RRC Group D Previous Year Paper 11 (Held On: 3 Oct 2018 Shift 1)

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. A solution contains 33g of common salt in 320g of water. Calculate the concentration in terms of mass, by mass percentage of the solution.

(a) 13.05%
(b) 9.09 g
(c) 9.35 g
(d) 9.35%

Q2. Two numbers are in the ratio of 15 : 11. If their HCF is 13, then the greater number is:

(a) 195
(b) 125
(c) 175
(d) 120

Q3. Geneva-based International Campaign to Abolish Nuclear Weapons (ICAN) received the 2017_____.

(a) Nobel Peace Prize
(b) Albert Einstein peace Prize
(c) Gandhi Peace Award
(d) Bruno Kreisky Award

Q4. Raghu bought an article for Rs.14,360 and spent Rs.240 on its transportation. At what amount (in Rs.) must he sell it to get a profit of 15%?

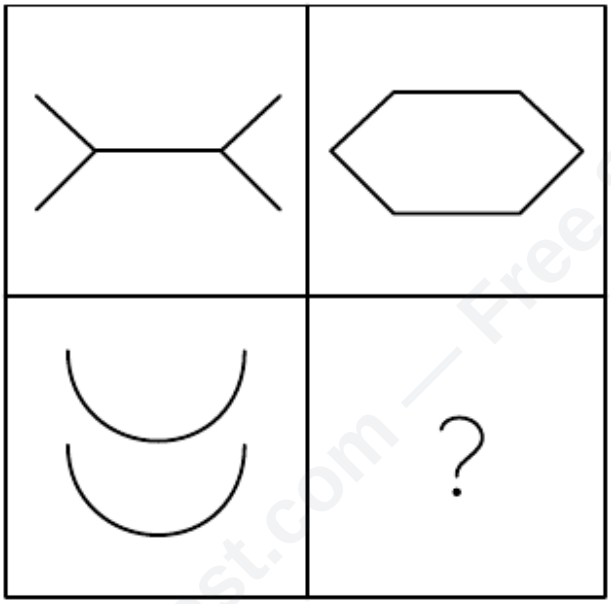
(a) Rs. 16,000
(b) Rs. 16,790
(c) Rs. 16,150
(d) Rs. 16,800

Q5. The base of a pyramid is a rectangle whose length and breadth are 16 cm and 12 cm, respectively. If the length of all the lateral edges passing through the vertex of the right rectangular pyramid is 26 cm, then find the volume of the pyramid in cubic centimeter.

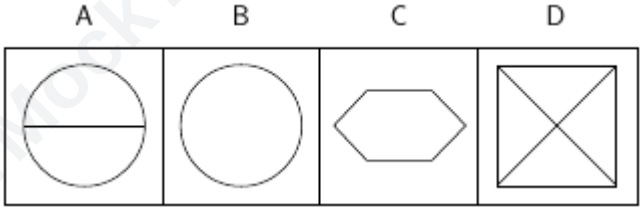
(a) 1536
(b) 1024
(c) 718
(d) 2072

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Q6.



Choose the correct picture that fit the blank place?



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

Q7. Which of the statements is sufficient to answer the question?

Question:

Find the sum of the first 10 consecutive even numbers in the series.

Statements:

I. The first number 2 and 10^(th) number is 20.

II. The common difference is 2.

(a) Only statement II is sufficient
(b) Only statement I is sufficient
(c) Both statement I and II are sufficient
(d) Either statement I or II is sufficient

Q8. Raghu goes to college at a speed of 4 kmph and returns at a speed of 3 kmph. If he takes 5.95 hrs in all, then what is the distance between his home and the college?

(a) 10.2 km
(b) 10.5 km
(c) 10 km
(d) 20 km

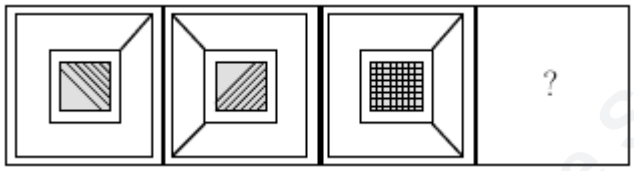
Q9. 7/9 of the people present in a hall are sitting in 9/13 of the chairs available and the rest are standing. If there are 28 empty chairs, how many chairs would have been still empty if everyone in the hall was sitting?

(a) 15
(b) 12
(c) 18

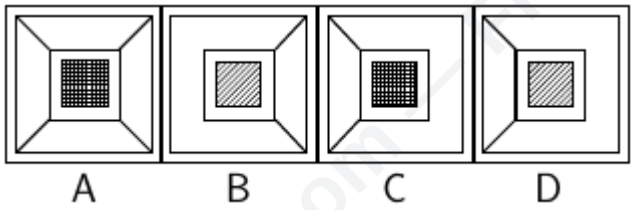
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(d) 10

Q10.

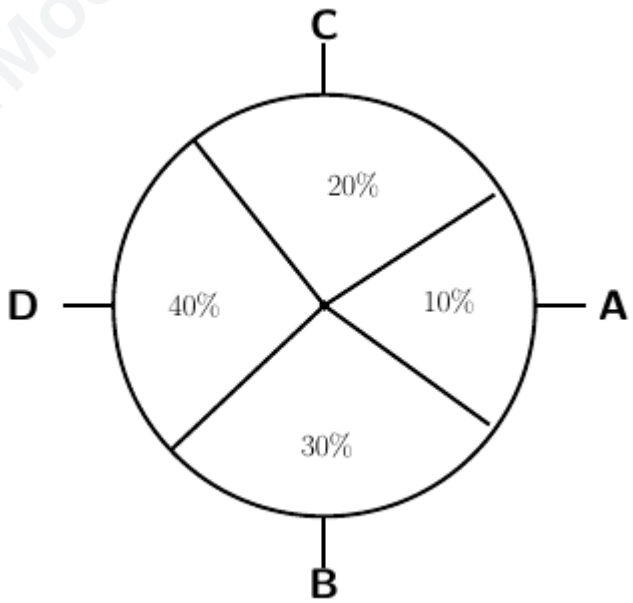


Choose the correct picture which fit the blank space form the figures given below?



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

Q11. The data shows the information on the number of children vaccinated in the year 2016 in different cities:



If the total number of children vaccinated in the year 2016 is 1,20,000, then how many children form city ‘A’ were vaccinated?

(a) 36,000
(b) 24,000
(c) 12,000
(d) 48,000

Q12. Rate of change of displacement is known as _____.

(a) Acceleration
(b) Velocity
(c) Speed
(d) Distance

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Q13. The zeros of the cubic polynomial $2x^3 - x^2 - 2x + 1$ are a, b and c, respectively. Find (a + b + c).

(a) -1
(b) 2
(c) +1
(d) 1/2

Q14. What is the compound interest on Rs. 5000 in 3 years, if the rate of interest is 4% for the first year, 3% for the second year and 2% for the third year?

(a) Rs. 435.21
(b) Rs. 453 .12
(c) Rs. 436.12
(d) Rs. 463.12

Q15. From a square plate with each side 7 cm. squares of area 0.25 cm^2 are cut out at each corner and the remaining plate is folded along the cuts to form a cuboid. The volume of this open-top cuboid will be ____ cm^3

(a) 21
(b) 16
(c) 18
(d) 20

Q16. Each question given below consists of a stamen, followed by two arguments numbered I & II. You have to decide which of the arguments is a 'strong argument'.

Statement:

Is global warming a real threat?

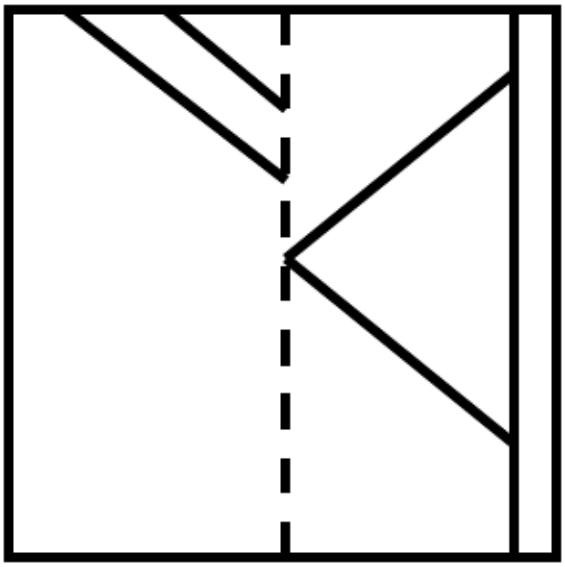
Arguments:

I. Yes, it is a threat leading to the consequences of sea level rise, extreme heat, heightened wildlife risk, and drought and other water supply issues.

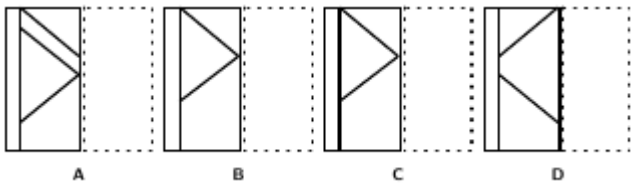
II. No Global warming is misconception created by some people.

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

Q17. Which pattern will the given transparent sheet resemble when it is folded at the dotted line?



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

Q18. Who among the following is the first Indian female gymnast ever to compete in the Olympics?
(a) Bindu Bhosle
(b) Dipa Karmakar
(c) Jyoti More
(d) Aruna Reddy

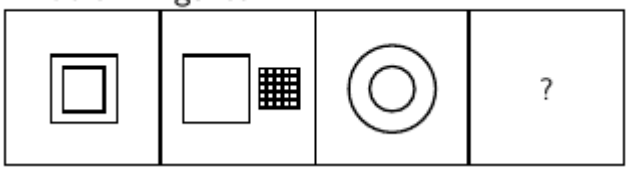
Q19. Find the next number in the given series.
9, 11, 15, 17, 21, 23, ?
(a) 29
(b) 28
(c) 30
(d) 27

Q20. Which is the state animal of Andhra Pradesh?
(a) Mithum
(b) Ox
(c) One-horned rhinoceros
(d) Blackbuck

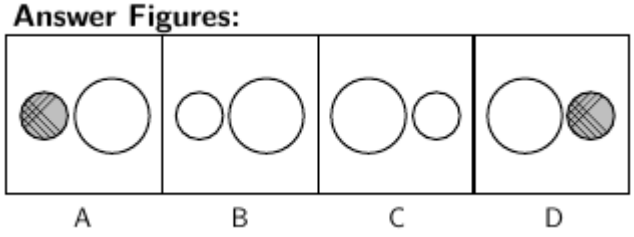
Q21. Find the next term for the series given below:
5G, 6H, 7I, 8J, ?
(a) 14K
(b) 9K
(c) 10K
(d) 12G

Q22. Find the next figure for the given series:

Problem Figures:



Answer Figures:



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

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(d) C

Q23. What is the least number that when divided by 63 and 105 leaves remainder 4 in each case?

(a) 634
(b) 25
(c) 214
(d) 319

Q24. Who among the following inaugurated the Dr. A.P.J. Abdul Kalam Memorial in Rameshwaram?

(a) Narendra Modi
(b) O. Panneerselvam
(c) Pranab Mukherjee
(d) K. Palani swami

Q25. Select the option that is related to the third word on the same basis as the second word is related to the first word

Real : Genuine ? Fake : ?

(a) Authentic
(b) Fell
(c) Counterfeit
(d) True

Q26. A statement is followed by two argument. Decide which of the arguments is/are strong with respect to the statement.

Statement:

Should too much revealing dress be banned?

Argument:

1. Yes, it disturbs the people and create abuse.

2) No, wearing cloths of their choice is the fundamental right of the individual.

(a) Neither argument 1 and 2 is strong
(b) Only argument 1 is strong
(c) Only argument 2 is strong
(d) Either argument 1 or 2 is strong

Q27. Read the following statement and the arguments that follow. Decide which of the arguments is strong.

Statement:

Should written examination in primary schools be abolished?

Arguments:

1. Yes, young students feel the burden and such examinations do not help in the natural thinking process.

2. No. without examination student will not be serious about education and learning.

(a) Both arguments 1 and 2 are strong
(b) Only arguments 1 is strong
(c) Neither arguments 1 nor 2 is strong
(d) Only arguments 2 is strong

Q28. The magnitude of the buoyant force depends on the _____ of the fluid.

(a) Mass
(b) Temperature
(c) Volume
(d) Density

Q29. Name the team which won the Santosh Trophy for the 32^(nd) time in 2017?

(a) Odisha
(b) West Bengal
(c) Andhra Pradesh
(d) Punjab

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Q30. Mathur's uncle's daughter's brother is Somu. How is somu related to Mathur?

(a) Cousin
(b) Son
(c) Brother
(d) Father

Q31. _____, the Sultan of Delhi shifted his capital from Delhi to Daulatabad.

(a) Iltutmish
(b) Akbar
(c) Ghiyas ud-din balban
(d) Muhammad-bin-Tughlaq

Q32. An electric iron of 750 W is used for 8 hours per day. Then the energy consumed in one day by the iron is:

(a) 6 units
(b) 600 units
(c) 0.6 units
(d) 60 units

Q33. The LCM of 72 and 84 is:

(a) 12 × 6 × 7
(b) 6 × 2 × 7
(c) 12 × 7 × 3
(d) 72 × 84

Q34. You are given a question and statements and two statements. Which of the statements is/are necessary/sufficient to answer the question?

Question:

What is the color of Sunflower?

Statements:

I. Blue is called white, white is called red and red is called yellow.

II. Yellow is called purple, purple is called black, white is called brown and brown is called orange.

(a) Data in I alone is sufficient
(b) Data either in I alone or Ii alone is sufficient
(c) Data in both I and II together Is not sufficient
(d) Data in II alone is sufficient

Q35. A solar cell is made up of _____.

(a) Carbon
(b) Gallium
(c) Silicon
(d) Teflon

Q36. In a class, there were 28 boys and some girls. In a test, the mean score obtained by the boys was 12.5 while that obtained by the girls was 14.5. If the overall mean score was 13.1, then what was the total number of students in the class?

