

NIACL AO Prelims 2018

REASONING ABILITY

Direction (1-5): Study the following information carefully and answer the questions given below:

Nine persons viz. A, B, C, D, E, P, Q, R and S, have born in three different dates such as- 7th, 10th and 15th of three different months i.e. May, June and October but not necessarily in the same order.

B was born on 15th in the month which has 31 days. Two persons were born between A and B. Number of persons born after B is same as before Q. No one was born between B and D, but both were not born in the same month. R was born just before P, but not in the month of October. Both S and E were born on the same dates. More than two persons were born between C and E.

- How many persons born after D as per the given information?
(a) One (b) Two (c) Three
(d) Four (e) None of these
- How many persons born between P and B as per the given information?
(a) Four
(b) More than four
(c) Two
(d) One
(e) None of these
- Who among the following born on 10th June?
(a) S (b) E (c) P
(d) C (e) A
- Four of the following five are alike in a certain way and hence they form a group. Which one of the following does not belong to that group?
(a) RB (b) SA (c) QE
(d) EC (e) CQ
- Who among the following born just before of Q?
(a) E (b) P (c) A
(d) D (e) S

Direction (6-10): Study the following information carefully and answer the questions given below:

Eight persons L, M, N, O, P, Q, R and S are sitting around a circular table but not necessarily in the same order. **(Some of them facing in the center while some are facing outside of the center).**

M sits 2nd to the right of N. Both M and N are facing in the same direction. M sits 2nd to the right of Q. Three persons sit between R and S, who does not sit near to M and Q. Three persons sit between L and O. P sits immediate left of L. Both P and O face same direction as L. O sits 2nd to the right of R, who faces inside the center. N sits immediate left of S.

- How many persons sit between L and N, when counted from left of N?
(a) One (b) None (c) Two
(d) Four (e) None of these
- Who among the following person sits 3rd to the right of M?
(a) R (b) L (c) Q
(d) S (e) None of these
- Who among the following person sits opposite to N?
(a) L (b) R (c) O
(d) Q (e) None of these
- If O and S interchanged their position than who among the following person faces O?
(a) R (b) M (c) Q
(d) P (e) None of these
- How many persons face outside to the center?
(a) Six (b) Four (c) One
(d) Three (e) None of these

Direction (11-15): Study the following information carefully and answer the questions given below:

In a certain code language:

“give our new details” is coded as “cp rb nk ak”

“expert advice give explore” is coded as “rb nj df ry”

“our future explore new” is coded as “nk pn ry cp”

“give details expert you” is coded as “pj rb nj ak”

- What is the code for “expert” in the given code language?
(a) nj (b) df (c) cp
(d) nk (e) cp
- If “give him new” is coded as “nk ut rb” than what is the code for “details him our” in the given code language?
(a) ut nk cp (b) cp pn nk (c) rb ut np
(d) ut cp ak (e) Either (a) or (d)

13. What is the code for "explore details future" in the given code language?
(a) rb ak cp (b) pn ry ak (c) df ry ak
(d) rb cp ry (e) None of these

14. Which of the following is coded as "df pj"?
(a) expert explore
(b) our advice
(c) future new
(d) advice you
(e) None of these

15. What is the code for "give new details" in the given code language?
(a) rb nk cp (b) nk cp df (c) rb nk aj
(d) pn ry cp (e) Can't be determined

Direction (16-20): Study the following information carefully and answer the questions given below:

Five persons i.e. A, D, E, F and G are arranged according to their weights in descending order from left to right and all they like different colors viz. Blue, Pink, Red Yellow and Green but not all in the same order. A is heavier than the person who likes Red color. E is heavier than D but not as heavier than F, who likes Yellow. The person, who likes Green is heavier than the person, who likes Pink. G is heavier than the one who likes Yellow and his weight is 76kg. The lightest person is 59kg. A like Blue. The person, who likes Green colour is 4th heaviest person.

16. Who among the following person likes Green?
(a) G (b) D (c) F
(d) E (e) None of these
17. How many persons lighter than F?
(a) One (b) None (c) Three
(d) Two (e) Four
18. Which of the following is possible weight of E?
(a) 56kg (b) 70kg (c) 53kg
(d) 78kg (e) 80 Kg
19. Who among the following is the heaviest person among all?
(a) The one who like Red
(b) The one who like Yellow
(c) The one who like Green
(d) The one who like Pink
(e) The one who like Blue
20. Who among the following person is the 2nd lightest person among all?
(a) G (b) F (c) E
(d) A (e) D
21. If the first, third, fourth, and sixth letter of the word "INTRODUCTION" are combined to form a meaningful word, then what will be the 3rd letter from the left in the so formed word. If more than one meaningful word is formed then the answer is X, if no such word is formed then answer is Z?

