograms = [4(4 - 1) (4 +1) (4 + 2)] / 8

= (4 × 3 × 5 × 6] / 8

= 360 / 8 = 45

Hence, the correct answer is "45".

Alternate Method

The number of parallelograms is,

The parallelograms consist of two triangles are,

ABFC, BDIF, CFJE, DGLI, FIMJ, EJNH, GKLI, ILMJ, JMNH, DGIF, FIJE, BDFC, GLMI, IMNJ, JNOH, DMNF, FJEC, BFEC = 18

The parallelograms consist of four triangles are,

GJMK, IHNL, DEJG, GJNL, IHOM, DEHI, DFLK, BCIG, FEML, FEON, BCHJ, DFNM, ACID, AEJB, BFLG, BJMD, CHNF, CEMI = 18

The parallelograms consist of six triangles are,

ACLG, BAHN, BCON, BCLK, GHNK, GHOL = 6

The parallelograms consist of eight triangles are,

DEMK, DEOM, AEMD = 3

Therefore The total number of parallelogram = 18 + 18 + 6 + 3 = 45

Hence, the correct answer is 45.

Q67. Answer: (d) 366.67g

Shortcut Trick

Ratio of packets received in January and February = 4 : 8 = 1 : 2

Using Weighted Average method: Average = [(n1 × A1) + (n2 × A2)] ÷ (n1 + n2)

Average = (1 × 300 + 2 × 400) ÷ (1 + 2)

Average = (300 + 800) ÷ 3 = 1100 ÷ 3 = 366.67 g

Therefore The correct answer is 366.67 g.

Alternate Method

Given:

Number of packets in January = 4 | Average weight = 300 g

Number of packets in February = 8 | Average weight = 400 g

Formula Used:

Total Average = (Total weight of all packets) ÷ (Total number of packets)

Calculations:

=> Total weight in January = 4 × 300 = 1200 g

=> Total weight in February = 8 × 400 = 3200 g

=> Total weight for both months = 1200 + 3200 = 4400 g

=> Total number of packets = 4 + 8 = 12

=> Combined average weight = 4400 ÷ 12

=> Combined average weight = 1100 ÷ 3 ≈ 366.666...

=> Combined average weight = 366.67 g

Therefore The correct answer is 366.67 g.

Additional Information

Weighted Average Formula

When two groups with averages A1 and A2 and sizes n1 and n2 are combined, the new average is (n1A1 + n2A2) ÷ (n1 + n2).

Deviation Method

Assume a temporary average (A), then Net Average = A + (Sum of Deviations ÷ Total Number). This simplifies large calculations.

Alligation Method

The ratio of the quantities is inversely proportional to the difference between their averages and the mixture average: n1/n2 = (A2 − A_m) / (A_m − A1).

Q68. Answer: (b) 2005

The correct answer is 2005.

Important Points

• 2005 was a momentous year for the right to information (RTI) in India because it saw the enactment of a national right to information law.

• The Central Act was passed by the Indian Parliament on 12 May 2005.

• The Right to Information Act, which gives legal rights to people to seek information from the government and curb corruption.

• The law promises accountability and transparency to climb up several notches, especially as it provides for hefty fines and

disciplinary action against erring officials.

Additional Information

• On October 12, 2005, a person called Shahid Raza Burney submitted India's first-ever Right To Information application to a police station in Pune and thus we entered the RTI age.

• The application fee for one single RTI is 10 rupees.

Q69. Answer: (b) 60

The given number is:

213 × 35 × 53 × 76

For each term, the perfect cubes can be obtained as:

For 2^{13} = 2^0, 2^3, 2^6, 2^9, 2^{12}; i.e. 5 terms

For 3^5 = 3^0, 3^3; i.e. 2 terms

For 5^3 = 5^0, 5^3; i.e. 2 terms

For 7^6 = 7^0, 7^3, 7^6; i.e. 3 terms

So, we have the multiples of the number 213 × 35 × 53 × 76 as perfect cubes = 5 × 2 × 2 × 3 = 60

Therefore The number of multiples of the number 213 × 35 × 53 × 76 are perfect cubes or complete cubes, are 60

Q70. Answer: (a) It is a disease caused by the absence of genes responsible for the factors that cause blood clotting.

The correct answer is It is a disease caused by the absence of genes responsible for the factors that cause blood clotting.

• Haemophilia is a group of bleeding disorders. Blood clotting factors are needed to stop bleeding.