(a) 42
(b) 44
(c) 40
(d) 38

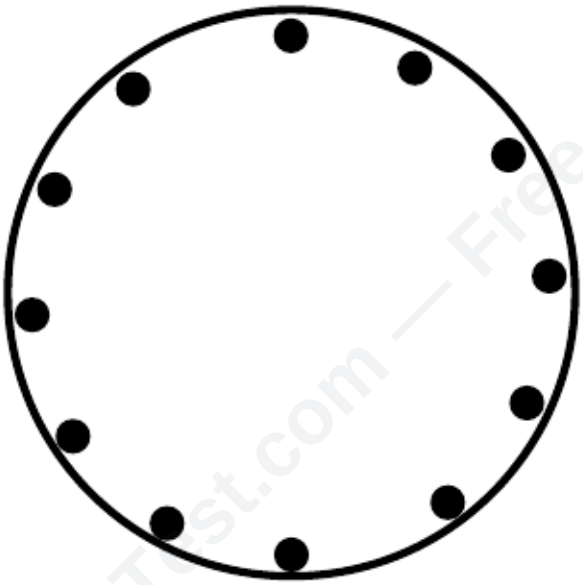
Q37. Coins of Rs. _____ denomination was introduced by the Reserve Bank of India (RBI) to mark MG Ramachandran's 102nd birth centenary.

(a) 200
(b) 100
(c) 500

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(d) 20

Q38. _____ element is presented by the given symbol.



(a) Hydrogen
(b) Mercury
(c) Carbon
(d) Gold

Q39. Which of the following statements is/are true about speed of sound in different media at 25 ºC?

A. In Oxygen gas, the speed of sound is 316 km/s.

B. In water (distilled), the speed of sound is 1498 km/s

(a) Only A is true
(b) Both A and B is true
(c) Neither A nor B is true
(d) Only B is true

Q40. Tarun, Manav, Nitu, Hema, and Priya are standing in a row according to their height. Which of the following statements is sufficient to answer the following question?

Who among the five is standing in the middle?

Statements:

1. Nitu is the tallest
2. Tarun is taller than Manav
3. Hema is the shortest of them all
4. Manav is taller than Priya

(a) Statements 1, 2, 3 and 4 together are sufficient
(b) Statement 1 and 3 are sufficient
(c) Statement 1, 2 and 3 alone are sufficient
(d) None of the statements are sufficient

Q41. _____ reproduces by binary fission

(a) Amoeba
(b) Liverfluke
(c) Plasmodium
(d) Planaria

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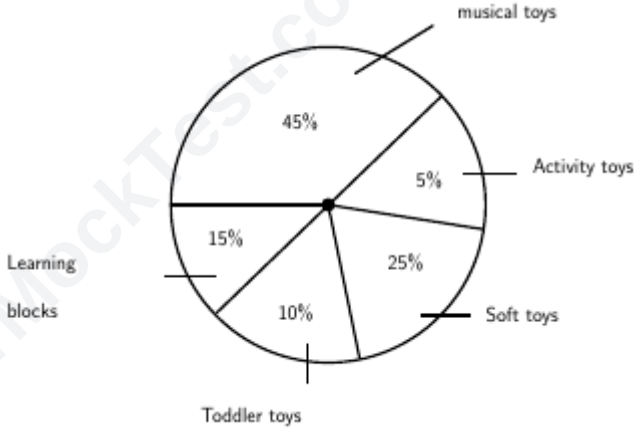
Q42. The ratio of the sides of a triangular shaped park is 3 : 4 : 5 and the perimeter of the park is 120 m. What is the perpendicular distance in meters from the vertex, opposite to the largest side of the park?

(a) 25
(b) 24
(c) 48
(d) 20

Q43. Mathura Refinery, the _____ refinery of Indian oil was commissioned in 1982 with a capacity of 6.0 MMTPA to meet the demand of petroleum products in north western region of India.

(a) 7^(th)
(b) 5^(th)
(c) 6^(th)
(d) 9^(th)

Q44. The following pie chart shows information on sales of a toy making company “XYZ” during 2017-18 financial year.



The total revenue made by sales of the toys was Rs. 38,72,00/-. Which type of toys made the highest revenue for the company?

(a) Toddler toys
(b) Musical toys
(c) Soft toys
(d) Learning blocks

Q45. Which of the following is NOT true about vascular system?

(a) Life span of human RBC is 115-120 days.
(b) The vascular system forms about 7-8% of the body weight.
(c) Blood is white or red vascular connective tissue.
(d) There is about 5-6 liters of blood in an adult person

Q46. Which of the number given below is the square root of 14161?

(a) 119
(b) 121
(c) 131
(d) 129

Q47. At what time between 4 o’clock and 5 o’clock will the two hands of the clock be the right angle to each other for the first time?

(a) 58/11 min past 4 o’clock
(b) 422/11 min past 4 o’clock
(c) 60/11 min past 4 o’clock
(d) 420/11 min past 4 o’clock

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Q48. If'+' means '÷', '-' means'+', '×' means '-' and '÷' means '×' then find the value of 27 ÷ 15 - 36 + 6?

(a) 411
(b) 414
(c) 416
(d) 412

Q49. In which of the following is MgCl2 soluble?

(a) Petrol
(b) Acetone
(c) Kerosene
(d) Water

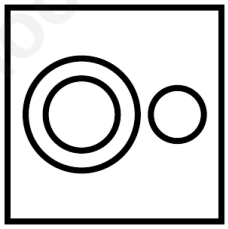
Q50. The secretion from the prostate gland enters into the:

(a) Kidney
(b) Ureter
(c) Urethra
(d) Testis

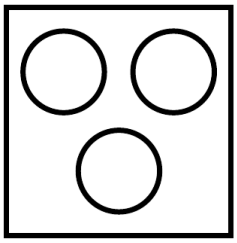
Q51. Choose the best suitable Venn diagram for the following words:

Transport vehicle, truck, van

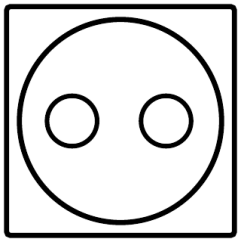
(a)



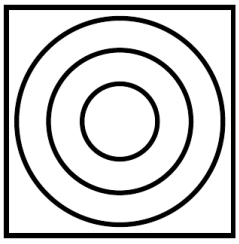
(b)



(c)



(d)



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Q52. Which of the following is associated with The Government of India's 'Khelo India' programme?

(a) Science and Technology
(b) Literature
(c) Sports
(d) Music

Q53. 1/8^(th) of the audience of a program, Jabardast were children. 2/5^(th) of the audience were men and the rest women. If the number of women is 380, find the total number of the audience in the program.

(a) 600
(b) 500
(c) 400
(d) 800

Q54. A statement is followed by two arguments. Decide which of the arguments is/are strong with respect to the statement.

Statement:

From tender age children must be trained to do household chores.

Arguments:

I. Yes, it will make them grow responsible for their work.

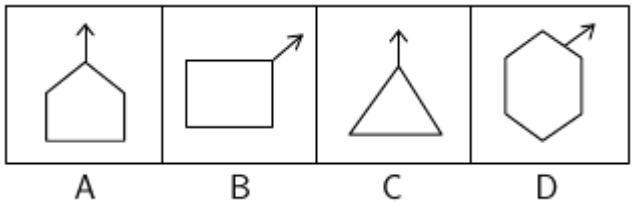
II. No, it is enough that we send them to school as they learn everything there.

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

Q55. A man travels 480 km in 4 hours, partially by air and partially by train if he had travelled all the way by air he would have saved 4/5 of the time he would have taken to travel by train and would have arrived at his destination 2 hours early. Find the distance he covered by traveling by train.

(a) 80 km
(b) 120 km
(c) 110 km
(d) 90 km

Q56. Choose the odd one out from among the given figures?



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

Q57. There are _____ metalloids in the modern periodic table.

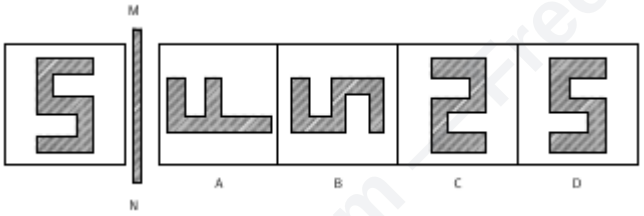
(a) 5
(b) 4
(c) 7
(d) 6

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Q58. The General Anti-Avoidance Rule introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on_____

(a) 1 April 2016
(b) 1 April 2015
(c) 1 April 2017
(d) 1 April 2018

Q59. Find the mirror image of the given figure if the mirror is placed at line MN.



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

Q60. Solve the following equation to find x:

$(x - 2)^2 - 36 = 0$: If $x \varepsilon N$

(a) 4
(b) 8
(c) -8
(d) -4

Q61. Anil is facing the East. He then turns 90° clockwise and then 135° anti-clockwise. In which direction is he facing now?

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

Q62. The Author of the book “The people’s president: Dr. APJ Abdul kalam” is:

(a) Tarun Vijay
(b) Sumitra Mahajan
(c) KC Pant
(d) SM Khan

Q63. Who is the Chief Minister of Punjab as of 1^(st) March 2018?

(a) Navjot Singh Sidhu
(b) Captain Amarinder Singh
(c) Prakash Singh Badal
(d) Naveen Mahindra

Q64. The two roots of quadratic are given as x = 1/7 and x = -1/8. The equation can be written as:

(a) (7x - 1) (8x - 1) = 0
(b) (7x - 1) (8x + 1) = 0
(c) (7x + 1) (8x - 1) = 0
(d) (7x + 1) (8x + 1) = 0

Q65. The force exerted on an object is 200 N its mass is 100kg. Find the acceleration of the object.

(a) 2 ms^(-1)
(b) 2 ms^(-2)
(c) 2 ms^1

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(d) 2 ms²

Q66. Four word have given below of which three are alike in some way and is different. Choose the odd one out.

(a) Table
(b) Chair
(c) Cupboard
(d) Cardigan

Q67. What time does the mirror image of an analog clock at 5' O clock show?

(a) 12:00
(b) 5:00
(c) 7:00
(d) 6:00

Q68. Read the following statements and the conclusions that follow. Decide which of the two conclusions follow the given statements.

Statements:

1) All swans are parrots

2) No parrot is a cuckoo

Conclusions:

1) No swan is a cuckoo

2) All parrots are swans

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

Q69. Which of the following elements has the electronic configuration 2, 8, 3?

(a) Magnesium
(b) Sodium
(c) Aluminum
(d) Argon

Q70. ABCD is quadrilateral inscribed in a circle (radius = r). The bisectors of the angle DAB and angle BCD intersect the circle at X and Y, respectively. What is the length of the straight line XY?

(a) πr^2
(b) 2r
(c) (r + 2)
(d) $\pi r^2/2$

Q71. The potential difference between the terminal of an electric heater is 60 V when it draws a current of 4 A from the source. What current will the heater draw if the potential difference is changed to 127.5 V?

(a) 8.5 A
(b) 24 A
(c) 10 A
(d) 12 A

Q72. Which of the following statements about the reaction below are INCORRECT?

$2PbO(s)+C(s) \rightarrow 2Pb(s)+CO2(g)$

A. Carbon di-oxide is getting oxidized

B. Lead is getting reduced

C. Carbon is oxidised

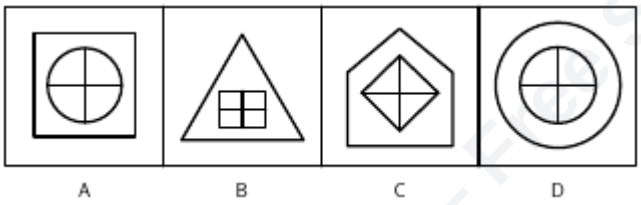
D. Lead oxide is getting reduced

(a) A and C

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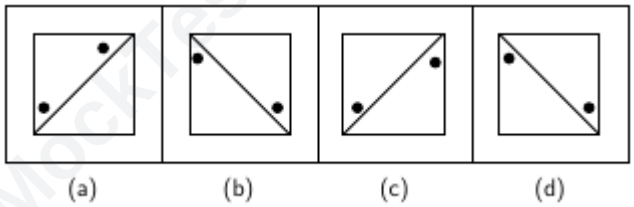
(b) A and B
(c) B and C
(d) A, B and C

Q73. Out of the four option figures, three are similar in a certain manner. However, one figure is NOT like the other three. Select the figure which is different from the rest.



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

Q74. Choose the figure which is different from the rest.



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

Q75. Kiran swims in a 90 m long pool. She covers 360 m in two minutes by swimming from one end to the other and back along the same straight path, twice. Find the average speed of Kiran.

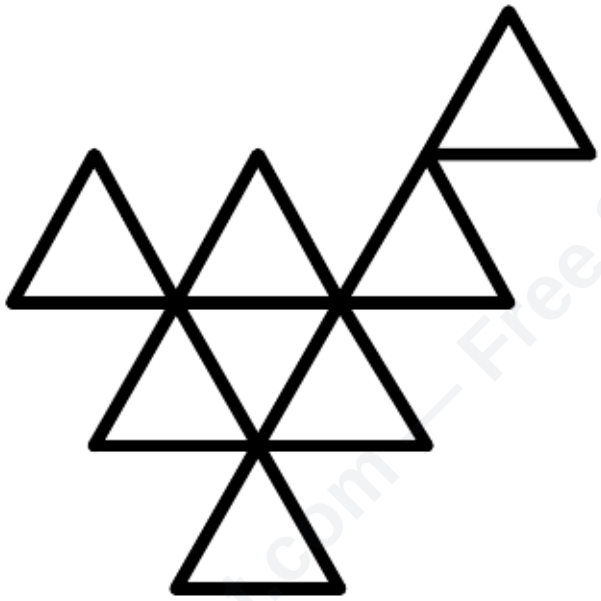
(a) 4 ms^(-1)
(b) 6 ms^(-1)
(c) 3 ms^(-1)
(d) 5 ms^(-1)

Q76. What type of cells is the skin made of?

(a) Epidermal cells
(b) Connective tissue
(c) Permanent tissues
(d) Parenchyma

Q77. Count the number of triangles in the following figure:

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(a) 10
(b) 7
(c) 8
(d) 9

Q78. The energy obtained from atoms is known as _____.
(a) Solar energy
(b) Heat energy
(c) Nuclear energy
(d) Chemical energy

Q79. Who is India's next Ambassador to Peru?
(a) M. Subbarayudu
(b) Yashvardhan Kumar Sinha
(c) Dr. Rizal Sukma
(d) Sandeep Chakravorty

Q80. Calculate the relative molecular mass of water (H2O).
(a) 18 u
(b) 1.8 u
(c) 2.0 u
(d) 20 u

Q81. Who is appointed as UNICEF's ambassador for Goodwill?
(a) Lilly Singh
(b) Iravati Dubey
(c) Lillete Dubey
(d) Rosa Mendes

Q82. Who among the following was conferred with sainthood by Pope Francis in 2016?
(a) Mary Euphrasia
(b) Kuriakose
(c) Sister Alphonsa
(d) Mother Teresa

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Q83. Which film was awarded the Best Film on social Issues in the 64^(th) National Film Awards in 2017?