- (a) D (b) X (c) R
(d) Z (e) T

22. How many such pairs of letters are there in the given word 'INVESTOR' which has as many as letters between them as are there in the alphabetical series?
(a) One (b) Two (c) Three
(d) Four (e) None of these

Directions (23-27): Study the information carefully and answer the questions given below.

Seven persons are sitting in a row and are facing north. A sits 2nd from one of the ends. C does not sit left to F. D is 2nd to the right of B and one of them sits at ends. C sits 3rd left to G, who does not sit next to A. E is at one of the positions to the right of F.

23. What is the position of A with respect to B?
(a) 3rd to the left
(b) 3rd to the right
(c) 4th to the left
(d) 5th to the right
(e) none of these
24. How many persons are sitting between A and G?
(a) Two (b) One (c) Three
(d) Four (e) None of these
25. Four of the following belongs to a group find the one that does not belong to that group?
(a) E (b) F (c) C
(d) B (e) G
26. Who among the following sits to the 3rd right of B?
(a) E (b) F (c) C
(d) B (e) No one
27. What is the position of E with respect to F?
(a) 3rd to the left
(b) 3rd to the right
(c) 4th to the left
(d) 5th to the right
(e) None of these

Directions (28-30): In these questions, relationship between different elements is shown in the statements. Two conclusions follow these statements: Give answer,

- (a) If only conclusion I follows.
(b) If only conclusion II follows.
(c) If either conclusion I or II follows.
(d) If neither conclusion I nor II follows.
(e) If both conclusion I and II follow.
28. **Statements:** $B < W \leq A < D \leq K < I$
Conclusion:
I. $W < I$ II. $K \geq W$
29. **Statements:** $L = K \geq R > D \geq M < N$
Conclusion:
I. $N < R$ II. $R > M$

30. Statements: $L < K$, $N \leq M < R$, $K = N$

Conclusion:

I. $N < R$

II. $R > L$

Directions (31-35): Study the information carefully and answer the questions given below.

Nine persons live in a nine floored building such that the ground floor is numbered one, and the topmost floor is numbered nine. Equal number of persons live above and below D. Two persons live between D and H. Four persons live between F and E. E lives immediately above A. Neither B nor G lives next to I. Equal number of persons live between B and C and C and G. Not more than four persons live between I and G.

31. On which of the following floors does I live?

- (a) 2nd (b) 1st (c) 5th
(d) 7th (e) None of these

32. How many persons live between E and H?

- (a) Two (b) One (c) Three
(d) Four (e) None of these

33. Four of the five are alike in a certain way, who among the following does not belong to that group?

- (a) I (b) F (c) C
(d) B (e) D

34. Who among the following lives on floor number 7?

- (a) E (b) F (c) C
(d) B (e) None of these

35. Which among the following pair represents the persons living immediately above and immediately below G?

- (a) E, H (b) F, G (c) C, D
(d) B, I (e) None of these

QUANTITATIVE APTITUDE

36. A shopkeeper sells two articles-A & B. Cost price of article-B is 20% less than cost price of article-A and shopkeeper sells article-A and article-B at 40% profit and 20% profit respectively. If selling price of article-A is Rs.528 more than selling price of article-B, then find cost price of article-B?

- (a) Rs.900 (b) Rs.1040 (c) Rs.1200
(d) Rs.960 (e) Rs.1130

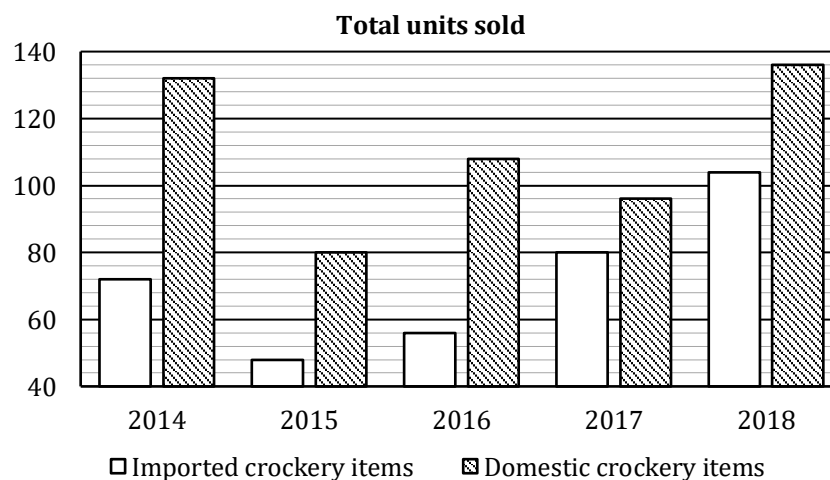
37. Area of circle is $144\pi \text{ cm}^2$ and radius of circle is equal to diagonal of a square. Find perimeter of square.

