Agniveer Army GD 2nd June 2026 (Shift 2) Memory-Based Paper (Previous Year Paper)

Army GD Agniveer • 2026 • 50 questions • 60 minutes • Answer key and solutions

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GENERAL KNOWLEDGE

Q1. Teak forests are found in which of the following states of India?

(a) Himachal Pradesh
(b) Madhya Pradesh
(c) Punjab
(d) Jharkhand

Q2. Which is the largest state of India in terms of area?

(a) Madhya Pradesh
(b) Uttar Pradesh
(c) Maharashtra
(d) Rajasthan

Q3. Which of the following Articles of the Indian Constitution automatically suspends the Fundamental Rights during emergencies?

(a) 356
(b) 352
(c) 359
(d) 358

Q4. The Himalayan Mountain ranges stretch in a west-east direction from the Indus River to which major Indian river?

(a) Godavari
(b) Brahmaputra
(c) Ganga
(d) Yamuna

Q5. What percentage of India's total geographical area is occupied by the state of Punjab?

(a) 0.54%
(b) 2.54%
(c) 3.12%
(d) 1.54%

Q6. Which city of Andhra Pradesh will launch India's first quantum computer as part of a major initiative to become a global technology hub?

(a) Visakhapatnam
(b) Vijayawada
(c) Tirupati
(d) Amaravati

Q7. When is National Consumer Day celebrated in India?

(a) 26 December
(b) 26 November
(c) 24 November
(d) 24 December

Q8. Exercise Gagan Shakti is organised by

(a) Indian Air Force to test its capabilities
(b) Joint Exercise of IAF and US Airforce
(c) INS Vikrant for testing its fighter jets landing and flying capabilities
(d) IAF and DGCA for flying out Indian civilians from conflict zone

Q9. Who was the founder of the Brahmo Samaj?

(a) Ishwarchandra Vidyasagar
(b) Raja Rammohun Roy
(c) Swami Dayanand Saraswati
(d) Swami Vivekananda

Q10. Article 356 of the Indian Constitution is related to which of the following?

(a) Separation of judiciary from executive
(b) Right of minorities to establish and administer educational institutions
(c) Provisions in case of failure of constitutional machinery in State
(d) Remedies for enforcement of fundamental rights

Q11. The _____ Amendment decreased the voting age from 21 to 18.

(a) 61^(st)
(b) 25^(th)
(c) 42^(nd)
(d) 44^(th)

Q12. Where is India's first international exhibition-cum-convention center, Bharat Mandapam, located?

(a) New Delhi
(b) Mumbai
(c) Bangalore
(d) Gandhinagar

Q13. Where is the National Defence Academy situated ?

(a) Wellington
(b) New Delhi
(c) Dehradun
(d) Khadakwasla

Q14. The western coastal plains extend from _____ coastal region in the north to _____ in the south.

(a) Konkan; Malabar
(b) Gujarat; Kerala
(c) Maharashtra; Tamil Nadu
(d) Kathiawar; Karnataka

Q15. Operation Meghdoot is related to

(a) Siachen Glacier
(b) Aksai Chin
(c) Kutch
(d) None of these

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GENERAL SCIENCE

Q16. Chemical composition of heavy water is _____.

(a) D2O
(b) HDO
(c) H2O
(d) H2O2

Q17. Which of the following is the correct sequence of blood flow through heart chambers?

(a) Right atrium → Right ventricle → Left atrium → Left ventricle
(b) Left atrium → Left ventricle → Right atrium → Right ventricle
(c) Right ventricle → Right atrium → Left ventricle → Left atrium
(d) Left ventricle → Left atrium → Right ventricle → Right atrium

Q18. Fill in the blanks.

Sieving is mainly done when there is a difference in _____of impurities and required material.

(a) mass
(b) size
(c) density
(d) None

Q19. Which of the following records brain activity?

(a) CTC
(b) ECG
(c) EEG
(d) MET

Q20. Electrical energy is measured in which unit?

(a) Joule
(b) Ampere-hour (Ah)
(c) Watt
(d) Kilowatt-hour (kWh)

Q21. Lie Detector, the instrument which is widely used in police investigation, is also called _____.

(a) Neuro Graph
(b) Electrocardiography
(c) Polygraph
(d) Seismograph

Q22. What is the botanical name of Turmeric?

(a) Cucumis sativas
(b) Mangifera indica
(c) Curcuma longa
(d) Citrus aurantium

Q23. What is the force that attracts objects towards the earth?

(a) Magnetic force
(b) Gravitational force
(c) Electrostatic force
(d) Pressure

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Q24. If a south pole of a magnet brings near to a north pole of another magnet, they

(a) Break
(b) Do not interact
(c) Repels each other
(d) Attract each other

Q25. Which hormone stimulates the thyroid gland to secrete thyroxine?

(a) TSH
(b) FSH
(c) LTH
(d) ACTH

Q26. The pH value of wine is _____

(a) 6.5
(b) 2.8
(c) 8.5
(d) 7.0

Q27. Chemical formula of sindoor or vermilion_____.

(a) HgS
(b) Hg0
(c) PbS
(d) None of the above

Q28. Speed is calculated as:

(a) Time + Distance travelled
(b) Distance travelled × Time
(c) Time taken/ Distance travelled
(d) Distance travelled/ Time taken

Q29. Which of the following causes the rusting of iron?

a. Oxidation
b. Reduction
c. Chemical reaction with acid
d. Chemical reaction with a base

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

Q30. A medical technique based on magnetism is :

(a) NRI
(b) MRI
(c) CRI
(d) FRI

MATHEMATICS

Q31. 2 pens and 3 pencils cost Rs. 35, and 3 pens and 2 pencils cost Rs. 40. Find the cost of 3 pencils.

(a) Rs. 12
(b) Rs. 30
(c) Rs. 18
(d) Rs. 15

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Q32. What is area of a rhombus which has diagonals 10 cm and 8 cm?

(a) 35 cm²
(b) 40 cm²
(c) 45 cm²
(d) 50 cm²

Q33. The ratio of the number of boys to the number of girls in a class is 9:7. If there are 96 students in the class, how many girls are there?

(a) 42
(b) 44
(c) 52
(d) 54

Q34. A mobile phone worth Rs. 8,000 is sold at a loss of 10%. What is the selling price?

(a) Rs. 7,000
(b) Rs. 7,100
(c) Rs. 7,200
(d) Rs. 7,400

Q35. If A:B=5:7 and B:C=9:11, find A:B:C.

(a) 45:63:77
(b) 45:77:99
(c) 35:63:77
(d) 55:77:99

Q36. Evaluate: 16 + 18 ÷ 6 - 3 × 4

(a) 7
(b) 6
(c) 10
(d) 9

Q37. The sum of two numbers is 45 and their difference is 13. Find the smaller number.

(a) 15
(b) 13
(c) 16
(d) 12

Q38. If x = 8 and y = 3 what is the value of 3x-2y+5?

(a) 21
(b) 23
(c) 25
(d) 27

Q39. Simplify: 86 + (14 ÷ 7 - 1)

(a) 85
(b) 84
(c) 88
(d) 87

Q40. What is the mode of the following data?

86, 84, 71, 82, 82, 63, 84, 71, 70, 86, 88, 65, 71, 81, 87, 60, 60, 74, 78, 62, 75, 66, 68, 85, 72

(a) 71
(b) 86
(c) 82
(d) 84

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Q41. In what duration (in years) will Rs. 7,200 fetch a simple interest of Rs. 360 at 4% per annum rate of interest?

(a) 2.25
(b) 1.25
(c) 0.25
(d) 2.5

Q42. The ratio of two numbers is 6 : 7 and their HCF is 3. Their LCM is.

(a) 124
(b) 128
(c) 122
(d) 126

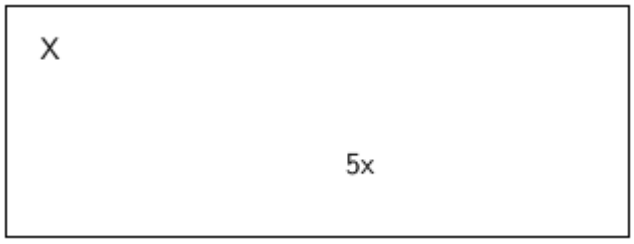
Q43. 92% of 100 is:

(a) 92
(b) 90
(c) 0
(d) none of these

Q44. A train 600 meters long is running with a speed of 72 km/hr. In what time will it pass a tunnel 300 metre long?