• The most common types are:

• Hemophilia A (classic haemophilia)—caused by too little or no factor VIII (most common)

• Hemophilia B (Christmas disease)—happens in males, caused by too little or no factor IX

• Causes of this disease is a faulty gene on a certain DNA strand.

• Females carry 2 copies of the strand. If one is faulty, the other one takes over. The faulty gene can pass to their children. If so, the female child will carry the gene. If it passes to the male, they will get the disease because they carry one copy of the strand.

Additional Information

• Haemoglobin disorders (also known as hemoglobinopathies) are rare blood conditions that affect a person's haemoglobin which is the protein in the blood that carries oxygen.

• Sickle Cell Disease includes a group of related disorders that affect a person's red blood cells.

• With sickle cell disease, a person's red blood cells can become hard, sticky, and sickle-shaped.

Q71. Answer: (a) All monkeys have two legs.

The least possible overlapping venn diagram is shown below:

Option1) All monkeys have two legs → True (As seen from the figure all monkeys are men and all men have two legs, thus all monkeys have two legs is definitely correct)

Option 2) Some monkeys are not cats → False (We can draw a big circle of cat which will include all monkeys, then the statement Some monkeys are not cats becomes incorrect)

Option 3) Some men are cat → False (as seen from the figure men and cat have no connection so it is incorrect)

Option 4) All men have four legs → False (as there is no mention of 4 legs in the statement so we can't assume anything on own, thus it is also incorrect)

Therefore, the option "All monkeys have two legs" is definitely correct.

Hence, the correct answer is All monkeys have two legs.

NOTE:

There is a discrepancy in the original paper and the board itself considered it invalid. so we modify this question a little bit according to the standard of the previous question.

Q72. Answer: (a) Neither assumption I nor II are implicit.

Given,

Statement:

"Please note that the company will only provide accommodation to outside candidates if selected."

Assumptions:

I. The company plans to select only external candidates

→ Not implicit as the company is not planning to select only external candidates or we don't know by the statements that the company is selecting internal or external candidates.

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II. The second company plans to select only local candidates.

→ Not implicit as the company is not planning to select only local candidates or we don't have anything about the second company in the statement.

Therefore, neither assumption I nor II is implicit.

Hence the correct answer is, neither assumption I nor II is implicit.

Q73. Answer: (a) Mass per unit volume

The correct answer is Mass per unit volume.

• Density is an important physical property for characterizing a material or chemical system.

• Mathematically, density is calculated as a substance's mass per the volume it occupies.

• The formula for density is d = M/V, where d is density, M is mass, and V is volume.

• Density is commonly expressed in units of grams per cubic centimetre (g/cm³).

Key Points

• Water achieves its maximum density at 4ºC (39.2ºF).

• The natural density of milk is 1.200 times greater than normal water at 4ºC, i.e. the standard density of water 1 gm/cc.

Q74. Answer: (c) Singapore

The correct answer is Singapore.

• India and Singapore signed the Second Protocol amending the Comprehensive Economic Cooperation Agreement (CECA) in New Delhi.

• The Protocol was signed by Deputy Chief Negotiators, Shri Rajneesh, Joint Secretary, Ministry of Commerce and Industry, Government of India, and Mr Francis Chong, Senior Director, Ministry of Trade and Industry, Government of Singapore.

• CECA will boost bilateral trade between India and Singapore.

Hint

• Singapore is the second-largest trading partner of India within ASEAN.

• Singapore’s trade with India constitutes about 21.8% of the total trade with ASEAN.

Q75. Answer: (c) 25%

The correct answer is 25%.

Given Data:

• Mass of sugar = 50 grams

• Maas of water = 150 grams

• Mass of total solution = 200 grams

• The concentration of the solution in terms of mass by mass percent of the solution is as given below:

• Mass= (Mass of solute)/(Mass of solution)*100

• = 50/200*100

• 25%

Q76. Answer: (a) Kamal Hassan

The correct answer is Kamal Hassan.

• Kamal Hassan had won the Henri Langlois Award for his contribution to cinema in France as a child artist in his debut movie Kalathoor Kannamma in 1959.

• In 2016, He was awarded the Knight Of the Order of Arts and Letters for his huge contribution to cinema.