(a) Udta Punjab
(b) Bobby Jassos
(c) Neerja
(d) Pink

Q84. Which is the only non-metal placed at the left side of the Modern Periodic Table?

(a) Hydrogen
(b) Carbon
(c) Neon
(d) Helium

Q85. If two flood gates A and B function simultaneously, the reservoir will be filled in 6 hours. Gate A fills the reservoir 5 hours faster than gate B. How many hours does the faster flood gate take to fill the reservoir?

(a) 7 hrs
(b) 13 hrs
(c) 5 hrs
(d) 10 hrs

Q86. X can complete a task in 8 days, whereas Y can complete the same task in 10 days. If they work together, in how many days will the task be completed?

(a) 44/9
(b) 9/40
(c) 48/9
(d) 9

Q87. Rajaram's son's sister's mother is Ramani. How is Ramani related to Rajaram?

(a) Aunt
(b) Wife
(c) Sister
(d) Cousin

Q88. _____ connects muscle to the bones.

(a) Cartilage
(b) Areolar
(c) Ligaments
(d) Tendons

Q89. What is the natural source of Oxalic acid?

(a) Tomato
(b) Sour milk
(c) Ant sting
(d) Tamarind

Q90. _____ is the new capital of Andhra Pradesh. (As of Oct 2018)

(a) Amaravati
(b) Hyderabad
(c) Secunerabad
(d) Tirupati

Q91. 6 6 8 5 5 3 7 3 7 2 5 9 8 7 8 1 5 5 4

Using the above sequence find the term that does NOT belong to the group.

83, 35, 27, 81

(a) 27
(b) 83

(c) 81
(d) 35

Q92. Ibrahim Lodi was killed by _____ in the First Battle of Panipat in 1526.
(a) Muhammad Shah
(b) Firoz Shah Tughlaq
(c) Babur
(d) Timur

Q93. The absolute refractive index of any medium is always_____.
(a) more than one
(b) 0
(c) 1
(d) less than one

Q94. Who is the author of the book 'Why I am a Hindu' published in 2017?
(a) Shashi Tharoor
(b) Manmohan Singh
(c) Arnab Goswami
(d) Venkaith Naidu

Q95. If a : b is 32 : 35 and b : c is 21 : 32, then a : c is:
(a) 5 : 3
(b) 3 : 5
(c) 1 : 1
(d) 5 : 7

Q96. The minimum value of LCM of given numbers is ..... the product of all the given numbers.
(a) Always greater than
(b) always less than
(c) always equal to
(d) None of the above

Q97. In a code language, BURN is written as YFIM. What is the code for WOUND?
(a) DLFMD
(b) DLFMW
(c) DNFMW
(d) DPFMW

Q98. Which one of the following is a leguminous crop?
(a) Mucuna
(b) Pulses
(c) Sesame
(d) Cereals

Q99. 1kW = ?
(a) 1000 W
(b) 10 W
(c) 100 W
(d) 10000 W

Q100. In a quadrilateral PQRS, angle S = 90°. A circle (o,r) touches the side PQ, QR, RS, and SP at A, B, C and D, respectively, if QR = 38 cm, RS = 25 cm and QA = 27 cm, find 'r'.
(a) 16 cm
(b) 12 cm

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(c) 14 cm
(d) 10 cm

ANSWER KEY

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

SOLUTIONS

Q1. Answer: (d) 9.35%

Shortcut Trick

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

Total Mass = 33g + 320g = 353g

Concentration = (33 ÷ 353) × 100 ≈ 9.348%

Therefore The correct answer is 9.35%.

Alternate Method

Given:

Mass of solute (Common Salt) = 33g

Mass of solvent (Water) = 320g

Formula Used:

Mass percentage of solution = (Mass of solute ÷ Mass of solution) × 100

Calculations:

=> Mass of solution = Mass of solute + Mass of solvent

=> Mass of solution = 33 + 320 = 353g

=> Concentration = (33 ÷ 353) × 100

=> Concentration = 3300 ÷ 353

=> Concentration = 9.3484...

=> Concentration ≈ 9.35%

Therefore The correct answer is 9.35%.

Additional Information

Mass by Volume Percentage

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

Saturated Solution

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

Solubility

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

Q2. Answer: (a) 195

Shortcut Trick

Numbers are in the ratio 15 : 11.

The HCF is the common factor between the terms of the ratio.

Greater number = Greater ratio part × HCF

Greater number = 15 × 13 = 195.

Therefore The correct answer is 195.

Alternate Method

Given:

Ratio of numbers = 15 : 11

HCF of numbers = 13

Let the numbers be 15x and 11x.

The Highest Common Factor (HCF) of 15x and 11x is x (since 15 and 11 are co-prime).

=> x = 13

=> First number = 15 × 13 = 195

=> Second number = 11 × 13 = 143

=> Greater number = 195

Therefore The correct answer is 195.

Additional Information

LCM and HCF Relationship

The product of two numbers is always equal to the product of their HCF and LCM. Formula: Product = HCF × LCM.

LCM of Ratio Numbers

If the ratio of two numbers is a : b and their HCF is H, then their LCM is given by the formula: LCM = a × b × H.

Co-prime Numbers

Two numbers are said to be co-prime if their HCF is 1. In ratio problems, the reduced terms are always co-prime.

Q3. Answer: (a) Nobel Peace Prize

• Geneva-based International Campaign to Abolish Nuclear Weapons (ICAN) received the 2017 Nobel Peace Prize.

• The International Campaign to Abolish Nuclear Weapons (ICAN):-

• It is a global civil society coalition working to promote adherence to and full implementation of the Treaty on the Prohibition of Nuclear Weapons.

• The campaign received the 2017 Nobel Peace Prize.

"for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its ground-breaking efforts to achieve a treaty-based prohibition of such weapons."

Foundation Year	**2007**
Founded at	Melbourne, Australia
Headquarters	Geneva, Switzerland
Executive Director	Beatrice Fihn

• The 2019 Winners of Nobel Prize are:-

Field	**Recipient**	**Awarded For**
The Nobel Peace Prize 2019	Abiy Ahmed Ali	“for his efforts to achieve peace and international cooperation, and in particular for his decisive initiative to resolve the border conflict with neighbouring Eritrea”
The Nobel Prize in Literature 2019	Peter Handke	“for an influential work that with linguistic ingenuity has explored the periphery and the specificity of human experience”
The Nobel Prize in Physics 2019	James Peebles, Michel Mayor and Didier Queloz	James Peebles “for theoretical discoveries in physical cosmology” Michel Mayor and Didier Queloz “for the discovery of an exoplanet orbiting a solar-type star”
The Nobel Prize in Chemistry 2019	John B. Goodenough, M. Stanley Whittingham and Akira Yoshino	“for the development of lithium-ion batteries”

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The Nobel Prize in Physiology or Medicine 2019	William G. Kaelin Jr, Sir Peter J. Ratcliffe and Gregg L. Semenza	“for their discoveries of how cells sense and adapt to oxygen availability”
The Nobel Prize in Economic Sciences 2019	Abhijit Banerjee, Esther Duflo and Michael Kremer	“for their experimental approach to alleviating global poverty.”

Q4. Answer: (b) Rs. 16,790

Shortcut Trick

Effective Cost Price (CP) = 14360 + 240 = 14600.

To get a Profit of 15%, multiplier = (100 + 15) ÷ 100 = 1.15.

Selling Price (SP) = 14600 × 1.15.

Calculation: 14600 × (1 + 0.15) = 14600 + 2190 = 16790.

Therefore The correct answer is Rs. 16,790.

Alternate Method

Given:

Purchase Price = Rs. 14,360, Overhead Expenses = Rs. 240, Profit Percentage = 15%.

Formulas:

Total CP = Purchase Price + Overhead Expenses | SP = CP × (100 + Profit%) ÷ 100

Steps:

=> Total Cost Price (CP) = 14360 + 240 = 14,600

=> Profit Amount = 15% of 14,600 = (15 ÷ 100) × 14600

=> Profit Amount = 15 × 146 = 2,190

=> Selling Price (SP) = Total CP + Profit = 14600 + 2190

=> Selling Price (SP) = 16,790

Therefore The correct answer is Rs. 16,790.

Additional Information

Effective Cost Price

Any additional expenditure incurred on an article like transportation, repairs, or labor after buying is added to the Cost Price to find the effective CP.

Profit and Loss Basic

Profit is always calculated on the Cost Price (CP) unless stated otherwise. If SP > CP, it is Profit. If CP > SP, it is Loss.

Q5. Answer: (a) 1536

Shortcut Trick

Diagonal of base = $\sqrt{(16^2 + 12^2)} = 20$ cm.

Height (h) = $\sqrt{[\text{Lateral Edge}^2 - (\text{Diagonal}/2)^2]} = \sqrt{(26^2 - 10^2)} = 24$ cm.

Volume = (1/3) × Area of base × Height = (1/3) × (16 × 12) × 24 = 1536 cm^3.

Therefore The correct answer is 1536 cm^3.

Alternate Method

Given: Length (l) = 16 cm, Breadth (b) = 12 cm, Lateral Edge (e) = 26 cm.

Formula Used: Volume = (1/3) × Area of Base × Height (h). Height (h) = $\sqrt{(e^2 - (d/2)^2)}$ where d is diagonal.

=> Diagonal of base (d) = $\sqrt{(16^2 + 12^2)}$

=> d = $\sqrt{(256 + 144)} = \sqrt{400} = 20$ cm.

=> Half-diagonal (d/2) = 10 cm.

=> h = $\sqrt{(26^2 - 10^2)} = \sqrt{(676 - 100)} = \sqrt{576} = 24$ cm.

=> Volume = (1/3) × (16 × 12) × 24

=> Volume = 16 × 12 × 8 = 1536 cm^3.

Therefore The correct answer is 1536 cm^3.

Additional Information

Rectangular Pyramid Properties

For a pyramid with rectangular base (l, b) and height h, the Total Surface Area = $lb + l\sqrt{[(b/2)^2 + h^2]} + b\sqrt{[(l/2)^2 + h^2]}$.

Pythagorean Triplet

Common triplets like (5, 12, 13) or (10, 24, 26) help find the height or edge quickly without lengthy square root calculations.

Slant Height vs Lateral Edge

Slant height is the altitude of the triangular face, whereas Lateral edge connects the vertex to a corner of the base.

Q6. Answer: (d) A

The logic follows here is:

Here, in the given figure, the two figures are inverted and joined with one extra line. In the figure 5 lines are given while one extra line is added in the related figure.

Similarly, if we consider the two semi circles, we need to join them after inverting them with one additional line as a diagonal.

Hence, option 4 is the correct answer.

Q7. Answer: (b) Only statement I is sufficient

Shortcut Trick

To find the sum of an Arithmetic Progression (AP), we need either the first and last terms or the first term and common difference.

Statement I provides the first term (a = 2) and the 10^(th) term (l = 20).

Sum = (n ÷ 2) × (a + l) => (10 ÷ 2) × (2 + 20) = 5 × 22 = 110.

Statement II only gives the common difference (d = 2) without a starting value, which is insufficient.

Therefore The correct answer is Only statement I is sufficient.

Alternate Method

Given: Number of terms (n) = 10. The series consists of consecutive even numbers.

Formula Used: Sum of AP = (n ÷ 2) × [2a + (n − 1)d] OR Sum = (n ÷ 2) × [first term + last term]

From Statement I: First term (a) = 2, Last term (l) = 20, n = 10.

=> Sum = (10 ÷ 2) × (2 + 20)

=> Sum = 5 × 22 = 110.

=> Statement I is sufficient.

From Statement II: Common difference (d) = 2.

=> Since the first term (a) is unknown, the sum cannot be calculated.

=> Statement II is insufficient.

Therefore The correct answer is Only statement I is sufficient.

Additional Information

Sum of First 'n' Even Numbers

The sum of the first n consecutive even numbers starting from 2 is given by the formula: n(n + 1).

General Term of AP

The n^(th) term of an Arithmetic Progression is a_n = a + (n − 1)d, where 'a' is the first term and 'd' is the common difference.

Data Sufficiency in AP

To solve for any property of an AP with 'n' terms, you must know at least two independent variables among a, d, or l.

Q8. Answer: (a) 10.2 km

Shortcut Trick

For two speeds x and y, Total Distance = [(x × y) ÷ (x + y)] × Total Time

Given: x = 4 kmph, y = 3 kmph, Total Time = 5.95 hrs

Distance = [(4 × 3) ÷ (4 + 3)] × 5.95

Distance = (12 ÷ 7) × 5.95 = 12 × 0.85 = 10.2 km

Therefore The correct answer is 10.2 km.

Alternate Method

Given:

Speed to college (s1) = 4 kmph

Speed back home (s2) = 3 kmph

Total time taken (T) = 5.95 hrs

Formula Used:

Time = Distance ÷ Speed

Calculations:

Let the distance between home and college be 'D' km.

=> Time taken to go (t1) = D ÷ 4

=> Time taken to return (t2) = D ÷ 3

=> t1 + t2 = 5.95

=> (D ÷ 4) + (D ÷ 3) = 5.95

=> (3D + 4D) ÷ 12 = 5.95

=> 7D ÷ 12 = 5.95

=> 7D = 5.95 × 12

=> D = (5.95 × 12) ÷ 7

=> D = 0.85 × 12

=> D = 10.2 km

Therefore The correct answer is 10.2 km.

Additional Information

Average Speed

When equal distances are covered at speeds x and y, Average Speed = (2 × x × y) ÷ (x + y).

Distance Constant Rule

If distance is constant, the ratio of speeds is inversely proportional to the ratio of time: s1/s2 = t2/t1.

Relative Speed

Same direction: S1 − S2 | Opposite direction: S1 + S2.

Q9. Answer: (d) 10

Let the number of people be x and number of the chair be y.

Number of available chair = y × (9/13) = 9y/13

Number of empty chair = y - (9y/13) = 4y/13

Given, Number of empty chairs = 28

According to the question

4y/13 = 28

y = 28 × (13/4) = 91

Total number of chairs = 91

Number of chairs in which people are sitting = 91 - 28 = 63

Number of people who sit = x × (7/9) = 7x/9

According to the question

7x/9 = 63

x = 63 × (9/7) = 81

Total number of people are = 81

Chairs would have been still empty if everyone in the hall was sitting = 91 - 81 = 10

Q10. Answer: (a) A

From figure 1 to 2 - one line is added and.