(a) 45 seconds
(b) 50 seconds
(c) 48 seconds
(d) 42 seconds

Q45. The length of a rectangular board is 5 times that of its breadth. If the area of the board is 125 square meters, what is its length?



(a) 8 m
(b) 16 m
(c) 24 m
(d) 25 m

LOGICAL REASONING

Q46. In a class of 45 students, Farah’s rank from the bottom is 26^(th). Vashu sits 8 places above Farah. What is Vashu’s rank from the top?

(a) 11
(b) 13
(c) 12
(d) 14

Q47. Four words have been given, out of which three are alike in some manner and one is different. Select the word that is different.

(a) Microphone
(b) Webcam
(c) Keyboard
(d) Plotter

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Q48. Which two numbers should be interchanged to make the given equation correct?

108 ÷ 6 - 18 + 8 × 9 = 42

(a) 108 and 18
(b) 9 and 6
(c) 18 and 9
(d) 6 and 8

Q49. In a certain code language, 'MINT' is written as 'TNIM'. How will 'CORTEX' be written in that language?

(a) XERTOC
(b) XETROC
(c) XTEROC
(d) XETRCO

Q50. Find the next term in the following series.

5I, 7J, 11L, 17O, ?

(a) 25S
(b) 25Y
(c) 20P
(d) 18C

ANSWER KEY

1	b	2	d	3	d	4	b	5	d	6	d	7	d	8	a	9	b	10	c
11	a	12	a	13	d	14	b	15	a	16	a	17	a	18	b	19	c	20	d
21	c	22	c	23	b	24	d	25	a	26	b	27	a	28	d	29	a	30	b
31	d	32	b	33	a	34	c	35	a	36	a	37	c	38	b	39	d	40	a
41	b	42	d	43	a	44	a	45	d	46	c	47	d	48	b	49	b	50	a

SOLUTIONS

Q1. Answer: (b) Madhya Pradesh

The correct answer is Madhya Pradesh.

Key Points

• The most important teak forests are found in Madhya Pradesh, Maharashtra, Tamil Nadu, Karnataka, and Kerala besides Uttar Pradesh (small extent), Gujarat, Orissa, Rajasthan, Andhra Pradesh, and Manipur.

• Teak is a tropical hardwood tree species in the family Lamiaceae.

• It is a large, deciduous tree that occurs in mixed hardwood forests.

• It is a deciduous tree and it is found in tropical deciduous forests.

Additional Information

• Moist Evergreen Forests:

• Region: Found in southern India along the Western Ghats, Andaman and Nicobar Islands, and the northeastern region.

• Climatic Conditions: Found in warm and humid areas with annual precipitation of over 200 cm and mean annual temperature above 22°C.

• Trees: In these forests, trees reach great heights up to 60 m or above.

• Semi-Evergreen Forests:

• Region: Found in the less rainy parts of the regions where moist evergreen forests are found; the Western Ghats, Andaman and Nicobar Islands, and the Eastern Himalayas.

• Trees: Such forests have a mixture of moist evergreen and moist deciduous trees.

• Dry evergreen:

• Region: Found in the Shivalik Hills and foothills of the Himalayas up to a height of 1000 meters in the north.

• Found along Andhra Pradesh and Karnataka coast in the south.

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• Climatic Conditions: Usually have a prolonged hot and dry season and a cold winter.

Q2. Answer: (d) Rajasthan

The correct answer is Rajasthan.

Key Points

• Rajasthan is the largest state in India in terms of area, covering approximately 342,239 square kilometers.

• It accounts for about 10.4% of the total geographical area of India.

• Rajasthan is located in the northwestern part of the country and shares its borders with Pakistan to the west and states like Gujarat, Madhya Pradesh, Uttar Pradesh, Haryana, and Punjab.

• The state is home to the Thar Desert, also known as the Great Indian Desert, which occupies a significant portion of its area.

Additional Information

• Madhya Pradesh: Madhya Pradesh is often referred to as the "Heart of India" because of its central location. It is the second-largest state in terms of area, covering approximately 308,252 square kilometers. The state is known for its rich cultural heritage, wildlife sanctuaries, and historical sites such as Khajuraho and Sanchi.

• Uttar Pradesh: Uttar Pradesh is the most populous state in India but ranks fourth in terms of area. It covers approximately 243,286 square kilometers. This state is renowned for its historical and religious significance, with cities like Varanasi, Agra, and Prayagraj (Allahabad) playing pivotal roles in Indian history.

• Maharashtra: Maharashtra is the third-largest state in India in terms of area, covering about 307,713 square kilometers. It is also one of the most industrialized states in the country, with Mumbai as its capital, which is the financial hub of India.

• Thar Desert: The Thar Desert, located in Rajasthan, is the 17th largest desert in the world and the 9th largest subtropical desert. It significantly contributes to Rajasthan's vast geographical area and unique climate.

Q3. Answer: (d) 358

The correct answer is Article 358.

Key Points

• Article 358 of the Indian Constitution provides for the automatic suspension of Fundamental Rights under Article 19 during a National Emergency.

• It applies only when the emergency is proclaimed due to war or external aggression (not in cases of internal disturbance).

• During such emergencies, legislative and executive actions violating Article 19 cannot be challenged in a court of law.

• Article 358 ceases to operate once the Emergency ends, and Article 19 is automatically restored.

• Only rights under Article 19 are affected; other Fundamental Rights remain enforceable unless specifically suspended under Article 359.

Additional Information

• Article 359:

• Allows the President to suspend the right to move courts for enforcement of Fundamental Rights (except Articles 20 and 21) during a National Emergency.

• Unlike Article 358, Article 359 requires a specific presidential order for suspension.

• Article 352:

• Deals with the proclamation of National Emergency in case of war, external aggression, or armed rebellion.

• It forms the constitutional basis for invoking Articles 358 and 359 during emergencies.

• Fundamental Rights:

• These are enshrined in Part III of the Constitution, guaranteeing essential rights to Indian citizens.

• Key rights include the Right to Equality, Right to Freedom, Right to Constitutional Remedies, etc.

• Historical Context:

• The suspension of Fundamental Rights under Articles 358 and 359 was notably applied during the Emergency of 1975-77.

• The Emergency was declared under Article 352 due to "internal disturbance," later amended to "armed rebellion" by the 44th Constitutional Amendment Act, 1978.

Q4. Answer: (b) Brahmaputra

The correct answer is Brahmaputra.

Key Points

• The Himalayan Mountain range is one of the youngest mountain ranges in the world, extending in a west-east direction from the Indus River in the west to the Brahmaputra River in the east.

• The Brahmaputra River originates in the Angsi Glacier in Tibet (China) and enters India through Arunachal Pradesh, flowing across Assam and Bangladesh before emptying into the Bay of Bengal.

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• The Himalayas act as a natural barrier and determine the flow direction of rivers like the Indus, Ganga, Yamuna, and Brahmaputra, influencing the major river systems in India.

• The Brahmaputra basin supports diverse ecosystems and is crucial for agriculture, transportation, and water resources in northeastern India and Bangladesh.

• Both the Indus River and the Brahmaputra River are considered geographic boundaries marking the extent of the Himalayan range, making the Brahmaputra the eastern boundary. Hence, the statement is correct.

Additional Information

• Himalayan Mountains:

• The Himalayas are divided into three parallel ranges: Greater Himalayas (Himadri), Lesser Himalayas (Himachal), and Shivaliks.

• They are known for their geographic, climatic, and ecological significance, influencing monsoon patterns and river systems in South Asia.

• The Himalayas cover approximately 2,400 km across five countries: India, Nepal, Bhutan, China, and Pakistan.

• Brahmaputra River:

• The Brahmaputra is known as the Tsangpo in Tibet, Dihang in Arunachal Pradesh, and eventually Brahmaputra in Assam.

• It flows for about 2,900 km, making it one of the longest rivers globally and a vital water source for millions.