Important Points

• Bollywood artists who were honoured by foreign countries for their contribution to cinema:

Satyajit Ray	**• He was conferred France’s highest civilian award the ‘Legion of Honour’ at a function at the Calcutta Library in 1989.**
Amitabh Bachchan	• He was conferred France’s highest civilian award the 'Legion of Honour'. - He was also decorated with the Medal of Honour of Morocco by Morocco’s King Mohammed.
Anurag Kashyap	• The Gangs Of Wasseypur director had been conferred with the Knight of the Order of Arts and Letters, a prestigious award from the French Government in 2015.

Aishwarya Rai Bachchan	• In 2011, she was conferred with the Knight of the Order of Arts and Letters by the Ambassador of France in New Delhi, Jerome Bonnafont.
Shah Rukh Khan	• He was conferred with the Knight of Legion of Honor in 2014. - In 2012, he was conferred with Morroco's Medal of Honor at the Marrakech International Film Festival.
Sajid Nadiadwala	• In 2016, producer Sajid Nadiadwala was decorated with the Knight of the Order of Arts and Letters by Mr Alexandre Ziegler, Ambassador of France to India.
Manish Arora	• The first Indian designer to be conferred with the Legion of Honour in 2016.
Nandita Das	• Critically acclaimed actor-director Nandita Das was conferred with the Knight of the Order of Arts and Letters by Jerome Bonnafont during her felicitation in Delhi.
Kalki Koechlin	• She conferred "Knight of the Order of Arts and Letters" in 2018.
Sanjna Kapoor	• She was awarded the French honour of Chevalier dans l'Ordre des Arts et des Lettres' (Knight of the Order of Arts and Letters) for her outstanding contribution to theatre in 2020.

Q77. Answer: (b) Telangana

The correct answer is Telangana.

• The Singareni coal reserves stretch across 350 Km of the Pranahita located in Godavari Valley of Telangana.

• Singareni Collieries Company Limited (SCCL) is currently operating 18 opencast and 27 underground mines in 4 districts of Telangana.

• The present Company was incorporated on 23rd December 1920.

Important Points

• Important mines in Odisha:

• Iron ore in Joda, Keonjhar, Jajpur.

• Manganese in Keonjhar, Rayagada, Sundergarh.

• Bauxite in Balangir, Koraput, Kalahandi, Sambalpur.

• Coal in Jharsuguda, Talcher.

• The principal mineral-bearing belts in Maharashtra are the Vidarbha area in the east and the Konkan area in the west.

• Important mineral occurrences are:

• Bauxite in Kolhapur, Raigad, Ratnagiri, Satara, Sindhudurg, Thane districts.

• China clay in Amravati, Bhandara, Chandrapur, Nagpur, Sindhudurg, Thane districts.

• Chromite in Bhandara, Chandrapur, Nagpur, Sindhudurg districts.

• Coal in Nagpur, Chandrapur, Yavatmal districts.

• Dolomite in Chandrapur, Nagpur, Yavatmal districts.

• Gold in Bhandara, Nagpur districts.

• Important mines in Chhattisgarh:

• Iron ore in Bailadila, Raoghat, Hahaladdi/Kodapakha, Metabodeli, Dalli Rajhara.

• Bauxite in Mainpat, Kandraja block, Jamirapat, Pendrapat.

• Coal in Sohagpur, Jhilimili, Chirimiri, Bisrampur, Lakhanpur, Panch Bhahni, Korba, Mand Raigarh.

Q78. Answer: (b) 9360

Shortcut Trick

Identify the LCM of 6, 9, 12, 13, and 15.

LCM (6, 9, 12, 13, 15) = 2340.

Find the largest 4-digit multiple of 2340.

2340 × 4 = 9360 (which is < 10000).

Therefore The correct answer is 9360.

Alternate Method

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Given: Divisors are 6, 9, 12, 13, and 15. We need the largest 4-digit number divisible by all.

Step 1: Find the LCM of the numbers.

=> Prime factorization:

=> $6 = 2 \times 3$

=> $9 = 3^2$

=> $12 = 2^2 \times 3$

=> $13 = 13^1$

=> $15 = 3 \times 5$

=> LCM = $2^2 \times 3^2 \times 5 \times 13 = 4 \times 9 \times 5 \times 13 = 2340$.

Step 2: Divide the largest 4-digit number (9999) by the LCM.

=> $9999 \div 2340$

=> Quotient = 4

=> Remainder = $9999 - (2340 \times 4) = 9999 - 9360 = 639$.

Step 3: Subtract the remainder from 9999.

=> Required Number = $9999 - 639 = 9360$.

Therefore The correct answer is 9360.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is perfectly divisible by a given set of numbers.