Similarly,

From 3 to 4 - One line is added.

Internal lines of figure A is related to the third figure in the same way as the internal lines of the second figure is related to the first figure.

Hence, option 1 is the correct answer.

Q11. Answer: (c) 12,000

Total number of children vaccinated in the year 2016 = 1,20,000

Number of children were vaccinated in 2016 from city A = 10% of 1,20,000 = 1,20,000 × (10/100) = 12,000

Q12. Answer: (b) Velocity

The correct answer is Velocity.

Key Points

• Rate of change of displacement is known as Velocity.

• Velocity is a physical vector quantity, both magnitude and direction are needed to define it.

• The scalar absolute value of velocity is called speed, which has only magnitude and not direction.

• For example, "10 meters per second" is a scalar, whereas "10 meters per second east" is a vector.

• In the displacement time graph, displacement is the dependent variable and is represented on the y-axis while time is the independent variable and is represented on the x-axis and is also known as a position-time graph.

• There are three different plots fro displacement time graph and they are given below:

• The first graph explains that the object is stationary for a period of time such that the slope is zero which means that the velocity of the object is zero.

• The second graph explains that the velocity of the object is constant and increases with time such that the slope of the graph remains constant and positive.

• The third graph explains that the acceleration, velocity, and displacement are constant. The slope of the graph increases with time.

Q13. Answer: (d) 1/2

Shortcut Trick

For any cubic polynomial $Ax^3 + Bx^2 + Cx + D$, the sum of its zeros (a + b + c) is given by the ratio −B / A.

In the given polynomial $2x^3 - x^2 - 2x + 1$, identify the coefficients: A = 2 and B = −1.

Sum of zeros (a + b + c) = −(−1) / 2 = 1/2.

Therefore The correct answer is 1/2.

Alternate Method

Given:

The cubic polynomial is $P(x) = 2x^3 - x^2 - 2x + 1$.

The zeros of the polynomial are a, b, and c.

Formula Used:

A standard cubic polynomial is represented as $Ax^3 + Bx^2 + Cx + D$, where:

Sum of zeros (a + b + c) = −B / A = −(coefficient of x^2) / (coefficient of x^3)

Calculations:

=> Comparing $2x^3 - x^2 - 2x + 1$ with $Ax^3 + Bx^2 + Cx + D$:

=> Coefficient of x^3 (A) = 2

=> Coefficient of x^2 (B) = −1

=> Coefficient of x (C) = −2

=> Constant term (D) = 1

=> We need to find the sum of the zeros: (a + b + c)

=> a + b + c = −B / A

=> a + b + c = −(−1) / 2

=> a + b + c = 1/2

Therefore The correct answer is 1/2.

Additional Information

Sum of Product of Zeros taken two at a time

For a cubic polynomial, the sum of the products of zeros taken two at a time is given by ab + bc + ca = C / A.

Product of Zeros

The product of all three zeros of a cubic polynomial is given by abc = −D / A.

Relation for Quadratic Polynomials

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

Q14. Answer: (d) Rs. 463.12

Shortcut Trick

Apply Successive Percentage increase on the Principal of Rs. 5000.

Year 1: 5000 + 4% of 5000 = 5000 + 200 = Rs. 5200

Year 2: 5200 + 3% of 5200 = 5200 + 156 = Rs. 5356

Year 3: 5356 + 2% of 5356 = 5356 + 107.12 = Rs. 5463.12

Compound Interest = Final Amount − Initial Principal = 5463.12 − 5000 = Rs. 463.12

Therefore The correct answer is Rs. 463.12.

Alternate Method

Given:

Principal (P) = Rs. 5000

Rates of Interest: R1 = 4%, R2 = 3%, R3 = 2%

Time (n) = 3 years

Formula Used:

Amount (A) = P × (1 + R1/100) × (1 + R2/100) × (1 + R3/100)

Compound Interest (CI) = A − P

Calculations:

=> A = 5000 × (1 + 4/100) × (1 + 3/100) × (1 + 2/100)

=> A = 5000 × (104/100) × (103/100) × (102/100)

=> A = 5000 × 1.04 × 1.03 × 1.02

=> A = 5200 × 1.03 × 1.02

=> A = 5356 × 1.02

=> A = Rs. 5463.12

=> CI = 5463.12 − 5000

=> CI = Rs. 463.12

Therefore The correct answer is Rs. 463.12.

Additional Information

Effective Rate of Interest

For two years with different rates a and b, the effective rate is [a + b + (a × b)/100]%.

CI vs SI Difference (2 Years)

The difference between Compound Interest and Simple Interest for 2 years is P × (R/100)².

Compounding Frequency

If interest is compounded half-yearly, the rate is halved (R/2) and the time is doubled (2n).

Q15. Answer: (c) 18

Shortcut Trick

Side of small cut-out square = √0.25 = 0.5 cm.

New Length (L) = 7 − (2 × 0.5) = 6 cm.

New Breadth (B) = 7 − (2 × 0.5) = 6 cm.

Height (H) of the cuboid = Side of the cut-out square = 0.5 cm.

Volume = L × B × H = 6 × 6 × 0.5 = 18 cm³.

Therefore The correct answer is 18 cm³.

Alternate Method

Given: Side of square plate (S) = 7 cm, Area of corner squares = 0.25 cm².

Formula: Volume of cuboid = Length × Breadth × Height.

=> Let x be the side of the small square cut from each corner.

=> $x^2 = 0.25$ cm² => x = √0.25 = 0.5 cm.

=> When the sides are folded, the height (h) of the cuboid = x = 0.5 cm.

=> The length (l) of the cuboid = 7 − 2x = 7 − 2(0.5) = 6 cm.

=> The breadth (b) of the cuboid = 7 − 2x = 7 − 2(0.5) = 6 cm.

=> Volume = l × b × h = 6 × 6 × 0.5

=> Volume = 36 × 0.5 = 18 cm³.

Therefore The correct answer is 18 cm³.

Additional Information

Cuboid Dimensions from Square Sheet

If a square of side 'x' is cut from corners of a square sheet of side 'S', the resulting box has dimensions (S−2x) × (S−2x) × x.

Surface Area of Open Box

The surface area of an open-top cuboid is given by lb + 2h(l + b). In this case, it is also equal to (Original Area − 4 × Area of small squares).

Maximum Volume Condition

For a square sheet of side S, the volume is maximum when the cut-out square side x = S/6.

Q16. Answer: (c) Only argument I is strong

Global warming is the gradual heating of Earth's surface, oceans and atmosphere due to man-made causes.

The direct consequences of global warming are sea-level rise, increase in temperatures, risk to flora and fauna, water shortage etc.

Since these effects are already visible in our daily life, global warming has to be a real threat and not a misconception.

Hence only argument I is strong.

Q17. Answer: (b) A

Hence, figure A is the correct answer.

Q18. Answer: (b) Dipa Karmakar

• Dipa Karmakar is the first Indian female gymnast ever to compete in the Olympics.

• Dipa Karmakar:-

• She is an Indian artistic gymnast.

• She hails from Agartala, Tripura.

• She won a bronze medal at the 2014 Commonwealth Games in Glasgow, becoming the first Indian female gymnast to do so in the history of the Game.

• She also won a bronze medal at the Asian Gymnastics Championships.

• Karmakar represented India at the 2016 Summer Olympics in Rio de Janeiro, becoming the first Indian female gymnast ever to compete in the Olympics.

• In July 2018, Karmakar became the first Indian gymnast to win a gold medal at a global event, when she finished first in the vault event of the FIG Artistic Gymnastics World Challenge Cup at Mersin, Turkey.

• She has been awarded the Padma Shri in 2017.

• For her performance in Rio Olympics 2016, she was awarded the Rajiv Gandhi Khel Ratna award in August 2016.

Q19. Answer: (d) 27

The pattern followed here is:

Hence, 27 is the correct answer.

Q20. Answer: (d) Blackbuck

• Blackbuck is the state animal of Andhra Pradesh.

• Andhra Pradesh facts:-

Capital	**Amravati, Hyderabad**
CM	N. Chandrababu Naidu
Governor	Sri S. Abdul Nazeer
Lok Sabha Seats	25
Rajya Sabha Seats	11

• Symbols of Andhra Pradesh-

State Language	**Telugu**
State Bird	Rose-ringed parakeet
State Flower	Jasmine
State Tree	Neem
State Dance	Kuchipudi

Q21. Answer: (b) 9K

Alphabetical sheet with its Placed Value:

Hence, 9K is the correct answer.

Q22. Answer: (b) D

Hence, figure 2 is the correct answer.

Q23. Answer: (d) 319

Shortcut Trick

Required number = LCM(63, 105) + Remainder

63 = 21 × 3

105 = 21 × 5

LCM = 21 × 3 × 5 = 315

Result = 315 + 4 = 319

Therefore The correct answer is 319.

Alternate Method

Given: Divisors are 63 and 105. Remainder in each case is 4.

Formula Used: Required Number = LCM(Divisors) + Common Remainder

=> Prime factorization of 63 = $3^2 \times 7$

=> Prime factorization of 105 = 3 × 5 × 7

=> LCM = $3^2 \times 5 \times 7 = 9 \times 35 = 315$

=> Required Number = 315 + 4

=> Required Number = 319

Therefore The correct answer is 319.

Additional Information

LCM (Least Common Multiple)

The smallest positive integer that is perfectly divisible by two or more numbers. It is found by multiplying the highest powers of all prime factors present.

Different Remainder Case

If division by a, b, c leaves remainders x, y, z respectively such that (a−x) = (b−y) = (c−z) = k, the required number is LCM(a, b, c) − k.

Relationship between HCF and LCM

For two numbers A and B, the product of the numbers is equal to the product of their HCF and LCM: A × B = HCF × LCM.

Q24. Answer: (a) Narendra Modi

• Narendra Modi inaugurated the Dr. A.P.J. Abdul Kalam Memorial in Rameshwaram.

• The memorial for Dr. Kalam showcases his life and times in a remarkable manner.

• The Prime Minister also flagged off the Kalam Sandesh Vahini, an exhibition bus which shall travel across various States of the country and reach Rashtrapati Bhavan in New Delhi on October 15, which marks the birth anniversary of the former President.

• APJ Abdul Kalam –

• His full name was Avul Pakir Jainulabdeen Abdul Kalam.

• He was born and raised in Rameswaram, Tamil Nadu and studied physics and aerospace engineering.

• He was a scientist, a visionary, a writer, and a public servant.

• He came to be known as the Missile Man of India for his work on the development of ballistic missile and launch vehicle technology.

• He also played a pivotal organisational, technical, and political role in India's Pokhran-II nuclear tests in 1998.

• Kalam was elected as the 11th President of India in 2002.

• He was widely referred to as the "People's President" for his humbleness and connection with the people.

• He was honoured with the Padma Bhushan in 1981 and the Padma Vibhushan in 1990 for his work with ISRO and DRDO and his role as a scientific advisor to the Government.

• In 1997, Kalam received India's highest civilian honour, the Bharat Ratna, for his contribution to the scientific research and modernisation of defence technology in India.

• While delivering a lecture at the IIM Shillong, Kalam collapsed and died from a cardiac arrest on 27 July 2015 at the age of 83.

• Some of his famous book are –

• Wings of Fire, India 2020, Ignited Minds, Target 3 Billion.

Q25. Answer: (c) Counterfeit

Since Genuine is the meaning of word Real,

Similarly, Counterfeit is the meaning of the word Fake,

Hence, option 3 is the correct answer.

Q26. Answer: (c) Only argument 2 is strong

Choice of dress should not be considered as an excuse to abuse a person. Hence the argument 1 which suggests that revealing dresses causes or provokes a person to abuse another is not strong.

Undoubtedly, a person has the right to choose what to wear. Therefore argument 2 is strong.

Hence, only argument 2 is strong.

Q27. Answer: (a) Both arguments 1 and 2 are strong

• The stress and pressure of examination might lead to students engaging in rote learning. This will suppress the abilities of critical thinking and creativity among students.

Hence argument 1 is strong.

• Examinations create a sense of competition and provide insight into one's ability to perform

• The realization of one's abilities through self-analysis thus obtained along with the spirit of competition can help improve one's personality and confidence.

Therefore, argument 2 is strong.

Important Points

• Both arguments can be strong at a time because we can have an examination that is not in the written form and yet evaluates the students' learning and progress

Q28. Answer: (d) Density

Concept:

• The magnitude of the buoyant force depends on the density of the fluid.

• Buoyancy or upthrust is an upward force exerted by a fluid that opposes the weight of an immersed object.

• In a column of fluid, pressure increases with depth as a result of the weight of the overlying fluid.

• Thus the pressure at the bottom of a column of fluid is greater than at the top of the column.

• If the object is less dense than the liquid, the force can keep the object afloat.

• Ex:- A ship will float even though it may be made of steel (which is much denser than water), because it encloses a volume of air (which is much less dense than water), and the resulting shape has an average density less than that of the water.

• Archimedes' principle:-

• The concept of buoyancy can be traced back to Archimedes' principle given in 212 BC.

• "Any object, wholly or partially immersed in a fluid, is buoyed up by a force equal to the weight of the fluid displaced by the object".

Q29. Answer: (b) West Bengal

• West Bengal won the Santosh Trophy for the 32nd time in 2017.

• West Bengal defeated Goa 1-0 to lift the trophy.

• Santosh Trophy:-

• It is a football knock-out competition contested by the regional state associations and government institutions under the All India Football Federation (AIFF).

• The tournament is held every year with 31 teams who are divided into groups and who must qualify for the tournament proper through the preliminary round.

• The tournament was started in 1941 and is named after the president of the then West Bengal's football association Sir Manmatha Nath Roy Chowdhary of Santosh.

• Recent winners:-

Year	Teams in Final	Winner
2017-2018	Kerala v/s West Bengal	Kerala
2018-2019	Services v/s Punjab	Services

• Player records

• Tournament top scorer: Inder Singh (Punjab) (45 goals)

• Most goals in a single tournament: Inder Singh (Punjab) (23 goals – 1973–74)

• Most goals in a single match: N. Pagsley (West Bengal) and Inder Singh (Punjab) (7 goals).

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Q30. Answer: (a) Cousin

Using the following notations, we can draw the family tree:

The best possible diagram is as follows,

Hence, Somu and Mathur are cousins of each other.