• The Brahmaputra is prone to seasonal flooding due to heavy monsoons, impacting agriculture and settlements in Assam and Bangladesh.

• Other Major Rivers Associated with the Himalayas:

• Indus River: Originates in Tibet, flows through India and Pakistan, and forms the western boundary of the Himalayas.

• Ganga River: Originates from the Gangotri Glacier, flows through northern India, and is one of India's most sacred rivers.

• Yamuna River: A tributary of the Ganga, it originates from the Yamunotri Glacier and flows through northern India.

• Important Points:

• The Himalayas play a critical role in shaping the geography and hydrology of the Indian subcontinent.

• Rivers originating in the Himalayas are vital for irrigation, hydroelectric power, transportation, and drinking water.

• The unique climatic conditions created by the Himalayas significantly impact biodiversity and ecosystems in the region.

Q5. Answer: (d) 1.54%

The correct answer is 1.54%.

Key Points

• The state of Punjab occupies about 1.54% of India’s total geographical area. Despite this relatively small share of land area, Punjab plays a very significant role in India’s agriculture and food production.

• The total geographical area of Punjab is approximately 50,362 square kilometres. In comparison, the total geographical area of India is about 3.28 million square kilometres.

• Punjab is located in the northwestern part of India and shares international borders with Pakistan and domestic borders with Haryana, Himachal Pradesh, and Rajasthan.

• The state is part of the fertile Indo-Gangetic plain, which makes it one of the most productive agricultural regions in the country.

• Punjab is often called the “Granary of India” because of its high production of wheat and rice.

• The Green Revolution in the 1960s significantly increased agricultural productivity in the state.

• The state has a well-developed irrigation system supported by canals and tube wells.

• Although the state covers a small area of the country, its agricultural contribution to the national food supply is very large.

Additional Information

• 0.54%: This value is significantly smaller than the actual geographical share of Punjab in India. Such a percentage would correspond to a much smaller administrative region or union territory rather than a large agricultural state like Punjab.

• 2.54%: A share of 2.54% would indicate a much larger state in terms of geographical area. States such as Rajasthan, Madhya Pradesh, and Maharashtra occupy far larger portions of India’s land area compared with Punjab.

• 3.12%: This percentage is also considerably higher than Punjab’s actual land share. States with geographical coverage above 3% of India’s total area are typically among the largest states in the country.

Q6. Answer: (d) Amaravati

The correct answer is Amaravati.

In News

• Chief Minister N Chandrababu Naidu announced that Andhra Pradesh is set to launch India’s first quantum computer in Amaravati on April 14, 2026.

Key Points

• The launch of India's first quantum computer in Amaravati is the cornerstone of the state's ambitious Amaravati Quantum Valley project.

• The city will host a specialized ecosystem featuring eight distinct towers dedicated to advanced research centers, innovation labs, and startup incubators.

• Strategic plans for the city include achieving self-reliance by indigenously producing quantum computing components within a span of two years.

• Amaravati Quantum Hub Goals

• Target - Position Andhra Pradesh among the top five global quantum hubs by 2030.

• Key Partners - IBM, Tata Consultancy Services, and Larsen & Toubro.

• Hardware Focus - End-to-end capabilities in cryogenics, photonics, and quantum devices.

Additional Information

• Quantum Computer

• Definition - A rapidly emerging technology that utilizes the laws of quantum mechanics to process information and solve complex problems much faster than classical computers.

• Amaravati Quantum Valley (AQV)

• Concept - A planned, specialized technological zone designed to foster a comprehensive hardware and software ecosystem for next-generation quantum innovation.

• Cryogenics and Photonics

• Explanation - Cryogenics is the production and behavior of materials at extremely low temperatures (essential for quantum processors), while photonics involves the generation and manipulation of light particles (photons) used in quantum communication.

• Medha Towers

• Context - An IT park located in Vijayawada where seven quantum technology companies have already begun operations to support the broader ecosystem of the state.

Q7. Answer: (d) 24 December

The correct answer is 24th December.

Key Points

• Every Year 24th December is observed as National Consumer Day with a specific theme in India.

• On this day, the Consumer Protection Act, 1986 had received the assent of the president.

• The enactment of this Act is considered a historic milestone in the consumer movement in the country.

Additional InformationImportant days:

Date	Days
15th January	National Army Day.
28th February	National Science Day.
8th March	International Women's Day.
22nd April	Earth Day.
1st May	Labour Day.
24th April	Panchayati Raj Day.
5th June	World Environment Day.
11th July	World Population Day.
29th August	National Sports Day.
15th September	International Day of Democracy.
10th October	World Mental Health day
16th November	International Day for Tolerance.

Q8. Answer: (a) Indian Air Force to test its capabilities

The correct answer is Option 1.

In News

• News: IAF's 10-Day Mega Exercise 'Gagan Shakti' Set To Begin.

Key PointsExercise Gagan Shakti:

• The Indian Air Force (IAF) is set to commence a 10-day exercise to test its capabilities and preparedness for high-intensity operations. Hence, Option 1 is correct.

• During the exercise, known as 'Gagan Shakti-2024,' the IAF will mobilize all its bases and assets across the country.

• The exercise is being conducted at various locations across the country, including the Pokhran Field Firing Range in Jaisalmer.

• It was last held in 2018, during which the IAF completed over 11,000 sorties during the two-phase air manoeuvres.

• Gagan Shakti is the biggest IAF war exercise after Vayu Shakti.

Q9. Answer: (b) Raja Rammohun Roy

The Correct answer is Raja Rammohun Roy.

Key Points

• Raja Rammohun Roy is considered the founder of the Brahmo Samaj, a social and religious reform movement in India.

• He founded the Brahmo Sabha in 1828, which later became the Brahmo Samaj.

• Raja Rammohun Roy is often referred to as the "Father of the Indian Renaissance" due to his efforts to modernize and reform Indian society.

• He worked to abolish the practice of Sati, where widows were forced to immolate themselves on their husband's funeral pyre.

• He advocated for women's rights, including education and property inheritance, and worked towards eradicating social evils like caste discrimination and child marriage.

• The Brahmo Samaj emphasized monotheism and rejected idol worship, advocating for a rational and ethical approach to religion.

• Rammohun Roy was influenced by both Western thought and ancient Indian scriptures, seeking to harmonize the two.

• He played a key role in the introduction of modern education in India and supported the establishment of institutions like the Hindu College in Calcutta (now Presidency University).

Additional Information

• Ishwarchandra Vidyasagar

• Ishwarchandra Vidyasagar was a prominent social reformer and educationist from Bengal.

• He is well-known for his efforts to promote women's education and his campaign for the legalization of widow remarriage, which led to the enactment of the Widow Remarriage Act of 1856.

• His contribution to simplifying and modernizing the Bengali script and prose was remarkable.

• Swami Dayanand Saraswati

• Swami Dayanand Saraswati was the founder of the Arya Samaj, a Hindu reform movement established in 1875.

• He advocated for a return to the teachings of the Vedas and opposed idol worship, caste discrimination, and ritualistic practices.

• He coined the phrase "Swaraj" (self-rule), which later became a rallying cry for India's independence movement.

• Swami Vivekananda

• Swami Vivekananda was a key figure in the introduction of Indian philosophy and spirituality to the Western world.

• He was a disciple of Ramakrishna Paramhansa and founded the Ramakrishna Mission in 1897.

• His famous speech at the World Parliament of Religions in Chicago in 1893 earned him global recognition.

• He emphasized the importance of universal brotherhood, education, and the upliftment of the poor.

Q10. Answer: (c) Provisions in case of failure of constitutional machinery in State

The correct answer is option 3, i.e. Provisions in case of failure of constitutional machinery in State.

Function	Article
Separation of judiciary from executive	50
Right of minorities to establish and administer educational institutions	30
Provisions in case of failure of constitutional machinery in State	356
Remedies for enforcement of fundamental rights	32

Q11. Answer: (a) 61^(st)

The correct answer is 61st.

Key Points

• The 61st Amendment of the Indian Constitution decreased the voting age for the State Legislative Assemblies and the Lok Sabha elections from 21 to 18 years.
• This involved amendment of Article 326 of the Indian Constitution.
• The bill was approved on 28 March 1989.