- (a) $60\sqrt{2} \text{ cm}$ (b) 24 cm (c) 48 cm
(d) $48\sqrt{2} \text{ cm}$ (e) $24\sqrt{2} \text{ cm}$

38. Ayush invested Rs.5000 in a scheme-A on S.I. for two years and he further invested the amount received from scheme-A on C.I. at the rate of 10% compounding annually for two years. If he received Rs.1218 as C.I., then find rate of interest of scheme-A?

- (a) 10% (b) 6% (c) 14%
(d) 8% (e) 12%

Directions (39-44): Bar chart given below shows the number of domestic and imported crockery items sold by a shopkeeper in 5 different years. Study the below mentioned bar chart carefully to answer the following questions. (total unit sold = imported crockery item + domestic crockery item)



39. Find the ratio of imported crockery items sold in 2014 & 2015 together to domestic crockery item sold in 2016?
 (a) 1 : 2 (b) 4 : 3 (c) 5 : 7
 (d) 10 : 9 (e) None of the above.
40. Domestic crockery items sold in 2015 and imported crockery items sold in 2016 together is how much less than imported crockery items sold in 2014 and domestic crockery items sold in 2017 together.
 (a) 38 (b) 36 (c) 22
 (d) 28 (e) 32
41. If in 2014 sales of domestic crockery items falls by 12% as compared to previous year and in 2013 ratio of domestic crockery items sold to imported crockery items sold is 5 : 4, then find imported crockery items sold in 2013 is what percent of domestic crockery items sold in 2015?
 (a) 150% (b) 200% (c) 50%
 (d) $66\frac{2}{3}\%$ (e) 100%
42. Domestic crockery items sold in 2016 and 2017 together is what percent more than the imported crockery items sold in 2016 and 2018 together?
 (a) 32.5% (b) 25.5% (c) 21.5%
 (d) 27.5% (e) 37.5%
43. Find the difference between average of imported crockery items sold in 2017 & 2018 and average of domestic crockery items sold in 2015, 2017 & 2018?
 (a) 25 (b) 12 (c) 21
 (d) 17 (e) 11
44. Ratio of domestic crockery items sold in 2017 to imported crockery items sold in 2019 is 3 : 4 and domestic crockery items sold in 2019 is $15\frac{5}{8}\%$ more than the imported crockery items sold in that year. Find ratio of total crockery items sold in 2019 to total crockery items sold in 2014?
 (a) 23 : 17 (b) 15 : 11 (c) 3 : 5
 (d) 9 : 16 (e) None of the above.
- Directions (45-50):** Find the wrong number in the following number series.
45. 6, 18, 36, 144, 720, 4320, 30240
 (a) 36 (b) 6 (c) 18
 (d) 144 (e) 720
46. 1487, 1170, 928, 803, 739, 712, 704
 (a) 739 (b) 1487 (c) 928
 (d) 1170 (e) 704
47. 19, 380, 669, 840, 959, 1008, 1033
 (a) 840 (b) 1033 (c) 380
 (d) 19 (e) 1008
48. 957, 597, 360, 237, 123, 110, 9
 (a) 237 (b) 597 (c) 9
 (d) 110 (e) Series is correct.
49. 1764, 1681, 1597, 1521, 1444, 1369, 1296
 (a) 1597 (b) 1764 (c) 1681
 (d) 1521 (e) Series is correct.
50. Machine-A can fill 200 empty bottles of 750ml each in 1 hour. Machine-B fills empty bottles of 500ml each. If total work done by both machine in 1 hour is same, then find how many empty bottles machine-B can fill in 8 hours?
 (a) 3600 (b) 2000 (c) 4800
 (d) 2400 (e) 1800
51. A number is chosen at random from the first 100 natural numbers, then find the probability that the number is either divisible by 5 or 7.
 (a) $\frac{11}{25}$ (b) $\frac{8}{25}$ (c) $\frac{17}{50}$
 (d) $\frac{15}{50}$ (e) None of the above.

Directions (52-57): Table given below shows the data of students and teachers of different branches in an engineering college. Study the below mentioned table carefully to answer the following questions.