Q31. Answer: (d) Muhammad-bin-Tughlaq

• Muhammad-bin-Tughlaq, the Sultan of Delhi shifted his capital from Delhi to Daulatabad.

• Muhammad bin Tughluq (also Prince Fakhr Malik Jauna Khan, Ulugh Khan; died 20 March 1351) was the Sultan of Delhi from 1325 to 1351.

• He was the eldest son of Ghiyas -ud -Din -Tughlaq, the founder of the Tughluq dynasty.

• Ibn Battuta, the famous traveler, and jurist from Morocco was a guest at his court and wrote about his suzerainty in his book.

• He attempted to shift his capital from Delhi to Daulatabad, which was supposed to be a more central location, but it was a disastrous decision.

Ruler	Reign
Ghiasuddin Tughlaq	1321 - 1325
Muhammad Bin Tughlaq	1325 – 1351
Firuz Shah Tughlaq	1351 - 1388
Various subsequent rulers	1388 - 1413

Q32. Answer: (a) 6 units

• 1 unit = 1 Kwh (Kilo Watt hour)

• Total consumption = 750W x 8 hours = 6000 watt hour

• as 1 KW = 1000W

• Hence, 6000 watt hour = 6 KWh = 6 units

• Total Energy consumed = 6 units

Q33. Answer: (a) 12 × 6 × 7

Shortcut Trick

Identify the Highest Common Factor (HCF) of 72 and 84.

72 = 12 × 6 and 84 = 12 × 7.

The HCF is 12. Since 6 and 7 are co-prime numbers, the LCM is HCF × remaining factors.

LCM = 12 × 6 × 7.

Therefore The correct answer is 12 × 6 × 7.

Alternate Method

Given: Numbers are 72 and 84.

Formula Used: LCM = Product of numbers ÷ HCF (or via Prime Factorization).

Calculations:

=> Prime factors of 72 = $2^3 \times 3^2 = 8 \times 9$

=> Prime factors of 84 = $2^2 \times 3 \times 7 = 4 \times 3 \times 7$

=> LCM = $2^3 \times 3^2 \times 7 = 8 \times 9 \times 7 = 504$

=> Looking at the options: 12 × 6 × 7 = 72 × 7 = 504

Therefore The correct answer is 12 × 6 × 7.

Additional Information

LCM and HCF Relationship

The product of two numbers is always equal to the product of their LCM and HCF. Formula: n1 × n2 = LCM × HCF.

Co-prime Numbers

If two numbers are co-prime (HCF = 1), then their LCM is simply the product of the two numbers.

LCM of Fractions

To find the LCM of fractions, use the formula: LCM of numerators ÷ HCF of denominators.

Q34. Answer: (d) Data in II alone is sufficient

Given Statements:

We know that the color of Sunflower is yellow.

From statement I, we cannot determine what is yellow called and hence it is not sufficient to answer the question.

From statement II, we see that yellow is called purple.

Therefore, the colour of Sunflower as per the coding must be purple.

Thus, data in statement II is sufficient to answer the question.

Hence, data in statement II alone is sufficient to answer the question.

Q35. Answer: (c) Silicon

• A solar cell is made up of Silicon.

• A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect.

• Photovoltaic modules often have a sheet of glass on the sun-facing side, allowing light to pass while protecting the semiconductor wafers.

• The photovoltaic effect was experimentally demonstrated first by French physicist Edmond Becquerel.

• The solar cell works in several steps:

• Photons in sunlight hit the solar panel and are absorbed by semiconducting materials, such as doped silicon.

• Electrons are excited from their current molecular/atomic orbital.

• The excited electron travels leaving holes behind.

• The potential difference thus produces current.

• The chemical bonds of the material are vital for this process, and usually, silicon is used in two layers, one layer being doped with boron, the other phosphorus.

• An array of solar cells converts solar energy into a usable amount of direct current (DC) electricity.

• An inverter converts direct current to alternating current (AC).

Q36. Answer: (c) 40

Shortcut Trick

Ratio of Boys to Girls by Alligation:

(Girls Mean − Overall) : (Overall − Boys Mean) = (14.5 − 13.1) : (13.1 − 12.5)

Ratio = 1.4 : 0.6 = 7 : 3

If 7 units = 28 boys, then 1 unit = 4 students.

Total students = (7 + 3) × 4 = 10 × 4 = 40 students.

Therefore The correct answer is 40 students.

Alternate Method

Given: Number of boys (n_b) = 28, Boys mean score = 12.5, Girls mean score = 14.5, Overall mean = 13.1.

Formula Used: Overall Mean = (n_b × Mean_b + n_g × Mean_g) ÷ (n_b + n_g)

=> Let the number of girls be n_g.

=> 13.1 = (28 × 12.5 + n_g × 14.5) ÷ (28 + n_g)

=> 13.1 × (28 + n_g) = 350 + 14.5n_g

=> 366.8 + 13.1n_g = 350 + 14.5n_g

=> 14.5n_g − 13.1n_g = 366.8 − 350

=> 1.4n_g = 16.8

=> n_g = 16.8 ÷ 1.4 = 12 girls

=> Total Students = Boys + Girls = 28 + 12 = 40 students.

Therefore The correct answer is 40 students.

Additional Information

Weighted Average Formula

The combined mean of two groups is calculated as (n1x1 + n2x2) ÷ (n1 + n2), where n is the count and x is the individual average.

Rule of Alligation

It relates the quantities of two components to the mean value. The ratio of the quantities is the inverse of the differences between the component values and the mean.

Mean Score Concept

Mean = Total Sum ÷ Number of Observations. Total sum of scores = Mean × Total number of students.

Q37. Answer: (b) 100

• Coins of Rs. 100 denomination were introduced by the Reserve Bank of India (RBI) to mark MG Ramachandran's 102^(nd)birth centenary.

• MG Ramachandran's -

• His full name was Maruthur Gopala Ramachandran, and was popularly known as MGR.

• He was an Indian actor, filmmaker and politician.

• He served as the Chief Minister of Tamil Nadu for ten years between 1977 and 1987.

• He was popularly known as "Makkal Thilagam" (People's King) as he was popular with the masses.

• He became a member of the C. N. Annadurai-led Dravida Munnetra Kazhagam (DMK party) and rapidly rose through its ranks, using his enormous popularity as a film star.

• In 1972, he left the DMK, then led by Karunanidhi, to form his own party—the All India Anna Dravida Munnetra Kazhagam (AIADMK).

• After his death in 1987, he became the third Chief Minister from the state of Tamil Nadu to receive the Bharat Ratna after C. Rajagopalachari and K. Kamaraj.

Q38. Answer: (b) Mercury

Element Mercury is represented by the given symbol.

• Mercury:-

• It is commonly known as quicksilver and was formerly named hydrargyrum.

• Mercury is the only metallic element that is liquid at room temperature.

• Mercury occurs in deposits throughout the world mostly as cinnabar (mercuric sulfide).

• Mercury is used in -

• thermometers, barometers, manometers, sphygmomanometers, float valves, mercury switches, mercury relays, fluorescent lamps etc.

• Mercury dissolves many metals such as gold and silver to form amalgams.

Symbol	**Hg**
Atomic Number (Z)	80
Block in periodic table	d block
Melting Point	-38.8°c
Boiling Point	356.7°c

Additional Information

• Dalton was the first scientist to use symbols to represent elements in a short way.

Q39. Answer: (c) Neither A nor B is true

None of the given statements are true.

• In Oxygen gas, the speed of sound is 316 m/s and not 316 km/s.

• In water (distilled), the speed of sound is around 1498 m/s and not 1498 km/s.

Key Points

• Sound travels at different speeds depending on what it is traveling through.

• Of the three mediums (gas, liquid, and solid) sound waves travel the slowest through gases, faster through liquids, and fastest through solids. Temperature also affects the speed of sound.

• At freezing (0º Celcius), sound travels through air at 331 meters per second, but, at 20ºC, room temperature, sound travels at 343 meters per second.

• Sound travels faster in liquids than in gases because molecules are more tightly packed.

• Sound travels fastest through solids. This is because molecules in a solid medium are much closer together than those in a liquid or gas, allowing sound waves to travel more quickly through it.

Additional Information

Speed of sound in different media at 25 ºC		
State	Medium	Speed of sound (m/s)

Solid	Solids Aluminium	6420
Nickel	6040	
Steel	5960	
Iron	5950	
Brass	4700	
Glass (Flint)	3980	
liquid	Liquids Water (Sea)	1531
Water (distilled)	1498	
Ethanol 1207	1207	
Methanol	1103	
gas	Gases Hydrogen	1284
Helium	965	
Air	346	
Oxygen	316	
Sulfur dioxide	213	

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

Q40. Answer: (a) Statements 1, 2, 3 and 4 together are sufficient

Let us check every statement individualy,

1. Nitu is the tallest → Data in this statement is inadequate since, only 1 person is mentioned here. Therefore statement 1 alone is not sufficient.

2. Tarun is taller than Manav → Data in this statement is inadequate since, only 2 persons are mentioned here. Therefore statement 2 alone is not sufficient.

3. Hema is the shortest of them all → Data in this statement is inadequate since, only 1 persons is mentioned here. Therefore statement 3 alone is not sufficient.

4. Manav is taller than Priya → Data in this statement is inadequate since, only 2 persons are mentioned here. Therefore statement 4 alone is not sufficient.

Since, no statement alone is sufficient now we can go through the options given,

From 1^(st) option combining all 1, 2, 3, and 4 statement together we get,

Nitu > Tarun > Manav > Priya > Hema

Hence, “Statements 1, 2, 3 and 4 together are sufficient”.

Q41. Answer: (a) Amoeba

• Amoeba reproduces by binary fission.

• An amoeba is a type of unicellular organism which has the ability to alter its shape, primarily by extending and retracting pseudopods.

• Binary Fission:-

• It is a kind of asexual reproduction in which the organism divides itself in two.

• It occurs in some single-celled Eukaryotes like the Amoeba and the Paramoecium.

• In binary fission, the fully grown parent cell splits into two halves, producing two pools.

• After replicating its genetic material, the parent cell divides into two equal sized daughter cells.

• The daughter cells are genetically identical.

Q42. Answer: (b) 24

Shortcut Trick

Sides are in ratio 3 : 4 : 5, which is a Pythagorean triplet, making it a Right-angled triangle.

Perimeter units = 3 + 4 + 5 = 12 units → 120 m. So, 1 unit = 10 m.

Sides are 30 m, 40 m, and 50 m (hypotenuse).

Perpendicular to the largest side (hypotenuse) = (Base × Perpendicular) ÷ Hypotenuse = (30 × 40) ÷ 50 = 24 m.
Therefore The correct answer is 24 m.
Alternate Method
Given: Ratio of sides = 3 : 4 : 5; Perimeter = 120 m.
Formula Used: Area of Right Triangle = 1/2 × Base × Height = 1/2 × Hypotenuse × Perpendicular distance (p).
=> Let sides be 3x, 4x, and 5x.
=> 3x + 4x + 5x = 120 => 12x = 120 => x = 10.
=> Sides are a = 30 m, b = 40 m, c = 50 m (Largest side).
=> Area = 1/2 × 30 × 40 = 600 m².
=> Area also = 1/2 × Largest side × Perpendicular distance (p).
=> 600 = 1/2 × 50 × p => 600 = 25 × p.
=> p = 600 ÷ 25 = 24 m.
Therefore The correct answer is 24 m.
Additional Information
Right-Angled Triangle Properties
In a right triangle with legs a, b and hypotenuse c, the altitude to the hypotenuse p = (a × b) ÷ c.
Heron's Formula
For any triangle, Area = √[s(s−a)(s−b)(s−c)], where s is the semi-perimeter (a+b+c)/2.
Pythagorean Triplets
Common ratios like (3,4,5), (5,12,13), and (8,15,17) always form a right-angled triangle.

Q43. Answer: (c) 6^(th)

• Mathura Refinery, the 6^(th) refinery of Indian oil was commissioned in 1982 with a capacity of 6.0 MMTPA to meet the demand of petroleum products in north western region of India.
• Indian Oil Corporation Limited:-
• It is an Indian state government owned oil and Gas Company.
• It is the largest commercial oil company in the country.
• In May 2018, IOCL become India's most profitable state-owned company for the second consecutive year.

Headquarter	**New Delhi**
Founded	30 June 1959
Chairman	Sanjiv Singh

• Refineries of IOCL:-
• Barauni Refinery
• Bongaigaon Refinery
• CPCL, Chennai
• CPCL, Narimanam
• Digboi Refinery
• Guwahati Refinery
• Haldia Refinery
• Koyali Refinery
• Mathura Refinery
• Panipat Refinery
• Paradip Refinery

Q44. Answer: (b) Musical toys

The highest revenue for the company is Musical toys (45% of the total revenue). Revenue of other toys are lesser than Musical toys.

Q45. Answer: (c) Blood is white or red vascular connective tissue.

• Blood is a fluid connective tissue because it has a matrix.
• The Blood consists of red blood cells also called erythrocytes, and white blood cells also called leukocytes and Plasma.
• The life span of human RBC is 115-120 days.

• There is about 5-6 litres of blood in an adult person.
• The vascular system is also known as the circulatory system.
• Heart, artery veins and capillaries with all body fluids are part of this system.

Q46. Answer: (a) 119

Square root of 14161
√14161 = √(7 × 7 × 17 × 17) = 7 × 17 = 119

Q47. Answer: (c) 60/11 min past 4 o'clock

Angle between 4 o' clock and 5 o'clock will 90° if minute hands cover 5 min
Distance covered by hours hands in 5 min
At 4 o'clock the minute hands is 20 minute spaces apart from the hour hand.
To be 90° between 4 o'clock and 5 o'clock, the minute hands must gain 5 minute
As we know,
55 minute are gained in = 60 min
5 minute are gained in = (60/55) × 5 = 60/11 minute
Required time = 60/11 min past 4 o'clock.

Q48. Answer: (a) 411

Given Expression: 27 ÷ 15 - 36 + 6
Decoding the information,

Symbols	•	•	×	÷
Codes	÷	•	•	×

On converting given expression: 27 × 15 + 36 ÷ 6
Applying bodmas rule,
= 27 × 15 + 36 ÷ 6
= 27 × 15 + 6
= 405 + 6
= 411
Hence, 411 is the correct answer.