Confusion Points

• The bill was passed by the Lok Sabha on 15th December 1988.
• The bill was passed by the Rajya Sabha on 20th December 1988.
• The bill was assented by President Venkaraman on 28th March 1989.
• The bill came into force on 28th March 1989.
• The Prime Minister who reduced the voting age from 21 to 18 years - Rajiv Gandhi.
• The first general elections to the Lok Sabha were held in India - Between 25th October 1951 and 21st February 1952.

Additional Information

• 42nd Amendment:
• Added Socialist, Secular& integrity in Preamble.
• Added Fundamental duties(Part IV A).
• Creation of All India Judicial Service.
• Extended the time limit of President rule from 6 months to 1 year.
• Added 3 new directive principles.
• Raised tenure of Lok Sabha &State legislature assemblies from 5 to 6 years;
• Proclamation of national emergency.
• Made obligatory for President to act on the advice of the Council of ministers.
• 44thAmendment:
• Amendment to negate judicial pronouncements on scope and applicability on Sales Tax.
• Amend articles 269, 286, and 366. Amend the seventh schedule.

Q12. Answer: (a) New Delhi

The correct answer is New Delhi.

Key Points

• The G20 Summit 2023 is taking place at the International Exhibition-cum-Convention Centre (IECC) complex also known as Bharat Mandapam in Pragati Maidan, New Delhi.
• The complex was inaugurated on July 26.
• Bharat Mandapam was constructed with an investment of approximately Rs 2,700 crores. Bharat Mandapam serves as a platform to showcase and promote India as a premier global business destination, as stated by the government.
• It is specifically designed to host grand international exhibitions, trade fairs, conventions, conferences, and various prestigious gatherings. Bharat Mandapam offers an array of amenities, including numerous meeting rooms, lounges, auditoriums, an amphitheatre, and a fully-equipped business centre, making it capable of accommodating a wide spectrum of events.
• ‘Bharat Mandapam’, the venue for world leaders, spans an impressive 123 acres, establishing itself as a prominent destination for global events.
• Its name ‘Bharat Mandapam’ seeks inspiration from Lord Basaveshwara’s concept of Anubhav Mandapam.
• The sprawling 123-acre expanse not only offers ample space for large-scale events but also exemplifies India's commitment to hosting global leaders and facilitating meaningful interactions.

Q13. Answer: (d) Khadakwasla

The correct answer is Khadakwasla.

Key Points

• The National Defence Academy (NDA) is located at Khadakwasla near Pune, Maharashtra.
• National Defence Academy is the Joint Services academy of the Indian Armed Forces, where cadets of the three services, the Army, the Navy, and the Air Force train together before they go on to pre-commissioning training in their respective service academies.

Additional Information

Training institutions	Locations
Indian Military Academy	Dehradun
Officer’s Training Academy	Chennai

Armed Forces Medical College	Pune
Defence Services Staff College	Wellington (Tamil Nadu)
National Defence Academy	Khadakwasla, Maharashtra
Indian Naval Academy	Ezhimala, Kerala
Air Force Academy	Dundigal, Telangana

Q14. Answer: (b) Gujarat; Kerala

The correct answer is Gujarat; Kerala.

Key Points

• The western coastal plains of India extend from the state of Gujarat in the north to Kerala in the south.

• This region is divided into three main sections: the Konkan Coast (Maharashtra and Goa), the Kanara Coast (Karnataka), and the Malabar Coast (Kerala).

• The plains are narrow and discontinuous, with a width ranging between 50 to 100 kilometers.

• The western coastal plains are known for their fertile soil, supporting agriculture and the growth of cash crops like coconut, spices, and rice.

• They are bordered by the Western Ghats to the east and the Arabian Sea to the west.

Additional Information

• Western Coastal Plains

• These plains are part of India’s Peninsular Plateau region, characterized by a tropical monsoon climate.

• They house several important ports like Mumbai, Goa, and Kochi, making them vital for trade and commerce.

• The region includes estuaries and lagoons, such as the famous Vembanad Lake in Kerala.

• Major rivers flowing through the region include the Narmada, Tapi, Mandovi, Zuari, and Periyar.

• Eastern Coastal Plains

• In contrast, the eastern coastal plains extend from West Bengal to Tamil Nadu.

• They are broader and more continuous than the western coastal plains.

• The region is home to large river deltas formed by the Ganga, Mahanadi, Godavari, Krishna, and Kaveri.

• Western Ghats

• The Western Ghats, also known as the Sahyadri Hills, are a UNESCO World Heritage Site.

• They play a significant role in influencing the region's monsoon climate and biodiversity.

• Arabian Sea

• The Arabian Sea is part of the northern Indian Ocean, bounded by the western coastal plains of India.

• It serves as a crucial waterway for international trade and maritime activities.

Q15. Answer: (a) Siachen Glacier

The correct answer is Siachin Glacier.

• Operation Meghdoot is the codename for the Indian Armed Forces' operation to seize control of the Siachen Glacier in Kashmir, precipitating the Siachen conflict.

Key Points

• Operation Meghdoot was in support of the Indian Army and paramilitary forces in Northern Ladakh.

• It helps to secure control of the heights predominating the Siachin glacier.

• It also referred to as the world's third pole and potentially a dangerous flashpoint on the disputed Northern borders.

Additional Information

• Its genesis lies in the partition of India and the ensuing wars between India and Pakistan over Kashmir.

• At the end of the UN-brokered ceasefire in 1949, India and Pakistan agreed on a ceasefire line (CFL) in undivided Kashmir as per the Karachi Agreement of 1949.

• The easternmost stretch of the ceasefire line was not demarcated beyond a point called NJ9842 since it was inhospitable and uninhabited.

• It simply said that from NJ9842, the line would run “thence north to the glaciers” - the Siachen glacier, the Rimo, and the Baltoro.

• The operation was entrusted to one of the Kumaon Battalions, supported by Ladakh Scouts. The initial assault was led by Maj (later Col) RS Sandhu, VrC.

• This military operation was unique because it was the first assault launched on the world’s highest battlefield.

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• During the operation, Indian troops landed on Bilafond La on Saltoro ridge, west of Siachen glacier, on Friday, April 13, 1984. It was a Baishakhi day.

• The operation resulted in Indian troops gaining control of the entire Siachen glacier, giving India a strategic advantage and also maintaining the status quo.

• Siachen not only gives India the opportunity to test the mettle of its own troops but also useful for R&D in various military disciplines.

• With occupying Siachen, India prides on sustaining its dominance on the world's highest battlefield, however, has paid a heavy price for it in the form of human costs.

Q16. Answer: (a) D2O

Explanation:

The chemical composition of heavy water is D2O which contains a larger than normal amount of deuterium. It is a colorless liquid.

Common Name	Chemical Formula	Other Name	Boiling Point	Freezing Point
Heavy Water	D2O	Deuterium oxide	101.4°C	3.82°C
Semi-heavy Water	HDO	Deuterium hydrogen monoxide	100.7°C	2.04°C
Light Water	H2O	Dihydrogen oxide	100°C	0.0°C
Hydrogen peroxide	H2O2	Dihydrogen dioxide	150.2°C	-0.43°C

Q17. Answer: (a) Right atrium → Right ventricle → Left atrium → Left ventricle

The correct answer is Right atrium → Right ventricle → Left atrium → Left ventricle.

Key Points

• The sequence of blood flow through the heart chambers is: Right atrium → Right ventricle → Left atrium → Left ventricle.

• Deoxygenated blood from the body enters the right atrium via the superior and inferior vena cava.

• The blood then flows into the right ventricle, which pumps it to the lungs through the pulmonary artery for oxygenation.

• Oxygenated blood from the lungs returns to the left atrium via the pulmonary veins.

• Finally, the blood enters the left ventricle, which pumps it to the rest of the body through the aorta.

Additional Information

• Heart and Circulatory System

• The human heart is a four-chambered organ consisting of two atria and two ventricles.

• The right side of the heart pumps deoxygenated blood to the lungs for oxygenation (pulmonary circulation).

• The left side of the heart pumps oxygenated blood to the rest of the body (systemic circulation).

• Valves within the heart, such as the tricuspid, pulmonary, mitral, and aortic valves, ensure unidirectional blood flow and prevent backflow.