Engineering Branches	Difference between number of students and number of teachers	Ratio of number of students to number of teachers
Computer Science	275	12 : 1
Electrical	234	15 : 2
Mechanical	228	21 : 2
I.T.	256	19 : 3
Civil	126	13 : 4
Chemical	168	13 : 1

52. Number of teachers in I.T. branch is how much more or less than number of teachers in Chemical branch?
 (a) 41 (b) 46 (c) 34
 (d) 31 (e) 39
53. Number of students in Mechanical branch is what percent of number of students in Computer Science branch?
 (a) 73% (b) 79% (c) 87%
 (d) 81% (e) 84%
54. If the ratio of number of boys to number of girls in Civil branch is 4 : 3, then find number of girls in Civil branch is what percent of number of teachers in that branch?
 (a) $150\frac{4}{7}\%$ (b) $139\frac{2}{7}\%$ (c) $143\frac{3}{7}\%$
 (d) $134\frac{6}{7}\%$ (e) None of the above.
55. If the ratio of boys to girls in Computer Science branch and Electrical branch is 7 : 5 and 3 : 2 respectively, then find number of boys in Computer Science branch and Electrical branch together is how much more or less than number of girls in Computer Science branch and Electrical branch together?
 (a) 127 (b) 111 (c) 104
 (d) 119 (e) 135
56. Find the ratio of number of students in I.T. and Electrical branch together to number of teachers in I.T. and Electrical branch together.
 (a) 41 : 6 (b) 9 : 7 (c) 17 : 14
 (d) 21 : 16 (e) None of the above.
57. Number of teachers in Chemical branch is what percent of number of students in Mechanical branch?
 (a) $3\frac{5}{9}\%$ (b) $7\frac{5}{9}\%$ (c) $2\frac{5}{9}\%$
 (d) $5\frac{5}{9}\%$ (e) $9\frac{5}{9}\%$
58. A vessel of capacity of 70 liters is completely filled with milk. 'x' liters are taken out from the vessel and replaced by water and this process is repeated one more time. If final quantity of milk in the vessel is 44.8 liters, then find value of 'x'?
 (a) 10 liters (b) 12 liters (c) 14 liters
 (d) 16 liters (e) 18 liters

59. In 2018, a school has 1200 students and ratio of boys to girls is 11 : 9. If 92% of the total students got passed in 2018 and 95% of the total boys got passed in 2018 then, find the percentage of girls who got passed in 2018?
 (a) $85\frac{1}{3}\%$ (b) $81\frac{2}{3}\%$ (c) $87\frac{2}{3}\%$
 (d) $89\frac{1}{3}\%$ (e) $88\frac{1}{3}\%$
60. Curved surface area of hemispherical bowl is 693 cm^2 . If radius of a conical tent is equal to the radius of hemispherical bowl and ratio of height to radius of conical tent is 10 : 7, then find volume of conical tent?
 (a) 1742.5 cm^3
 (b) 1732.5 cm^3
 (c) 1712.5 cm^3
 (d) 1729.5 cm^3
 (e) 1701.5 cm^3

Directions (61-65): Find the approximate value of the (?) in the following questions.

61. 23.83% of $625.02 - 100.01 = ?\%$ of $3599.99 + 98.13 \div 6.9999$
 (a) 6 (b) 23 (c) 17
 (d) 1 (e) 11
62. $659.97 \times (?)^2 = (64.92)^2 + 24.997\%$ of 6860.0013
 (a) 3 (b) 11 (c) 19
 (d) 43 (e) 30
63. $5677.1321 + 4913.9133 - 3798.92 = ? + 20.005\%$ of 3960.1321
 (a) 7000 (b) 6500 (c) 6000
 (d) 6200 (e) 6800
64. $? = 56.9156$ of $28.056 \div 76.0754 \times 5.9743$
 (a) 141 (b) 126 (c) 157
 (d) 190 (e) 117
65. 11.994% of $500.03 + \frac{16.01 \times ?}{20.04} = 150.0123 + (25.9531 \times 35.121)$
 (a) 1250 (b) 1300 (c) 1100
 (d) 1050 (e) 1150

Directions (66-70): Study the following information carefully and answer the given questions.

Data regarding number of students studying various courses viz. Commerce, Management, Arts, Medical, Science and Law in College P and that in College Q in the year 2019.

In college P, Students studying in Medical and Science are 1140 and 1800 respectively. Students studying in Commerce are $57\frac{1}{7}\%$ of students studying in Arts. Students studying in Arts are same as average of students studying in Management, Law and Science. Ratio of students studying in management to Science is 3:4. Number of students studying in law are 20 % more than students studying in Arts.

In college Q, students studying in management are 12.5% more than students studying in Commerce. Medical students consist of 10% of total students of College B. Ratio of students studying in Science to Law is 5:7. Difference of students studying in Management and Commerce is 200. Number of students studying in Arts are 1250. Total students in college Q are 2480 less than total students in college P.