Divisibility Rules

A number is divisible by 9 if the sum of its digits is divisible by 9. In 9360, 9+3+6+0 = 18 (divisible by 9).

Finding Multiples

Any number divisible by a set of numbers must be a multiple of their LCM.

Q79. Answer: (a) Saba Karim

The correct answer is Saba Karim.

• Former India wicketkeeper Saba Karim has been asked to resign from the post of BCCI General Manager – Cricket Operations.

• He played one Test and 34 ODIs for India, was appointed by the Board of Control for Cricket in India in December 2017.

• He was responsible for implementing operational plans, budgeting, monitoring the match playing conditions, and administration of the Domestic program.

Important Points

Sunil Gavaskar	**• He is an Indian cricket commentator and former cricketer representing India. - He is also known as "Sunny", "Little Master". - Trinidad Calypso singer Lord Relator (Willard Harris) wrote a song in Gavaskar's honour, the "Gavaskar Calypso". - The Board of Control for Cricket in India (BCCI) named Sunil Gavaskar as the recipient of the Col CK Nayudu Lifetime Achievement Award for Cricket in India in 2012**
Ravi Shastri	• Ravi Shastri is an Indian cricket coach, former commentator, cricketer, and current head coach of the Indian national cricket team.
MV Sridhar	• He is the former Indian first-class cricketer and GM of cricket operations in the Board of Control for Cricket in India (BCCI). - The former Hyderabad cricketer had resigned from his post in September 2017 after failing to report a conflict of interest.

Additional Information

• Sourav Ganguly is the president of BCCI 2020.

Q80. Answer: (a) 72

Shortcut Trick

In same direction problems involving a moving object passing two others, use the constant train length property.

Let Train Speed = S km/h.

$(S - 9) \times 8 = (S - 12) \times 8.4$

$8S - 72 = 8.4S - 100.8$

0.4S = 28.8

S = 28.8 ÷ 0.4 = 72 km/h

Therefore The correct answer is 72 km/h.

Alternate Method

Given: Speed of 1^(st) person = 9 km/h, Time taken = 8 s. Speed of 2^(nd) person = 12 km/h, Time taken = 8.4 s.

Formula Used: Distance = Relative Speed × Time

=> Let the speed of the train be S km/h and length be L meters.

=> Conversion factor: 1 km/h = 5/18 m/s.

=> L = (S − 9) × (5/18) × 8 --- (Equation 1)

=> L = (S − 12) × (5/18) × 8.4 --- (Equation 2)

=> (S − 9) × 8 = (S − 12) × 8.4

=> 8S − 72 = 8.4S − 100.8

=> 100.8 − 72 = 8.4S − 8S

=> 28.8 = 0.4S

=> S = 72 km/h

Therefore The correct answer is 72 km/h.

Additional Information

Relative Speed in Same Direction

When two objects move in the same direction with speeds u and v (v), their relative speed is (u − v).

Relative Speed in Opposite Direction

When two objects move in opposite directions, their relative speed is (u + v).

Speed Conversion

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

Q81. Answer: (c) North - West

Given,

Here we see the person is facing North-West direction.

Hence, the correct answer is North-West.

Q82. Answer: (c) Only argument 1 is correct.

Given,

Statement: There are many aspects to a person.

Argument:

1. Yes, everyone responds to a situation that is different from the other → Correct as everyone's response to a situation is different from the other.

2. No, we are responsible for what we create all around us. What we produce happiness or sorrow is up to us.

→ Incorrect as we are not always responsible for what we create all around us.

Therefore Only argument 1 is correct.

Hence the correct answer is, Only argument 1 is correct.

Q83. Answer: (b) Anushka Sharma

The correct answer is Anushka Sharma.

• Indian cricket captain Virat Kohli married film actress Anushka Sharma in 2017.

Important Points

• Virat Kohli is an Indian cricketer and the current captain of the India national team.

• In the 2011 World Cup which India won, Kohli became the first Indian batsman to score a century on his World Cup debut.

• In 2012, Kohli was named the ICC ODI Cricketer of the Year at the age of 23, being the youngest to win the coveted award.

• He won the International Cricketer of the Year at the CEAT Cricket Rating Awards, 2019.

• He won the Rajiv Gandhi Khel Ratna award in 2018.

Q84. Answer: (c) Displacement takes place there.

The correct answer is Displacement takes place there.

• On the body, work is done only when displacement takes place by force applied to the body.