Q18. Answer: (b) size

Explanation:

Sieving

• It is used to separate mixtures containing predominantly different-sized components.

• The mixture is filtered via the sieve's pores.

• All of the tiny compounds pass through easily, while the mixture's larger components are kept.

So the most appropriate answer is size.

Q19. Answer: (c) EEG

The correct answer is EEG.

Key Points

• EEG stands for Electroencephalogram.

• An EEG is used to detect problems in the electrical activity of the brain that may be associated with certain brain disorders.

• The measurements given by an EEG are used to confirm various conditions including head injury, epilepsy, brain tumor, memory problems, stroke, sleep disorders.

• Brain cells communicate with each other through electrical impulses.

• An EEG tracks and records brain wave patterns.

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• Small flat metal discs called electrodes are attached to the scalp with wires.
• The electrodes analyze the electrical impulses in the brain and send signals to a computer that records the results.
• The electrical impulses in an EEG recording look like wavy lines with peaks and valleys.
• These lines allow doctors to quickly assess whether there are abnormal patterns.
• Any irregularities may be a sign of seizures or other brain disorders.

Additional Information

Codes	Descriptions
ECG	• ECG stands for Electrocardiogram. - ECG senses the electrical forces produced by the Heart. - ECG was invented by Williem Einthoven. - It records the heart's rhythm and activity on a moving strip or a line on the screen.
CTC	• The CellSearch Circulating Tumor Cell (CTC) test is a simple blood test that helps oncologists in assessing the prognosis of patients with metastatic breast, colorectal, or prostate cancer.
MET	• MET stands for metabolic equivalent. - One metabolic equivalent (MET) is defined as the amount of oxygen consumed while sitting at rest and is equal to 3.5 ml O2 per kg body weight x min.

Q20. Answer: (d) Kilowatt-hour (kWh)

Explanation:

Electrical Energy Measurement

Definition: Electrical energy is the energy derived from the movement of electrons through an electrical conductor. It is widely used to power various devices, machines, and systems and is measured in specific units depending on the context of its application. The standard unit for measuring electrical energy is the kilowatt-hour (kWh).

Correct Option Analysis:

The correct option is:

Option 4: Kilowatt-hour (kWh)

The kilowatt-hour (kWh) is the standard unit for measuring electrical energy. It is defined as the amount of energy consumed by a device with a power rating of 1 kilowatt (kW) running for 1 hour. This unit is commonly used in electricity billing and energy consumption calculations, as it provides a practical way to quantify the energy used over time.

Calculation:

To understand how electrical energy is measured in kilowatt-hours, consider the formula:

Energy (kWh) = Power (kW) × Time (hours)

For instance, if an electrical appliance with a power rating of 2 kW operates for 3 hours, the energy consumed can be calculated as:

Energy = 2 kW × 3 hours = 6 kWh

Thus, the appliance consumes 6 kilowatt-hours of energy during this period.

Applications:

• Electric utility companies use kilowatt-hours to calculate electricity bills for residential and commercial customers.
• Energy consumption in industrial applications is often measured in kilowatt-hours for monitoring efficiency and cost-effectiveness.
• Renewable energy systems, such as solar panels and wind turbines, also use kilowatt-hours to quantify the energy generated.

Advantages:

• Provides a standardized and practical method for measuring energy consumption over time.
• Widely accepted and used in energy billing and management systems worldwide.
• Enables consumers to track and manage their energy usage effectively.

Important Information:

To further understand the analysis, let’s evaluate the other options:

Option 1: Joule

The joule (J) is the SI unit of energy and work. While joules can be used to measure electrical energy, it is not practical for everyday applications, as electrical energy consumption is typically in the range of thousands or millions of joules. For example, 1 kilowatt-hour equals 3.6 × 10^6 joules, making kilowatt-hours a more convenient unit for measuring and billing purposes.

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Option 2: Ampere-hour (Ah)

Ampere-hour (Ah) is a unit used to measure the charge capacity of a battery. It represents the amount of electric charge transferred by a current of one ampere over an hour. Although it is related to electrical energy, it is not a direct measure of energy consumption. To calculate energy in watt-hours (Wh) or kilowatt-hours (kWh) using ampere-hours, the voltage of the system must also be considered. For example:

Energy (Wh) = Charge (Ah) × Voltage (V)

Thus, ampere-hour is not used for measuring electrical energy directly in power systems.

Option 3: Watt

The watt (W) is the SI unit of power, which represents the rate of energy consumption or generation. While power is a crucial factor in electrical systems, it is not a measure of energy itself. Energy is determined by multiplying power by time, as shown in the formula:

Energy (kWh) = Power (kW) × Time (hours)

Therefore, watts are used to measure power, not energy.

Option 5: Other Unit

This option is incorrect because the question specifically asks for the unit of electrical energy measurement, which is kilowatt-hour (kWh). Other units, such as joules or ampere-hours, may be indirectly related to energy but are not standard for practical applications like electricity billing.

Conclusion:

In summary, kilowatt-hour (kWh) is the correct unit for measuring electrical energy, as it provides a practical and standardized method for quantifying energy consumption over time. While other units like joules, ampere-hours, and watts are related to energy and power, they are not used for direct measurement of electrical energy in everyday applications. Understanding the distinction between these units is essential for accurately analyzing and managing energy usage in various contexts.

Q21. Answer: (c) Polygraph

The correct answer is Polygraph.

Key Points

• A Lie detector test is also known as polygraph test.

• A polygraph instrument is a piece of equipment that records physiological phenomena—typically respiration, heart rate, blood pressure, and electrodermal response.

• Examiners review the changes in a person's physiological response to questions in order to make a determination as to whether or not an individual is telling the truth.

• Polygraph tests are used for three main reasons: investigations that are event specific (such as in a crime investigation), employee screenings, or pre-employment screenings.

Additional Information

• Electrocardiography

• Electrocardiography is the process of producing an electrocardiogram.

• An electrocardiogram (ECG) is a medical test that detects cardiac (heart) abnormalities by measuring the electrical activity generated by the heart as it contracts.

• The machine that records the patient's ECG is called an electrocardiograph.

• Seismograph

• A seismograph, or seismometer, is a device used primarily to measure and record the intensity, direction, and duration of the Earth's seismic activity, such as earthquakes, volcanic eruptions, or even man-made explosions. Seismographs are key to the study of earthquakes and are used to detect and predict earthquakes and other earth tremors.

Q22. Answer: (c) Curcuma longa

Curcuma longa is the botanical name of Turmeric.

Common Name	Botanical Name	Order	Kingdom
Turmeric	Curcuma longa	Zingiberales	Plantae
Cucumber	Cucumis sativas	Cucurbitales	Plantae
Orange	Citrus aurantium	Sapindales	Plantae
Mango	Mangifera indica	Sapindales	Plantae

Q23. Answer: (b) Gravitational force

The correct answer is Gravitational force.

Key Points

• Gravitational force is a fundamental force of attraction that acts between any two objects with mass. In the context of the Earth, it is the force that pulls all objects toward its center, which we perceive as things falling "down." Hence, this option is correct.

• This force is responsible for keeping the Moon in its orbit around the Earth and the Earth in its orbit around the Sun. Without it, objects would float away into space.

• The concept was famously formulated by Sir Isaac Newton in 1687 through his Universal Law of Gravitation. He proposed that the force is directly proportional to the product of the masses and inversely proportional to the square of the distance between them.

• On the surface of the Earth, the acceleration caused by this force is approximately 9.8 m/s^2, commonly denoted by the symbol g.

• Magnetic force is the attraction or repulsion that arises between electrically charged particles because of their motion or between magnetic poles. It is not the force that universally attracts all objects to the Earth. Hence, this option is incorrect.

• Electrostatic force is the force of attraction or repulsion between stationary electrical charges (positive or negative). While powerful at small scales, it does not govern the falling of macroscopic neutral objects to the ground. Hence, this option is incorrect.

• Pressure is defined as the force applied perpendicular to the surface of an object per unit area over which that force is distributed. It is a physical quantity, not a fundamental attractive force. Hence, this option is incorrect.

Additional Information

• Universal Law of Gravitation: The mathematical formula is $F = G(m1m2/r^2)$, where F is the force, m1 and m2 are the masses, r is the distance, and G is the Gravitational Constant.