66. Find the ratio of total students in management and science together from College P and total students in arts and Commerce together from College Q?

- (a) $\frac{23}{19}$ (b) $\frac{19}{25}$ (c) $\frac{21}{19}$
(d) $\frac{19}{27}$ (e) $\frac{19}{21}$

67. Total students in commerce and Arts from both colleges is what percent of total students in Medical and Law from both colleges?

- (a) $130\frac{29}{67}\%$ (b) $83\frac{3}{4}\%$ (c) $129\frac{37}{77}\%$
(d) $87\frac{7}{8}\%$ (e) $119\frac{27}{67}\%$

68. 40% of total students in Science from College Q are girls and 60% of total students in Management from College Q are boys. If average of girls of Science, Management and law from College Q are 458, then find number of boys students in Law from College Q?

- (a) 354 (b) 944 (c) 224
(d) 720 (e) 454

69. Find the ratio of average number of students in Science, Commerce, Management and art from College Q to the Average number in students of Management, Medical and Science from College P?

- (a) 521 : 576 (b) 521 : 572 (c) 572 : 521
(d) 521 : 580 (e) None of these

70. Total number of students studying in Science from both the Colleges is how much per cent less than total number of students in art from both the colleges?

- (a) $21\frac{1}{3}\%$ less (b) $28\frac{2}{3}\%$ more (c) $25\frac{1}{3}\%$ less
(d) $\frac{100}{7}\%$ less (e) $\frac{150}{7}\%$ more

Solutions

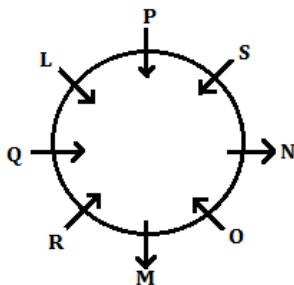
REASONING ABILITY

Solutions (1-5):

Month	Date	Persons
May	7	R
	10	P
	15	B
June	7	D
	10	E
	15	A
October	7	Q
	10	S
	15	C

1. (e); 2. (e); 3. (b);
4. (d); 5. (c);

Solutions (6-10):



6. (c); 7. (b); 8. (d);
9. (a); 10. (e);

Solutions (11-15):

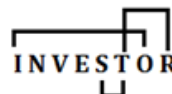
Word	Code
give	rb
our	nk/cp
new	nk/cp
details	ak
expert	nj
advice	df
explore	ry
future	pn
you	pj

11. (a); 12. (d); 13. (b);
14. (d); 15. (e);

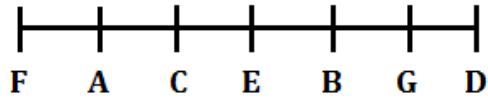
Solutions (16-20):

A	G	F	E	D
Blue	Red	Yellow	Green	Pink
	76			59

16. (d); 17. (d); 18. (b);
19. (e); 20. (c);
21. (c); 1st, 3rd, 4th and 6th letters are I, T, R, D
The meaningful word formed is DIRT
22. (c);



Solutions (23-27):



23. (a); 24. (c); 25. (b)
 26. (e); 27. (b);
 28. (a); I. $W < I$ (True) II. $K \geq W$ (False)
 29. (b); I. $N < R$ (False) II. $R > M$ (True)
 30. (e); I. $N < R$ (True) II. $R > L$ (True)

Solutions (31-35):

Floor	Persons
9	F
8	B
7	C
6	G
5	D
4	E
3	A
2	H
1	I

31. (b); 32. (b); 33. (d);
 34. (c); 35. (c);

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36. (d); Let cost price of article – A be Rs. $10x$
 So, cost price of article – B = $10x \times \frac{80}{100}$
 = Rs. $8x$
 And, Selling price of article – A = $10x \times \frac{140}{100}$
 = Rs. $14x$
 And selling price of article – B = $8x \times \frac{120}{100}$
 = Rs. $9.6x$
 ATQ,
 $14x - 9.6x = 528$
 $4.4x = 528$
 $x = \text{Rs. } 120$
 Hence, cost price of article – B = $8x$
 = Rs. 960
37. (e); Area of circle = πr^2
 ATQ,
 $\pi r^2 = 144\pi \Rightarrow r = 12\text{cm}$
 Let side of a square be 'a' cm.
 So,
 $a^2 + a^2 = (12)^2$
 $2a^2 = 144$
 $a^2 = 72$
 $a = 6\sqrt{2}\text{ cm}$
 So, required perimeter = $4a = 24\sqrt{2}\text{ cm}$
38. (d); Let rate of interest offered by scheme – A be R% p.a.
 Amount invested by Ayush at C.I.
 = $\frac{5000 \times R \times 2}{100} + 5000 = (100R + 5000)\text{ Rs.}$
 Equivalent rate of interest of 10% C.I. for two years = $10 + 10 + \frac{10 \times 10}{100} = 21\%$
 ATQ,
 $\frac{(100R + 5000) \times 21}{100} = 1218$
 $\Rightarrow 21R + 1050 = 1218 \Rightarrow R = 8\%$
39. (d); Required ratio = $\frac{(72 + 48)}{108} = \frac{120}{108} = 10 : 9$