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• There is a displacement of the body caused by the applied force along the direction of the applied force.
• it is possible that a force is acting on a body and still the work done is zero.
• When there is no displacement.
• Work done by conservative forces to move a particle in a closed path is zero.
• Work done formula will be given as W = F * d, where F = force, and d = displacement.

Hint

• According to the work-energy theorem, the work done by the force is equal to an increase in the kinetic energy of the body.

Q85. Answer: (d) 148

Shortcut Trick

To find the square root of 21904:

Last digit is 4, so the square root must end in 2 or 8.

Ignore last two digits (04), remaining number is 219. The largest perfect square below 219 is 196 (14^2). So the first two digits are 14.

Possible answers: 142 or 148. Compare 219 with 14 × 15 = 210. Since 219 > 210, we choose the larger number.

Therefore The correct answer is 148.

Alternate Method

Given: Number = 21904

Method: Long Division Method

=> Grouping digits from right to left: 02 19 04

=> Step 1: 1 × 1 = 1. Remainder 1. Bring down 19. New number = 119.

=> Step 2: Double the quotient (1 × 2 = 2). Try 24 × 4 = 96. Remainder 23. Bring down 04. New number = 2304.

=> Step 3: Double the quotient (14 × 2 = 28). Try 288 × 8 = 2304. Remainder 0.

=> √21904 = 148

Therefore The correct answer is 148.

Additional Information

Square Ending Digits

A perfect square never ends in 2, 3, 7, or 8. If a number ends in 4, its square root ends in either 2 or 8.

Unit Digit 5 Rule

The square of a number ending in 5 always ends in 25. Example: $(n5)^2 = [n \times (n+1)]$ followed by 25.

Number of Digits

If a perfect square has n digits, its square root has n/2 digits (if n is even) or (n+1)/2 digits (if n is odd).

Q86. Answer: (c) 66

The correct answer is 66.

• The 2018 Commonwealth Games held at Gold Coast, Australia.
• India ranked 3rd, with 26 Golds, 20 Silvers, and 20 Bronze medals.
• The flag bearer of this game:
• Opening: P. V. Sindhu
• Closing: Mary Kom

Important Points

• Shooter Heena Sidhu clinched the gold medal in the women's 25m pistol event at the 21st Commonwealth Games (CWG) in Australia.
• Indian sprinter Mohammad Anas qualified for the finals of the men’s 400m event.
• Shooter Shreyasi Singh clinches the gold medal in the women's double trap event.
• Shooter Jitu Rai won gold in the men's 10m air pistol event.
• India’s teen shooter Manu Bhaker grabbed the gold medal in the women’s 10m air pistol.
• Punam Yadav won India's fifth gold medal in the women's 69kg weightlifting event.
• The first Paralympic medal with Para powerlifter Sachin Chaudhary bagging bronze in the heavyweight category.
• The 15-year-old Indian shooter, Anish Bhanwala, has created history by becoming the country’s youngest ever gold medal winner in the Commonwealth Games.
• Indian wrestler Bajrang Punia has won gold in the men's freestyle 65 kg category.
• Neeraj Chopra became the first Indian javelin thrower to claim a gold medal at the Commonwealth Games.

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Additional Information

• The 1st and 2nd position holds Australia and England respectively.

• The 2022 Commonwealth Games will be held in Birmingham, England.

• The first Commonwealth Game in 1930 was hosted in Hamilton, Canada.

• Delhi hosted Commonwealth Games in 2010.

Q87. Answer: (c) Caravan Talkies

The correct answer is Caravan Talkies.

• UFO Movies India Limited is a listed company and engaged in the business of digital cinema distribution and in-cinema advertising.

Key Points

• Caravan Talkies, which is owned by UFO Movies through its subsidiary is taking both Bollywood and regional films to the hinterlands of the country where there is no proper cinema hall.

• Caravan Talkies is a movie-on-wheels concept, wherein sundown non-ticketed shows (complimentary) are played at villages for India's rural population situated in media dark areas.

• This platform provides an opportunity for brands to reach out and engage with rural audiences via consumer activations in a fun and receptive environment.

Q88. Answer: (b) Volt

The correct answer is Volt.

• The SI unit of potential difference is volts and is represented by the letter V.

Key Points

• Electric potential is the amount of energy per unit charge at a particular point.

• The difference in the electric potential between the two points is called the electrical potential difference. Electric potential difference can also be called the voltage.