• Gravitational Constant (G): The value of G was first measured by Henry Cavendish in 1798. It is approximately 6.674×10^{-11} $N \cdot m^2/kg^2$.

• Weight vs. Mass: Mass is a measure of the amount of matter in an object and is constant everywhere. Weight is the measure of the gravitational force acting on that mass and changes depending on the location (e.g., you weigh less on the Moon than on Earth).

• Types of Forces: Gravity is one of the four fundamental forces of nature, alongside the Electromagnetic force, the Strong Nuclear force, and the Weak Nuclear force.

• Atmospheric Retention: Earth's gravity is strong enough to hold onto its atmosphere, which provides the oxygen and pressure necessary for life. Smaller bodies like the Moon have weaker gravity and cannot sustain a thick atmosphere.

Important Points

• Tides: The gravitational pull of the Moon (and to a lesser extent the Sun) on the Earth's oceans causes the rise and fall of tides twice a day.

• Center of Gravity: Every object has a center of gravity, which is the point where the entire weight of the body may be considered to act. For a uniform sphere like the Earth, it is at the geometric center.

• Black Holes: These are regions in space where gravity is so strong that nothing, not even light, can escape. This happens when a massive amount of matter is compressed into an extremely small volume.

• Units: The S.I. unit of force (including gravitational force) is the Newton (N), named after the scientist who defined it. The unit for Pressure is the Pascal (Pa).

Q24. Answer: (d) Attract each other

The correct answer is Attract each other.

Key Points

• Magnets have two poles: north pole and south pole.

• Opposite poles attract each other, while like poles repel each other. For example, the north pole of one magnet will attract the south pole of another magnet.

• This attraction occurs due to the magnetic field lines, which originate from the north pole and curve towards the south pole, creating a force of attraction between opposite poles.

• When a south pole of a magnet is brought near the north pole of another magnet, they experience a strong magnetic force of attraction.

• Such interactions form the basis of many applications of magnets, including motors, generators, and magnetic locks.

Additional Information

• Break

• When magnets interact, they do not break due to the magnetic forces involved. However, excessive physical force or improper handling can cause a magnet to physically break.

• Breaking a magnet results in two smaller magnets, each with its own north and south poles.

• Do not interact

• Magnets always interact when in proximity, as their magnetic fields influence one another.
• The strength of the interaction depends on the distance between the magnets and their magnetic field strength.
• Repels each other
• Repulsion occurs when like poles (north-north or south-south) of two magnets are brought close to each other.
• This happens because magnetic field lines from similar poles repel and cannot merge.

Q25. Answer: (a) TSH

The correct answer is TSH.

Key Points

• Hormones are chemicals that are formed and produced by specific glands in the human body for controlling and regulating the activity of different cells and organs. These glands are known as endocrine glands.
• Examples of endocrine glands are thyroid glands, parathyroid glands, pituitary glands and adrenal glands.
• The thyroid gland is present in the neck while the pituitary gland is located in a bony cavity called Sella tursica and is attached to the hypothalamus by a stalk.
• The pars distalis region of the pituitary, commonly called the anterior pituitary, produces several hormones like growth hormone (GH), prolactin (PRL), thyroid-stimulating hormone (TSH), adrenocorticotrophic hormone (ACTH), luteinizing hormone (LH), and follicle-stimulating hormone (FSH)
• TSH regulates the production of thyroid hormones, secreted by the thyroid gland which ultimately affects the metabolism of the body.
• High levels of TSH is known as hypothyroidism in which the thyroid gland enlarges leading to goitre.
• Low levels of TSH is known as Hyperthyroidism in which a person lose weight, experience anxiety and feel very hot.

Q26. Answer: (b) 2.8

• The pH value of wine is 2.8. Wine is acidic in nature.
• The pH level of wine affects the texture, flavour, smell and colour of the wine.
• The Ph level is measured by the acidity of the wine.
• The lower pH indicates more acidic wine and the higher pH indicates the less acidic wine.

Q27. Answer: (a) HgS

• Chemical formula of sindoor or vermilion is HgS.
• Sindoor is a red lead which is made from cinnabar.
• It also contains mercury.

Other important Chemical formula:

Sodium Chloride	**NaCl**
Glucose	C6H12O6
Ethanol	C2H6O
Butane	C4H10
Vinegar	C2H4O2

Q28. Answer: (d) Distance travelled/ Time taken

The Correct answer is Distance travelled/ Time taken.

Key Points

• Speed is defined as the rate at which an object covers a certain distance.
• It is expressed as the ratio of Distance travelled to the Time taken to travel that distance.
• The formula for speed is: Speed = Distance travelled / Time taken.
• Speed is a scalar quantity as it has only magnitude and no direction.
• The standard unit for measuring speed in the International System of Units (SI) is meters per second (m/s). Other common units include kilometers per hour (km/h) and miles per hour (mph).
• In everyday life, speed is used to measure the performance of vehicles, athletes, and even machines.
• Understanding speed is essential for applications such as transportation planning, navigation, and physics calculations.
• Examples include calculating the speed of a car traveling a specific distance in a given time or determining the speed of a runner in a race.

Additional Information

• Option: Time + Distance travelled

• This option is incorrect because adding time and distance does not yield speed.

• Time and distance are measured in different units and cannot be directly summed to calculate speed.

• Option: Distance travelled × Time

• This option is incorrect because multiplying distance and time gives a new quantity but does not define speed.

• Speed requires division, not multiplication, of distance and time.

• Option: Time taken / Distance travelled

• This option is incorrect because dividing time by distance calculates the reciprocal of speed, which is not the correct formula.

Q29. Answer: (a) a and b

Rust or iron oxide occurs when iron or an alloy that contains iron oxidizes or chemically reacts with oxygen

. It makes the metal brittle and crumbly.

Technically, rust comes from a chemical reaction between oxygen in the air, water, and iron.

Its chemical formula is Fe2O3.

Q30. Answer: (b) MRI

The correct answer is MRI.

Key Points

• MRI stands for magnetic resonance imaging.

• MRI based on Magnetism technique.

• It is a common scan procedure around the world.

• MRI scanning is non-invasive and painless.

• By using a strong magnetic field and radio waves detailed images of the organs and tissues within the body are created.

• The magnetic field inside the body forms the basis for obtaining images of different body parts.

• An MRI scan uses a large magnet, radio waves, and a computer to create a detailed, cross-sectional image of internal organs and structures.

• It differs from CT scans and X-rays, as it does not use potentially harmful ionizing radiation.

• Uses: For scanning tumors, cysts, and other anomalies in various parts of the body.

Additional InformationCRI (color rendering index)

• The most useful measure of a light source's color characteristics is the color rendering index (CRI).

• CRI is a measure of a light source's ability to show object colors "realistically" or "naturally" compared to a familiar reference source, either incandescent light or daylight.

• The color rendering index (CRI) is measured as a number between 0 and 100.

Q31. Answer: (d) Rs. 15

Shortcut Trick

Summing equations: 5 pens + 5 pencils = 75 => 1 pen + 1 pencil = 15

Subtracting equations: 1 pen − 1 pencil = 5

Solving for pencil: (15 − 5) ÷ 2 = 5

Cost of 3 pencils = 3 × 5 = 15

Therefore The correct answer is Rs. 15.

Alternate Method

Given:

Cost of 2 pens and 3 pencils = Rs. 35

Cost of 3 pens and 2 pencils = Rs. 40

Method: Linear Equation Elimination

Let the cost of one pen be x and one pencil be y.

=> 2x + 3y = 35 --- (Equation 1)

=> 3x + 2y = 40 --- (Equation 2)

Multiply Equation 1 by 3 and Equation 2 by 2 to eliminate x:

=> 6x + 9y = 105 --- (Equation 3)

=> 6x + 4y = 80 --- (Equation 4)

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Subtract Equation 4 from Equation 3:

=> (6x − 6x) + (9y − 4y) = 105 − 80

=> 5y = 25

=> y = 25 ÷ 5 = 5

=> Cost of 3 pencils = 3y = 3 × 5 = 15

Therefore The correct answer is Rs. 15.