40. (e); Domestic crockery items sold in 2015 and imported crockery items sold in 2016 together = $80 + 56 = 136$
 Imported crockery items sold in 2014 and domestic crockery items sold in 2017 together = $72 + 96 = 168$
 Required difference = $168 - 136 = 32$
41. (a); Domestic crockery items sold in 2013 = $132 \times \frac{100}{88} = 150$
 Imported crockery items sold in 2013 = $150 \times \frac{4}{5} = 120$
 Now, required % = $\frac{120}{80} \times 100 = 150\%$
42. (d); Domestic crockery items sold in 2016 & 2017 together = $108 + 96 = 204$
 Imported crockery items sold in 2016 & 2018 together = $56 + 104 = 160$
 Now, required % = $\frac{204 - 160}{160} \times 100$
 = $\frac{440}{16} \% = 27.5\%$

- 43. (b);** Average of imported crockery items sold in 2017 & 2018 = $\frac{80 + 104}{2} = 92$
Average of domestic crockery items sold in 2015, 2017 & 2018 = $\frac{80 + 96 + 136}{3} = 104$
Required difference = $104 - 92 = 12$
- 44. (a);** ATQ,
Imported crockery items sold in 2019 = $96 \times \frac{4}{3} = 128$
Domestic crockery items sold in 2019 = $128 \times \frac{925}{800} = 148$
So, required ratio = $\frac{(148 + 128)}{(72 + 132)} = \frac{276}{204} = 23 : 17$
- 45. (c);** Wrong number = 18
Pattern of series
 $6 \times 2 = 12$
 $12 \times 3 = 36$
 $36 \times 4 = 144$
 $144 \times 5 = 720$
 $720 \times 6 = 4320$
 $4320 \times 7 = 30240$
So, there should be 12 in place of 18.
- 46. (d);** Wrong number = 1170
Pattern of series
 $1487 - (7)^3 = 1487 - 343 = 1144$
 $1144 - (6)^3 = 1144 - 216 = 928$
 $928 - (5)^3 = 928 - 125 = 803$
 $803 - (4)^3 = 803 - 64 = 739$
 $739 - (3)^3 = 739 - 27 = 712$
 $712 - (2)^3 = 712 - 8 = 704$
So, there should be 1144 in place of 1170.
- 47. (a);** Wrong number = 840
Pattern of series
 $19 + (19)^2 = 19 + 361 = 380$
 $380 + (17)^2 = 380 + 289 = 669$
 $669 + (13)^2 = 669 + 169 = 838$
 $838 + (11)^2 = 838 + 121 = 959$
 $959 + (7)^2 = 959 + 49 = 1008$
 $1008 + (5)^2 = 1008 + 25 = 1033$
So, there should be 838 in place of 840.
- 48. (d);** Wrong number = 110
Pattern of series
 $957 - 597 = 360$
 $597 - 360 = 237$
 $360 - 237 = 123$
 $237 - 123 = 114$
 $123 - 114 = 9$
So, there should be 114 in place of 110.
- 49. (a);** Wrong numbers = 1597
Pattern of series
 $1764 - 83 = 1681$
 $1681 - 81 = 1600$
 $1600 - 79 = 1521$
 $1521 - 77 = 1444$
 $1444 - 75 = 1369$
 $1369 - 73 = 1296$
So, there should be 1600 in place of 1597.
- 50. (d);** ATQ,
Number of bottles filled by machine - B in 1 hour = $\frac{200 \times 750}{500} = 300$
Hence, numbers of bottles filled by machine - B in 8 hours = $300 \times 8 = 2400$
- 51. (b);** Number of divisible of 5 in first 100 natural numbers = $\frac{100 - 5}{5} + 1 = 20$
Number of divisible of 7 in first 100 natural numbers = $\frac{98 - 7}{7} + 1 = 14$
Since, 35 and 70 both numbers are divisible by 5 & 7.
So, total number of possible outcomes = $20 + 14 - 2 = 32$
Required probability = $\frac{32}{100} = \frac{8}{25}$
- 52. (c);** Let number of teachers & students in I.T. branch be '3x' & '19x' respectively.
So,
 $19x - 3x = 256$
 $x = 16$
So, number of teachers in I.T. branch = $3x = 48$
Let numbers of teacher and students in Chemical branch be 'y' & '13y' respectively.
So,
 $13y - y = 168$
 $y = 14$
Hence, number of teachers in Chemical branch = $y = 14$
Required difference = $48 - 14 = 34$
- 53. (e);** Let number of students & teachers in Computer Science branch be '12x' & 'x' respectively.
So,
 $12x - x = 275$
 $x = 25$
So, number of students in Computer Science branch = $12x = 300$
Now, let number of students & teachers in mechanical branch be '21y' & '2y' respectively.
So,
 $21y - 2y = 228$
 $y = 12$
Hence, number of students in Mechanical branch = $21y = 252$
So, required % = $\frac{252}{300} \times 100 = 84\%$