• Some other quantities and their SI units:

SI UNIT	Quantity
Watt	Power
Joule	Energy
Coulomb	Electric charge
Ampere	Current
Volt	Potential difference(Voltage)

Q89. Answer: (b) 2029

CONCEPT :

A leap year repetition will be on a leap year.

A non-leap year repetition will be on a non-leap year.

A calendar year is repeated after every 7 odd days.

No. of odd days in non-leap year = Remainder of (365 ÷ 7) = 1 odd day

No. of odd days in leap year = Remainder of (366 ÷ 7) = 2 odd day

Calculate the year gap with a multiple of 7.

If the leap year repetition comes after 7 odd days is also a leap year then it will be the answer, otherwise count for the next multiple of 7. Same for the non-leap year also.

EXPLANATION :

Given, It is Sunday on 30 September 2018.

For the year to have the same calendar as 2018 we need the sum of the number of odd days. When this sum is divisible by 7 then that year will have the same calendar as 2018.

Therefore

Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Odd Days	1	2	1	1	1	2	1	1	1	2	1

Therefore The sum of the odd days = 14 days = 0 odd days.

Therefore The 30th September 2029 will be Sunday.

Hence the correct answer is 2029.

Shortcut Trick

Year	Repetition after years
Leap year	28
Leap year + 1	6
Leap year + 2	11
Leap year + 3	11

Important Pointsi) For century non-leap years like 1500, 1700, 1900, 2100 calendar repeats after 6 years.

ii) After adding 28 to a leap years if it comes a non leap year then add 40 to it.

ex: 1972(LY) + 28 = 2000(LY) but 2072(LY) + 28 = 2100(NLY),

Therefore add 40 to it. 2072(LY) + 40 = 2112(LY)

iii) If crossing a century year while adding 6 or 11 then check whether the century year is LY or NLY. If NLY then add 12 or 6 accordingly. otherwise, remain same.

Ex: 1897 is a leap + 1 years so we add 6 to it generally which is wrong because 1900 is a NLY crossing so we add 12 years hence answer is 1909.

Ex: 1898 is a leap + 2 years so we add 11 to it generally which is wrong because 1900 is a NLY crossing so we add 12 years hence answer is 1910.

The year after 1600 end with 99.

If crossing century leap year like 2000, 2400 etc. then add 11 to it. 1999, 2399 etc repeats after 11 years.

If crossing century Non leap year year like 1700, 1800, 1900 etc. then add 6 to it. 1699, 1799, 1899, 2199, 2299 etc repeats after 6 years.

Q90. Answer: (b) 21US19

We know,

Given,

11KI9, 16PN14, _____

The pattern followed here is letters are denoted by their place value.

Hence, the correct answer is 21US19.

Q91. Answer: (a) 1 N m^(-2)

The correct answer is 1 N m-2

Important Points

• The pascal is the SI derived unit of pressure.

• The unit, named after Blaise Pascal.

• The name pascal was adopted for the SI unit newton per square meter (N/m^2).

• The pascal can be expressed using SI derived units as:

1 pa = 1 Nm^(-2) = 1 Kgm^(-1)s^(-2)= 1 Jm^(-3),

• where N is the newton, m is the meter, kg is the kilogram, s is the second, and J is the joule.

Key Points

• dyne cm^(-2) is one of the smallest pressure units and is derived from the CGS unit for force where 1 dyne equals 1 gram accelerated by 1 centimetre per second squared.

• 1 Dyne per Square Centimetre equals 0.1 pascals.

• The standard atmosphere (symbol: atm) is a unit of pressure defined as 101325 Pa (1.01325 bar).

• It is sometimes used as a reference or standard pressure. It is approximately equal to Earth's atmospheric pressure at sea level.

• So 1 atmosphere = 101325 pa

• 1 pa = 1/101325 atm

Q92. Answer: (c) 140

Shortcut Trick

Let the numbers be 17x and 28x.

Ratio change: 17x + 6 : 28x = 13 : 20
Cross multiply: 20(17x + 6) = 13(28x) → 340x + 120 = 364x
24x = 120 → x = 5
Larger number = 28 × 5 = 140.
Therefore The correct answer is 140.
Alternate Method
Given:
Initial Ratio = 17 : 28
Final Ratio = 13 : 20 (after adding 6 to the smaller number)
Calculations:
=> (17x + 6) / 28x = 13 / 20
=> 20 × (17x + 6) = 13 × 28x
=> 340x + 120 = 364x
=> 364x − 340x = 120
=> 24x = 120
=> x = 5
=> Larger Number = 28x = 28 × 5 = 140
Therefore The correct answer is 140.
Additional Information
Ratio and Proportion
A ratio compares two quantities by division. If a : b = c : d, then ad = bc (Product of extremes = Product of means).
Cross Multiplication Method
When values are added or subtracted from ratio terms, cross multiplication is the most efficient way to find the unknown variable x.