Q49. Answer: (d) Water

• MgCl2is highly soluble in water.
• MgCl2
• Natural Extraction:-
• The hydrated magnesium chloride can be extracted from brine (highly saline water) or sea water.
• Magnesium chloride, as the natural mineral bischofite, is also extracted out of ancient seabeds.
• Some magnesium chloride is made from solar evaporation of seawater.
• Preparation from the Dow process:-
• In the Dow process, magnesium chloride is regenerated from magnesium hydroxide using hydrochloric acid.
• Mg(OH)2(s) + 2 HCl → MgCl2(aq) + 2 H2O (l)
• Applications of MgCl2:-
• MgCl2 is the main precursor to metallic magnesium. Metallic magnesium can be obtained by electrolysis of MgCl_(2.)
• Magnesium chloride is one of many substances used for dust control, soil stabilization, and wind erosion mitigation.
• It is also used as a catalyst to speed up certain reactions.
• It is used for low-temperature de-icing of highways, sidewalks, and parking lots.

Q50. Answer: (c) Urethra

• The secretion from the prostate gland enters into the Urethra.
• The Prostate:-
• The prostate is an exocrine gland (glands with ducts) of the male reproductive system in most mammals
• It is a walnut-sized gland located between the bladder and the penis.

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• The prostate is just in front of the rectum. The urethra runs through the center of the prostate, from the bladder to the penis, letting urine flow out of the body.

• The function of the prostate is to secrete a fluid that contributes to the volume of the semen.

• The secreted fluid nourishes and protects sperm.

• During ejaculation, the prostate squeezes this fluid into the urethra, and it's expelled with sperm as semen.

Q51. Answer: (c) [figure]

Truck and Van both are transport vehicles.

So, the least Possible Venn Diagram:

Hence, figure 3 is the correct answer.

Q52. Answer: (c) Sports

The Government of India's 'Khelo India' programme is related to Sports category.

• Khelo India:-

• It was introduced by Ministry of Sports and Youth affairs to revive sports culture in India at grass-root level.

• Its objective is to build strong framework for all sports played in our country and establish India as great sporting nation.

• It is expected to help scout young talent from schools in various disciplines and groom them as future sports champions.

• Talented players will be identified under it in priority sports disciplines at various levels by High-Powered Committed and each will be provided annual financial assistance of Rs. 5 lakh for 8 years.

Q53. Answer: (d) 800

Let the total number of the audience be x.

Number of children in program = x × (1/8) = x/8

Number of men in program = x × (2/5) = 2x/5

Number of women in program = x - (1/8) - (2x/5) = 19x/40

According to the question

19x/40 = 380

x = 380 × (40/19) = 800

The total audience in the program is 800.

Alternate MethodLet the the number of audience be 40 (LCM of 8 and 5)

Then, Number of children = 1/8 × 40 = 5

Number of Men = 2/5 × 40 = 16

Therefore, number of women = 40 - 21 = 19

Actual number of women = 380

On comparing,

19 ------- 380

1 ---------20

Total audience in the program = 20 × 40 = 800

Therefore, the total audience in the program was 800.

Q54. Answer: (b) Only argument I is strong.

Household chores are not a part of formal education and hence cannot be learned from schools. Therefore, argument II is not strong.

On the other hand, participating in household chores helps children develop a greater sense of responsibility, accomplishment and well-being. They might also develop fine motor skills during the process. Therefore, argument I is strong.

Hence only argument I is strong.

Q55. Answer: (b) 120 km

Shortcut Trick

Time saved (2 hours) = 4/5 × Time spent on train in mixed journey.

=> Actual train time = (2 × 5) ÷ 4 = 2.5 hours.

=> Actual air time = 4 − 2.5 = 1.5 hours.

=> Speed of air = Total distance ÷ (Total time − saved time) = 480 ÷ 2 = 240 kmph.

=> Distance covered by air = 240 × 1.5 = 360 km.

=> Distance by train = 480 − 360 = 120 km.

Therefore The correct answer is 120 km.

Alternate Method

Given:

Total distance = 480 km | Total time (mixed) = 4 hours | Time saved by air = 2 hours.

Formula Used:

Speed = Distance ÷ Time | Distance = Speed × Time

Total Distance = 480 km

Train Part

Air Part

Time: 2.5 h

Time: 1.5 h | Speed: 240 kmph

Total Time (Mixed) = 4 hours

Calculations:

=> Time taken if traveled all way by air = 4 − 2 = 2 hours.

=> Speed of air = 480 ÷ 2 = 240 kmph.

=> Time saved (2 hours) = 4/5 of actual train time (t_(train)).

=> 2 = 4/5 × t_(train)

=> t_(train) = (2 × 5) ÷ 4 = 2.5 hours.

=> Time spent in air during mixed journey = 4 − 2.5 = 1.5 hours.

=> Distance covered by air = Speed × Time = 240 × 1.5 = 360 km.

=> Distance covered by train = Total Distance − Distance by air

=> Distance covered by train = 480 − 360 = 120 km.

Therefore The correct answer is 120 km.

Additional Information

Average Speed Formula

Average Speed is the total distance divided by total time: V_(avg) = (D1 + D2) ÷ (T1 + T2).

Inverse Proportionality

When distance is constant, speed (S) is inversely proportional to time (T). Thus, S1 ÷ S2 = T2 ÷ T1.

Relative Speed

For objects moving in the same direction, relative speed = S1 − S2. For opposite directions, relative speed = S1 + S2.

Q56. Answer: (c) D

In each figure, except figure D the arrow is attached at the corner of the figure, where in figure D, it is attached to the one of the sides of hexagon.

Hence, figure D is odd one out.

Q57. Answer: (c) 7

The correct answer is 7.

Mistake Points

• But depending on the author in some books they don't consider boron and polonium as metalloids due to their major inclined behavior towards one side.

• Either being non metallic or metallic.

• Also polonium being radioactive as well.

• There are seven metalloid or semi-metals -

Boron (B), Silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te), Polonium.

• The zig-zag line separates them, You can see the NCERT Class 10 science book, page 89 under section Metal and metallic properties for more details.

Key Points

• There are 7 metalloids in the modern periodic table.

• The seven commonly recognized metalloids are:-

• Boron (B), Silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te), Polonium.

• Metalloids Silicon and Germanium are widely used in the semiconductor industry.

Additional Information

Metalloid:-

• A metalloid is a type of chemical element which has properties in between, or that are a mixture of, those of metals and nonmetals.

Properties of Metalloids:-

• Most of their other physical properties and chemical properties are intermediate in nature.

• Typical metalloids have a metallic appearance.

• They are brittle and only fair conductors of electricity.

• Chemically, they behave mostly as nonmetals.

• They can form alloys with metals.

• They are lustrous in appearance.

• Their oxides are amphoteric or weakly acidic.

Q58. Answer: (c) 1 April 2017

• The General Anti-Avoidance Rule (GAAR) introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on 1 April 2017.

• General anti-avoidance rule (GAAR):-

• The General Anti-Avoidance Rule (GAAR) introduced in the 2012 – 13 budget speech by the then Finance Minister Pranab Mukherjee was finally implemented on 1 April 2017.

• General anti-avoidance rule (GAAR):-

• It is an anti-tax avoidance law under the Income Tax Act, 1961 of India.

• It scans the deals and arrangements specifically made to avoid taxes.

• GAAR was originally proposed in the Direct Tax Code 2009.

• GAAR was finally introduced in India by then Finance Minister, Pranab Mukherjee, on 16 March 2012 during the Budget session.

• However, it was considered controversial because it had provisions to seek taxes from past overseas deals involving local assets retrospectively.

• GAAR is finally applicable from assessment year 2018-19.

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• However, it was considered controversial because it had provisions to seek taxes from past overseas deals involving local assets retrospectively.

• GAAR is finally applicable from assessment year 2018-19.

• Features of GAAR:-

• The regulation allows tax officials to deny tax benefits, if a deal is found without any commercial purpose other than tax avoidance.

• It allows tax officials to target participatory notes. Under GAAR, the investor has to prove that the participatory note was not set to avoid taxes.

• It also allows officials to deny double taxation avoidance benefits, if deals made in tax havens were found to be avoiding taxes.

• Vodafone-Hutchison Essar Case –

• - The first big profile case, that highlighted the need of GAAR.

• In 2007, Vodafone entered the Indian market by buying Hutchison Essar.

• The deal took place in far off Cayman Islands, where Indian authorities had no say.

• The Indian government claimed that over US$2 billion (INR 20,000 crores) were intentionally avoided as tax.

• In September 2007, a notice was sent to Vodafone regarding tax avoidance.

• Vodafone claimed that the transaction was not taxable as it was between two foreign firms.

• The government claimed that the deal was taxable as the underlying assets involved were located in India.

• In 2012, the Supreme Court of India gave the verdict in favour of Vodafone, saying that Vodafone did not owe any capital gain taxes.

Q59. Answer: (a) C

Hence, figure 1 is the correct answer.

Q60. Answer: (b) 8

Shortcut Trick

Rewrite the equation as $(x - 2)^2 = 36$.

Take the square root on both sides: $x - 2 = \pm 6$.

Two possible values for x: 2 + 6 = 8 or 2 − 6 = −4.

Since the condition specifies x in N (Natural Numbers), we exclude −4.

Therefore The correct answer is 8.

Alternate Method

Given: $(x - 2)^2 - 36 = 0$ where x is a natural number.

Formula Used: $a^2 - b^2 = (a - b)(a + b)$

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

=> $[(x - 2) - 6][(x - 2) + 6] = 0$

=> $(x - 8)(x + 4) = 0$

=> Case 1: $x - 8 = 0 \Rightarrow x = 8$

=> Case 2: $x + 4 = 0 \Rightarrow x = -4$

=> According to the question, x in N (Natural Numbers start from 1, 2, 3...).

=> Therefore, x = −4 is rejected as it is a negative integer.

=> x = 8.

Therefore The correct answer is 8.

Additional Information

Natural Numbers (N)

Natural numbers are positive integers beginning from 1 and extending to infinity (1, 2, 3, 4...). They do not include 0, fractions, or negative numbers.

Quadratic Equations

An equation of the form $ax^2 + bx + c = 0$ is a quadratic equation. It usually has two roots, which can be found via factorization or the quadratic formula $x = [-b \pm \sqrt{(b^2 - 4ac)}] \div 2a$.

Identity of Difference of Squares

The expression $a^2 - b^2$ is always equal to $(a - b)(a + b)$. Recognizing perfect squares like 36 (6^2) allows for faster factorization in such equations.

Q61. Answer: (c) North-East

Drawing the diagram according to the given information:

From the diagram,

Here Anil is facing in east direction, after turning 90° clockwise, he will face south direction,

From South if he again turns 135° in anti-clockwise direction, he will be face north-east direction,

Hence, ‘North-east’ is the correct answer.

Q62. Answer: (d) SM Khan

• SM Khan is the Author of the book “The people’s president: Dr. APJ Abdul kalam”.

• About the book:-

• SM Khan has written his debut book on the "People's President Dr. APJ Abdul Kalam".

• The book shares his experiences with Dr. Kalam during and post presidency.

• It provides insight into various facets of Dr. Kalam's life including important highlights of his travel in India and abroad.

• S.M. Khan:-

• He is a 1982-batch Indian Information Service (IIS) officer of Government of India currently serving as Director General (Press Registrar and Head of Department), Registrar of Newspapers for India.

• Khan served as Press Secretary to the Hon’ble President of India (2002 to 2007) Dr. APJ Abdul Kalam.

Q63. Answer: (b) Captain Amarinder Singh

The correct answer is Captain Amarinder Singh.

Key Points

• Captain Amarinder Singh is the Chief Minister of Punjab as of 1st March 2021.

• Navjot Singh Sidhu- Navjot Singh Sidhu is an Indian politician, television personality, and former cricketer. He was the Minister of Local Government, Tourism & Cultural Affairs of the State of Punjab from 2017 to 2019.

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• Prakash Singh Badal- Parkash Singh Badal is an Indian politician who was Chief Minister of Punjab state from 1970 to 1971, from 1977 to 1980, from 1997 to 2002, and from 2007 to 2017. He is also the patron of Shiromani Akali Dal (SAD), a Sikh-centered regional political party.

Additional Information

• Basic Information about Punjab:

• Capital: Chandigarh

• Governor: Banwarilal Purohit

• Chief Minister: Bhagwant Mann

• State Animal: Blackbuck

• State Bird: Baaz

• State Aquatic Animal: Indus River Dolphin

Q64. Answer: (b) (7x - 1) (8x + 1) = 0

Shortcut Trick

If x = a/b is a root of an equation, then (bx − a) is a factor of that equation.

For the root x = 1/7, the factor is (7x − 1).

For the root x = −1/8, the factor is (8x + 1).

The required quadratic equation is the product of these two factors.

Therefore The correct answer is (7x − 1) (8x + 1) = 0.

Alternate Method

Given: The roots of the quadratic equation are x1 = 1/7 and x2 = −1/8.

Formula Used: A quadratic equation with roots x1 and x2 is expressed as (x − x1)(x − x2) = 0.

=> (x − 1/7) × (x − (−1/8)) = 0

=> (x − 1/7) × (x + 1/8) = 0

=> ((7x − 1) / 7) × ((8x + 1) / 8) = 0

=> (7x − 1)(8x + 1) / 56 = 0

=> (7x − 1)(8x + 1) = 0 × 56

=> (7x − 1)(8x + 1) = 0

Therefore The correct answer is (7x − 1) (8x + 1) = 0.

Additional Information

Sum and Product of Roots

For a standard quadratic equation ax2 + bx + c = 0, the Sum of roots (α + β) = −b/a and the Product of roots (αβ) = c/a.

Nature of Roots

The nature of roots is determined by the Discriminant (D) = b2 − 4ac. If D > 0, roots are real and distinct; if D = 0, roots are real and equal; if D < 0, roots are imaginary.

Factor Theorem

If x = k is a root of the polynomial f(x), then (x − k) is a factor of f(x). This is used to reconstruct the equation from its roots.

Q65. Answer: (b) 2 ms^(-2)

CONCEPT:

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

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

CALCULATION:

Given that:

Force = 200 Newton (N)

Mass = 100 kg

We know that, F = ma

putting values, 200 N = 100 kg x a

a (acceleration) = F/m = 200/100 = 2 ms-2

Thus, an object weighing 100Kg, when subjected to a force of 200 N, is accelerated by 2 ms-2.

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Q66. Answer: (d) Cardigan

Table, Chair and Cupboard all three are made up of furniture.

Whereas Cardigan is one type of winter wear.