54. (b); Let number of students & teachers in Civil branch be '13x' and '4x' respectively.

So,

$$13x - 4x = 126$$

$$x = 14$$

Hence, number of students in Civil branch = $13x = 182$

Number of teachers in Civil branch = $4x = 56$

Now,

$$\text{Number of girls in Civil branch} = 182 \times \frac{3}{7} = 78$$

$$\text{Required \%} = \frac{78}{56} \times 100 = \frac{975}{7} \% = 139\frac{2}{7}\%$$

55. (c); Let number of students & teachers in Computer Science branch be '12x' & 'x' respectively.

$$\text{So, } 12x - x = 275$$

$$x = 25$$

Hence, number of students in Computer Science branch = $12x = 300$

$$\text{Number of boys in Computer Science branch} = 300 \times \frac{7}{12} = 175$$

$$\text{Number of girls in Computer Science branch} = 300 - 175 = 125$$

Now,

Let number of students & teachers in Electrical branch be '15y' & '2y' respectively.

So,

$$15y - 2y = 234$$

$$y = 18$$

Hence, number of students in Electrical branch = $15y = 270$

So,

Number of boys in Electrical branch

$$= 270 \times \frac{3}{5} = 162$$

And number of girls in Electrical branch

$$= 270 - 162 = 108$$

$$\text{Required difference} = (175 + 162) - (108 + 125) = 337 - 233 = 104$$

56. (a); Let number of students & teachers in I.T. branch be '19x' & '3x' respectively.

So,

$$19x - 3x = 256 \Rightarrow x = 16$$

Hence, number of students in I.T. branch = $19x = 304$

and number of teachers in I.T. branch = $3x = 48$

Let number of students & teachers in Electrical branch be '15y' & '2y' respectively.

So,

$$15y - 2y = 234$$

$$y = 18$$

Hence, number of students in Electrical branch = $15y = 270$

And number of teachers in Electrical branch = $2y = 36$

Now,

$$\text{Required ratio} = \frac{304 + 270}{48 + 36} = \frac{574}{84} = 41 : 6$$

57. (d); Let number of students and teachers in Chemical branch be '13x' & 'x' respectively.

So,

$$13x - x = 168$$

$$x = 14$$

And number of teachers in Chemical branch = $x = 14$

Let number of students and teachers in mechanical branch be $21y$ & $2y$ respectively

$$\text{So, } 21y - 2y = 228$$

$$19y = 228$$

$$y = 12$$

$$\text{Require percentage} = \frac{14}{252} \times 100 = 5\frac{5}{9}\%$$

58. (c); Final quantity of mixture left after replacing 'x' lit. of water

= total quantity of mixture

$$\left(1 - \frac{\text{quantity of mixture replaced}}{\text{total quantity of mixture}}\right)^{\text{no. of time process performed}}$$

ATQ

$$44.8 = 70 \left(1 - \frac{x}{70}\right)^2$$

$$\frac{16}{25} = \left(1 - \frac{x}{70}\right)^2$$

$$\text{So, } x = 14, 126 \text{ lit.}$$

As x cannot be greater than 70 lit

$$\text{So, } x = 14 \text{ lit.}$$

So, 14 liters of mixture can be taken out as capacity of vessel is only 70 liters.