Q93. Answer: (c) Lead oxide + oxygen + nitrogen dioxide

The correct answer is Lead oxide + oxygen + nitrogen dioxide.
Important Points
• Lead nitrate is a white coloured inorganic compound.
• It is soluble in water.
• The chemical formula of lead nitrate is Pb(-NO--3)2.
• Lead nitrate is poisonous in nature.
Additional Information
• Decomposition is the chemical reaction where a complex substance breaks into simpler ones.
• Decomposition of Lead Nitrate occurs when it is strongly heated. This is called thermal decomposition.
• The Chemical reaction of decomposition of lead nitrate is:
2Pb(-NO--3)2 → 2PbO + 4NO2 + O2
• So, the products of decomposition are:
• Lead oxide à Yellow coloured
• Nitrogen dioxide à Brown coloured gas
• Oxygen à Colourless

Q94. Answer: (b) 49 : 32

Shortcut Trick
Given the ratio of parallel sides MN : BC = 7 : 9.
Since MN || BC, ΔAMN is similar to ΔABC.
Ratio of their areas = (Side ratio)² = $7^2 : 9^2$ = 49 : 81.
Area of trapezium BMNC = Area(ΔABC) − Area(ΔAMN) = 81 − 49 = 32 units.
Required ratio Area(ΔAMN) : Area(BMNC) = 49 : 32.
Therefore The correct answer is 49 : 32.
Alternate Method
Given: In ΔABC, MN || BC and MN : BC = 7 : 9.
Formula Used: If two triangles are similar, the ratio of their areas is equal to the square of the ratio of their corresponding sides.

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=> In ΔABC, since BMNC is a trapezium, MN must be parallel to BC.

=> In ΔAMN and ΔABC, angle A is common and angle AMN = angle ABC (corresponding angles).

=> Therefore ΔAMN ~ ΔABC by AA similarity criterion.

=> Area(ΔAMN) / Area(ΔABC) = (MN / BC)²

=> Area(ΔAMN) / Area(ΔABC) = (7 / 9)² = 49 / 81

=> Let Area(ΔAMN) = 49k and Area(ΔABC) = 81k.

=> Area(trapezium BMNC) = Area(ΔABC) − Area(ΔAMN)

=> Area(trapezium BMNC) = 81k − 49k = 32k

=> Ratio = Area(ΔAMN) : Area(trapezium BMNC) = 49k : 32k = 49 : 32.

Therefore The correct answer is 49 : 32.

Additional Information

Similar Triangles Area Theorem

The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides: Area1/Area2 = (s1/s2)².

Trapezium in a Triangle

When a line is drawn parallel to one side of a triangle, it divides the triangle into a smaller similar triangle and a trapezium. The area of the trapezium is the difference between the areas of the two triangles.

Q95. Answer: (b) Neither 1 nor 2 follows

Given,

Statement: All jaguars are cheetahs, all panthers are cheetahs

Conclusion:

1. All Jaguars are Panthers.

2. Some Jaguars are Panthers.

The least possible Venn diagram for the given statements is as follows,

Case 1:

Case 2:

Conclusions:

1. All Jaguars are Panthers → False (As all Jaguars are Cheetah and all panthers are cheetah given so from both possible Venn diagrams, it can be possible but not definite)

2. Some Jaguars are Panthers → False (As all Jaguars are Cheetah and all panthers are cheetah given so from both possible Venn diagrams, it can be possible but not definite)

Hence, the correct answer is Neither 1 nor 2 follows.

Q96. Answer: (d) Meristematic

The correct answer is Meristematic.

• Growth in plants occurs as the stems and roots lengthen. This is called primary growth.

Key Points

• Many plants, especially woody plants, also increase in thickness during their life span. This is called secondary growth.

• Plants continue to grow as long as they live. They grow through a combination of cell growth and cell division (mitosis).

• Cell division takes place in specialized tissue called meristematic tissue.

• The cells of the tissue are undifferentiated and continue to divide and differentiate.

• Meristem allows plant stems and roots to grow longer (primary growth) and wider (secondary growth).