Hence, Cardigan is the correct answer.

Q67. Answer: (c) 7:00

For every mirror image based on a clock,

If it is a 12 hours clock, then subtract the given time from 11:60 hrs.

And if it is a 24 hr clock, then subtract the given time from 23:60 hrs.

Here, it is a 12 - hr analog clock, hence, 11:60 – 5:00 = 6:60 I.e. 7:00

Hence, the mirror image time will be 7'O clock.

Hence, 7:00 is the correct answer.

Additional Information

• Real time + Water image time = 18 : 30 (If the water image time is 6 more than the imaginary time).

• If the imagery time in water image time is less than 6, then the given imagery time is subtracted to 6:30.

Q68. Answer: (b) Only conclusion 1 follows

The least possible Venn diagram is as follows,

Conclusions:

1) No swan is a cuckoo → True, as all swans are parrots and no parrot is cuckoo, no swan will be a cuckoo

2) All parrots are swans → False, it is possible but not definite.

Hence, only conclusion 1 follows.

Q69. Answer: (c) Aluminum

Aluminum is the elements which has the electronic configuration 2, 8, 3.

Chemical Symbol	**Al**
Atomic Number	13
Block in Periodic table	P block
Discovered by	Hans Christian Ørsted in 1824

• It is a silvery-white, soft, non-magnetic and ductile metal in the boron group.

• It is the third most abundant element after oxygen and silicon.

• It is the most abundant metal in the Earth's crust.

• Bauxite ore is the main source of aluminium.

Q70. Answer: (b) 2r

Shortcut Trick

In a cyclic quadrilateral, the internal bisector of an angle meets the circumcircle at the midpoint of the arc subtended by the opposite angle.

Let arc BCD = θ1 and arc DAB = θ2. Since ABCD is cyclic, θ1 + θ2 = 360°.

Point X is the midpoint of arc BCD, and point Y is the midpoint of arc DAB.

The angular distance between X and Y is θ1/2 + θ2/2 = (360°)/2 = 180°.

Since the angular distance is 180°, the line segment XY must be a diameter of the circle.

Therefore The correct answer is 2r.

Alternate Method

Given:

Radius of the circle = r

ABCD is a cyclic quadrilateral.

AX is the bisector of angle DAB and CY is the bisector of angle BCD.

Formula Used:

Sum of opposite angles in a cyclic quadrilateral = 180°

Length of a chord subtending 180° at the center = 2r (Diameter)

A

B

C

D

Q71. Answer: (a) 8.5 A

CONCEPT:

• Ohm's law: At constant temperature and other physical quantities, the potential difference across a current-carrying wire is directly proportional to the current flowing through it.

V= R I

Where V is the potential difference, R is resistance and I is current

CALCULATION:

Given that:

In first instance, V = 60 volts, I = 4 Ampere

Therefore, Resistance (R) = V/I = 60/4 = 15 Ohms

In second instance, V = 127.5 Volts and R (as calculated above) = 15 Ohms.

Therefore, Current (I) = V/R = 127.5/15 = 8.5 Ampere.

• Thus, the heater will draw a current of 8.5 Ampere, if the potential difference is changed to 127.5 V. So option 1 is correct.

Q72. Answer: (b) A and B

• Statement A and B are Incorrect.

• The correct statements are:-

• A - Elemental carbon (and not carbon dioxide) is being oxidized into carbon dioxide.

• B - Lead Oxide (and not Lead) is getting reduced to Elemental Lead.

• C - Correct - Carbon is getting oxidized.

• D - Correct - Lead oxide is getting reduced.

Q73. Answer: (b) D

Here except figure D, all figures consist of different mathematical shapes.

Whereas figure D consists of same mathematical shape.

Hence, figure D is odd one out.

Q74. Answer: (c) a

In all figures except figure a, the dots are on either side of the line,

Whereas, in figure a, dots are on the same side of the line.

Hence, option 3 is the correct answer.

Q75. Answer: (c) 3 ms^(-1)

Shortcut Trick

Total Distance covered by Kiran = 360 m

Total Time taken in seconds = 2 × 60 = 120 seconds

Average Speed = Total Distance ÷ Total Time = 360 ÷ 120

Therefore The correct answer is 3 ms^(−1).

Alternate Method

Given:

Pool Length = 90 m

Total Distance = 360 m

Time = 2 minutes

Formula Used:

Average Speed = Total Distance / Total Time

Calculations:

=> Total Time = 2 × 60 = 120 seconds

=> Average Speed = 360 / 120

=> Average Speed = 3 ms^(−1)

Therefore The correct answer is 3 ms^(−1).

Additional Information

Average Speed vs Average Velocity

Average speed is the total distance divided by total time, whereas Average velocity is the net displacement divided by total time. In this case, since Kiran returns to the starting point twice, her net displacement is zero, making her average velocity 0 ms^(−1).

Unit Conversion

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

Q76. Answer: (a) Epidermal cells

• Skin is made up of Epidermal cells.

• Epidermal cells:-The epidermis is the outer of the two layers that make up the skin.

• The epidermal cells perform a barrier function in the human body, protecting against the invasion of bacteria and foreign particles and regulating the amount of water released from the body.

• Connective Tissues:-

• The human body is composed of just four basic kinds of tissue: nervous, muscular, epithelial, and connective tissue.

• Connective tissue is the most abundant, widely distributed, and varied type.

• It includes fibrous tissues, fat, cartilage, bone, bone marrow, and blood. As the name implies, connective tissues often bind other organs together, hold organs in place, cushion them, and fill space.

Additional Information

Type of connective Tissue	Function
Areolar (loose) connective tissue	Nourishes and cushions epithelia, provides arena for immune defense against infection, binds organs together, allows passage for nerves and blood vessels through other tissues.
Adipose Tissue (Fat)	Stores energy, conserves body heat, cushions and protects many organs, fills space, shapes body
Dense Irregular connective tissue	Toughness; protects organs from injury; provides protective capsules around many organs
Dense regular connective tissue	Binds bones together and attaches muscle to bone; transfers force from muscle to bone.
Cartilage	Eases joint movements; resists compression at joints; holds airway open; shapes outer ear; moves vocal cords; forerunner of fetal skeleton; growth zone of children's bones
Bone	Physically supports body, provides movement, encloses and protects soft organs, stores and releases calcium and phosphorus
Blood	Transports nutrients, gases, wastes, hormones

• Parenchyma:-

• Parenchyma is a term used to describe the functional tissues in plants and animals.

• This tissue is “functional” – performing tasks such as photosynthesis in plants or storing information in the human brain – as opposed to “structural” tissues like wood in plants or bone in animals.

• In animals “parenchyma” refers to the cells that perform the biological function of the organ – such as lung cells that perform gas exchange, liver cells that clean blood, or brain cells that perform the functions of the brain.

• Permanent Tissues:-

• In simple words, the permanent tissues in a plant are those tissues that contain non-dividing cells.

• The cells are also modified to perform specific functions in the plants. The cells of the permanent tissue are derived from the meristematic tissue.

• Simple permanent tissue:- These tissues are simple and are made up of only one type of cell. Here, all the cells that make up the tissue are similar and have the same structure, with the same type parts.

• Some simple permanent tissues are:- parenchyma, collenchyma, sclerenchyma.

• Complex Permanent tissue:- The complex permanent tissues are made up of more than one type of cell.

• They coordinate together to perform the same specialized functions in the plant body.

• They are classified into two types – Xylem and Phloem

Q77. Answer: (d) 9

We can count the triangles as follows,

Hence, 9 triangles are present in the given figure.

Q78. Answer: (c) Nuclear energy

Key Points

• The energy obtained from atoms is known as Nuclear energy.

• Some Types of Energy:-

• Thermal Energy:- Thermal energy (also called heat energy) is produced when a rise in temperature causes atoms and molecules to move faster and collide with each other.

• The energy that comes from the temperature of the heated substance is called thermal energy.

• Chemical energy:- Energy stored in the bonds of chemical compounds, like atoms and molecules. This energy is released when a chemical reaction takes place.

• Nuclear Energy:- Nuclear energy comes from the nucleus of atoms. The energy is released by nuclear fusion (nuclei are fused together) or nuclear fission (nuclei are split apart).

• Nuclear plants use nuclear fission of a radioactive element called uranium to generate electricity.

• Electrical Energy:- Electrical energy is caused by moving electric charges called electrons. The faster the charges move, the more electrical energy they carry.

• As the charges that cause the energy are moving, electrical energy is a form of kinetic energy.

• Gravitational Energy:- Gravitational energy is energy associated with gravity.

• It is the potential energy stored by an object because of its higher position compared to a lower position.

• Magnetic Energy:- Potential energy due to or stored in magnetic fields.

• Sound Wave Energy:- Sound is the movement of energy through a substance – like air or water – and is caused by vibrations.

• Radiant energy:- Radiant energy is a form of electromagnetic energy.

• It can take the form of visible waves – which is what we call light energy – or invisible waves such as radio waves or x-rays.

• Mechanical Energy:- Mechanical energy is the sum of kinetic and potential energy in an object that is used to do work. In other words, it is energy in an object due to its motion or position, or both.

Q79. Answer: (a) M. Subbarayudu

• M. Subbarayudu is India's next Ambassador to Peru.

• He is a 1994 batch IFS officer.

• He is presently Joint Secretary in the Ministry of External Affairs.

• Peru facts:-

Capital	**Lima**
Official Language	Spanish
President	Martin Vizcarra
Prime Minister	Vicente Zeballos
Currency	Sol (PEN)
Highest Peak	Huascaran

Q80. Answer: (a) 18 u

• Relative molecular mass of water (H2O) is 18.

• The relative molecular mass is unit-less.

• How to find relative molecular mass?

1. Determine the chemical formula of the molecule.
2. Use the Periodic Table to determine atomic mass of each element.
3. Multiply the atomic mass with number of atoms of each element in the molecule.
4. Add the values to get the relative molecular mass.

• Relative molecular mass of water:-

• The formula for water is H2O. Each molecule contains 2 hydrogen atoms and 1 oxygen atom.

• Relative atomic masses: (H (Hydrogen) = 1, O (Oxygen) = 16).

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• Thus, The relative molecular mass of water is -

• M_r (H2O)= 2*A_r(H) + A_r(O) = 2 x 1 + 16 = 18

Q81. Answer: (a) Lilly Singh

• Lilly Singh is appointed as UNICEF's ambassador for Goodwill.

• Lily Singh:-

• She is an Actress, comedian, and author.

• She is known by her digital alias Superwoman.

• In her role as a Goodwill Ambassador, Lilly will use her unique digital presence to engage children and young people and empower them to speak out about the challenges they face.

• Lilly joins an impressive list of other UNICEF Goodwill Ambassadors that includes David Beckham, Orlando Bloom, Jackie Chan, Muzoon Almellehan, Danny Glover, Liam Neeson, Priyanka Chopra, Ricky Martin and Shakira.

• Lilly, 28, has gained a huge fan base of over 11 million YouTube subscribers.

• She has also released her international and New York Times bestselling book How To Be A Bawse, and was recently cast in HBO's film adaptation of "Fahrenheit 451."

• Additionally, Lilly was ranked 1st on the Forbes Magazine Top Influencers List in the entertainment category.

• UNICEF:-

• It was founded at the behest of Polish physician Ludwik Rajchman, to provide immediate hunger relief and healthcare to children and mothers in countries devastated by World War II.

• UNICEF was awarded the Nobel Peace Prize in 1965, the Indira Gandhi Prize in 1989 and the Prince of Asturias Award of Concord in 2006.

Formation	**11 Dec 1946**
Headquarters	New York City, US
Head(Executive Director)	Henrietta H Fore

Q82. Answer: (d) Mother Teresa

• Other Teresa was conferred with sainthood by Pope Francis in 2016.

• Mother Teresa:-

• She was born in Skopje (now the capital of North Macedonia), then part of the Kosovo Vilayet of the Ottoman Empire.

• She was born on 26^(th) August 1910.

• She arrived in India in 1929.

• She was canonised on 4 September 2016, and the anniversary of her death (5 September) is her feast day.

• Teresa received a number of honors, including the 1962 Ramon Magsaysay Peace Prize and 1979 Nobel Peace Prize.

• She has also been awarded the Padma Shri in 1962 and the Jawaharlal Nehru Award for International Understanding in 1969.

• She was awarded the Bharat Ratna in 1980.

• Missionaries of Charity

• In 1950, Teresa founded the Missionaries of Charity, a Roman Catholic religious congregation.

• The congregation manages homes for people who are dying of HIV/AIDS, leprosy and tuberculosis.

• It also runs soup kitchens, dispensaries, mobile clinics, children's and family counselling programmes, as well as orphanages and schools.

Q83. Answer: (d) Pink

• Pink was awarded the Best Film on social Issues in the 64th National Film Awards in 2017.

• Directorate of Film Festivals presented its annual National Film Awards to honour the best films of 2016 in the Indian cinema.

• The awards were awarded by the then President, Pranab Mukherjee.

• Other awardees:-

Best Popular Film Providing Wholesome Entertainment	**Sathamanam Bhavathi**
Best Actor	Akshay Kumar (Rustom)
Best Actress	Surabhi Lakshmi (Minnaminungu)
Best Supporting Actress	Zaira Wasim (Dangal)
Best Direction	Rajesh (Ventilator)

Best Children's Film	Dhanak (Hindi)
Best Feature Film	Kaasav
Best Animated Film	Mahayodha Rama

Q84. Answer: (a) Hydrogen

• Hydrogen is the only non-metal placed at the left side of the Modern Periodic Table.

• Hydrogen:-

• At standard temperature and pressure, it is a colorless, odorless, tasteless, non-toxic, nonmetallic, highly combustible diatomic gas with the molecular formula H2.

• It is the lightest element in the periodic table.

• It is also the most abundant chemical substance in the Universe.

• The two largest use of Hydrogen include Fossil fuel processing and Ammonia production, mostly for the fertilizer market.

Symbol	**H**
Appearance	Colorless Gas
Atomic Number (Z)	1
Block in periodic Table	S block
Discovered By	Henry Cavendish (1766)
Named By	Antoine Lavoisier (1783)

• Isotopes:-

• ^{1}H – Protium - It is the most common hydrogen isotope with an abundance of more than 99.98%.

• Because the nucleus of this isotope consists of only a single proton, it is given the name protium

• ^{2}H, Deuterium - the other stable hydrogen isotope, and contains one proton and one neutron in the nucleus.

• ^{3}H Tritium - It contains one proton and two neutrons in its nucleus.