59. (e); Total number of students who got passed in 2018 = $1200 \times \frac{92}{100} = 1104$

Total number of boys who got passed in 2018

$$= 1200 \times \frac{11}{20} \times \frac{95}{100} = 627$$

$$\text{Required \%} = \frac{(1104 - 627)}{1200 \times \frac{9}{20}} \times 100 = \frac{477}{540} \times 100$$

$$= \frac{265}{3} = 88\frac{1}{3}\%$$

60. (b); CSA of hemispherical bowl = $2\pi r^2$
 ATQ,
 $2\pi r^2 = 693$
 $r^2 = 693 \times \frac{7}{22} \times \frac{1}{2}$
 $r^2 = \frac{441}{4}$
 $r = 10.5$ cm
 Now,
 Height of conical tent = $10.5 \times \frac{10}{7} = 15$ cm
 Radius of conical tent = 10.5 cm
 So,
 Required volume = $\frac{1}{3} \times \frac{22}{7} \times 10.5 \times 10.5 \times 15 = 1732.5$ cm³
61. (d); $\frac{24}{100} \times 625 - 100 = \frac{?}{100} \times 3600 + \frac{98}{7}$
 $\Rightarrow 50 = ? \times 36 + 14$
 $\Rightarrow ? = \frac{50 - 14}{36} \Rightarrow ? = 1$
62. (a); $660 \times (?)^2 = (65)^2 + \frac{25}{100} \times 6860$
 $660 \times (?)^2 = 4225 + 1715$
 $(?)^2 = \frac{5940}{660}$
 $? = \sqrt{9}$
 $? = 3$
63. (c); $5677 + 4914 - 3799 = ? + \frac{20}{100} \times 3960$
 $6792 = ? + 792$
 $? = 6000$
64. (b); $? = 57 \times 28 \times \frac{1}{76} \times 6$
 $? = 126$
65. (a); $\frac{12}{100} \times 500 + \frac{16 \times ?}{20} = 150 + (26 \times 35)$
 $60 + \frac{4 \times ?}{5} = 150 + 910$
 $\frac{4 \times ?}{5} = 1060 - 60$
 $? = \frac{1000 \times 5}{4}$
 $? = 1250$

Solution (66-70)

Total number of students studying in Science of College P = 1800
 So, total number of students studying in Management of College P = $\frac{3}{4} \times 1800 = 1350$
 Let number of students studying in Law and Arts of College P be 'x' and 'y' respectively.
 As, $y = \frac{1800 + 1350 + x}{3}$
 And $x = \frac{120}{100} \times y$
 So, $y = 1750$ and $x = 2100$

Number of students studying in Commerce of College P
 $= \frac{400}{7} \times \frac{1}{100} \times 1750 = 1000$
 Total students in college P = $(1800 + 1140 + 1350 + 1750 + 2100 + 1000) = 9140$
 Let total number of students studying in Commerce of College Q be '8x'
 So, total number of students studying in Management of College Q be '9x'
 ATQ
 Given, $9x - 8x = 200$
 $x = 200$
 Total number of students studying in Commerce of College Q = 1600
 Total number of students studying in Management of College Q = 1800
 Total number of students in College Q = $9140 - 2480 = 6660$
 so, total number of students studying in Medical of College Q = $6660 \times \frac{10}{100} = 666$
 Total students studying in science & law in college Q
 $= 6660 - (1800 + 1600 + 1250 + 660) = 1344$
 total number of students studying in Science of College Q
 $= \frac{5}{12} \times 1344 = 560$
 total number of students studying in Law of College Q
 $= (1344 - 560) = 784$

Courses	P	Q
Commerce	1000	1600
Management	1350	1800
Arts	1750	1250
Medical	1140	666
Science	1800	560
Law	2100	784
Total	9140	6660

66. (c); Required ratio = $\frac{1800 + 1350}{1250 + 1600} = \frac{21}{19}$
67. (e); Required percentage
 $= \frac{(1000 + 1600) + (1750 + 1250)}{(1140 + 666) + (2100 + 784)} \times 100$
 $= 119 \frac{27}{67} \%$
68. (a); Number of girls in Science of College Q
 $= \frac{40}{100} \times 560 = 224$
 Number of girls in Management of College Q
 $= \frac{40}{100} \times 1800 = 720$
 Let number of girls studying Law in College Q be 'x'
 ATQ,
 $\frac{224 + 720 + x}{3} = 458 \Rightarrow x = 430$
 So, boys studying in Law of College Q = $784 - 430 = 354$

69. (b); Required ratio

$$\begin{aligned} &= \frac{\frac{560+1250+1800+1600}{4}}{\frac{1800+1350+1140}{3}} \\ &= 521 : 572 \end{aligned}$$

70. (a); Required percentage

$$\begin{aligned} &= \frac{(1250+1750)-(1800+560)}{(1750+1250)} \times 100 \\ &= \frac{640}{3000} \times 100 \\ &= 21\frac{1}{3}\% \end{aligned}$$