Additional Information

Elimination Method

A process of solving simultaneous equations by adding or subtracting them to remove one variable, usually after multiplying by a constant.

Substitution Method

Solving one equation for one variable (e.g., x = 15 − y) and substituting it into the other equation to find the value of the second variable.

Consistent Systems

A system of linear equations that has at least one solution (intersecting lines) is called a consistent system.

Q32. Answer: (b) 40 cm²

Shortcut Trick

Area of a rhombus = (1/2) × d1 × d2

Area = (1/2) × 10 × 8

Area = 5 × 8 = 40 cm²

Therefore The correct answer is 40 cm².

Alternate Method

Given:

Length of first diagonal (d1) = 10 cm

Length of second diagonal (d2) = 8 cm

Formula Used:

Area of Rhombus = (Product of diagonals) / 2

Calculations:

=> Area = (d1 × d2) / 2

=> Area = (10 × 8) / 2

=> Area = 80 / 2

=> Area = 40 cm²

Therefore The correct answer is 40 cm².

Additional Information

Perimeter of a Rhombus

The perimeter is calculated as 4 × side. All four sides of a rhombus are equal in length.

Side and Diagonal Relationship

The side of a rhombus can be found using the formula: side = (1/2) × √(d1² + d2²).

Diagonal Properties

The diagonals of a rhombus bisect each other at right angles (90°).

Q33. Answer: (a) 42

Shortcut Trick

Total ratio parts = 9 (Boys) + 7 (Girls) = 16 units.

Given, 16 units = 96 students.

1 unit = 96 ÷ 16 = 6.

Number of girls = 7 units = 7 × 6 = 42.

Therefore The correct answer is 42.

Alternate Method

Given:

Ratio of Boys : Girls = 9 : 7

Total students in the class = 96

Formula Used:

Value of a part = (Ratio of that part ÷ Sum of ratios) × Total value

Calculations:

=> Let the number of boys be 9x and girls be 7x.

=> Total students = 9x + 7x = 16x

=> 16x = 96

=> x = 96 ÷ 16

=> x = 6

=> Number of girls = 7x = 7 × 6

=> Number of girls = 42

Therefore The correct answer is 42.

Additional Information

Ratio and Proportion

A ratio compares two quantities by division. If a : b is the ratio, then the quantities can be taken as ax and bx.

Duplicate Ratio

The duplicate ratio of a : b is $a^2 : b^2$. For example, the duplicate ratio of 9 : 7 is 81 : 49.

Compounded Ratio

The compounded ratio of (a : b) and (c : d) is (a × c) : (b × d).

Q34. Answer: (c) Rs. 7,200

Shortcut Trick

Cost Price (CP) is always 100%.

Since there is a loss of 10%, the Selling Price (SP) = 100% − 10% = 90% of CP.

SP = 90% of 8,000

SP = 0.9 × 8,000 = 7,200.

Therefore The correct answer is Rs. 7,200.

Alternate Method

Given: Cost Price (CP) = Rs. 8,000, Loss Percentage = 10%.

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

=> Loss Amount = 10% of 8,000

=> Loss Amount = (10 ÷ 100) × 8,000 = Rs. 800

=> SP = CP − Loss

=> SP = 8,000 − 800 = 7,200

Therefore The correct answer is Rs. 7,200.

Additional Information

Loss and Selling Price

When an item is sold for less than its cost price, it results in a loss. SP = CP − Loss.

Percentage Calculation

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

Q35. Answer: (a) 45:63:77

Shortcut Trick

To find the combined ratio A:B:C, multiply the terms in a cross-pattern:

A = 5 × 9 = 45

B = 7 × 9 = 63

C = 7 × 11 = 77

Therefore The correct answer is 45:63:77.

Alternate Method

Given: Ratios A:B = 5:7 and B:C = 9:11.

Formula Used: To merge two ratios with a common element, equate the values of the common element using their Least Common Multiple (LCM).

=> In ratio A:B, the value of B is 7. In ratio B:C, the value of B is 9.

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=> LCM of 7 and 9 is 63.
=> Multiply A:B by 9 to make B = 63: (5 × 9) : (7 × 9) = 45 : 63.
=> Multiply B:C by 7 to make B = 63: (9 × 7) : (11 × 7) = 63 : 77.
=> Now that B is common, combine the values: A:B:C = 45 : 63 : 77.
Therefore The correct answer is 45:63:77.
Additional Information
Compound Ratio
The compound ratio of a:b and c:d is (a × c) : (b × d). It represents the product of individual ratios.
Mean Proportional
The mean proportional between two numbers a and b is √(a × b). If a:x = x:b, then x is the mean proportional.
Duplicate and Sub-duplicate Ratio
The duplicate ratio of a:b is $a^2 : b^2$, and the sub-duplicate ratio is √a : √b.

Q36. Answer: (a) 7

Shortcut Trick
Apply BODMAS hierarchy: Divide → Multiply → Add → Subtract.
Mental Breakdown: (18 ÷ 6) = 3 and (3 × 4) = 12.
Evaluation: 16 + 3 − 12 = 7.
Therefore Answer = 7
Alternate Method
Given:
Expression: 16 + 18 ÷ 6 − 3 × 4
Formula used:
BODMAS Rule: B (Brackets), O (Of), D (Division), M (Multiplication), A (Addition), S (Subtraction).
16 + (18 ÷ 6) − (3 × 4) 3 12 Step-wise Priority Breakdown: Final: 16 + 3 − 12 = 7
Calculations:
Evaluate 16 + 18 ÷ 6 − 3 × 4
=> Step 1 (Division): 16 + 3 − 3 × 4
=> Step 2 (Multiplication): 16 + 3 − 12
=> Step 3 (Addition): 19 − 12
=> Step 4 (Subtraction): 7
Therefore The correct answer is 7 (Option 1).
Additional Information
BODMAS Rule
Standard order for mathematical operations: Brackets → Of (orders) → Division → Multiplication → Addition → Subtraction.
Vinculum (V-BODMAS)
If a bar (vinculum) is present over a set of numbers, that operation must be performed before brackets.
Same Priority Logic
Division and Multiplication share the same level of priority, as do Addition and Subtraction; solve them from left to right as they appear.

Q37. Answer: (c) 16

Shortcut Trick
To find the smaller number when the sum (S) and difference (D) are given:
Smaller number = (Sum − Difference) ÷ 2
=> (45 − 13) ÷ 2 = 32 ÷ 2 = 16
Therefore The correct answer is 16.
Alternate Method
Given:
Sum of numbers = 45
Difference of numbers = 13
Let the two numbers be x and y (where x > y).

=> x + y = 45 --- (Equation 1)

=> x − y = 13 --- (Equation 2)

Subtracting Equation 2 from Equation 1:

=> (x + y) − (x − y) = 45 − 13

=> 2y = 32

=> y = 32 ÷ 2

=> y = 16

Therefore The correct answer is 16.

Additional Information

Finding the Larger Number

The larger number can be found using the formula: (Sum + Difference) ÷ 2. In this case, (45 + 13) ÷ 2 = 29.

Verification of Results

Check the sum and difference of 29 and 16: 29 + 16 = 45 and 29 − 16 = 13. The values are correct.

Product of Numbers

The product of two numbers can be expressed as [(Sum)² − (Difference)²] ÷ 4.

Q38. Answer: (b) 23

Given:

x = 8

y = 3

Formula used:

Expression: 3x - 2y + 5

Calculation:

Expression = 3x - 2y + 5

=> 3(8) - 2(3) + 5

=> 24 - 6 + 5

=> 23

Therefore The correct answer is option 2 (23).

Q39. Answer: (d) 87

Shortcut Trick

According to the VBODMAS rule, we solve the Bracket first, followed by Division, and then Addition.

Inside Bracket: (14 ÷ 7 − 1) → (2 − 1) = 1.

Result: 86 + 1 = 87.

Therefore The correct answer is 87.

Alternate Method

Given:

Expression: 86 + (14 ÷ 7 − 1)

Formula Used:

Apply the BODMAS rule which stands for Brackets, Of, Division, Multiplication, Addition, and Subtraction.

Step-by-step Calculation:

=> 86 + (2 − 1)

=> 86 + 1

=> 87

Therefore The correct answer is 87.