Q85. Answer: (d) 10 hrs

Shortcut Trick

Use Options Substitution for efficiency: Let faster gate A take x hours, then slower gate B takes (x + 5) hours.

Combined time formula: (x × (x + 5)) ÷ (x + x + 5) = 6

Test Option 4 (10 hr): (10 × 15) ÷ (10 + 15) = 150 ÷ 25 = 6 hours.

The condition matches perfectly with the given combined time.

Therefore The correct answer is 10 hr.

Alternate Method

Given: Time taken by (A + B) = 6 hours. Difference between A and B = 5 hours.

Formula Used: 1/A + 1/B = 1/T_(total)

Person	**Days**	**Total Work**	**Efficiency**
Gate A (Faster)	x	x(x + 5)	x + 5
Gate B (Slower)	x + 5	x	

=> Total Efficiency = (x + 5) + x = 2x + 5

=> Total Time = Total Work ÷ Total Efficiency

=> 6 = [x(x + 5)] ÷ (2x + 5)

=> $6(2x + 5) = x^2 + 5x$

=> $12x + 30 = x^2 + 5x$

=> $x^2 - 7x - 30 = 0$

=> $(x - 10)(x + 3) = 0$

=> x = 10 (Since time cannot be negative)

Therefore The correct answer is 10 hr.

Additional Information

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Pipes and Cisterns Basic Rule

If a pipe fills a tank in x hours, then the part filled in 1 hour is 1/x.

Combined Work Formula

When two pipes work together, the total time T is given by T = (xy) ÷ (x + y), where x and y are individual times.

Quadratic Roots Shortcut

For $x^2 - Sx + P = 0$, the sum of roots is S and the product is P. In $x^2 - 7x - 30$, roots are 10 and −3.

Q86. Answer: (a) 44/9

Shortcut Trick

Time taken by two people working together = (A × B) ÷ (A + B)

Time = (8 × 10) ÷ (8 + 10)

Time = 80 ÷ 18 = 40/9 = 4(4/9) days.

Therefore The correct answer is 4(4/9) days.

Alternate Method

Given:

Time taken by X = 8 days

Time taken by Y = 10 days

Formula Used:

Total Work = LCM of individual days

Efficiency = Total Work ÷ Days

Person	Days	Total Work	Efficiency
X	8	40	5
Y	10	4	

=> Combined Efficiency of X + Y = 5 + 4 = 9 units/day

=> Total Work = 40 units

=> Time required = Total Work ÷ Combined Efficiency

=> Time = 40 ÷ 9

=> Time = 4(4/9) days

Therefore The correct answer is 4(4/9) days.

Additional Information

Combined Work Formula

For two people A and B, the combined rate is 1/T = 1/A + 1/B, which simplifies to T = (AB)/(A+B).

Efficiency and Time Relationship

Efficiency is inversely proportional to the time taken to complete a task. If the ratio of time is x:y, the ratio of efficiency is y:x.

Work and Wages

Wages are generally distributed in the ratio of efficiency or the actual amount of work done by each individual.

Q87. Answer: (b) Wife

Using the following notations, we can draw the family tree:

The best possible diagram as per the given information is as follows,

Hence, Ramani is wife of Rajaram.

Q88. Answer: (d) Tendons

Concept:

• Tendons are fibrous connective tissues, and connects muscle to the bones.

• Ligaments join one bone to bone, while tendons connect muscle to bone for a proper functioning of the body.

• Both Tendons and Ligaments are made of collagen.

• Cartilage

• is a resilient and smooth elastic tissue, rubber-like padding that covers and protects the ends of long bones at the joints.

• It is a structural component of the rib cage, the ear, the nose, the bronchial tubes, the intervertebral discs, and many other body components.

• It is not as hard and rigid as bone, but it is much stiffer and much less flexible than muscle.
• Areolar tissue is a type of loose connective tissue.
• It holds organs in place and attaches epithelial tissue to other underlying tissues.
• It also surrounds the blood vessels and nerves.

Q89. Answer: (a) Tomato

• Tomato is one of the natural sources of Oxalic Acid.
• Oxalic Acid:-
• Oxalic acid is a crystalline solid which forms colourless solution in water.
• Food articles like spinach, cabbage Broccoli, parsley, tomato are some good sources of Oxalic acid.
• Main use of Oxalic Acid is in cleaning and removal of rust.

Important Points

Some other naturally occurring organic acids and their sources are:-

Acid	Source
Citric Acid	Citrus fruits like Lemon, Lime, Orange etc
Acetic Acid	Vinegar
Malic Acid	Apple, Apricot, Blueberries, cherries etc
Formic Acid	Ants and sting-less bees
Tartaric Acid	Grapes, Banana, Tamarind
Lactic Acid	Fermented or sour milk products
Ascorbic acid (Vitamin C)	Amla, Citrus fruits, Kiwi, Mango, Papaya, Green leafy vegetables

Q90. Answer: (a) Amaravati

The correct answer is Amaravati.

Key Points

• Amaravati is the new capital of Andhra Pradesh.

Mistake Points

In January 2023, Andhra Pradesh, India, has designated Visakhapatnam as its new capital under a three-capital plan.
• The three-capital strategy aims to enhance the state's infrastructure and economy.
• The plan involves dividing the state capital functions into three parts:
• Legislative capital: Amaravati
• Executive capital: Visakhapatnam
• Judicial capital: Kurnool

Additional Information

• Andhra Pradesh facts:-

Capital	Amravati, Kurnool, Visakhapatnam
CM	N. Chandrababu Naidu
Governor	Justice Syed Abdul Nazeer
Lok Sabha Seats	25
Rajya Sabha Seats	11

• Symbols of Andhra Pradesh-

State Language	Telugu
State Bird	Rose-ringed parakeet
State Flower	Jasmine
State Tree	Neem

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State Dance	Kuchipudi
State Mammal	Blackbuck

Q91. Answer: (a) 27

Second element in every pair is third to the right of first element except 27.

6 6 8 5 5 3 7 3 7 2 5 9 8 7 8 1 5 5 4

There is a gap of two digits in every number like, there are 5 and 5 between 8 and 3 in 83.

Similarly, there are 7 and 2 between 3 and 5 in 35 and 7 and 8 between 8 and 1 in 81. But there are 5, 8, 8, and 7 between 2 and 7 in 27.

Hence, 27 does not belong to the group.

Q92. Answer: (c) Babur

• Ibrahim Lodi was killed by Babur in the First Battle of Panipat in 1526.

• The First Battle of Panipat:-

• It was fought between the invading forces of Babur and the Lodi Kingdom in 1526.

• It took place in north India and marked the beginning of the Mughal Empire and the end of the Delhi Sultanate.

• This was one of the earliest battles involving gunpowder firearms and field artillery in the Indian subcontinent which were introduced by Mughals in this battle.

• Babur's guns proved decisive in battle, firstly because Ibrahim lacked any field artillery, but also because the sound of the cannon frightened Ibrahim's elephants, causing them to trample his own men.

• Famous ruler chronologically are-

• Babur (1526 - 1530), Humayun (1530 - 1540), Akbar (1556 - 1605), Jehangir (1605 - 1627), Shah jahan (1628 - 1658), Aurangzeb (1658 - 1707).

Q93. Answer: (a) more than one

• The absolute refractive index of any medium is always more than one.

• Absolute refractive index:-

• The refractive index of a material describes how fast light travels through that material.

• More specifically, it is the ratio of the speed of light in a vacuum to the speed of light in that medium.

• It is always greater than one.

• Refractive Index = (Speed of light in Vacuum)/(Speed of light in the medium)

• n = c/v

• For example, the refractive index of water is 1.333, meaning that light travels 1.333 times as fast in a vacuum as in water.

• The refractive index is a unit-less, dimensionless quantity.

• The concept of refractive index applies within the full electromagnetic spectrum, from X-rays to radio waves.

Q94. Answer: (a) Shashi Tharoor

• Shashi Tharoor is the author of the book ‘Why I am a Hindu’ published in 2017.

• In the book, Tharoor writes about the history of Hinduism and its core tenets.

• He also traced the socio-cultural developments in India that relate to the religion, while elucidating his own religious convictions.

• Shashi Tharoor:-

• He is an Indian politician, writer and a former career international diplomat.

• He is also famous for his extraordinary oratory skills.

• He was born in London, UK in 1956.

• He is currently serving as Member of Parliament, Lok Sabha from Thiruvananthapuram, Kerala, since 2009.

• From 1978 to 2007, Tharoor was a career official at the United Nations, rising to the rank of Under-Secretary General for Communications and Public Information in 2001.

• He announced his retirement from UN after finishing second in the 2006 selection for U.N. Secretary-General to Ban Ki-moon.

• He is a member of Indian National Congress Party (INC).

• Tharoor served as Minister of State for External Affairs (2009–2010) and Minister of Human Resource Development (2012–2014) under UPA government.

• Some of his famous books are:-

• Why I Am A Hindu (2018) and The Paradoxical Prime Minister (2018), An Era Of Darkness,The Great Indian Novel.

Q95. Answer: (b) 3 : 5

Shortcut Trick

To find the ratio of a : c, multiply the given ratios (a/b) and (b/c) directly.

a/c = (a/b) × (b/c)

=> a/c = (32/35) × (21/32)

=> a/c = 21/35 = 3/5

Therefore The correct answer is 3 : 5.

Alternate Method

Given:

a : b = 32 : 35

b : c = 21 : 32

Calculations:

=> a/b = 32/35

=> b/c = 21/32

=> a/c = (a/b) × (b/c)

=> a/c = (32/35) × (21/32)

=> a/c = 21/35

=> a/c = (21 ÷ 7) / (35 ÷ 7)

=> a/c = 3/5

Therefore The correct answer is 3 : 5.

Additional Information

Compound Ratio

When two or more ratios are multiplied together, the result is called a compound ratio. For ratios a:b and c:d, the compound ratio is (ac):(bd).

Continued Proportion

To find a : b : c, make the common term 'b' equal in both ratios by multiplying with suitable constants.

Ratio Simplification

A ratio is always expressed in its lowest terms by dividing both the antecedent and consequent by their HCF.

Q96. Answer: (d) None of the above

Shortcut Trick

The LCM (Least Common Multiple) of numbers depends on their Common Factors.

If numbers are Co-prime, LCM = Product (e.g., 3 and 5 → LCM = 15).

If numbers have Common Factors, LCM < Product (e.g., 4 and 6 → LCM = 12, but Product = 24).

Since the LCM can be either equal to or less than the product, no single comparison like 'always greater' or 'always less' is universally true.

Therefore The correct answer is None of the above.

Alternate Method

Given: A set of numbers.

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

=> LCM(a, b) = (a × b) ÷ HCF(a, b)

=> If HCF = 1 (Co-prime), then LCM = Product.

=> If HCF > 1, then LCM < Product.

=> In no case is the LCM greater than the product of the numbers.

=> Since the value is either equal to or less than, options 1, 2, and 3 are individually incorrect as 'always' conditions.

Therefore The correct answer is None of the above.

Additional Information

LCM of Fractions

LCM = (LCM of Numerators) ÷ (HCF of Denominators).

Co-prime Numbers

Two numbers are co-prime if their HCF is 1; for such numbers, LCM is always exactly equal to their product.

HCF Property

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The HCF of given numbers is always less than or equal to the smallest number in the set.

Q97. Answer: (b) DLFMW

The positions of the letters according to the English alphabet series:

The pattern followed here is;

Similarly,

Hence, 'DLFMW' is the correct answer.

Q98. Answer: (b) Pulses

• Pulses are one of the leguminous crops.

• Legumes/Leguminous crops:-

• Legumes are notable in that most of them have symbiotic nitrogen-fixing bacteria in structures called root nodules.

• They are able to take nitrogen, one of the most important plant foods, from the air while all other plants have to rely on nitrogen available in the soil.

• This has an important consequence: They do not compete with other crops for nitrogen.

• They even enrich the soil with nitrogen they do not use up themselves.

• The plants have root nodules. The nodules are filled with bacteria.

• These bacteria feed on sugars and starches supplied by the plant.

• They fix nitrogen and make it available to the plant whose roots they are living in.

• By living together, plant and bacteria both gain. Each of them produces something the other needs. This living together is called symbiosis.

• Each nodule functions for only four weeks. Afterwards, it dies and breaks open, releasing nitrogen into the surrounding soil and thus enriching it.

• In this way, the plant gets so much nitrogen that additional nitrogen from chemical fertilizers is not necessary*.*

• Some common legumes:-

• alfalfa, clover, beans, peas, chickpeas, lentils, lupins, mesquite, carob, soybeans, peanuts, and tamarind.

Q99. Answer: (a) 1000 W

• 1 kilo Watt (KW) = 1000 Watt

• Extra:-

• The watt (W) is the SI unit of power.

• It is named after James Watt, the inventor of the steam engine.

• One watt is defined as the energy consumption rate of one joule per second.

• 1W = 1J / 1s.

Q100. Answer: (c) 14 cm

Shortcut Trick

Tangents from an external point to a circle are equal in length.

=> QB = QA = 27 cm

=> RB = QR − QB = 38 − 27 = 11 cm

=> RC = RB = 11 cm

=> SC = RS − RC = 25 − 11 = 14 cm

Since angle S = 90°, the radius r is equal to the tangent length SC.

Therefore The correct answer is 14 cm.

Alternate Method

Given: QR = 38 cm, RS = 25 cm, QA = 27 cm, and angle S = 90°.

Formula Used: Lengths of tangents drawn from an external point to a circle are equal. Radius is perpendicular to the tangent at the point of contact.

Calculations:

=> QB = QA = 27 cm (Tangents from point Q)

=> RB = QR − QB = 38 − 27 = 11 cm

=> RC = RB = 11 cm (Tangents from point R)

=> SC = RS − RC = 25 − 11 = 14 cm

=> In quadrilateral OSCD, angle S = 90°, angle OSC = 90°, and angle ODC = 90° (Radius perpendicular to Tangent).

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=> Since three angles are 90° and adjacent sides OC = OD = r, OSCD is a square.

=> r = SC = 14 cm.

Therefore The correct answer is 14 cm.

Additional Information

Tangent-Radius Property

The radius of a circle is always perpendicular to the tangent at the point of contact (angle = 90°).

Tangents from External Point

The lengths of two tangents drawn from an external point to a circle are always equal.

Pitot Theorem

In a tangential quadrilateral (one that circumscribes a circle), the sums of opposite sides are equal: PQ + RS = QR + SP.

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