• Primary growth is caused by the growth of Apical meristems and secondary growth is caused by lateral meristem.

Additional Information

• Parenchyma tissue is involved in photosynthesis, secretion, food storage, and other activities of plant life.

• Collenchyma tissue provides support, structure, mechanical strength, and flexibility to the petiole, leaf veins, and stem of young plants, allowing for easy bending without breakage.

• Xylem is planted vascular tissue. It transports water and dissolved minerals from the roots to the rest of the plant and also provides physical support.

Q97. Answer: (a) Rs. 550

Shortcut Trick

Total percentage difference = Profit% − (−Loss%) = 7% + 33% = 40%.

Given that 40% of CP corresponds to Rs. 220.

Using the unitary method: 1% of CP = 220 ÷ 40 = 5.5.

Therefore, 100% (Cost Price) = 5.5 × 100 = Rs. 550.

Therefore The correct answer is Rs. 550.

Alternate Method

Given: Difference in Selling Prices = Rs. 220, Loss = 33%, Profit = 7%.

Formulas: SP = CP × (100 ± P/L)% | CP = (Difference in SP ÷ Difference in %age) × 100.

=> Let the Cost Price (CP) be x.

=> Selling Price at 33% loss (SP1) = x × (100 − 33)% = 0.67x.

=> Selling Price at 7% profit (SP2) = x × (100 + 7)% = 1.07x.

=> According to the question: SP2 − SP1 = 220.

=> 1.07x − 0.67x = 220 => 0.40x = 220.

=> x = 220 ÷ 0.40 = 550.

Therefore The correct answer is Rs. 550.

Additional Information

Effective Percentage Difference

When comparing a profit scenario and a loss scenario, the percentage gap is the sum of the two percentages (Profit% + Loss%).

Cost Price Calculation

The Cost Price is always considered 100% in such profit and loss comparison problems unless otherwise stated.

Q98. Answer: (b) [figure]

The correct answer is

• Unsaturated hydrocarbons are hydrocarbons that have double or triple covalent bonds between adjacent carbon atoms.

Key Points

• The term "unsaturated" means more hydrogen atoms may be added to the hydrocarbon to make it saturated (i.e. consisting of all single bonds).

• The example of the unsaturated compound is alkenes and alkynes, as well as branched chains and aromatic compounds.

Additional Information

• Alkane - acyclic saturated hydrocarbon.

• Alkane consists of hydrogen and carbon atoms arranged in a tree structure in which all the carbon-carbon bonds are single.

• Alkene - any hydrocarbon containing one or more double bonds.

• Alkenes unsaturated compounds

• Alkyne - any hydrocarbon containing one or more triple bonds.

• Alkenes unsaturated compounds

NOTE:

In the Official paper of RRB group D, the options given here are invalid, we have updated the options for better clarification for this question.

Q99. Answer: (c) Marsilea

The correct answer is Marsilea.

• Plants belonging to the 'PTERIDOPHYTA' group are differentiated into true roots, stems, and leaves.

Key Points

• They are the first plants that have a vascular system.

• The examples of the pteridophytes plants are Fern, Horsetail, Psilotum, Azolla, Isoetes, Marsilea, Salvinia, Selaginella, Equisetum, Pteridium, etc.

Important Points

Funaria	**• Funaria is a genus of approximately 210 species of moss. - Species in this genus are known as cord-mosses because of the rope-like way in which the stalk twists and curls with changes in humidity. - The specific epithet 'hygrometric' refers to the hygroscopic nature of the seta.**

Chara	• Chara is freshwater, green alga found submerged in shallow water ponds, tanks, lakes, and slow running water. - They are called stoneworts because the plants can become encrusted in lime (calcium carbonate) after some time. - The "stem" is actually a central stalk consisting of a giant, multinucleated cells.
Marchantia	• Marchantia, a genus of liverworts (creeping ribbonlike plants) in the order Marchantiales, commonly found on moist clay or silty soils, especially on recently burned land throughout the Northern Hemisphere.

Q100. Answer: (d) 6

Given,

A means addition,

E means division,

I means subtraction,

O means multiplication and

the remaining letters are replaced with numbers according to their chronological position (used as mathematical notation If the letters formed to retain their number in the series)

88E11A2I4 = ?

Therefore 88 ÷ 11 + 2 – 4

Therefore 8 + 2 – 4 = 10 – 4 = 6

Hence the correct answer is 6.

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