Additional Information

BODMAS Rule Hierarchy

It defines the order of operations: Brackets (), {}, [] come first, followed by Orders (roots/powers), Division and Multiplication (left to right), and finally Addition and Subtraction.

Role of Brackets

Brackets are used to group terms. The operations inside the innermost brackets are always performed first regardless of the operators involved.

The 'Of' Operator

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The 'Of' operator mathematically represents multiplication but holds a higher precedence than Division in the sequence of calculation.

Q40. Answer: (a) 71

Shortcut Trick

Mode is the value that appears most frequently in a data set.

Count occurrences of the given numbers:

71 → 3 times | 86 → 2 times | 84 → 2 times | 82 → 2 times | 60 → 2 times

All other numbers appear only once.

Since 71 has the highest frequency (3), it is the mode.

Therefore The correct answer is 71.

Alternate Method

Given Data: 86, 84, 71, 82, 82, 63, 84, 71, 70, 86, 88, 65, 71, 81, 87, 60, 60, 74, 78, 62, 75, 66, 68, 85, 72

Formula Used: Mode = Value with the maximum frequency.

=> Total items in data set = 25

=> Frequency (60) = 2

=> Frequency (71) = 3

=> Frequency (82) = 2

=> Frequency (84) = 2

=> Frequency (86) = 2

=> Frequency (other items) = 1

=> Highest frequency = 3, which belongs to 71.

Therefore The correct answer is 71.

Additional Information

Empirical Formula

Relationship between Mean, Median, and Mode: Mode = 3 × Median − 2 × Mean.

Types of Mode

Data with one mode is Unimodal; with two modes is Bimodal; with more than two is Multimodal.

Median

The middle-most value when data is sorted. For N = 25, Median = (25+1)/2 = 13^(th) term.

Q41. Answer: (b) 1.25

Shortcut Trick

=> SI = (P × R × T) / 100

=> T = (SI × 100) ÷ (P × R)

=> T = (360 × 100) ÷ (7200 × 4)

=> T = 36000 ÷ 28800 = 1.25

Therefore Answer = 1.25 years

Alternate Method

Given:

=> Principal (P) = 7200

=> Simple Interest (SI) = 360

=> Rate (R) = 4%

Formula:

=> SI = (P × R × T) / 100

Calculations:

=> 360 = (7200 × 4 × T) / 100

=> 360 = (28800 × T) / 100

=> 360 = 288T

=> T = 360 ÷ 288 = 1.25

Therefore Final Answer: 1.25 years

Additional Information

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Simple Interest Formula: SI = (P × R × T) / 100
Time Formula: T = (SI × 100) ÷ (P × R)
Unit Rule: Rate is always per annum unless specified.
Shortcut Tip: Cancel zeros early to simplify calculation quickly.

Q42. Answer: (d) 126

Given:
The ratio of two numbers is 6 : 7 and their HCF is 3.
Concept used:
LCM is the smallest common multiple of two or more numbers.
Calculation:
First number = 6 × 3 = 18
Second number = 7 × 3 = 21
LCM (18, 21) = 3 × 6 × 7 = 126
Therefore Their LCM is 126.

Q43. Answer: (a) 92

Given:
Value: 92% of 100
Formula Used:
Percentage calculation formula: (Percentage × Total) / 100
Calculation:
=> 92 × 100 / 100
=> 92
Therefore The correct answer is 92.

Q44. Answer: (a) 45 seconds

Given:
Length of the train = 600 meters
Length of the tunnel = 300 meters
Speed of the train = 72 km/hr
Formula Used:
Time = Distance / Speed
Convert speed to meters/second: Speed (m/s) = (Speed (km/hr) × 1000) / 3600
Calculation:
=> Speed of the train in meters/second = (72 × 1000) / 3600
=> Speed = 20 m/s
=> Total distance to be covered = Length of the train + Length of the tunnel
=> Total distance = 600 + 300 = 900 meters
=> Time = Distance / Speed
=> Time = 900 / 20
=> Time = 45 seconds
Therefore The correct answer is 45 seconds.

Q45. Answer: (d) 25 m

Shortcut Trick
Let the breadth be x. Then the length is 5x.
Area = Length × Breadth = 5x × x = $5x^2$
Given Area = 125 => $5x^2 = 125$ => $x^2 = 25$ => x = 5 m
Length = 5 × 5 = 25 m
Therefore The correct answer is 25 m.
Alternate Method
Given:

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The length of the rectangular board is 5 times its breadth.
Area of the rectangular board = 125 m²
Formula Used:
Area of rectangle = Length × Breadth
Calculation:
=> Let the breadth of the rectangular board be x meters.
=> The length of the rectangular board = 5x meters.
=> Area = 5x × x
=> $5x^2 = 125$
=> $x^2 = 125 \div 5$
=> $x^2 = 25$
=> $x = \sqrt{25} = 5$ m
=> Length of the board = 5x = 5 × 5 = 25 m
Therefore The correct answer is 25 m.
Additional Information
Perimeter of a Rectangle
The total distance around the outside of a rectangle. Formula: P = 2 × (Length + Breadth).
Diagonal of a Rectangle
The straight line connecting opposite corners of the rectangle. Formula: d = √(Length² + Breadth²).
Square as a Special Rectangle
A square is a special type of rectangle where all four sides are equal (Length = Breadth). Area = Side².

Q46. Answer: (c) 12

Total no. of students = 45
Rank of Farah from bottom = 26
Rank of Vashu = Rank of Farah from bottom + 8 → 26 + 8 → 34
Therefore, rank of Vashu from top = (45 – 34) + 1 → 11 + 1 → 12
Hence, Vashu’s rank from top is 12^(th).

Q47. Answer: (d) Plotter

The logic followed here is:
Option (1) Microphone → Microphone is input device of computer.
Option (2) Webcam → Webcam is input device of computer.
Option (3) Keyboard → Keyboard is input device of computer.
Option (4) Plotter → Plotter is output device of computer.
Hence, “Plotter” is an odd one.

Q48. Answer: (b) 9 and 6

The logic followed here is :-
By using BODMAS RULE :
Option 1) : 108 and 18
Given equation is : 108 ÷ 6 - 18 + 8 × 9 = 42
After interchanging the two numbers the equation is as follows : 18 ÷ 6 - 108 + 8 × 9 = 42
=> 18 ÷ 6 - 108 + 8 × 9 = 42
=> 3 - 108 + 8 × 9 = 42
=> 3 - 108 + 72 = 42
=> 75 - 108 = 42
=> - 33 ≠ 42
LHS ≠ RHS
Option 2) : 9 and 6
Given equation is : 108 ÷ 6 - 18 + 8 × 9 = 42
After interchanging the two numbers the equation is as follows : 108 ÷ 9 - 18 + 8 × 6 = 42
=> 108 ÷ 9 - 18 + 8 × 6 = 42

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=> 12 - 18 + 8 × 6 = 42

=> 12 - 18 + 48 = 42

=> 60 - 18 = 42

=> 42 = 42

LHS = RHS

Option 3) : 18 and 9

Given equation is : 108 ÷ 6 - 18 + 8 × 9 = 42

After interchanging the two numbers the equation is as follows : 108 ÷ 6 - 9 + 8 × 18 = 42

=> 108 ÷ 6 - 9 + 8 × 18 = 42

=> 18 - 9 + 8 × 18 = 42

=> 18 - 9 + 144 = 42

=> 162 - 9 = 42

=> 153 ≠ 42

LHS ≠ RHS

Option 4) : 6 and 8

Given equation is : 108 ÷ 6 - 18 + 8 × 9 = 42

After interchanging the two numbers the equation is as follows : 108 ÷ 8 - 18 + 6 × 9 = 42

=> 108 ÷ 8 - 18 + 6 × 9 = 42

=> 13.5 - 18 + 6 × 9 = 42

=> 13.5 - 18 + 54 = 42

=> 67.5 - 18 = 42

=> 49.5 ≠ 42

LHS ≠ RHS

Hence, the correct answer is "9 and 6".

Q49. Answer: (b) XETROC

The pattern for the code is as follows:

Similarly,

Hence, the correct answer is "XETROC".

Q50. Answer: (a) 25S

The pattern followed here is as follows:

Hence, “25S” is the correct answer.

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